Newell Highway Heavy Duty Pavements, Narrabri to Moree

Preliminary environmental investigation

Roads and Maritime Services | November 2017
Document controls

Approval and authorisation

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Infrastructure Development Division |
| Signed | |
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Executive summary

The proposal

Roads and Maritime Services NSW (Roads and Maritime) is proposing major road upgrades to about 32.8 kilometres of Newell Highway between Narrabri and Moree, including five overtaking lanes within the existing road corridor.

The proposal is located in the Central West of NSW, and extends across the Narrabri Shire and Moree Plains Local Government Areas (LGAs). Narrabri is located around 415 kilometres north west of Sydney.

Key features of the proposal include:

- upgrading and resurfacing sections of the existing Newell Highway between Narrabri and Moree to a heavy duty (HD) pavement
- road widening on one side or both sides of the highway
- new 1.5 kilometre long overtaking lanes at five locations between Narrabri and Moree along the Newell Highway (three northbound, two southbound)
- upgrading intersections and right turning lanes
- upgrading drainage to improve the Newell Highway flood immunity.

Need for the proposal

The Newell Highway between Narrabri and Moree has road surface and structural deficiencies. The road was built in the 1960s using natural gravel and a pavement thickness appropriate for the low volumes of regional traffic during that period. Today, 98 per cent of the road along this section of the highway has a remaining theoretical life of 10 years or less. Due to its structural limitations, the road is also at heightened risk of surface failure caused by rainfall.

These road surface deficiencies, coupled with a strong freight demand, are affecting travel reliability and travel times for freight movements between Victoria and Queensland, as well as increasing maintenance costs and reducing road safety.

Proposal objectives

The proposal’s primary objective is to provide productivity gains across the economy by improving freight movement efficiency on the National Land Transport Network. More specifically, the proposal aims to:

- increase travel reliability and reduce travel times on the Newell Highway
- reduce vehicle operating costs on the Newell Highway
- reduce the costs of maintaining the Newell Highway
- improve the safety of the Newell Highway
- improve freight efficiency.

Community and stakeholder consultation

A project web page is available that outlines the benefits, features and objectives of the project as well as all other project information and documents available.

A Community and Stakeholder Engagement Plan will be prepared for the planning, development and delivery of the proposal. This plan will identify key stakeholders, proposed communication tools, key messages and protocols to be implemented.
Environmental issues and recommendations

Based on the preliminary assessment the following are considered key environmental issues:

- disruptions and management of traffic and transport on the Newell Highway, including heavy and light vehicle movements, and access to rural/residential and commercial properties including Moree Airport
- threats to ecological values, primarily due to the presence of Weeping Myall Woodlands threatened ecological community, listed under both the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act), and Threatened Species Conservation Act 1995 (TSC Act), and the presence of Poplar Box Grassy Woodland nominated for listing under the EPBC Act
- potential impacts to identified Aboriginal and non-aboriginal heritage items adjacent to the proposal
- management of potentially high salinity risks and contamination potential
- water quality and hydrology, due potential direct impacts to short-lived waterbodies
- management of flooding risk to and from the proposal
- noise and vibration issues to local rural/residential land uses
- disruptions to landscape character and visual amenity
- socio-economic impacts due to the competition for construction labour, materials and influx of workers placing pressure on local infrastructure
- cumulative issues to the local community and environment due to other major projects.

Based on the outcomes of the Preliminary Environmental Investigations (PEI), the following recommendation should be considered during design and planning:

- apply the ‘avoid, minimise, mitigate and offset’ hierarchy during further design development, specifically in relation to threatened communities and species consistent with commitment made within the EPBC Act Strategic Assessment – Strategic Assessment (Roads and Maritime, 2015)
- detailed geotechnical investigations and assessment, and preliminary site assessments should be undertaken to support further design development
- further design development and detailed environmental assessment for the proposal should assess potential flooding impacts during construction and operation including consideration of the NSW Government’s Floodplain Development Manual (Department of Natural Resources, 2005), Practical Consideration of Climate Change – Flood risk management guideline (DECC, 2007) and Australian Rainfall and Runoff: A guide to flood estimation (Commonwealth of Australia (Geoscience Australia) 2016)
- further detailed environmental assessment for the proposal should assess potential noise and vibration impacts in line with the following Roads and Maritime guidelines; Noise Mitigation Guidelines (Roads and Maritime, 2015a), Noise Criteria Guideline (Roads and Maritime, 2015b) Noise model validation Guideline (Roads and Maritime, 2016a) Construction and Noise Vibration Guideline (Roads and Maritime, 2016b)
- an urban design, landscape character and visual impact assessment will be undertaken to identify the potential visual impacts of the proposal in line with the Roads and Maritime Environmental Impact Practice Note: Guideline for Landscape Character and Visual Impact Assessment; (EIA-N04)
- a basic level of socio-economic assessment should be undertaken in line with the Roads and Maritime Environmental Impact Practice Note: Socio-economic Assessment (EIA N-05).
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Appendix A  Newell Highway upgrade: Narrabri to Moree preliminary ecological assessment
1 Introduction

This chapter introduces the proposal and provides the context of the preliminary environmental investigations (PEI). In introducing the proposal, the objectives and project development history are detailed and the purpose of the report provided.

1.1 Proposal overview

Roads and Maritime Services NSW (Roads and Maritime) is proposing major road upgrades to about 32.8 kilometres of Newell Highway between Narrabri and Moree, with five overtaking lanes also proposed to be included in the scope of works. This report addresses the proposed pavement upgrades and overtaking lanes between Narrabri to Moree (the proposal).

The proposal is located in the Central West of NSW, and extends across the Narrabri Shire and Moree Plains Local Government Areas (LGAs). Narrabri is located around 415 kilometres North West of Sydney. For the purpose of this report, the study area has been established using a 30 m buffer either side of the existing road corridor centreline. The general location of the study area is shown in Figure 1-1.

To assist in identifying environmental issues, the proposal has been divided into a number of segments applicable to the pavement upgrade and overtaking lane locations, shown on Figure 1-1. Segments 1, 2 and 3 are located within Narrabri LGA, Segment 5 is located within Moree LGA, while Segment 4 traversers both LGA’s.

Key features of the proposal would include:

- upgrade and resurface sections of the existing highway between Narrabri and Moree to a heavy duty (HD) pavement
- road widening on one side or both sides of the highway
- new 1.5 kilometre long overtaking lanes at five locations between Narrabri and Moree along the Newell Highway (three northbound, two southbound)
- upgrade intersections
- upgrade drainage to improve the Newell Highway flood immunity up to a 20-year average recurrence interval where feasible and reasonable.

The proposal consists of five sections of upgrades to the Newell Highway between Narrabri and Moree in northern NSW. The five segments and indicative works which are investigated in this PEI are included in Table 1-1.

### Table 1-1 Segments and proposed works

<table>
<thead>
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<th>Segment</th>
<th>Location</th>
<th>Proposed works</th>
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<tbody>
<tr>
<td>1</td>
<td>8.2 km to 12.8 km north of Narrabri</td>
<td>• Upgrading 4.6 km of highway</td>
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</table>
| 2       | 15.6 km to 25.9 km north of Narrabri at Edgeroi | • Upgrading 10.6 km of highway  
|         |          | • Two overtaking lanes – northbound and southbound |
| 3       | 46.8 km to 49.30 km north of Narrabri at Bellata | • Upgrading 4.1 km of highway  
|         |          | • One northbound overtaking lane |
| 4       | 52.4 km to 58.2 km north of Narrabri, north of Bellata | • Upgrading 5.8 km of highway |
| 5       | 88.4 km to 97.9 km north of Narrabri, south of Moree | • Upgrading 9.5 km of highway  
|         |          | • Two overtaking lanes - northbound and southbound |
Figure 1.1 Study Area
1.2 Strategic context

The Newell Highway Corridor (A39) is the longest highway in NSW, extending 1085 kilometres through the state providing an essential connection for central western NSW and a vital transport corridor between Victoria, NSW, and Queensland. The highway supports access between key regional primary industries and export markets in addition to regional tourism.

1.2.1 Newell Highway Corridor Strategy

Transport for NSW (TfNSW) in collaboration with Roads and Maritime released a final Newell Highway Corridor Strategy, in May 2015, to address the transport needs of the corridor, including support for greater use of Higher Productivity Vehicles (HPVs) over the full length of the highway. The report identified a large portion of the northern section of the highway is nearing the end of its life, with regular failure occurring with structural pavement, as well as large sections not meeting desired cross section dimensions. Furthermore, the NSW Long Term Transport Master Plan (TfNSW, 2012) identified the need to provide heavy duty pavement between Narrabri and the Queensland border as well as additional overtaking lanes to improve overtaking opportunities and safety as a short term priority.

The need to provide additional overtaking lanes was also identified in the Newell Highway Overtaking Lanes Strategy as part of a study completed in 2011. The strategy listed the overtaking lanes between Narrabri and Moree as medium to high priority for future planning in the Newell Highway Corridor Strategy (NSW Government, 2015).

The key strategic planning and policy documents relevant to the proposal are:

- Melbourne–Brisbane Corridor Strategy: Building our National Transport Future (Commonwealth of Australia, 2007)
- NSW 2021 (NSW Government, 2011)
- NSW Long Term Transport Master Plan (TfNSW, 2012a)
- State Infrastructure Strategy (NSW Government, 2014)
- NSW Road Safety Strategy 2012–21 (TfNSW, 2012b)
- NSW Freight and Ports Strategy (NSW Government, 2013)
- New England North West Regional Transport Plan (TfNSW, 2013)
- Newell Highway Corridor Strategy (NSW Government, 2015)
- New England North West Strategic Regional Land Use Plan (DPE, 2012).

1.3 Need for the proposal

The Newell Highway between Narrabri and Moree has road surface and structural deficiencies. The road was built in the 1960s using poor quality natural gravel and a pavement thickness appropriate for the low volumes of regional traffic during that period. Today, 98 per cent of the road along this section of the highway has a remaining life of 10 years or less. Due to its structural limitations, the road is also at heightened risk of surface failure caused by rainfall.

To address this issue, Roads and Maritime has improved and reconstructed parts of this section of the highway using granular pavements, however the works have not resulted in a satisfactory level of service for the full design life of the highway:

• excessive maintenance cost when compared to similar roads
• old pavement which was constructed in the 1960’s
• portions of the highway being flood prone during a 1 in 5 year event, rather than the desired 1 in 20 year event
• culverts with an insufficient capacity during flooding events
• crash history on intersections, and insufficient intersection standards
• insufficient overtaking lanes which do not meet the rural network planning targets.

These road surface deficiencies, coupled with a strong freight demand, are affecting travel reliability and travel times for freight movements between Victoria and Queensland, as well as increasing maintenance costs and reducing road safety.

1.4 Proposal objectives

The primary objective for the proposal is to provide productivity gains across the economy, by improving the efficiency of freight movements on the National Land Transport Network. More specifically, the proposal aims to:

• increase travel reliability and reduce travel times on the Newell Highway
• reduce vehicle operating costs on the Newell Highway
• reduce the costs of maintaining the Newell Highway
• improve the safety of the Newell Highway
• improve freight efficiency.

Other supporting objectives of the proposal are to:

• ensure route development meets the standards required of the National Land Transport Network
• develop a proposal that contributes to the economic development of the region and improves transport efficiency on this section of the Newell Highway in terms of travel time and vehicle operating costs
• ensure that all potential impacts of the proposal on the local community are assessed and appropriate mitigation measures are developed
• ensure broad road safety objectives are met by reducing the crash rate along the Newell Highway
• ensure an adequate level of service for existing and predicted traffic volumes
• ensure route development minimises the impact on environmentally sensitive areas and that appropriate mitigation measures are included in the proposal to manage any impact
• ensure stakeholder involvement in all phases of the proposal development
• ensure compatibility of the road network and the long-term land use planning for the area.

1.5 Purpose of the report

This PEI has been prepared by WSP Australia Pty Ltd on behalf of Roads and Maritime’s Freight and Regional Program Office.

The purpose of the PEI is to:

• identify potential environmental issues for the proposal
• provide recommendations to inform options considerations, the design process and future detailed environmental impact assessment
• integrate environmental, economic and social outcomes into decision making.

The information and recommendations in this PEI will be used to inform the options investigations and ongoing design process for the proposal with an aim to avoid or minimise environmental, economic and social impacts wherever possible.
Once a preferred option has been identified and a concept design has been developed, a detailed environmental impact assessment would be prepared. This detailed environmental assessment would detail environmental safeguards and management measures that would be implemented.

1.6 Exclusions and limitations

Biodiversity and Aboriginal and Non-Aboriginal assessments have included searches of relevant databases and brief site visits undertaken on 31 May and 1 June 2017. The remaining assessments have been prepared with reference to preliminary desktop assessments of published data including relevant databases and reports, and the design shown in Figure 1-1.
2 Statutory and planning framework

This chapter outlines the planning and approvals processes that may apply to the proposal.

2.1 Environmental Planning and Assessment Act 1979

Clause 94 of State Environmental Planning Policy (Infrastructure) 2007 ISEPP permits development for the purpose of roads and road infrastructure facilities as development without consent. The proposal can be characterised as being for the purpose of a road/road infrastructure facility.

The planning pathway for the proposal is likely to be an assessment under Part 5 of the Environmental Planning and Assessment Act, 1979 (EP&A Act) and a Review of Environmental Factors (REF) would be prepared to document the environmental assessment. Roads and Maritime would be the proponent and determining authority. Other approvals may also be required for the proposal as set out in section 2.1.2 below.

Should the proposal be likely to significantly affect the environment then the proposal would become State Significant Infrastructure (SSI) under Part 5.1 of the EP&A Act. An Environmental Impact Statement (EIS) would be prepared in accordance with environmental assessment requirements of the Secretary of the Department of Planning and Environment and the Minister for Planning would be the consent authority. Some approvals required under other legislation do not apply in respect of SSI.

The appropriate planning pathway will be confirmed as part of more detailed environmental assessment.

2.1.1 Local Environmental Plans

The Proposal is located with the Narrabri and Moree Plains LGAs and subject to land use zones under the following Local Environmental Plans (LEPs). Table 2-1 and Table 2-2 outline local land use zonings and objectives within the study area.

Table 2-1 Land use zoning Narrabri Shire LEP 2012

<table>
<thead>
<tr>
<th>LEP Provisions</th>
<th>Objective</th>
</tr>
</thead>
</table>
| Primary production – RU1 | • To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.  
• To encourage diversity in primary industry enterprises and systems appropriate for the area.  
• To minimise the fragmentation and alienation of resource lands.  
• To minimise conflict between land uses within this zone and land uses within adjoining zones.  
• To allow for non-agricultural land uses that will not restrict the use of other land for agricultural purposes. |
| Village – RU5 | • To provide for a range of land uses, services and facilities that are associated with a rural village.  
• To enable development of a scale compatible with the general residential character of village areas and which will not prejudice the viability of established shopping and commercial centres. |
Table 2-2  Land use zoning Moree Plains LEP 2011

<table>
<thead>
<tr>
<th>LEP Provisions</th>
<th>Objective and outcome</th>
</tr>
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<tbody>
<tr>
<td>Primary production – RU1</td>
<td>• To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.</td>
</tr>
<tr>
<td></td>
<td>• To encourage diversity in primary industry enterprises and systems appropriate for the area.</td>
</tr>
<tr>
<td></td>
<td>• To minimise the fragmentation and alienation of resource lands.</td>
</tr>
<tr>
<td></td>
<td>• To minimise conflict between land uses within this zone and land uses within adjoining zones.</td>
</tr>
<tr>
<td></td>
<td>• To permit development for certain purposes if it can be demonstrated that suitable land or premises are not available elsewhere.</td>
</tr>
<tr>
<td>Village – RU5</td>
<td>• To provide for a range of land uses, services and facilities that are associated with a rural village.</td>
</tr>
<tr>
<td></td>
<td>• To facilitate development that reinforces village viability.</td>
</tr>
<tr>
<td>Infrastructure – SP2</td>
<td>• To provide for infrastructure and related uses.</td>
</tr>
<tr>
<td></td>
<td>• To prevent development that is not compatible with or that may detract from the provision of infrastructure.</td>
</tr>
<tr>
<td>Air Transport Facility– SP1</td>
<td>• To provide for special land uses that are not provided for in other zones.</td>
</tr>
<tr>
<td></td>
<td>• To provide for sites with special natural characteristics that are not provided for in other zones.</td>
</tr>
<tr>
<td></td>
<td>• To facilitate development that is in keeping with the special characteristics of the site or its existing or intended special use, and that minimises any adverse impacts on surrounding land.</td>
</tr>
<tr>
<td>Enterprise Corridor – B6</td>
<td>• To promote businesses along main roads and to encourage a mix of compatible uses.</td>
</tr>
<tr>
<td></td>
<td>• To provide a range of employment uses (including business, office, retail and light industrial uses).</td>
</tr>
<tr>
<td></td>
<td>• To maintain the economic strength of centres by limiting retailing activity.</td>
</tr>
<tr>
<td></td>
<td>• To provide for residential uses, but only as part of a mixed use development.</td>
</tr>
<tr>
<td></td>
<td>• To improve the presentation of the major access corridors into Moree.</td>
</tr>
</tbody>
</table>

The provisions of the ISEPP override any development consent requirements under the Narrabri and Moree Plains LEPs and therefore the upgrade would not require development consent from Narrabri Shire Council or Moree Plains Shire Council.

2.2 State environmental planning policies

2.2.1 State Environmental Planning Policy (Infrastructure) 2007

*State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposal is for a road and is to be carried out on behalf of Roads and Maritime Services, it can be assessed under Part 5 of the EP&A Act. Development consent from council is not required.

The proposal is not located on land reserved under the National Parks and Wildlife Act 1974 and does not affect land or development regulated by State Environmental Planning Policy No. 14 – Coastal Wetlands, State Environmental Planning Policy No. 26 – Littoral Rainforests, State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (Major Development) 2005.
Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities before starting certain types of development. Consultation, including consultation as required by ISEPP (where applicable), would be determined in the REF.

2.2.2 State Environmental Planning Policy 44 (Koala Habitat Protection)

The aim of State Environmental Planning Policy No - 44 Koala Protection (SEPP 44) is to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas. SEPP 44 applies to each local government area listed in Schedule 1 of the SEPP, which includes Narrabri and Moree Plains LGAs.

The koala is considered to have a moderate likelihood of occurring within the study area based on recorded occurrence within the locality and the availability of potential habitat. However, vegetation within the landscape is highly fragmented and there is limited connectivity to larger areas of bushland (WSP, 2017).

While SEPP 44 does not apply to projects being assessed under Part 5 of the EP&A Act, any future environmental assessment for the proposal should recognise the intent of SEPP.

2.3 Other relevant NSW legislation

2.3.1 Threatened Species and Conservation Act 1995

The NSW Threatened Species Conservation Act 1995 (TSC Act) lists a number of threatened species, populations or ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened species, communities, or their habitats.

Where there may be an impact on threatened species, communities, or their habitats a test of significance, pursuant to Section 5A of the EP&A Act would be required to assess the significance of potential impacts on threatened biota listed under the TSC Act. Where there is a significant impact on threatened species, populations or ecological communities listed under the TSC Act the preparation of a species impact statement would be required.

A Preliminary biodiversity assessment is included Appendix A, and summarised in Section 4.2.

2.3.2 Noxious Weeds Act 1993

The Noxious Weeds Act 1993 provides for the identification, classification and control of noxious weeds in NSW. It aims to reduce the negative impacts of weeds on the economy, community and environment by establishing control mechanism to:

• prevent the establishment of significant new weeds
• prevent, eliminate or restrict the spread of significant weeds
• effectively management widespread significant weeds in the state.

Part 3 of the Act outlines public authority obligations to control noxious weeds management lands.

A desktop review of noxious weeds has been undertaken. Refer to section 4.2.2 for further detail.

2.3.3 Fisheries Management Act 1994

The NSW Fisheries Management Act 1994 (FM Act) aims to conserve threatened species, populations and ecological communities of fish and key fish habitats. The FM Act is administered by the Department of Primary Industries (DPI). Part 7 of the FM Act relates to the protection of aquatic habitats including
providing management of dredging and reclamation work within permanently or intermittently flowing watercourses.

Construction works associated with some culvert work may meet the definition of reclamation work under Section 198A of the FM Act, which defines reclamation as:

1. using any material (such as sand, soil, silt, grave, concrete, oyster shells, tyres, timber or rocks) to fill in or reclaim water land, or
2. depositing any such material on water land for the purpose of constructing anything over water land (such as a bridge) or
3. draining water from water land for its reclamation.

Roads and Maritime are required to consult with DPI prior to undertaking any reclamation work, as defined under Section 199 of the FM Act.

In addition to the requirements of Section 199 and depending on construction methodologies developed during further project development, a permit may be required under Section 219 of the FM Act regarding blockage of fish passage. Section 219 requires a permit for any works carried out by a public authority that could result in the temporary or permanent blockage of fish passage within a waterway.

A preliminary ecological investigation is included in Appendix A, and summarised in Section 4.2.

2.3.4 National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act) provides the basis for the management of National Parks estate, and for legal protection and management of Aboriginal sites within NSW.

National parks

No National Parks are located in the overall study area.

Aboriginal sites

Part 6 of the Act provides provisions for the protection and management of Aboriginal sites.

Implementation of the Aboriginal heritage provisions in the Act is the responsibility of the Office of Environment and Heritage (OEH).

All Aboriginal sites and objects, other than those made for sale, are protected under the NPW Act.

Under Section 86 the NPW Act, it is an offence to:

- knowingly harm or desecrate an Aboriginal object
- harm or desecrate an Aboriginal object or Aboriginal place.

Under Section 86 provides the following defences against prosecution of harm to Aboriginal objects:

- the harm or desecration concerned was authorised by an Aboriginal heritage impact permit (AHIP) and the conditions to which that AHIP was subject were not contravened
- if due diligence was exercised to determine whether the upgrade work would harm an Aboriginal object and reasonably determined that no Aboriginal object would be harmed.

A preliminary heritage assessment is summarised in Section 4.3 and 4.4.

2.3.5 Biodiversity Conservation Act 2016


Subsequent assessments for this project will need to adhere to these new guidelines and methodology.
2.3.6 Protection of the Environment Operations Act 1997

The Protection of Environment and Operations Act 1997 (POEO Act) focuses on protecting, restoring and enhancing the environment within NSW and through the use of various mechanisms, reduce potential risks to human health and the environment. It aims to provide opportunity for increased public involvement and access to information about environmental protection.

Environment protection licenses are issued under the POEO Act for scheduled developments and activities listed under Schedule 1.

Clause 35 of Schedule 1 identifies ‘road construction’ as a scheduled activity and states:

1. this clause applies to road construction, meaning the construction, widening or re-routing of roads, but does not apply to the maintenance or operation of any such road

2. the activity to which this clause applies is declared to be a scheduled activity if it results in the existence of 4 or more traffic lanes (other than bicycle lanes or lanes used for entry or exit) for at least:
   a. where the road is classified, or proposed to be classified, as a main road (but not a freeway or tollway) under the Roads Act 1993:
      i. 3 kilometres of their length in the metropolitan area, or
      ii. 5 kilometres of their length in any other area.

Other scheduled activities listed under Schedule 1 that may apply to the upgrade work include ‘extractive industries’, ‘crushing, grinding and separating’ and/or ‘contaminated soil treatment’, depending on whether the volumes specified in Schedule 1 are exceeded.

In addition, during the construction phase, Roads and Maritime would be obliged to notify Environment Protection Authority (EPA) if a ‘pollution incident’ occurs that causes or threatens ‘material harm’ to the environment.

2.3.7 Roads Act 1993

Section 138 of the Roads Act 1993 requires consent from the relevant roads authority (Roads and Maritime) for the erection of a structure, or the carrying out of work in, on or over a public road, or the digging up or disturbance of the surface of a road. The construction of the proposal would require partial lane closures.

The Newell Highway is a classified road and requires consent from the road authority to proceed. Approval would be sought for a road occupancy licence for the temporary closure of traffic lanes and, if required, the movement of over-sized vehicles during construction.

2.3.8 Heritage Act 1997

The Heritage Act 1997 (Heritage act) is concerned with the conservation of buildings, work, relics and other places of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance to the state. It is designed to manage all aspects of heritage conservation ranging from basic protected against indiscriminate damage and demolition of buildings and sites, through to restoration and enhancement. All matters protected under the act are listed on the State Heritage Register (SHR), and includes the heritage schedules of local council LEPs, and the heritage and conservation registers established under section 17 of the Act by NSW state Government agencies (section 170 registers).

Approval under section 60 of the act would be required for any action that would adversely affect an item that is subject to an interim Heritage order or listing on the SHR. Under Section 139 of the act, approval from the NSW Heritage Council is required prior to the disturbance or excavation of land if a project will or likely result in disturbance to a relic.
Further heritage assessments may be required as part of the environmental assessment. This would determine the need for a permit under Section 138 of the Heritage Act.

A preliminary heritage assessment is summarised in sections 4.4 and 4.5.

2.4 Commonwealth legislation

2.4.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. The Matters of National environmental significance are:

- World Heritage properties
- National Heritage planes
- RAMSAR Wetlands
- listed threatened species and ecological communities
- listed migratory species
- Commonwealth marine areas
- nuclear actions
- Great Barrier Marine Park.

A search for matters of national environmental significance and other matters protected under the EPBC Act within a 20 kilometre radius of the proposal was undertaken on 28 April 2017. Search results are included in the *Newell Highway Upgrade: Narrabri to Moree Preliminary Ecological Investigation* in Appendix A.

Due to the approval of a strategic assessment approval under the EPBC Act by the Australian Government in September 2015, referral is not required for the proposed road activities in the event that they affect nationally listed threatened species, populations, endangered ecological communities and migratory species.

2.4.2 Native Title Act 1993

The *Native Title Act 1993* provides the legislative framework that:

- recognises and protects native title
- establishes ways in which future dealings affecting native title may proceed, and to set standards for those dealings, including providing certain procedural rights for registered native title claimants and native title holders in relation to acts which affect native title
- establishes the National Native Title Tribunal.

The National Native Title Tribunal has a number of functions under the Act including maintaining the Register of Native Title Claims, the National Native Title Register and the Register of Indigenous Land Use Agreements and mediating native title claims. The *NSW Native Title Act 1994* was introduced to ensure that the laws of NSW are consistent with the Commonwealth *Native Title Act 1993*.

A search of the National Native Tribunal applications register was undertaken 22 March 2017. The proposal transverses land subject to the Registered Native Title Claim NC2011/006 by the Gomeroi People filed on 20 December 2011. Part 3 of the Registered Native Title Claim stipulates that any public works commenced before 23 December 1996 are excluded from the claim. The Newell Highway and associated infrastructure contained within the roads reserve are considered public works. Hence the land occupied by these public works is excluded from the Gomeroi People Native Title Claim NC2011/006; Federal Court file no. NSD2308/2011).
3 Stakeholder engagement and community consultation

This chapter discusses the consultation undertaken to date for the proposal and the consultation proposed for the future.

3.1 Consultation strategy

A Community and Stakeholder Engagement Plan will be prepared for the planning, development and delivery of the proposal. This plan will identify key stakeholders, proposed communication tools, key messages and protocols to be implemented.

The plan will provide an agreed approach to communication and engagement.

3.2 Community involvement

To date, no community consultation has been carried out for the proposed investigations. Following project announcement, broad community and stakeholder consultation will commence. Any issues raised during this consultation would be considered in further design development and detailed environmental impact assessment.

3.3 Aboriginal community involvement

Aboriginal representatives from the following organisations participated in the field survey

- Gomeroi People Native Title Claim Group (Gomeroi NTCG; Tribunal file no. NC2011/006; Federal Court file no. NSD2308/2011)
- Narrabri Local Aboriginal Land Council (Narrabri LALC)
- Moree Local Aboriginal Land Council (Moree LALC).

Table 3-1 Summary of Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Initial Roads and Maritime assessment</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Site survey and further assessment</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Formal consultation and preparation of a cultural heritage assessment report</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Implement environmental impact assessment recommendations</td>
</tr>
</tbody>
</table>

Table 3-2 Issues raised through Aboriginal community consultation

<table>
<thead>
<tr>
<th>Group</th>
<th>Issue</th>
<th>Response / where addressed in PEI</th>
</tr>
</thead>
</table>
| Gomeroi People Native Title Claimants | • No significant known or potential Aboriginal cultural heritage features as identified by the survey will be affected by the project.  
• If any infrastructure such as bridges or bridge culverts are to be relocated test pitting will be required. | • Section 4.4                      |
3.4 Government agency and stakeholder involvement

To date, agency consultation has been completed for the proposal with Australian Rail Track Corporation (ARTC) in regards to the Narrabri to North Star project which runs to alongside the Newell Highway and Moree Plains Shire Council who were invited to attend and provide input into the proposal risk workshop which was held in June 2017. Following project announcement, it is anticipated that broad community and stakeholder consultation will commence. Any issues raised during this consultation will be considered in further design development and detailed environmental impact assessment.

3.5 Ongoing or future consultation

Specific notification and consultation will be carried out with adjacent and potentially affected residences, groups and landowners prior to the start of the proposed works and during the next phase of the environmental assessment. If issues are raised during the initial consultation, comments will be considered in the proposed work methodology.
4 Environmental issues

For the purposes of chapter 4 and identifying potential environmental issues, the proposal has been divided into five segments (refer to Figure 1-1). For each environmental issue described below, an initial overview of the issues is provided with specific issues identified for each segment as required.

4.1 Traffic and transport

This section identifies the traffic and transport impacts of the proposal.

4.1.1 Methodology

The investigation considered how the Newell Highway upgrade and associated construction may temporarily impact the traffic network performance, all modes of public and private transport, and access to public roads and private property within the proposal corridor and surrounding area.

Source information has been obtained from the following resources:

- Moree and Narrabri LGA online information
- Reviews of relevant online aerial photography and mapping tools
- The schedule of classified and unclassified roads.

4.1.2 Existing environment

Road network

The proposal extends over the area of highway between Narrabri and Moree and is classified as a Class 4 rural road (4R) for its entire length. The speed limit on rural road is 110 km/hr, limited to 50 km/h to 80 km/h through towns and urban areas and 40 km/h in school zones.

A total of 13 intersections, and 16 rural/residential access locations (containing one or more properties) exist within the identified segments.

Traffic volume and mix

Average daily traffic volumes (ADT) vary from around 1200 to 4000 vehicles per day on rural sections. In urban centres such as Narrabri and Moree volumes can exceed 20,000 ADT.

A large number of heavy vehicles use the Newell Highway as they key freight route between Victoria and Queensland representing an average of between 26 per cent and 52 per cent of daily traffic volumes. The highest percentage of heavy vehicles is in the northern sections between Narrabri and Boggabilla. The highway carries a seasonally high proportion of caravan and tourist traffic travelling between Victoria and Queensland. There are between 50 and 1000 caravans per day during this time (NSW Government, 2015).

Specifically, on the section of the highway investigated by this report (Narrabri to Moree), as indicated in Table 4-1 below, the numbers of light and heavy vehicles are close to equal proportions, with light vehicles making up slightly move volume.
Table 4-1  Newell Highway vehicle movements (Narrabri to Moree)

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Average daily vehicle movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Vehicles</td>
<td>1297 (47.5%)</td>
</tr>
<tr>
<td>Light Vehicles</td>
<td>1433 (52.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>2730</td>
</tr>
</tbody>
</table>


Public transport

Public transport on the highway corridor is generally restricted to urban areas. Local bus services operate in both Narrabri and Moree. The Narrabri service operates two routes that use the Newell Highway as they pass through the town. The Moree service operates one route that uses the Newell Highway as it passes through the town. No local bus routes traverse the study area. The Newell Highway is used by a number of daily, long distance coaches that service the towns in central NSW from major capital cities and larger regional centres. School bus routes are provided in each of the towns on the Newell Highway.

Pedestrian, cycling and road user facilities

As with bus services, dedicated infrastructure for walking and cycling is also generally restricted to residential areas. Generally, in areas between towns a sealed road shoulder provides a minimum standard facility of less than 2 m width for bicycle travel. Narrabri Shire Council have proposed a number of off road paths along sections of the Newell Highway, including the bridge crossings over the Namoi River and Narrabri Creek. Moree has a bicycle network including paths along the river, and the local road network. No routes are proposed within the study area that is within Moree Plains LGA.

There are four vehicle rest areas located between Narrabri and Moree on the Newell Highway. Rest areas located within or near the proposal include:

- Edgeroi Park, located approximately 24 kilometres to the north of Narrabri within the town of Edgeroi
- Tookey Creek rest area, a light vehicle rest area located north of Bellata, approximately 53 kilometres north of Narrabri
- Woolabrar rest area located on the eastern side of the proposal 48.8 kilometres north of Narrabri
- an unofficial rest area currently being used by heavy vehicles one kilometre north of the Tookey Creek rest area.

Property access

There are 16 property access roads containing 18 properties which adjoin the highway within the study area. The locations of rural access points are included in Figure 4-1.
4.1.3 Summary of issues

The following table outlines the traffic and transportation issues associated with the development of the proposal in the above sections of this investigation.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 1</td>
<td>Management of vehicle access to four rural/residential properties</td>
<td>8.7 km, 9.5 km, 9.7 km, 10.9 km</td>
</tr>
<tr>
<td></td>
<td>Management of access to Murrumbilla Lane</td>
<td>12.7 km</td>
</tr>
<tr>
<td>Segment 2</td>
<td>Management of vehicle access to six rural/residential properties</td>
<td>17.7 km, 18.1 km, 20.7 km, 21.8 km, 22.1 km, 23.5 km</td>
</tr>
<tr>
<td></td>
<td>Management of access to Tarlee and Courrada Roads, and disruptions</td>
<td>25–25.5 km</td>
</tr>
<tr>
<td></td>
<td>around the village of Edgeroi</td>
<td></td>
</tr>
<tr>
<td>Segment 3</td>
<td>Management of access and disruptions to residential streets and</td>
<td>46.8–47.8 km</td>
</tr>
<tr>
<td></td>
<td>properties within the village of Bellata</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of access and traffic movements to and from the BP</td>
<td>47.4 km</td>
</tr>
<tr>
<td></td>
<td>service station on the western side of the proposal within the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>village of Bellata</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of access to Millie Road and heavy vehicle movements</td>
<td>47.7 km</td>
</tr>
<tr>
<td></td>
<td>associated with the grain storage facility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of access to Wilga street within the village of Bellata</td>
<td>47.3 km</td>
</tr>
<tr>
<td></td>
<td>Management of access to two rural/residential properties</td>
<td>48 km, 49.2 km</td>
</tr>
<tr>
<td>Segment 4</td>
<td>Management of heavy and light vehicle movements to and from, and</td>
<td>48.8 km</td>
</tr>
<tr>
<td></td>
<td>stationary vehicle access to Wollobrar Rest Area on the eastern</td>
<td></td>
</tr>
<tr>
<td></td>
<td>side of the proposal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of heavy and light vehicle movements to and from, and</td>
<td>52.4 km</td>
</tr>
<tr>
<td></td>
<td>stationary vehicle access to Tooke Creek Rest area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of heavy and light vehicle movements to and from, and</td>
<td>54.3 km</td>
</tr>
<tr>
<td></td>
<td>stationary vehicle access at an unofficial rest area located one</td>
<td></td>
</tr>
<tr>
<td></td>
<td>kilometre north of the Tooke Creek rest area, on the western side</td>
<td></td>
</tr>
<tr>
<td></td>
<td>of the proposal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of access to four rural residential properties</td>
<td>53 km, 54.7 km, 56.6 km</td>
</tr>
<tr>
<td></td>
<td>Management of access for heavy vehicles to and from an unidentified</td>
<td>54 km</td>
</tr>
<tr>
<td></td>
<td>quarry on the eastern side of the proposal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of access to Brigalow Lane</td>
<td>56.4 km</td>
</tr>
<tr>
<td></td>
<td>Management of access to Penneys Road, and access to the grain</td>
<td>57.4 km</td>
</tr>
<tr>
<td></td>
<td>storage and rail loop facility</td>
<td></td>
</tr>
</tbody>
</table>
### 4.1.4 Recommendations

The following recommendations are made in relation to traffic and transport issues for the proposal.

- consultation with the ARTC regarding the proposed inland rail alignment should be undertaken to ensure cumulative traffic and transport impacts are understood and assessed
- consider the need for construction staging within design development to ensure access for heavy vehicles to is maintained
- consultation with community, trucking association and agricultural industry groups to minimise network disruptions and manage peak periods; and other major project proponents to manage potential cumulative impacts.
Figure 4.1 General Constraints
Segment 1

Legend
- Rural access point
- Intersection
- North Narrabri Segments
- Property
- Northern Railway line
- Surface elevation contour (m AHD)
- Watercourse
- Water Area
- Threatened Fauna
  - Koala
  - Little Eagle
- Vegetation (see Figure 4.2 for detailed survey results)
  - Brigalow - Belah woodland on alluvial clay soil, mainly Brigalow Belt South
  - Ironbark - White Bloodwood - Black Cypress Pine healthy woodlands, Brigalow Belt South
  - Ironbark - White Cypress Pine - Belah shrubland mainly of the Piliga outwash area, Brigalow Belt South
  - Piliga Box - Poplar Box - White Cypress Pine shrubland on sandy plains, Darling Riverine Plains and Brigalow Belt South
  - Poplar Box - Belah woodlands, mainly Darling Riverine Plains and Brigalow Belt South
  - Poplar Box grassy woodland on alluvial clay soils, Brigalow Belt South
  - River Red Gum riparian woodlands and forests, Darling Riverine Plains, Brigalow Belt South and Nandewar
- National Park

Map: 2270619A_GEO_260111_NL
Author: nchellberg
Date: 1/01/2017
Approved by: 

Coordinate system: DDA: 1954 MGA Zone 55
Scale ratio correct when printed at A3
Figure 4.1 General Constraints
Segment 2

Legend
- Rural access point
- Intersection
- North Narrabri Segments
- Northern Railway line
- Surface elevation contour (m AHD)
- Watercourse
- Water Area
- Aboriginal heritage (see Figure 4.3 for more detailed information)
- PAD
- Aboriginal potential archaeological deposit (PAD)
- Threatened Flora
- Digital point data

Vegetation (see Figure 4.2 for detailed survey results)
- Brigalow - Brach woodlands on alluvial clay soils, mainly Brigalow Belt South
- Carabeen woodland on alluvial soils, Darling Riverine Plains and Brigalow Belt South
- Ironbark - White Cypress Pine - Callitris species woodlands mainly of the Pilliga outwash area, Brigalow Belt South
- Pilliga Box - Poplar Box - White Cypress
- Pine shrubland/woodland on sandy loams, Darling Riverine Plains and Brigalow Belt South
- Pilliga Box - Poplar Box - White Cypress
- Pine grassy open woodland on alluvial loams, Darling Riverine Plains and Brigalow Belt South
- Poplar Box - Brach woodlands, mainly Darling Riverine Plains and Brigalow Belt South
- Poplar Box - Grass woodland on alluvial clay soils, Brigalow Belt South
- River Red Gum riverine woodlands and forests, Darling Riverine Plains, Brigalow Belt South and Nandewar
- Wreng Myall open woodland, Darling Riverine Plains, Brigalow Belt South and Nandewar

National Park
Figure 4-1c  General constraints – Segment 3

Legend
- Rural access point
- Intersection
- North Narrabi Segments
- Northern Railway line
- Surface elevation contour (m AHD)
- Watercourse
- Water Area
- Aboriginal heritage (see Figure 4.3 for more detailed information)
  - Culturally modified tree
- Non-Aboriginal heritage (see Figure 4.3 for more detailed information)
  - General
    - Threatened Fauna
      - Brown Treecreeper (eastern subspecies)
      - Fine-billed Worm-lark
      - Grey-crowned Friarbird (eastern subspecies)
      - Koalas
      - Varied Sittella
  - Vegetation (see Figure 4.2 for detailed survey results)
    - Ironbark shrubland woodland of the Pilliga area, Gulgong Belt South
4.2 Biodiversity

This section identifies the biodiversity values of the study area and potential impacts from the proposed highway upgrade. This section is based on the results of the desktop and preliminary biodiversity assessment of the proposal.

4.2.1 Methodology

This section is based on the results of the Newell Highway Upgrade: Narrabri to Moree Preliminary Ecological Investigation included in Appendix A.

Background research

The aim of the background research was to identify threatened flora and fauna species, populations and ecological communities, Commonwealth listed migratory species or critical habitat recorded previously or predicted to occur in the locality of the proposal. Searches were carried out within the locality (20 km) of the study area.

This methodology allowed for known habitat characteristics of the locality to be compared with those present within the study area to determine the likelihood of occurrence of each species or populations. These results informed the identification of appropriate field survey effort and the groups likely to occur.

The following spatial data, and database searches (Table 4-3) were accessed to determine the landscape features and site values:

- NSW Mitchell Landscapes Office of Environment and Heritage (Office for Environment & Heritage, 2016)
- Interim Biogeographic Regionalisation of Australia (Thackway and Cresswell, 1995)
- Namoi CMA vegetation mapping (Office of Environment & Heritage, 2009)
- Border Rivers-Gwydir Catchment vegetation mapping (Eco Logical Australia, 2009)
- records of threatened species, populations and ecological communities known or predicted to occur in the locality of the road corridor were obtained from a range databases (as outlined in the Preliminary Biodiversity Assessment included in Appendix A).

<table>
<thead>
<tr>
<th>Database</th>
<th>Search date</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected Matters Search</td>
<td>28/04/2017</td>
<td>(Department of the Environment and Energy, 2017b)</td>
</tr>
<tr>
<td>Directory of Important Wetlands</td>
<td>28/04/2017</td>
<td>(Department of Environment and Energy, 2017a)</td>
</tr>
<tr>
<td>Critical habitat Register (TSC Act)</td>
<td>28/04/2017</td>
<td>(Office of Environment and Heritage, 2017a)</td>
</tr>
<tr>
<td>Register of Critical Habitat (EPBC Act)</td>
<td>28/04/2017</td>
<td>(Department of Environment and Energy, 2017b)</td>
</tr>
<tr>
<td>Register of Critical Habitat (FM Act)</td>
<td>28/04/2017</td>
<td>(Department of Primary Industries, 2017c)</td>
</tr>
<tr>
<td>Key Fish Habitats (FM Act)</td>
<td>28/04/2017</td>
<td>(Department of Primary Industries, 2017a)</td>
</tr>
</tbody>
</table>

Field survey

Field surveys were undertaken on the 31 March and 1 June 2017, and consisted of four rapid assessments and two plot based surveys whilst undertaking incidental observations within the study area.
4.2.2 Existing environment

The study area is located within a highly fragmented and largely cleared landscape where land use is predominately agricultural, primarily cropping. The road corridor has also been routinely cleared. For the purpose of this report, the study area has been established using a 30 m buffer either side of the existing road corridor centreline. Few occurrences of native vegetation along the road corridor have connectivity to larger areas of native vegetation. Those areas of vegetation continuity were present along creek lines.

The majority of vegetation within the study area was comprised of derived native grasslands of PCT56, PCT56/BR186/NA182 Poplar Box – Belah woodland on clay loam soils on alluvial plains of north – central NSW (Poplar Box – Belah woodland) and miscellaneous ecosystems (Exotic/Native grasslands).

A total of 192 flora species were recorded during field surveys for both this report and the North Moree PEI (WSP 2017). Of these, 131 were native (68 per cent) and 61 were exotic (32 per cent). A total of 34 species of bird were recorded in the study area during field survey. Of these, four species are exotic and one, Grey-crowned Babbler (*Pomatostomus temporalis temporalis*), is listed as Vulnerable under the TSC Act.

Fauna habitat observed within the study area occurs as disjunct remnant patches of modified woodland, scattered across a fragmented landscape. The majority of fauna habitat within the study area consisted of Eucalypt woodland and grasslands. These areas of native and non-native vegetation were recorded in a largely cleared and fragmented landscape, dominated by agricultural land use (ie cropping and agricultural grazing). Those marginal areas of connectivity exist along water courses and road reserves where canopy has been retained and grazing excluded. The study area does not form part of, or exist within any regional wildlife corridors or connectivity.

Fauna habitat observed was dominated by a remnant eucalypt canopy, often with varying levels of disturbance in the understorey, in some cases structural complexity was limited. Eucalypt canopy may provide opportunistic blossom resources for mobile species able to cross a disturbed and majority cleared landscape. Flowering resources include Weeping Myall woodland (with recorded mistletoe resources), Poplar Box, and River Red Gums. Scattered hollow bearing trees were observed which may be utilised by various hollowing dwelling species, which are mobile and adapted to a fragmented landscape.

No structural complexity in habitat was observed (ie no shrubby understorey) influencing the likely habitat for ground-dwelling species. Little fallen timber and rock outcrops were present, limiting fauna sheltering habitat. The fauna most likely to utilise this habitat are species that are mobile and adapted to fragmented environment.

Whilst no surface water was recorded, several ephemeral creeks, including an unnamed tributary of Narrabri Creek, Bobbiwaa Creek and Tookey Creek, intersect the study area and have been classified as supporting minimal Key Fish Habitat watercourses (Class 3). These creeks may also be utilised opportunistically in times of high rainfall and flooding by a number of fauna species including birds, amphibians and reptiles.

Within the locality, water reservoirs (farm dams) associated with agricultural land use are present. These dams were generally small in extent and scattered with no connectivity between water bodies or remnant vegetation. Fauna utilising these water bodies are generally species which are mobile and well adapted to moving across fragmented landscapes (eg wetland birds).

Table 4-4 includes vegetation communities, their location, and status within the study area. Figure 4-2 outlines vegetation communities along the highway corridor within proposal segments 1-5.
<table>
<thead>
<tr>
<th>PCT</th>
<th>BVT</th>
<th>Plant Community Name</th>
<th>Location</th>
<th>Threatened ecological community</th>
<th>EPBC Act Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>BR233</td>
<td>Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion</td>
<td>Occurs as fringing vegetation in the Southern portion of the study area, connected to larger patches.</td>
<td>Forms part of <em>Myall Woodland in the</em> Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (Endangered).</td>
<td>Larger patches of PCT27/BR233 forms part of the Weeping Myall Woodlands (Endangered).</td>
</tr>
<tr>
<td>56</td>
<td>BR186/NA182</td>
<td>Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW</td>
<td>Occurs consistently throughout the study area in both small isolated patches and as vegetation corridors.</td>
<td>Not listed</td>
<td>Currently not listed though Poplar Box Grassy Woodland on Alluvial Plains has been nominated for an Endangered listing under the EPBC Act, scientific assessment of the nomination by the Department of Environment and Energy is underway.</td>
</tr>
<tr>
<td>78</td>
<td>BR196</td>
<td>River Red Gum riparian tall woodland/open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion</td>
<td>Restricted to ephemeral water courses such as Halls Creek and Bobbiwaa Creek.</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>
**Threatened ecological communities**

Database searches revealed 13 threatened ecological communities listed under the TSC Act as occurring within the locality of the proposal. Based on field verification of existing vegetation mapping, two of the plant community types recorded are consistent with TSC Act listed threatened ecological communities.

Database searches identified seven threatened ecological communities listed under the EPBC Act as being considered likely to occur within locality of the study area.

One Commonwealth listed threatened ecological community was recorded within the study area being Weeping Myall Woodlands. This community is listed as Endangered under the EPBC Act and corresponds with PCT 27/BR233 Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion. The occurrence of this community is restricted to isolated patches and linear strips fringing the Newell Highway.

**Table 4-5  Threatened ecological community recorded within the study area**

<table>
<thead>
<tr>
<th>Plant community type</th>
<th>Threatened Ecological Community</th>
<th>TSC Act Status</th>
<th>EPBC Act Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCT 27/BR233 Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion</td>
<td>Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
</tbody>
</table>

**Threatened flora**

Database searches identified 15 species of threatened flora as being known to occur or considered likely to occur within locality of the study area. Of these four threatened flora species are considered to have a moderate or higher likelihood of occurring within the study area based on recorded occurrence within the locality and the availability of potential habitat.

Results of the threatened species database searches identified 12 threatened plant species listed under the EPBC Act as being known to occur or considered likely to occur within the locality of the study area. Of these Creeping Tick-trefoil (*Dichanthium setosum*), Blue Grass (*Digitaria porrecta*) and Slender Darling Pea (*Swainsona murrayana*) were considered to have a moderate likelihood of occurring within the study area based on reordered occurrence within the locality and availability of potential habitat (Refer to the flora likelihood of occurrence tables within Appendix B of Ecological Assessment (Appendix A of this Report)). Targeted surveys are recommended to confirm the presence or inform likelihood of the below species occurring.

**Table 4-6  TSC and EPBC listed threatened flora species considered to have a moderate to high likelihood of occurrence**

<table>
<thead>
<tr>
<th>Common name</th>
<th>TSc Act Status</th>
<th>EPBC Act Status</th>
<th>Likelihood of occurrence assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creeping Tick-trefoil</td>
<td>E1</td>
<td>-</td>
<td><strong>High.</strong> Brown clay soils, plant community types and several understorey species associated with species were recorded within the study area. Potential habitat in form of BR233 and NA182 recorded within the study area.</td>
</tr>
<tr>
<td>Blue grass</td>
<td>V</td>
<td>V</td>
<td><strong>Moderate</strong> Associated habitat present within study area. One record within the locality (1999). Potential habitat in the form of BR196, BR233 and NA182 recorded within the study area.</td>
</tr>
</tbody>
</table>
**Threatened fauna**

Results of threatened species database searches (BioNet Atlas of NSW Wildlife) identified 54 threatened fauna species listed under the TSC Act as being known to occur or considered likely to occur within locality of the study area. Of these one Vulnerable species, the Grey-Crowned Babbler (*Pomatostomus temporalis temporalis*), was recorded. A further 19 species were considered to have a moderate likelihood of occurring within the study area based on recorded occurrence within the locality and the availability of potential habitat (Refer to the fauna likelihood of occurrence tables within Appendix D of Ecological Assessment (Appendix A of this Report)).

Results of threatened species database searches (Protected Matters Search) identified 23 threatened fauna species listed under the EPBC Act as being known to occur or considered likely to occur within locality of the study area. Of these three species; the Five-clawed Worm-skink (*Anomalopus mackayi*), Koala (*Phascolarctos cinereus*) and Superb Parrot (*Polytelis swainsonii*) were considered to have a moderate likelihood of occurring within the study area based on recorded occurrence within the locality and the availability of potential habitat.

**Table 4-7** TSC and EPBC listed threatened fauna with a moderate or high likelihood of occurrence

<table>
<thead>
<tr>
<th>Common name</th>
<th>TSC Act Status¹</th>
<th>EPBC Act Status²</th>
<th>Likelihood of occurrence assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finger Panic Grass</td>
<td>E1</td>
<td>E</td>
<td><strong>Moderate</strong> Associated habitat and soils type present within the study area. Recent records within the locality. Potential habitat in the form of BR186, BR233 and NA182 recorded within the study area.</td>
</tr>
<tr>
<td>Slender Darling Pea</td>
<td>V</td>
<td>V</td>
<td><strong>Moderate</strong> Associated soils types and vegetation present within the study area. Recent records within locality. Potential habitat in the form of BR233 and NA182 recorded within the study area.</td>
</tr>
</tbody>
</table>

(1) TSC Act Status: V = Vulnerable E1 = Endangered species
(2) EPBC Act Status: V = Vulnerable E = Endangered
<table>
<thead>
<tr>
<th>Common name</th>
<th>TSC Act Status¹</th>
<th>EPBC Act Status²</th>
<th>Likelihood of occurrence assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey-Crowned Babbler (Eastern subspecies)</td>
<td>V</td>
<td>-</td>
<td>Recorded</td>
</tr>
<tr>
<td>Diamond Firetail</td>
<td>V</td>
<td>-</td>
<td>Moderate</td>
</tr>
<tr>
<td>Masked Owl (southern mainland)</td>
<td>V</td>
<td>-</td>
<td>Moderate</td>
</tr>
<tr>
<td>Little Pied Bat</td>
<td>V</td>
<td>-</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koala</td>
<td>V</td>
<td>V</td>
<td>Moderate</td>
</tr>
<tr>
<td>Yellow-bellied Sheathtail-bat</td>
<td>V</td>
<td>-</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Reptiles</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five-clawed Worm-skink</td>
<td>E1</td>
<td>V</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

(1)  TSC Act status: V = Vulnerable, E1 = Endangered species
(2)  EPBC Act Status: V = Vulnerable

**Noxious weeds**

Of the 61 exotic flora species recorded within the study area, five were listed under the *Noxious Weeds Act 1993* within the Moree Plains noxious weed control area and three were listed within the Narrabri noxious weed control area. Of these, African Boxthorn, Tiger Pear and Velvety Tree Pear are listed as a Weeds of National Significance (WONS). All recorded noxious weeds, WONS and their control classes are listed in Table 4-8 below.

**Table 4-8  Noxious weeds and weeds of National Significance reordered within the study area**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Noxious Weed Listing¹</th>
<th>Weed of national significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moree Plains</td>
<td>Narrabri</td>
</tr>
<tr>
<td>Paterson's curse</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>African boxthorn</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Tiger pear</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Velvety tree pear</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Johnson grass</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

(1)  Control Categories under the Noxious Weeds Act 1993 - Class 4: 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.

**4.2.3 Summary of issues**

Below is a summary of findings of the desktop study and initial phases of field surveys completed to identify the broad-scale distribution of key ecological attributed, including associated values and constrains across the study area.
Key ecological attributes include:

- the presence of the Endangered ecological community:
  - listed under the EPBC Act as Weeping Myall Woodlands
  - listed under the TSC as Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes Bioregions
- the presence of a community nominated for listing under the EPBC Act, *Poplar Box Grassy Woodland on Alluvial Plains*
- the presence of Grey-Crowned Babbler (*Pomatostomus temporalis temporalis*) within the study area
- potential habitat for:
  - three threatened flora species listed under the TSC Act
  - nineteen threatened flora species listed under the TSC Act
  - three threatened fauna species listed under the EPBC Act
  - three threatened fauna species listed under the EPBC Act.

The potential impacts on the ecological attributes include:

- clearing of endangered ecological communities and habitat for threatened flora and fauna
- increased habitat fragmentation and edge effects through widening Newell Highway
- potential weed invasion, including noxious weeds and spread into adjacent sensitive habitats (large patches of EPBC listed *Weeping Myall Woodlands* within close proximity)
- introduction of pathogens into the environment such as *Phytophthora cinnamomi* and *Uredo rangelii* (Myrtle Rust).

### Table 4-9 Summary of Biodiversity constraints to the proposal

<table>
<thead>
<tr>
<th>Segment</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 2</td>
<td>Areas of Endangered Ecological Community – Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion is located along the eastern edge of the highway corridor to the south of the village of Edgeroi.</td>
<td>23.2 – 24.7 km</td>
</tr>
<tr>
<td>Segment 2</td>
<td>Areas of Endangered Ecological Community – Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion is located in patch areas within and immediately to the north of the village of Edgeroi.</td>
<td>25 – 25.8 km</td>
</tr>
<tr>
<td>Segment 2</td>
<td>Potential for weed invasion and spread into adjacent sensitive habitats (Large patches of <em>Weeping Myall Woodlands</em> within close proximity)</td>
<td>23.2 – 24.7 km 25 – 25.8 km</td>
</tr>
</tbody>
</table>

### 4.2.4 Recommendations

The following recommendations are made in relation to biodiversity issues for the proposal.

- apply the ‘avoid, minimise, mitigate and offset’ hierarchy during further design development, specifically in relation to threatened communities and species consistent with commitment made within the EPBC Act Strategic Assessment – Strategic Assessment Report (Roads and Maritime, 2015)
- where feasible and reasonable, avoid PCT 27/BR233 Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion which are/may be consistent with:
- TSC Act listed Weeping Myall Woodlands and Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
- EPBC Act listed Weeping Myall Woodlands
- all creek crossing should be designed in accordance with the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).

Once the preferred option is identified, the ecological value and expected impacts to flora and fauna species and areas of high ecological value should be confirmed by a specialist including targeted surveys for threatened flora and fauna and detailed field surveys to map and confirm vegetation communities. These subsequent surveys will need to be undertaken in accordance with the Draft Biodiversity Assessment Methodology (BAM) 2017 which comes into effect on the 25 August 2017.

Measures to minimise impacts should be progressed through design.
Figure 4.2 Biodiversity Constraints
Segment 1 - Page 1
Figure 4.2 Biodiversity Constraints
Segment 2 - Page 1
Figure 4.2 Biodiversity Constraints
Segment 2 - Page 2
Figure 4.2 Biodiversity Constraints

Segment 6 - Page 1

Legend
- Road Corridor
- Railway
- Watercourse
- Water Area
- Cadastre
- Study area

Surveyed vegetation
- Derived Native Grasslands of PCT56/
- BR186 Poplar box - Belush woods and
- dry-land woods on alluvial plains of north-
- central NSW

Map: 22706184_GIS_P2096_R3
Author: initialised
Date: 13/07/2017
Approved by

PEI - Narrabri to Moree
4.3 Aboriginal heritage

This section identifies the Aboriginal heritage values of the study area and potential issues to be managed during further development of the proposal. This section is based on the results of the desktop and preliminary heritage assessment of the proposal.

4.3.1 Methodology

The following section provides a preliminary assessment of Aboriginal heritage for the proposal undertaken, and is based on the Draft Aboriginal and Historical Archaeological Survey Report: Newell Highway HD Pavements – North Narrabri.

The assessment follows the Code of Practice for the Investigation of Aboriginal Objects in New South Wales (Code of Practice; DECCW 2010) and Stage 2 of the PACHCI (Roads and Maritime, 2011) in order to meet the following objectives:

- undertake background research on the study area to formulate a predicative model for site location within the study area
- identify and record objects or sites of aboriginal heritage significance within the study area, as well as any landforms likely to contain further archaeological deposits
- assess the likely impacts of the proposed work to Aboriginal cultural heritage and provide management recommendations.

The fieldwork component of this assessment was undertaken by OzArk on Thursday 1 June 2017 and included five representatives from three Aboriginal groups (Gomeroi People Native Title Claim Group, Narrabri Local Aboriginal Land Council (LALC) and Moree LALC).

4.3.2 Existing environment

A search of the AHIMS database returned 100 records for Aboriginal heritage sites within the designated search areas. One site has a restriction applied with no information about the location or site features provided. No sites are located in the study areas; and the nearest sites are located more than 300 metres away.

Culturally modified trees are the most commonly represented site type in the study area (76 per cent) followed by artefact scatters and isolated finds (12 per cent). Only two potential archaeological deposits (PADs) have been identified. One is associated with an artefact near the Mehi River (around 1.7 kilometres north of Segment 5) and the other is located near Skinners Creek (around 3.2 kilometres north of Segment 5). Four burials have been recorded, including two associated with culturally modified trees, mostly located close to major watercourses. A broad range of other site types exist at low frequencies, including two resource and gathering sites, a stone quarry near Halls Creek, a habitation structure, a ceremonial ring and a conflict site (the Waterloo Creek massacre site).

The study areas include land currently subject to Native Title Claim by the Gomeroi People (Tribunal file no. NC2011/006; Federal Court file no. NSD2308/2011).

One Aboriginal site (BL-HW17-ST1) and one Aboriginal potential archaeological deposit (PAD; BC-HW17-PAD1) were recorded during the field survey.

**Bobbiwaa Creek-HW17-PAD1 (BC-HW17-PAD1)**

BC-HW17-PAD1 is on the northern and western bank of Bobbiwaa Creek on an alluvial plain within a highly modified open woodland and riparian habitat. The PAD extends for approximately 100 metres (east–west) by 110 metres (north–south) encompassing a flat, slightly raised landform above the creek bank. The PAD includes a point bar deposit on the inner bank of Bobbiwaa Creek and the landform encompassed by the PAD has a slightly elevated topography relative to the surrounding alluvial plain.
Ground surface visibility in the area was nil due to dense grass cover and the PAD was identified on the basis of the moderate–high archaeological potential of the landform. Vegetation clearance, animal grazing and trampling, fencing, the construction and maintenance of the Newell Highway and possibly ploughing are likely to have affected the integrity any archaeological deposits. Nevertheless, intact archaeological deposits are likely to exist in the PAD area. The PAD is located outside of the Newell Highway Crown Land road reserve where construction of a bridge over Bobbiwaa Creek is proposed to replace the existing bridge as part of an offline option for this project.

**Bellata-HW17-ST1 (BL-HW17-ST1)**

BL-HW17-ST1 is an Aboriginal culturally modified tree on an undulating alluvial plain, within a highly-modified woodland environment. The tree is located within a highly disturbed roadside rest area. The site appears to have been previously assessed and managed during the construction of the rest area including the installation of two protective concrete bollards; however, the site does not appear to have been registered on AHIMS. The tree is in overall good condition, despite a very small area at the base of the tree (about three metres by three metres) being left uncovered by bitumen, which could severely limit the amount of moisture able to reach the tree’s roots.

### 4.3.3 Summary of issues

The assessment has found that one Aboriginal PAD (BC-HW17-PAD1) is at risk of impact from the proposal.

Potential impact to BL-HW17-ST1 can be avoided with the implementation of management strategies.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 2</td>
<td>Aboriginal heritage site BC-HW17-PAD1 is located on the northern and western bank of Bobbiwaa Creek. The PAD extends for approximately 100 metres (east–west) by 110 metres (north–south) encompassing a flat, slightly raised landform above the creek bank. The heritage assessment found that the site is at risk of impact from the proposal.</td>
<td>17.8 km</td>
</tr>
<tr>
<td>Segment 3</td>
<td>Aboriginal heritage site ‘Modified Tree’ BL-HW17-ST1 is located within the highway corridor 1.5 km north of the village of Bellata. The tree species is a Bimble Box eucalypt, alive and in good overall health with an oval shaped bark slab (sheet) removal scar on the north-Northwest west orientation. The site is located with a roadside rest area, around 18 m to the west of the highway centre line. Impact can be avoided with the implementation of management strategies.</td>
<td>48.8 km</td>
</tr>
</tbody>
</table>

### 4.3.4 Recommendations

The assessment found that one PAD is at risk of impact from the proposal, and impacts to one Aboriginal site can be avoided with the implementation of management strategies. Specific recommendations for each are provided below.

**BC-HW17-PAD1**

If the PAD area cannot be substantially avoided by the proposal, then test archaeological excavation will be required in accordance with Stage 3 of the PACHCI and the Code of Practice.

**BL-HW17-ST1**

To avoid harming the site, BL-HW17-ST1 must be demarcated during the proposed work using high visibility ground markers to delineate the site perimeter (ie staking and flagging) encompassing the tree
canopy. The ground markers used must be visible to any person in the vicinity of the site, whether on foot or in a vehicle. BL-HW17-ST1 must be documented within the Construction Environmental Management Plan (CEMP) and detailed design plans and the canopy extent demarcated as a ‘no-go’ and ‘no-harm’ area. Vehicles must not be driven on, or in the immediate vicinity of, the BL-HW17-ST1 site extent. If required, appropriate sediment control measures must be installed, operated and maintained to prevent sediment moving onto the site extent during the proposed work.

General recommendations relating to Aboriginal Heritage are as follows:

- should design development result in changes to the study area or what is generally proposed, additional assessment may be required by a suitably qualified heritage professional and documented in an updated Stage 2 PACHI report
- at the time of writing the report a stage 3 PACHI is not required, however this is to be determined during future environmental assessment and concept design phases.
4.4 Non-Aboriginal heritage

This section identifies the Non-Aboriginal heritage values of the study area and potential impacts from the proposed highway upgrade. This section is based on the results of the desktop and preliminary heritage assessment of the proposal.

4.4.1 Methodology

The following section provides a preliminary assessment of Aboriginal heritage for the proposal undertaken, and is based on the Draft Aboriginal and Historical Archaeological Survey Report: Newell Highway HD Pavements – North Narrabri.

The current assessment follows the Cultural Heritage Guidelines (Roads and Maritime 2015) and will apply the Historical Archaeology Code of Practice (Historic Code of Practice; Heritage Council 2006) in the completion of a historical heritage assessment, including field investigations, in order to meet the following objectives:

- to assess the significance of any recorded historical heritage items or areas
- determine whether the activities of the proponent are likely to cause harm to recorded historical heritage items or areas
- provide management recommendations and options for mitigating impacts.

Desktop searches were conducted to identify any potential previously recorded heritage within the study area. Database searches were undertaken on 22 May 2017 and included the following:

- Heritage Council of NSW administered State Heritage Register (SHR) and State Heritage Inventory (SHI)
- Australian Heritage Database
- Australia’s National Heritage List
- Narrabri and Moree Plains Shire LEPs.

The archaeological methods used in the historic archaeological assessment followed the Historical Code of Practice. Standard archaeological field survey and recording methods were employed (Burke and Smith 2004) to ground-truth existing levels of disturbance, confirm the location and curtilage of previously recorded heritage items, and to assess whether any other historic heritage items exist, or are likely to exist, in the study areas. A combination of pedestrian transects and vehicle traverses were used to inspect the Study Areas.

The fieldwork component of this assessment was undertaken by OzArk on Thursday 1 June 2017.

4.4.2 Existing environment

History

European colonisation of north-central NSW occurred relatively late, as the expansion had halted at Wellington Valley during the 1820s. The Moree plains area between Narrabri and Moree began to be occupied by pastoralists shortly after Mitchell passed through the area in 1831 and Coxen in 1835, each reporting good pastoral land. Mitchell’s route passed through country around Narrabri, crossing the Gwydir River near Moree and continuing as far north as Mungindi (Heritage Concepts 2009).

An early pastoral centre was established at Warialda (to the east of the Proposal), which was home of the Commissioner of Crown Lands. In 1850 Warialda included a courthouse and lockup that served the region. The town of Moree was laid out in 1860 and an additional court was established there in 1862, although a courthouse building was not built until 1874. Moree soon eclipsed Warialda with the establishment of two inns, two stores, a post office, a pound and a population of 43 in 1861. By 1871, Moree had a population of 107, three hotels, a butcher, a saddler and a school. Major growth occurred
during the 1880s with accelerated European occupation and the establishment of a Land Office to administer it. Moree became a municipality in 1891. The first of many bores was sunk into the Great Artesian Basin at Moree in 1895 and bores have continued to provide pastoral water supplies to the region, despite the depletion and westward retreat of the artesian basin. Moree’s hot artesian water initially sustained a wool-scouring industry and continues to be exploited as a tourist attraction today (NSW HO and DUAP 1996).

Narrabri is located on the northern edge of the Pilliga Scrub where sawmilling was historically important. A nearby early pastoral settlement was established at Wee Waa. In 1880, the larger town of Narrabri was established on a water reserve on Narrabri Creek, a tributary of the Namoi River, at an important crossing place on the droving route south. By 1871, Narrabri’s population was 350 and the town included stores, inns, a bank and school. The railway reached the town in 1882 and Narrabri became an official municipality the following year, when a courthouse was also built (NSW HO and DUAP 1996).

The small town of Bellata is located midway between Narrabri and Moree. Bellata was a small rural centre in the early to mid-twentieth century that included a post office, two general stores, two stock and station agencies, two garages, a cafe, a telephone exchange, a railway station and a doctor’s surgery. The Nandewar Hotel was a two-storey colonial style hotel constructed in 1902 and was regarded as a local landmark until destroyed by fire in 2006. The Bellata Police station and residential quarters was originally designed in 1902 for use as a courthouse by the government architect Walter Liberty Vernon.

Four items located in Bellata are listed on both the SHI and the Narrabri LEP: AB Meppem & Co, Bellata Post Office, Oldhams Smallgoods and Bellata Police Station. The Nandewar Hotel is listed on the SHI as being located in Bellata. However the hotel burnt down more than a decade ago and no longer exists. Additionally, one item, LS Rowe Stock and Station Agents, located in Bellata, is listed on the Narrabri LEP.

No new historic heritage sites were recorded during the field assessment. Five previously recorded historic heritage items were located. Details of these sites are provided below.

**Listed heritage items**

All existing heritage items identified during the desktop and accompany field surveys are located with the village of Bellata, and included on Figure 4-3.

The **AB Meppem & Co building** is a small weatherboard building. The satellite imagery suggests the western part of the building extends slightly beyond the curtilage frontage to the west. A veranda is attached to the building, covering the pavement further west of the building and, as such, is situated outside of the curtilage boundary.

The **Bellata Post Office building** is a weatherboard building. The satellite imagery suggests the western part of the building extends slightly beyond the curtilage frontage to the west. A large veranda is attached to the building, covering the pavement further west of the building and, as such, is situated outside of the curtilage boundary.

The **Oldhams Smallgoods building** is a weatherboard building with large shopfront windows with a weatherboard and plasterboard extension to the south. The satellite imagery suggests the western part of the building extends slightly beyond the curtilage frontage to the west. A large veranda is attached to the building, covering the pavement further west of the building and, as such, is situated outside of the curtilage boundary.

The **Bellata Police Station building** is a weatherboard building and double garage. The main building is contained within the curtilage boundary. The satellite imagery suggests that the boundary fence and double garage extend slightly west and south of the curtilage boundary.

The **LS Rowe Stock and Station Agents** building is a weatherboard and plasterboard building with large shopfront windows and doors, a large corrugated metal fascia with shop signage and an awning overhanging the pavement. The satellite imagery suggests the western part of the building and awning extend slightly beyond the curtilage frontage to the west.
Additional site photographs and site figures are included in Chapter 9.1 in the Draft Aboriginal and Historical Archaeological Survey Report, Newell Highway HD Pavements – North Narrabri.

### 4.4.3 Summary of issues

The following environmental constrains/issues have been identified relating to non-Aboriginal heritage within the study area.

Table 4-11 Summary of non-aboriginal heritage constraints to the proposal

<table>
<thead>
<tr>
<th>Segment</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 3</td>
<td>Historical heritage Item identified as the Bellata Police station is located to the east directly adjacent to the proposal.</td>
<td>47.1 km</td>
</tr>
<tr>
<td></td>
<td>Historical heritage Item identified as the Oldhams Smallgoods building is located to the east directly adjacent to the proposal.</td>
<td>47.2 km</td>
</tr>
<tr>
<td></td>
<td>Historical heritage Item identified as the Bellata Post Office is located to the east directly adjacent to the proposal.</td>
<td>47.2 km</td>
</tr>
<tr>
<td></td>
<td>Historical heritage site identified as AB Meppem &amp; Co is located on the east directly adjacent to the proposal.</td>
<td>47.2 km</td>
</tr>
<tr>
<td></td>
<td>Historical heritage Item identified as the LS Rowe Stock and Station Agents is located to the east directly adjacent to the proposal.</td>
<td>47.4 km</td>
</tr>
</tbody>
</table>

### 4.4.4 Recommendations

Recommendations concerning the study area are as follows and in accordance with the Draft Aboriginal and Historical Archaeological Survey Report, Newell Highway HD Pavements – North Narrabri.

- design development should aim to avoid impacting the AB Meppem & Co, Bellata Post Office, Oldhams Smallgoods, Bellata Police Station, and LS Rowe Stock and Station Agents sites. Where this is not reasonable or feasible, a detailed Statement of Heritage Impact should be prepared in accordance with Roads and Maritime Cultural Heritage Guidelines and relevant OEH guidelines and policies

- consideration of any protection measures during construction, eg demarcation of the historic site extent, must be undertaken in consultation with property owners to ensure measures are practical but fit for purpose. Notwithstanding, any ground markers used must be visible to any person in the vicinity of the site, whether on foot or in a vehicle. A ‘no-go’ and ‘no-harm’ area must be documented in the CEMP and detailed design plans encompassing the historic site extent

- the AB Meppem & Co, Bellata Post Office, Oldhams Smallgoods, Bellata Police Station, and LS Rowe Stock and Station Agents sites must be demarcated during the proposed work using high visibility ground markers to delineate the historic site extent (e.g. with high visibility temporary fencing) along the western boundary. The demarcation method must be developed in consultation with property owners and/or tenants to ensure that the method is practical and fit for purpose. The ground markers used must be visible to any person in the vicinity of the site, whether on foot or in a vehicle. A ‘no-go’ and ‘no-harm’ area must be mapped on a Construction Environmental Management Plan (CEMP) and detailed design plans encompassing the historic site extent

- should further design development result in changes to the study area or what is generally proposed, additional assessment may be required by a suitably qualified heritage professional

- inductions for staff undertaking the proposed work must explain the legislative protection requirements for historic sites and items in NSW and the relevant fines for non-compliance

- if objects are encountered that are suspected to be historic heritage items, the Unanticipated Finds Protocol must be followed.
4.5 Soils and geology

This section identifies the soil and geological impacts of the proposal.

4.5.1 Methodology

A desktop investigation was conducted to identify any geology or contamination issues within the study area.

The following published records were reviewed to understand the potential constraints within the study area, and includes a review of regulatory databases from the following sources.

- NSW list of contaminated sites notified to the EPA (26 April 2017).
- Australian Soil Resource Information System (ASRIS) to confirm acid sulphate soil (ASS) potential
- Australian Department of Agriculture and Water Resources, NSW Dryland Salinity Assessment 2000 – Assessment of Dryland Salinity extent 2050

4.5.2 Existing environment

**Landform, geology and soils**

The study area is characterised by an alluvial flood plain associated with the Mehi River and the Gwydir River. The terrain is typically near level to gently undulating. The proposal site is located in the Gunnedah Basin crossing the Goondiwindi thrust fault into the New England Fold Belt east of Camurra.

The subsurface conditions of the Gunnedah Basin are dominated by Quaternary and Tertiary aged river plain sediments, including black and red clayey silt, and black and yellow brown clay soils. Exceptions to this include the Jurassic aged clayey sandstone unit north of Narrabri and partially consolidated polymictic gravel around Bellata.

East of the Goondiwindi fault, variable soil conditions are mapped, including deep reactive clays, basaltic soils, and red brown sandy and silty clay soils. Tertiary aged mafic volcanics outcrop intermittently from south of Moree to North Star.

The study area is relatively flat (grade less than 10 per cent), and erosion risk would be considered low. Given the distance of the study area from the coast and the elevation of the areas, no acid sulfate soils are expected or known to occur along the proposal corridor.

**Salinity**

A review NSW DPE Salinity hazard report for Catchment Action Plan upgrade – Borders rivers-Gwydir CMA indicates that the salinity risk within the proposal is classed as high and very high (NSW DPI, 2013). Specifically, detailed assessments indicated high risks across most the proposal, extending from Narrabri to Moree. Very high risk of salinity impacts is present in the southern area of the study area, identified as the location south of Edgeroi.
Contamination

A search of the list of NSW contaminated sites notified to the EPA for the Narrabri and Moree Plains LGAs identified 16 contaminated sites. Notifications are predominately attributed to underground storage tanks at service stations and fuel depots.

A search of the *Contaminated Land: Record of Notices* database was undertaken. This search identified six properties that are currently or formerly regulated under the Contaminated Land Management Act 1997. None of these properties are located within 200 m of the proposal.

Moree and Narrabri Local councils have highlighted illegal dumping an increasing problem with the LGAs, and have implemented an illegal dumping program in a bid to reduce incidents within the area (Molino, 2016). While the Newell Highway was not identified as a hot spot however for illegal dumping incidents, there is potential to encounter dumped waste materials.

### 4.5.3 Summary of issues

The following table outlines environmental constrains/issues that have been identified relating to landform, geology and sols, and contamination issues within the study area.

Table 4-12  Summary of landform, geology and contamination constraints to the proposal

<table>
<thead>
<tr>
<th>Segment</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 1</td>
<td>Very High Salinity Risk</td>
<td>8.2 – 12.8 km</td>
</tr>
<tr>
<td></td>
<td>Potential Illegal dumping of waste</td>
<td>8.2 – 12.8 km</td>
</tr>
<tr>
<td>Segment 2</td>
<td>High Risk of Salinity</td>
<td>15.6 – 25.9 km</td>
</tr>
<tr>
<td></td>
<td>Potential Illegal dumping of waste</td>
<td>15.6 – 25.9 km</td>
</tr>
<tr>
<td>Segment 3</td>
<td>High Risk of Salinity</td>
<td>46.8 – 49.3 km</td>
</tr>
<tr>
<td></td>
<td>General contamination risks associated with accidental spills or leaks from parked vehicles and potential for illegal dumping of waste at Woolabrar Rest area.</td>
<td>47.4 km</td>
</tr>
<tr>
<td></td>
<td>General contamination risks associated with accidental spills or leaks from parked vehicles and potential for illegal dumping of waste at Tookey Creek Rest area.</td>
<td>48.8 km</td>
</tr>
<tr>
<td>Segment 4</td>
<td>Potential Illegal dumping of waste</td>
<td>46.8 – 49.3 km</td>
</tr>
<tr>
<td></td>
<td>High Risk of Salinity</td>
<td>52.4 – 58.2 km</td>
</tr>
<tr>
<td></td>
<td>General contamination risks associated with accidental spills or leaks from parked vehicles and potential for illegal dumping of waste at Tookey Creek Rest area.</td>
<td>52.4 km</td>
</tr>
<tr>
<td></td>
<td>General contamination risks associated accidental spills from parked vehicles and potential for illegal dumping of waste at the unofficial rest area located 1 kilometre north of the Tookey Creek rest area, on the western side of the proposal.</td>
<td>54.3 km</td>
</tr>
<tr>
<td></td>
<td>Potential Illegal dumping of waste</td>
<td>52.4 – 58.2 km</td>
</tr>
<tr>
<td>Segment 5</td>
<td>High Risk of Salinity</td>
<td>88.4 – 97.9 km</td>
</tr>
<tr>
<td></td>
<td>Potential Illegal dumping of waste</td>
<td>88.4 – 97.9 km</td>
</tr>
</tbody>
</table>
4.5.4 Recommendations

The following recommendations are made in relation to soil and geological issues associated with the proposal.

- detailed geotechnical investigations and assessments should be undertaken to support further design development.
4.6 Hydrology and flooding

The following section provides an outline of the water and hydrological constraints identified within the study area.

4.6.1 Methodology

The preliminary hydrology and flooding assessment is based on a desktop review of the following resources.

- Narrabri Flood Study Review (URS, 2014)
- Narrabri Flood Study (WRM, 2016)
- Moree and Environs Floodplain Risk Management Plan (Parsons Brinckerhoff, 2008)
- Moree Plains Flood Mapping (Parsons Brinckerhoff, 2007)
- Review of Moree and environs Flood Study/Floodplain Risk Management (WRM, 2017)
- Water resources and management overview – Gwydir catchment (Green D et.al 2011a)
- Water resources and management overview: Namoi catchment (Green D et.al 2011b)
- various online mapping tools
- registered groundwater bore searches

4.6.2 Existing environment

The proposal is located within two major river catchments with Segments 1 and 2 located within the Namoi River catchment, and Segments 3, 4 and 5 located within the Gwydir River catchment. Both catchments flow in a westerly direction from headwaters within the Great Diving Range. The proposal is not located in the vicinity of either major rivers, however minor tributaries transect the proposal at various locations along its extent, thus no flow data could be found for any waterways intersecting the proposal.

Summer dominant rainfall varies across both catchments between 500–900 mm per year, with around 500–600 mm falling within the study area. Summer storms can cause severe flooding and erosion. Pan evaporation rates within both catchments range between 1800–2000 mm per year within the proposal, with summer dominant rates of up to 10 mm/day (Green, et.al, 2011a & 2011b).

Surface waters and associated features

The proposal crosses a number of waterways including Bobbiwaa Creek, Tarlee Creek, Gehan Creek, Tookey Creek and Halls Creek as shown on Figure 1-1. The proposal also crosses a number of other intermittent watercourses and irrigation canals. The largest waterway that intersects the Newell Highway between Narrabri and Moree is the Tycannah Creek, however the creek is not located in the vicinity of any current proposal study areas.

Groundwater

A review of NSW Water Information Data base accessed on 9 May 2017 identified 38 registered groundwater bores within around a 500 m radius of the proposal segments. Bores ranged from a depth of around 5 m to 741 m. Standing water levels ranged from a depth of 6.0 m (BGS) to 41.1 m (BGS).

Groundwater quality within both the Namoi and Gwydir river catchments, and specifically the study area, has been identified as predominantly moderate (500–1500 TDS mg/L) suitable for domestic, stock and some irrigation purposes. Groundwater quality improves close to the town of Moree, with groundwater in the vicinity of Segment 5 identified as fresh (0-500 TDS mg/l) and suitable for domestic, stock of all ages, and some irrigation purpose, municipal use.
**Flooding**

Both river catchments have a long history of flooding, with flooding based studies focused on the population centres of Moree (WRM, 2017, PB, 2007/2008), and Narrabri (WRM, 2017), and the catchments of the Namoi and Gwydir River catchments. Historical flood events have occurred in 1955, 1998, 2004, 2011 and 2012 (WRM, 2017).

A review of the Narrabri Flood Study (2016) identified a focus on the Namoi River, Mulgate Creek and Long gully. The Newell Highway was identified as a primary escape route to the north during a major flooding event. The study indicates periodic flooding on an average 10-year basis and due to local topography, the area at highest risk of flooding, is low lying areas directly within the township of Narrabri and to the south and North West. The highest flood risk within study area was identified to the south of Segment 1. Minimal information is available on flood risk across the remainder of study areas. The most relevant studies relate to Mulgate Creek located within the town of Narrabri and to the immediate east of Segment 1. Road infrastructure including the Newell Highway have been sighted as having the potential to change the distribution of flow within Mulgate Creek. (WRM, 2016). A review of mapping within the Narrabri Flood Study report (2016) indicated that the area around Segment 1, was identified as flood plain, with the extent further north beyond the extent of flood modelling for the area.

A review of the Moree Flood Mapping (PB, 2008) and the Flood Mapping Atlas (PB, 2007) indicated flood risk across current study area within Moree Plains LGA varied by segment. The area immediately to the south of Moree is considered a non-inundation zone, with the exception of Halls Creek. While low lying areas to the south, transected by the Newell Highway are identified as potential inundation areas. Halls Creek was identified as having low to high hazard risk in all events including 10 per cent AEP (WRM, 2017). Flood hazard information was not available for the remaining creeks within the study area.

A review of flood mapping data (GHD 2017) included in Figure 4-4, indicates that portions of Segment 1 would be impacted by a 1 in 10-year flooding event. The Northern extent around Murrumbilla Lane would be inundated by a 1 in 2-year event.

Large portions of Segment 2 would be impacted by a 1 in 2-year flood event, the flood risk is mainly associated with the southern portion around Edgeroi. Impacts are also noted associated with Tarlee Creek.

Flood risk in Segments 3 and 4 are mainly restricted to creek crossings, with general impacts associated with a 1 in 10-year event. Excessive build-up of flood waters is expected to occur on the up-creek site of the highway.

Flood risk is considered low in Segment 5, with the exception of the Halls Creek highway crossing, which would be impacted by a 1 in 10-year flooding event.

### 4.6.3 Summary of issues

The following environmental constraints/issues have been identified relating to hydrology and flooding within the study area:

- general impacts of the proposal on the hydrology of the catchment, including general drainage, flood flow paths and flood volumes across all segments
- impacts of the hydrology of the catchment on the proposal, including creeks, low lying areas, unnamed ephemeral creeks, gullies that transect investigation area.

Specific issues associated with hydrology and flooding risk is included in Table 4-13.
### Table 4-13 Summary of hydrology and flooding constraints to the proposal

<table>
<thead>
<tr>
<th>Segment</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 2</td>
<td>Direct or indirect water quality impacts from the proposal on Bobbiwaa Creek, such as erosion of banks at crossings and sedimentation/contamination from uncontained runoff. Assessment of the flooding risk on the proposal from Bobbiwaa Creek.</td>
<td>17.9 km</td>
</tr>
<tr>
<td></td>
<td>Direct or indirect water quality impacts from the proposal on Tarlee Creek, such as erosion of banks at crossings and sedimentation/contamination from uncontained runoff.</td>
<td>23.5 km</td>
</tr>
<tr>
<td></td>
<td>Assessment of flooding risk on the proposal from Tarlee Creek.</td>
<td>23.5 km</td>
</tr>
<tr>
<td>Segment 3</td>
<td>Impacts on the groundwater monitoring bores associated with the BP service station located adjacent to the proposal in the village of Bellata.</td>
<td>47.4 km</td>
</tr>
<tr>
<td></td>
<td>Assessment of the flooding/inundation risk on the proposal from Gehan Creek.</td>
<td>46.5 – 46.7 km</td>
</tr>
<tr>
<td></td>
<td>Direct or indirect water quality impacts from the proposal on Gehan Creek, such as erosion of banks at crossings and sedimentation/contamination from uncontained runoff.</td>
<td>46.5 – 46.7 km</td>
</tr>
<tr>
<td>Segment 4</td>
<td>Direct or indirect water quality impacts from the proposal on the Tookey Creek catchment, such as erosion of banks at crossings and sedimentation/contamination from uncontained runoff.</td>
<td>52.6 – 55 km</td>
</tr>
<tr>
<td></td>
<td>Assessment of the flooding/inundation risk of on the proposal construction and operation from Tookey Creek catchment.</td>
<td>52.6 – 55 km</td>
</tr>
<tr>
<td>Segment 5</td>
<td>Direct or indirect water quality impacts from the proposal on Halls Creek, such as erosion of banks at crossings and sedimentation/contamination from uncontained runoff.</td>
<td>94.1 km</td>
</tr>
<tr>
<td></td>
<td>Review and assessment of the flooding/inundation risk on the proposal construction and operation from Halls Creek.</td>
<td>94.1 km</td>
</tr>
</tbody>
</table>

### 4.6.4 Recommendations

Specific recommendations concerning the proposal and identified hydrology and flooding issues are as follows:

- further design development and detailed environmental assessment for the proposal should assess potential flooding impacts during construction and operation including consideration of the NSW Government’s Floodplain Development Manual (Department of Natural Resources, 2005), Practical Consideration of Climate Change - Flood risk management guideline (DECC, 2007) and Australian Rainfall and Runoff: A guide to flood estimation (Commonwealth of Australia (Geoscience Australia) 2016)

- further design development and detailed environmental assessment for the proposal should include identification of potential impacts on stormwater quantity, change in stormwater runoff (increase or decrease) and sensitivity of downstream waters.
Figure 4.4 Flooding Risk
Segment 2 - Page 3
Figure 4.4 Flooding Risk
Segment 4 - Page 1
Figure 4.4 Flooding Risk
Segment 6 - Page 1
4.7 Noise and vibration

This section identifies noise and vibration impacts associated with the proposal within each segment.

4.7.1 Methodology

The preliminary noise and vibration investigation has been carried out with consideration to the following documents:

- Noise Mitigation Guidelines (Roads and Maritime, 2015a)
- Noise Criteria Guideline (Roads and Maritime, 2015b)
- Noise model validation Guideline (Roads and Maritime, 2016a)

Sensitive receivers were identified by reviewing aerial photography and identifying receivers within or adjacent to the study area. Once identified, the sensitive receivers were mapped and a constraint category was assigned. Noise constraints were classified and mapped as:

- high constraint – sensitive receivers mapped within 0–200 m of the study area
- moderate constraint – sensitive receivers located between 200–500 metres of the study area
- low constraint – sensitive receivers located between 500–1000 metres of the study area.

4.7.2 Existing environment

Background and ambient noise

No background noise data was available for the proposal, however the area is predominantly characterised as rural with low ambient noise levels expected. The main sources of ambient noise within the study area are farming activities, road traffic, rail operations, and operations of grain storage and handling facilities are present in the study area. It is expected that noise levels are likely in larger towns of Narrabri and Moree, high traffic areas in small towns of Edgeroi, Bellata and Gurley, and vehicle rest areas within the proposal.

Australian Standard AS1055:2 Acoustics: Description and Measurement of Environmental Noise provides estimated average background noise levels for different residential areas in Australia. It would be reasonable to assume that ambient noise within rural residential areas would be about between 45 dB(A) during the day, 45 dB(A) in the evening and 30 dB(A) at night. In areas containing a mix of medium density transport and some commercial and industrial properties, it would be reasonable to assume an ambient noise of between 50 dB(A) during the day, 45 dB(A) in the evening, and 40 dB(A) at night.

Sensitive receivers

Sensitive receivers are concentrated in towns and villages along the proposal route. Other sensitive receivers include scattered dwellings on rural landholdings. The majority of receivers outside the towns are located more than 100 metres from the proposal. The nearest sensitive receivers to the proposal are shown on Figure 4-5.

Vibration

There is potential for construction work to cause vibration impacts to residential impacts to residential receivers within the towns and villages of Edgeroi, Bellata, and South Moree. There is also the potential for vibration impacts to heritage items within the town of Bellata. The main sources of vibration would be due to rolling and/or compacting. Sensitive receivers within 20 metres of the rolling works pose a moderate constraint.
### 4.7.3 Summary of issues

Specific noise and vibration issues associated with the proposal are included in Table 4-14 and shown on Figure 4-5.

**Table 4-14 Summary of noise and vibration issues of the proposal**

<table>
<thead>
<tr>
<th>Segment 1</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural/Residential receiver approximately 300 m to the west of the proposal.</td>
<td>9.9 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential receiver approximately 200 m to the east of the proposal.</td>
<td>9.9 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential receiver approximately 300 m to the west of the proposal.</td>
<td>10.9 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential receiver approximately 360 m to the east of the proposal.</td>
<td>11.3 km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Segment 2</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural/Residential property approximately 400 m to the east of the proposal.</td>
<td>18.5 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential property approximately 200 m to the east of the proposal.</td>
<td>22.6 km</td>
</tr>
<tr>
<td></td>
<td>The village of Edgeroi with a mix of commercial and residential properties immediately east of the proposal, and a grain storage facility to the west beyond the inland rail line.</td>
<td>25.7 km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Segment 3</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The village of Bellata with a mix of commercial and residential properties immediately east of the proposal, and a grain storage facility to the west beyond the inland rail line.</td>
<td>47.8 km</td>
</tr>
<tr>
<td></td>
<td>Potential vibration impacts to listed heritage items as outlined in section 4.4.2 and 4.4.3.</td>
<td>47.1 – 47.4 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential property on the outskirts of the village of Bellata approximately 50 m to the east of the proposal.</td>
<td>48.2 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential property approximately 200 m west of the proposal beyond the Inland rail line.</td>
<td>49.9 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential property approximately 400 m west of the proposal beyond the Inland rail line.</td>
<td>51.0 km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Segment 4</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural/Residential property approximately 250 m east of the proposal beyond the Inland rail line.</td>
<td>53.8 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential property approximately 450 m west of the proposal.</td>
<td>54.2 km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Segment 5</th>
<th>Issue</th>
<th>Distance from Narrabri (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural/Residential property approximately 400 m west of the proposal.</td>
<td>89.6 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential property approximately 700 m west of the proposal.</td>
<td>91.7 km</td>
</tr>
<tr>
<td></td>
<td>A small cluster of residential properties located 100 m to the east of the proposal, adjacent to the Inland rail line.</td>
<td>93.6 km</td>
</tr>
<tr>
<td></td>
<td>Rural/Residential property approximately 700 m east of the proposal.</td>
<td>94.8 km</td>
</tr>
<tr>
<td></td>
<td>Moree Airport and Facilities 100 m to the west of the proposal.</td>
<td>96.8 km</td>
</tr>
<tr>
<td></td>
<td>Residential properties approximately 50 m to the west of the proposal.</td>
<td>97.8 km</td>
</tr>
<tr>
<td></td>
<td>Gwydir Carpark Motel and thermal pools located approximately 150 m to the west of the proposal.</td>
<td>98.0 km</td>
</tr>
</tbody>
</table>
4.7.4 Recommendations

The following recommendations to reduce noise and vibration impacts during construction and operation of the proposal are:

Figure 4.5 Noise Receivers
Segment 1
Figure 4.5 Noise Receivers
Segment 2
Figure 4.5 Noise Receivers
Segment 3
Figure 4.5 Noise Receivers
Segment 5
4.8 Socio-economic and land use

The following section provides an outline of the likely land use, property and socio economic impacts of the proposal.

4.8.1 Methodology

The information obtained within the section is based on a desktop study on a review of the following resources.

- Australian Census data (2001-2016)
- Narrabri and Moree Plains Strategic Community Planning documents
- various online mapping tools.

4.8.2 Existing environment

**Population and demography**

The proposal is located within the local government areas of Narrabri and Moree Plains. The population of Narrabri Shire is 13,084. The LGA experienced a 5 per cent decrease in population between 2001 and 2006, however it has remained relatively stable since 2006 (ABS, 2001, 2006, 2011 and 2016). The shire has a median age of 39, and a weekly household weekly income of $1,242 (ABS, 2016).

The population of the Moree Plains Shire is 13,059. The LGA experienced a 10.9 per cent decline in population between 2001 and 2006, however since 2006 it has remained relatively steady, with a slight decline. The shire has a median age of 38 years old, and a weekly household income of $1,240 (ABS, 2016).

The population within both LGAs increases during the cotton chipping season (November – January), which also overlaps with the peak tourist season of (August – December).

**Community value**

The Moree Plains Shire promotes the area as a family friendly region, with good opportunities for education and sporting interests. The LGA has identified aims within their 2035 strategic plan for; an inclusive caring community; a vibrant regional economy which is an environmental role model; and a coordinated committed leadership to deliver the plan (Moree Plains Shire Council, 2013). The LGA has identified objectives around community safety, specifically improving safety on public roads, and providing road networks that meet the shires transport needs.

The Narrabri Shire aims to be a strong and vibrant regional growth centre providing a quality living environmental for all its community (Narrabri Shire, 2013). The strategic plan identified four themes central to achieving these goals; one community; a sustainable environment; a strong and diverse economy; proactive leadership and advocacy.

**Business and employment**

Agriculture remains the largest employer in the Moree Plains shire with 15.8 per cent working in Sheep, beef cattle and grain farming. Other major industries of employment included school education 6.4 per cent, other crop growing 4.3 per cent, agriculture and fishing support services 3.4 per cent and local government administration 3.1 per cent. (ABS, 2011).

Agriculture remains the Narrabri LGAs most important industry with 11.7 per cent worked in sheep, beef cattle and grain farming. Other major industries of employment included School education 4.8 per cent, other crop growing 4.6 per cent, agriculture and fishing support services 3.3 per cent and cafes, restaurants and takeaway food services 3.2 per cent (ABS, 2011). Narrabri is also supported by a strong
resources sector, with a number of coal mines operating within the shire, and gas deposits present in the Pilliga State forest area (Narrabri Shire Council, 2013).

**Land use**

Narrabri LGA and Moree Plains LGA make up an area of around 13,000 and 18,000 square kilometres respectively. The area is dominated by agricultural industries, with significant cotton, wheat and livestock industries. The region is also experiencing ongoing development pressure within the coal basin around Narrabri and Moree due to the increasing mining and exploration of coal seam gas.

The proposal site traverses a predominantly rural area, with rural properties surrounding the majority of the proposal. The land surrounding the proposal is used for agricultural and grazing purposes.

The regional towns of Narrabri and Moree are located at the southern and northern extent of the proposal respectively. Smaller villages of Edgeroi, and Bellata (shown on Figure 4-2) are located within the study area and will be directly impacted by the proposed works. The majority of the study area has been cleared of the original vegetation with scattered patches of remnant vegetation remain remaining. Remnant vegetation including some threatened ecological communities is present along the road corridor in many places within the study areas. Vegetation communities are shown on Figure 4-2 and in more detail in 4.2.

Other key features/land uses in the vicinity of the proposal sites include:

- University of Sydney Plant Breeding Institute is located about two kilometres north of Narrabri, and at the southern extent of the proposal
- a number of grain storage and handling facilities are located at various location along and adjacent to the proposal
- Moree Airport is located adjacent to the proposal south of Moree
- Narrabri Airport is located around 3.5 kilometres to the south east of the proposal
- the Moree Solar and water ski park is located to the south of Moree to the east of the proposal
- Killarney State Forest is located about 10 kilometres north east of Narrabri, and around 5 kilometres to the east of the proposal
- Couradda and Moema National Parks are located around 11 and 15 kilometres respectively north east of the proposal.

**Utilities**

There is the potential for utilities to be present along the highway corridor and the adjacent Inland Rail line.

**4.8.3 Summary of issues**

The following general issues associated with socio economic and land use have been identified across all segments of the proposal:

- impacts on productive agricultural land adjacent to the road corridor
- impacts to ecological and environmental values adjacent to and within the road corridor
- the timing of the project may coincide with other major projects currently proposed within the region placing an increase in demand and completion for construction labour (see cumulative impacts in section 4.12)
- the timing of the project may coincide with peak agricultural periods placing an increase in demand and completion for construction labour
- non-resident workforce or workers relocating to the region to pursue employment opportunities have the potential to place excessive demand regional facilities, including the cumulative impacts with other major projects currently under assessment (see cumulative impacts in section 4.12)
- location of local and regional utilities along the proposal corridor
- construction impacts on traffic and highway use with greater impacts likely during peak tourism and harvest seasons.

**4.8.4 Recommendations**

The following recommendations are made in relation to Socio-economic and land use impacts of the proposal:

- a basic level of socio-economic assessment should be undertaken in accordance with the Roads and Maritime Environmental Impact Practice Note: Socio-economic Assessment (EIA N-05)
- consultation with local council, stakeholders, and other major projects proponents to manage cumulative socio-economic impacts of the proposal, and manage community concerns.
4.9 Landscape character and visual amenity

The following section provides an outline of the landscape character and visual amenity impacts of the proposal. For the purpose of this report, the study area has been established using a 30 m buffer either side of the existing road corridor centreline.

4.9.1 Methodology

This investigation considered how the landscape character would be affected by the proposal and how visual receivers in the local area would respond to such changes. Aerial imagery was used to identify key landscape characteristics in the area.

4.9.2 Existing environment

Landscape character

Segment 1 is entirely located within agricultural land approximately 4.5 kilometres to the north of Narrabri. The southern extent of the proposal is located adjacent to land owned by the University of Sydney. Two rural residential properties are located adjacent to the proposal within Segment 1. Agricultural lands are predominantly grazing and cropping. With small pockets of vegetation present mainly to the west of the proposal. A number of small dams are scattered throughout the area. The proposal crosses four small creek or drainage lines. The Inland rail line runs parallel for the length of the proposal immediately to the west.

Segment 2 is located entirely within agricultural land approximately 15 kilometres north of Narrabri, the area is largely void of large patches of vegetation, and dominated by grazing and cropping lands. The proposal passes a number of small creeks or gullies. Towards the northern extent of the proposal the small village of Edgerio is present, with a small group of residual properties, a grain storage facility. The Inland rail line runs parallel for the length of the proposal immediately to the west.

Segment 3 extends north from the village of Bellata around 52 kilometres north of Narrabri. A number of residential properties are present directly on the Newell Highway. The town of Bellata has some heritage buildings which increase the visual sensitivity of this area. Beyond the village area is predominantly grazing and cropping land. With two rural residential properties to the west of the proposal. The inland rail line runs parallel to the proposal for its duration. Areas of vegetation are present within the road verge, creeks and gullies and in some larger block sections. The inland rail line runs adjacent along the western boundary of the site. A number of commercial/agricultural properties are present within the village area including:

- a large grain storage facility
- a small number of abandon commercial properties
- an Australia post office
- an auto repairs shop
- a large BP service station. Potential contaminants of concern include heavy metals and hydrocarbons
- a large truck parking area
- Woolabrar rest area is located around 500 metres to the north of the village.

Segment 4 is located around 53 kilometres North of Narrabri, and comprises agricultural land use. Areas of vegetation are present along the road verge for the length of the segment. The inland rail line runs parallel to the proposal immediately to the east. An unofficial heavy vehicle rest area is present in the central portion, adjacent to a lager quarry area. The heavy and light vehicle Tookey Creek Rest area is located around 50m to the south of the study area. In the northern portion a rail loop, grain storage
facility and loading area is present on the eastern side of the proposal. The inland rail line runs adjacent to the site on the eastern boundary.

Segment 5 is located 88 kilometres north of Narrabri, and immediately south of Moree. The area comprises both agricultural areas (dominated with cropping land) in the southern section and regional urban areas in the northern section including a range of residential, commercial and some industrial land uses. A large grain storage facility is located to the east adjacent to the Moree Water Park, and Moree landfill. The Moree Airport is located immediately to the west of the proposal in the northern section of the study area. A number of commercial and light industrial land uses, along with a large grain storage facility are present to the west of the proposal. A large area of residential properties are located to the east of the proposal, north of the Moree airport. The inland rail line runs parallel west of the proposal. The Moree solar farm is located three kilometres to the east of the proposal.

4.9.3 Summary of issues

The following general issues associated with landscape character and visual amenity as a result of the proposal:

- removal of vegetation especially within areas with greater visual sensitivity such as roadside vegetation along creek lines or within predominately cleared agricultural environments
- temporary ground disturbance
- widening and alterations to the current highway surface
- alteration of existing intersection and rural access roads
- temporary disruptions to village character of Bellata, especially around the heritage items.

A summary of specific site based impacts is included in Table 4-15.

| Segment  | Issue                                                                                         | Distance from Narrabri (km) |
|----------|------------------------------------------------------------------------------------------------|
| Segment 2 | Temporary disturbance to character of the village of Edgeroi                                | 25 – 25.5 km                |
| Segment 3 | Temporary disturbance to character of the village of Bellata                                | 46.8 – 47.8 km              |
| Segment 4 | Impacts on the visual amenity at Woolabrar rest area.                                       | 48.8 km                    |
|          | Impacts on the visual amenity at Tookey Creek rest area.                                     | 54.4 km                    |
| Segment 5 | Impacts of the visual amenity at the unofficial rest area located one kilometre north of the Tookey Creek rest area, on the western side of the proposal. | 54.3 km                    |
|          | Impacts on the visual amenity in the southern areas of the town of Moree, adjacent to the airport and surrounds. | 96 – 97.9 km               |

4.9.4 Recommendations

The following recommendation is made in relation to Landscape character and visual amenity impacts of the proposal:

- an urban design, landscape character and visual impact assessment will be undertaken to identify the potential visual impacts of the proposal in accordance with the Roads and Maritime Environmental Impact Practice Note: Guideline for Landscape Character and Visual Impact Assessment (EIA-N04)
- further design development should consider the use of urban design principles in accordance with Beyond the Pavement: Urban Design Policy Procedures and Design Principles (Roads and Maritime, 2014).
4.10 Air quality

The following section provides an outline of the air quality impacts of the proposal.

4.10.1 Methodology

Given the rural characteristics of the area, a high-level air quality assessment was carried out by reviewing local sensitive receivers and any contributing factors or local land uses that would likely impact local air quality.

4.10.2 Existing environment

**Ambient air quality**

Air quality in the study area is characteristic of an inland rural area, where the main local influences on air quality are agricultural activities, dust from the operation of the grain storage and handling facilities in the study area, and road traffic. Additional impacts to air quality include the Moree Airport, industrial land uses to the south of Moree.

**Sensitive receivers**

A number of sensitive receivers are present adjacent to the proposal. A number of rural/residential properties are located within 500 m to one kilometre of the proposal corridor. In addition, the proposal passes through the villages of Edgeroi, Bellata, and the southern area of Moree, and runs adjacent to the Moree Airport, and a number of commercial and industrial properties within the area.

4.10.3 Summary of issues

The potential sources of emissions to air, which may affect air quality and sensitive receivers from the proposal are mainly associated with construction, and include:

- gaseous emissions from mobile and station construction plant and equipment, and construction vehicles
- vehicle and mobile plan movement on paved and unpaved roads and haulage routes
- wind erosion of expose areas
- handling and transfer of materials, including the loading and unloading of spoil and other materials
- bulk earthwork operations, such as excavations, clearing of groundcover and topsoil, blasting and the spreading of topsoil.

4.10.4 Recommendations

During the next phase of assessment further consideration will be given to managing air quality during construction including:

- potential sources of air pollution
- air quality management objectives consistent with any relevant published EPA and/or OEH guidelines
- mitigation and suppression measures to be implemented
- methods to manage work during strong winds or other adverse weather conditions
- a progressive rehabilitation strategy for exposed surfaces.
4.11 Greenhouse gas and climate change

This section considers issues associated with greenhouse gases and climate change that may arise or affect the proposal.

4.11.1 Methodology

Given the land use activities and rural characteristics a high level assessment of the greenhouse gas and climate change impacts was undertaken to identify any emission sources, or likely emission sources from the proposal.

4.11.2 Existing environment

The existing environment within the study area is predominantly rural with greenhouse gas emissions associated with agricultural activities and productions, agricultural plant and equipment and vehicle usage on local roads and highways. It is likely that an increase in the frequency and intensity of storms would leave to more frequent short and long term highway closures (NSW Government, 2015).

4.11.3 Summary of issues

Greenhouse gas emissions associated with construction of the proposal relate to fuel consumption of plant, equipment and vehicles. During operation greenhouse emissions may increase with the expected initial increase in traffic volumes, however upgrades to the road surface and addition of overtaking lanes may improve fuel efficiency in addition with the NSW government proposed shift of freight from road to rail the overall emissions and particulate matter may reduce over time. This may result in marginal improvements to air quality for passing motorists and local rural residents.

4.11.4 Recommendations

Assessment of the greenhouse gas emissions for the project will be carried out for construction and operation. This will investigate, but not be limited to, the following:

- identify and quantify the sources of greenhouse gas emissions associated with the construction, operation and maintenance of the project
- identify opportunities to reduce the greenhouse gas emissions associated with the project.

Overall, climate change risks for the proposal are considered to be readily manageable through the adoption of standard practices that are currently being applied elsewhere for similar infrastructure projects. Such measures include designing infrastructure in accordance with relevant standards and guidelines and ensuring that stormwater drainage is designed with sufficient capacity to account for the projected effects of climate change on the Central West region.

Further design development and climate change assessment would be guided by the draft Roads and Maritime Climate Change Adaptation for Road Networks Technical Guide and consider the range of climate change variables over time applicable to the proposal, including temperature, rainfall and hail, wind speed and bushfire. The assessment will identify adaptation actions to be incorporated into the design and operation of the project.
4.12 Cumulative impacts

This section identifies any major project occurring in the vicinity of the study area and assess the cumulative impact that may result.

4.12.1 Methodology

Desktop assessment of the following:

- NSW Major Project’s Assessments (accessed 21 June 2017)
- Moree Plains Shire Council development projects (accessed 21 June 2017)
- Narrabri Shire council development projects (access 21 June 2017).

4.12.2 Existing environment

**Newell Highway upgrade (North Moree)**

The North Moree Newell Highway upgrade is an extension of the current project to the north of Moree. The proposal consists of highway upgrades and additional overtaking lanes on three segments of the Newell Highway totalling approximately 30 kilometres.

**Inland Rail Line (Narrabri to North Star)**

The Inland Rail Line (Narrabri to North Star) proposal is a commitment from the Australian government to construct an inland railway between Melbourne and Brisbane via the central west NSW. The $50 million proposal would involve upgrading 183 kilometres of existing rail track in NSW between Narrabri and North Star. The rail line runs parallel to the current proposal for the majority of the length. The project is planned to commence in mid-2018, and expected to take around 18 months. (GHD, 2016). At the time of writing the Secretary’s Environmental Assessment Requirements (SEARS) have been issued.

**Narrabri Gas Project**

The Narrabri Gas Project is a $3.6 billion proposal for the progressive installation of up to 850 new gas wells on up to 425 new well pads over a 20 year period. The proposal also includes the construction and operation of gas processing and water treatment facilities. The proposal is for the Gunnedah basin, approximately 20 kilometres south west of Narrabri and is expected to employ up to 1300 people during the construction peak. Construction of the project is proposed to commence in early/mid 2018, subject to obtaining regulatory approval, with the first gas scheduled for 2019/2020 (GHD, 2017). As of 21 June 2017 the project was under assessment, with public submissions having closed in May 2017.

**The Western Slopes Gas Pipeline**

The Western Slopes Gas Pipeline located to the south west of Narrabri is a 450 kilometres high pressure gas pipeline proposal which would connect the Narrabri Gas Project to the NSW gas transmission network. The $450 million proposal is expected to generate 250–350 full time jobs during construction. No expected construction timeframes or schedules have been identified however construction is expected to take 8-10 months (APA Group, 2017). At the time of writing the project SEARS have been issued.

**Narrabri Grain Storage and Rail Transfer Facility**

The Narrabri Grain Storage and Rail Transfer Facility is a $40 million proposal to construct and operate a grain storage and rail transfer facility approximately 4.7 kilometres north of Narrabri. It is expected to generate 30 full time jobs during construction and a further 12 full time roles during operation. The
proposed site is located on private grazing lands directly to the west of the Newell Highway, and consist of up to five grain silos, and four open storage bunkers. The proposal identified an expected one truck every 5 minutes delivering grain to the facility during peak periods of operation. No expected construction timeframes or schedules identified however construction is expected to take 5 months (GHD, 2014). At the time of writing the SEARS have been issued.

**The Narrabri Solar Farm**

The Narrabri Solar Farm is a proposed 120 megawatt (MW) Photovoltaic (PV) electricity generating facility. The project has a capital investment of $170 million, with an estimated 280 full time jobs during construction and 10-14 full time operational roles. The proposal is located four kilometres north west of Narrabri between the Newell and Kamilaroi highways (CleanGen, 2015). The proposal includes the connection to the Narrabri substation to the east of the town, with possible routes traversing Segment 1 of the current proposal. At the time of writing the project SEARS have been issued.

**Narrabri South Solar Farm**

The Narrabri South Solar Farm is a 60 MW Solar PV electricity generating facility, located around seven kilometres south east of Narrabri. The proposal has a capital investment of $90 million, construction is expected to take 9 to 12 months, with an expected peak in employment of around 112 onsite workers (Melotte, 2017). At the time of writing the project SEARS have been issued.

**Moree Solar**

The Moree Solar project is a 150 MW PV electricity generation facility. The project also includes construction of an electricity transmission line which would connect the solar power station to the Moree 132 kV substation. The project site is located around 10 kilometres south of Moree (Walsh et.al, 2011). At the time of writing, the power station was online and contributing electricity to the grid.

**Moree Water Park**

The Moree Water Park project is underway and on completion will include the construction of three water ski lakes between 800 and 1200 m in length. The project is located around eight kilometres to the south of Moree and is anticipated to be operational in 2017 (Moree Plains LGA, 2017).

The Moree Gateway Project is the development of a precinct at the southern entrance of the town of Moree. The proposal is located on land directly adjacent to the Airport, between the airport and the Newell highway. The proposal is aimed at generating economic activity and employment. (Moree Plains LGA, 2017).

**4.12.3 Summary of issues**

The following projects could result in cumulative impacts with the proposal and would require consideration as part of the future planning stages:

- The North Moree Newell Highway upgrade
- The Narrabri Grain Storage and Rail Transfer facility
- The Inland Rail Line (Narrabri to North Star)
- Narrabri Solar Farm
- Narrabri South Solar Farm
- Narrabri Gas Project and associated Western Slopes Gas Pipeline.

The remaining proposals identified in section 4.12.2 are not considered an issue due to their location from the current proposal, the size the projects, or current development stage.
Generally the following issues require consideration:

- the timing of the proposal may coincide with other major projects currently proposed within the region placing an increase in demand and completion for construction labour and local accommodation and construction materials
- the timing of the project may coincide with peak agricultural periods placing an increase in demand and completion for construction labour
- non-resident workforce or workers relocating to the region to pursue employment opportunities have the potential to place excessive demand regional facilities
- the timing of the project may coincide with other major projects and result in cumulative construction impacts such as traffic delays and amenity issues relating to construction noise and dust.

The following project specific impacts require consideration:

- given the close proximity, it is anticipated that Segment 1 would be impacted by the planning, construction and operation of the Grain storage and rail transfer facility. The timing of the construction of both projects would need to be considered in the project planning for both proposals to minimise cumulative construction impacts such as traffic, noise and air quality in the vicinity of Narrabri
- the Inland Rail Line (Narrabri to North Star) project is located adjacent to all segments associated with the proposal, and as a result will need to be considered during the planning and assessment process for the current proposal. Its location adjacent to the proposed Grain Storage and Rail transfer facility, and within the villages that are impacted by the Newell Highway upgrade will also require consideration. The timing of the construction of both projects would need to be considered in the project planning for both proposals to minimise cumulative construction impacts such as traffic, noise and air quality
- it is anticipated that planning and assessment of the North Moree Newell Highway upgrade will be undertaken in conjunction with this current proposal location. Potential cumulative impacts could be associated during construction that would impact access in and around to the town of Moree, in addition to impact on highway movements
- the Narrabri Solar farm is located on land directly to the west of the proposed grain storage facility. Cumulative impacts such as noise, dust and traffic on Narrabri and surrounds would need to be assessed should construction activities occur simultaneously. Construction traffic for the solar farm is unlikely to impact the Newell Highway as the access road is off the Kamilaroi Highway
- the Narrabri South Solar farm would not impact the Newell Highway upgrade due to the distance between the projects, however potential timing of projects may increase pressure on competition and availability of labour and associated infrastructure
- while the Narrabri Gas project and associated Western Slopes Gas Pipeline would not impact the Newell Highway geographically given the distances between the proposals. However increasing highway usage of construction vehicles, and the planned intersection upgrades of the Newell Highway associated with the gas project would need to be considered to avoid extensive delays should construction periods align. Cumulative socio economic impacts should also be considered during construction due to the influx of site workers during construction.

### 4.12.4 Recommendations

The following recommendations should be considered during the planning and assessment phase of the proposal:

- further assessment of cumulative impacts would be carried out as detailed environmental assessment for the proposal. This would include, but not be limited to further review of current or planned projects near the proposal for which construction may occur over a similar period, specialist studies for the environmental assessment would consider the potential for cumulative impacts arising from the proposal in combination with the impacts of other projects, and identification of mitigation measures where needed for cumulative impacts.
5 Conclusion

Roads and Maritime is proposing major pavement upgrades to about 32.8 kilometres of Newell Highway between Narrabri and Moree. Five overtaking lanes are also proposed to be included in the scope of works. This report addressed the proposed pavement upgrades and overtaking lanes between Narrabri to Moree.

The proposal is located in the Central West of NSW, and traverses the Narrabri Shire and Moree Plains Local Government Areas (LGAs). Narrabri is located around 415 kilometres North West of Sydney.

Once a preferred option has been identified and a concept design has been developed, a detailed environmental impact assessment would be prepared. This detailed environmental assessment would detail environmental safeguards and management measures that would be implemented.

Based on the preliminary assessment the following are considered key environmental issues:

- disruptions and management of traffic and transport on the Newell Highway, including heavy and light vehicle movements, and access to rural/residential properties, and commercial including Moree Airport, agricultural and industrial land uses
- threats to ecological values, primarily due to the presence of Weeping Myall Woodlands threatened ecological community, listed under both the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), and *Threatened Species Conservation Act 1995* (TSC Act), and the presence of Poplar Box Grassy Woodland nominated for listing under the EPBC Act
- potential impacts to identified Aboriginal and non-aboriginal heritage items adjacent to the proposal
- management of potentially high salinity risks and contamination potential
- water quality and hydrology, due potential direct impacts to ephemeral waterbodies
- management of flooding risk to and from the proposal
- noise and vibration issues to local rural/residential land uses
- disruptions to landscape character and visual amenity
- socio-economic impacts due to the competition for construction labour, materials and influx of workers placing pressure on local infrastructure
- cumulative issues to the local community and environment due to other major projects.

5.1 Summary of recommendations

Based on the outcomes of the PEI, the following recommendation should be considered during design and planning.

- consultation with community, trucking association and agricultural industry groups to minimise network disruptions and manage peak periods; and other major project proponents to manage potential cumulative impacts
- apply the ‘avoid, minimise, mitigate and offset’ hierarchy during further design development, specifically in relation to threatened communities and species consistent with commitment made within the EPBC Act Strategic Assessment – Strategic Assessment Report (Roads and Maritime, 2015a)
- design development should ensure identified aboriginal and non-aboriginal heritage sites are avoided, and management actions implemented to avoid harm to these sites
- detailed geotechnical investigations and assessment, and preliminary site assessments should be undertaken to support further design development
• further design development and detailed environmental assessment for the proposal should assess potential flooding impacts during construction and operation including consideration of the NSW Government’s Floodplain Development Manual (Department of Natural Resources, 2005), Practical Consideration of Climate Change - Flood risk management guideline (DECC, 2007) and Australian Rainfall and Runoff: A guide to flood estimation (Commonwealth of Australia (Geoscience Australia) 2016)

• further design development and detailed environmental assessment for the proposal should include identification of potential impacts on stormwater quantity, change in stormwater runoff (increase or decrease) and sensitivity of downstream waters

• further detailed environmental assessment for the proposal should assess potential noise and vibration impacts in accordance with the following Roads and Maritime guidelines; Noise Mitigation Guidelines (Roads and Maritime, 2015a), Noise Criteria Guideline (Roads and Maritime, 2015b) Noise model validation Guideline (Roads and Maritime, 2016a) Construction and Noise Vibration Guideline (Roads and Maritime, 2016b)

• a basic level of socio-economic assessment should be undertaken in accordance with the Roads and Maritime Environmental Impact Practice Note: Socio-economic Assessment (EIA N-05)

• an urban design, landscape character and visual impact assessment will be undertaken to identify the potential visual impacts of the proposal in accordance with the Roads and Maritime Environmental Impact Practice Note: Guideline for Landscape Character and Visual Impact Assessment; (EIA-N04)

• during the next phase of assessment further consideration will be given to managing air quality during construction including:
  • potential sources of air pollution
  • air quality management objectives consistent with any relevant published EPA guidelines
  • mitigation and suppression measures to be implemented
  • methods to manage work during strong winds or other adverse weather conditions
  • a progressive rehabilitation strategy for exposed surfaces

• assessment of the greenhouse gas emissions for the project will be undertaken for construction and operation. This will investigate, but not be limited to, the following:
  • identify and quantify the sources of greenhouse gas emissions associated with the construction, operation and maintenance of the project
  • identify opportunities to reduce the greenhouse gas emissions associated with the project

• further assessment of cumulative including but not be limited to, further review of current or planned projects near the proposal with similar development schedules and specialist studies to assess the potential for cumulative impacts arising, and identification of mitigation measures where needed for cumulative impacts.
6 Certification

This preliminary environmental investigation provides a true and fair review of the proposal in relation to environment issues.

Emma Dean
Principal Environmental Scientist
WSP

Date: 3 November 2017

I have examined this preliminary environmental investigation and accept it on behalf of Roads and Maritime Services.

Ben Orford
Project Development Manager
Regional Project Office | Technical Project Services

Date:
7 References


APA Group (2017) Preliminary Environmental Assessment Western Slopes Pipeline project, Western Slopes Pipeline Pty Ltd.


GHD (2014), Narrabri Grain Storage and Rail Transfer Facility, Preliminary Environmental Assessment, CBH Group, Sydney.


Molino Stewart (2016) State of the Environment Report 2015-2016; Moree and Narrabri Local Government Areas; Moree Plains and Narrabri LGAs, NSW.


Moree Plains Shire (2013) Moree Plains 2035 Community Strategic Plan, Moree NSW.


NSW Department of Planning and Infrastructure (2013) Salinity hazard report for Catchment Action upgrade – border Rivers – Gwydir CMA.


Office for Environment and Heritage (2016) *NSW Mitchell Landscapes Version 3.1*.


## Terms and acronyms used in this PEI

<table>
<thead>
<tr>
<th>Term / Acronym</th>
<th>Description</th>
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<tr>
<td>A39</td>
<td>The Newell Highway</td>
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<tr>
<td>ADT</td>
<td>Average daily traffic volumes</td>
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<td>AHIP</td>
<td>Aboriginal heritage impact permit</td>
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<td>ARTC</td>
<td>Australian Rail Track Corporation</td>
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<td>BAM</td>
<td>Draft Biodiversity Assessment Methodology 2017</td>
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<td>Decibel – A-weighted</td>
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<td>Environmental impact assessment</td>
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<td>EIS</td>
<td>Environmental impact statement</td>
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<td>EP&amp;A Act</td>
<td><em>Environmental Planning and Assessment Act 1979</em> (NSW). Provides the legislative framework for land use planning and development assessment in NSW</td>
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<td>EPA</td>
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<td>ESD</td>
<td>Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.</td>
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<td>Local Aboriginal Land Council</td>
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<td>Matters of national environmental significance under the Commonwealth <em>Environment Protection and Biodiversity Conservation Act 1999</em>.</td>
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<td>PAD</td>
<td>Potential archaeological deposit</td>
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<td>PEI</td>
<td>Preliminary environmental investigation</td>
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<td>POEO Act</td>
<td><em>Protection of Environment and Operations Act 1997</em> (NSW)</td>
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<td>TSC Act</td>
<td>Threatened Species Conservation Act 1995 (NSW)</td>
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Appendix A

Newell Highway upgrade: Narrabri to Moree preliminary ecological assessment