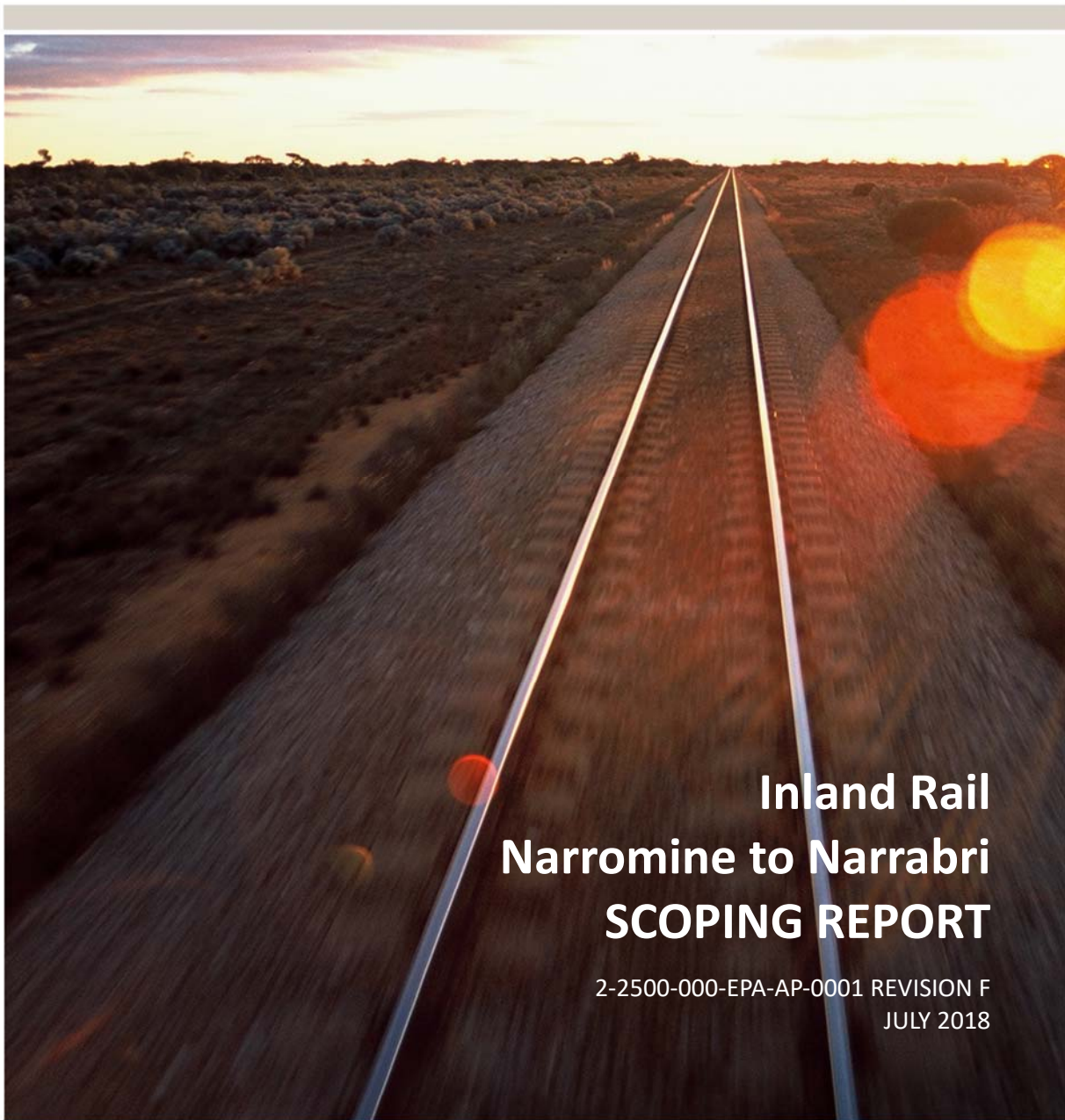




The Australian Government's priority freight rail project



Inland Rail Narromine to Narrabri SCOPING REPORT

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GLOSSARY

TERM	DEFINITION
Culvert	A small channel, pipe or drain that allows water to pass under a road/rail line
Crossing loop	A separate section of track that is used to allow one train to safely pass another
Cutting	A form of deep excavation in soil or rock
Embankment	A structure where the rail line is above the natural surface
Emission	A substance discharged into the air
Inland Rail programme (Inland Rail)	The Inland Rail programme encompasses the construction and operation of a new inland rail connection between Melbourne and Brisbane, via Wagga, Parkes, Moree, and Toowoomba. The route for Inland Rail is about 1,700 km in length. Inland Rail will involve a combination of upgrades of existing rail track and the provision of new track.
Level crossing	A place where rail lines and a road cross at the same grade (or elevation).
Proposal	The construction and operation of the Narromine to Narrabri section of Inland Rail
Proposal site	The area that would be directly affected by construction works (also known as the construction footprint). It includes the location of proposal infrastructure, the area that would be directly disturbed by the movement of construction plant and machinery, and the location of construction compounds, storage areas and other ancillary facilities that would be used to construct that infrastructure.
Rail infrastructure	Infrastructure required for the operation of a rail network, which includes tracks, wiring, signalling, stations etc.
Rail sidings	A short stretch of railroad track used to store rolling stock or enable trains on the same line to pass , or to enable the loading or unloading of freight trains.
Search area or Study area	The proposal site with a 10 kilometre buffer
Sensitive receivers	Land uses which are sensitive to potential noise, air and visual impacts, such as residential dwellings, schools and hospitals
Signalling	Rail traffic lights and operational signage to allow for the safe operation of trains
Turn outs	A mechanical installation that enables railway trains to be guided from one track to another
Wheel squeal	A screeching train-track friction sound, most commonly occurring on sharp curves or as a result of heavy braking

LIST OF ABBREVIATIONS

TERM	DEFINITION
AHD	Metres Australian Height Datum
AEP	Annual exceedance probability
AHIMS	Aboriginal Heritage Information Management System
ARTC	Australian Rail Track Corporation Ltd
BC Act	(NSW) <i>Biodiversity Conservation Act 2016</i>
CEEC	Critical endangered ecological community
CRN	Country Regional Network
DotEE	(Commonwealth) Department of the Environment and Energy
DP&E	(NSW) Department of Planning and Environment
DPI	NSW Department of Primary Industries
EEC	Endangered ecological community
EIS	Environmental impact statement
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
EP&A Act	(NSW) <i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	(NSW) Environmental Planning and Assessment Regulation 2000
EPBC Act	(Commonwealth) <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	(NSW) <i>Fisheries Management Act 1994</i>
GHD	GHD Pty Limited
Infrastructure SEPP	(NSW) <i>State Environmental Planning Policy (Infrastructure) 2007</i>
IRIG	Inland Rail Implementation Group
IS	Infrastructure Sustainability
ISCA	Infrastructure Sustainability Council of Australia
Jacobs	Jacobs Group (Australia) Pty Limited
LEP	Local environmental plan

TERM	DEFINITION
LGA	Local government area
NPW Act	(NSW) <i>National Parks and Wildlife Act 1974</i>
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PAHs	Poly-aromatic hydrocarbons
POEO Act	(NSW) <i>Protection of the Environment Operations Act 1997</i>
Roads Act	(NSW) <i>Roads Act 1993</i>
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSI	State Significance Infrastructure
TEC	Threatened ecological community
The study	Melbourne–Brisbane Inland Rail Alignment Study
Umwelt	Umwelt (Australia) Pty Limited

1. INTRODUCTION

1.1. Background

The Australian Government has committed to delivering the Inland Rail programme, which is a high performance and direct interstate freight rail corridor between Melbourne and Brisbane, via central-west New South Wales (NSW) and Toowoomba in Queensland.

Inland Rail is a major nation-building programme that will enhance Australia's existing national rail network and serve the interstate freight market.

The Inland Rail route, which is about 1,700 kilometres (km) long, involves:

- Using the existing interstate rail line through Victoria and southern NSW.
- Upgrading about 400 km of existing track, mainly in western NSW.
- Providing about 600 km of new track, mainly in northern NSW and south-east Queensland.

The Inland Rail programme consists of 13 separate projects, seven of which are located within NSW. Each of these projects (and, in some cases as appropriate, separate work sites within a project) would be subject to an assessment and, if required, approval under the relevant planning or project laws in the relevant jurisdictions. Each assessment would also take into account its part in the Inland Rail programme.

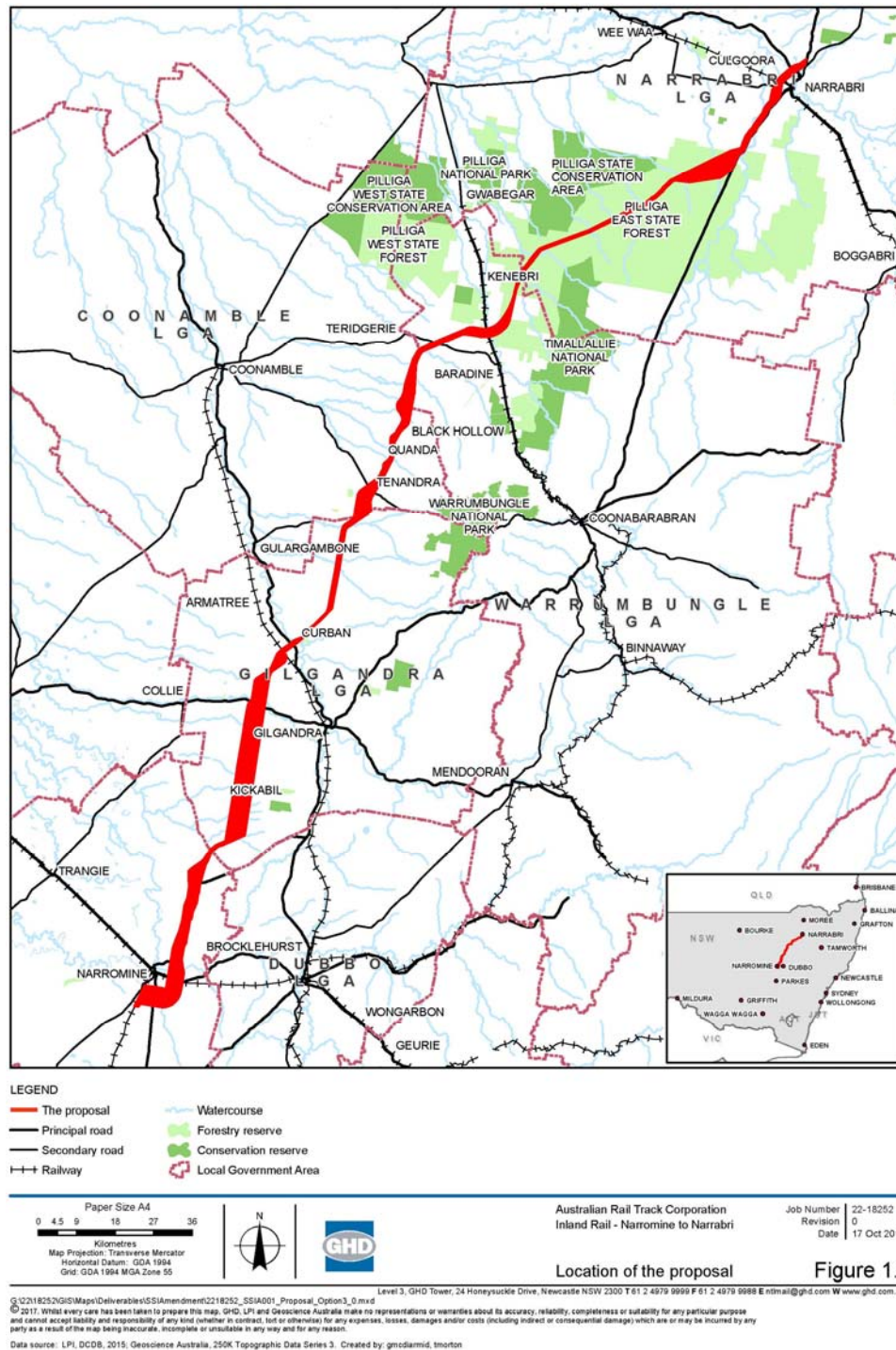
The project that is the subject of this application is the Narromine to Narrabri section ('the proposal'), consisting of approximately 300 km of new single track rail line, through private and public property in a "greenfield" environment.

Australian Rail Track Corporation Ltd (ARTC) ('the proponent') is seeking approval to construct and operate the Narromine to Narrabri section of Inland Rail.

The proposal is subject to environmental assessment under Part 5, Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The capital investment value of the proposal is estimated to be in excess of \$50 million, and as a result the proposal is State Significant Infrastructure under *State Environmental Planning Policy (State and Regional Development) 2011*. The proposal requires approval from the NSW Minister for Planning under Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). In addition, ARTC is seeking to have the proposal declared Critical State Significant Infrastructure under Schedule 5 of the *State Environmental Planning Policy (State and Regional Development) 2011*.

This document supports an application to the Department of Planning and Environment (DP&E) seeking the Secretary's Environmental Assessment Requirements (SEARs) for the Environmental Impact Statement (EIS), as part of the first step in the approvals process for the proposal.

Figure 1.1 Location of the proposal



1.2. Overview of the proposal

The proposal passes through agricultural and rural properties and state forests in central NSW. The proposal site therefore includes a broad corridor to allow for an optimal alignment to be further refined during the design process, as shown in Figure 1.1.

The land requirement for the Inland Rail will comprise a corridor with an average width of 40 metres (m), with some variation to accommodate particular infrastructure and to cater for local topography. The corridor will be of sufficient width to accommodate the infrastructure currently proposed for construction, as well as future expansion, including possible future requirements for 3,600 m long trains.

Project construction will be a single track railway, with crossing loops to accommodate double stacked freight trains up to 1,800 m long. Components of the construction will include infrastructure to accommodate possible future augmentation and upgrades of the track as discussed above. However, the future upgrades to the track would be subject to their own planning, assessment and approval considerations. Clearing of the corridor, with an average width of 40 m, would be required to allow for construction and to maintain the safe operation of the railway.

The operational phase will be of a single track with crossing loops to accommodate double stacked freight trains up to 1,800 m long. Impact assessment will be undertaken for rail traffic and associated activities projected at the year 2040. Inland Rail train specifications and operation of the proposal is described in section 5.

1.2.1. Key features

The key features of the proposal, as currently designed, are included below and are subject to further design and refinement:

- About 300 km of rail track construction including rail embankments and cuttings.
- Construction of about 260 culverts and underbridges.
- Construction of about 120 level crossings, including public roads and private crossings.
- Construction of around seven crossing loops.
- Around five bridges including grade separated crossings for road over rail or rail over road.
- Potential for viaducts where the design determines appropriate, such as where the new rail line will pass over the Macquarie River floodplain and the Namoi River / Narrabri Creek floodplain.
- Junctions with existing rail lines to allow trains to travel between networks (where required).

Associated works would include signalling and communications, signage, fencing, services and utilities. The construction and operation of the proposal would also require ancillary facilities which may include:

- Construction access roads and access tracks.
- Permanent and temporary changes to the road network.
- Construction compounds, storage areas and small quarries or borrow pits.

In addition to the above proposal key features and subject to further feasibility analysis and design definition, the following may form part of the project scope and, if so, will be assessed in the EIS:

- Mobile batch plant.
- Camp accommodation for construction workers.
- Construction water supply and storage.
- Substantial environmental impact mitigation measures.
- Rail sidings.

1.2.2. Timing and program

Construction is anticipated to commence in 2020 and is expected to take about 48 months to construct.

1.2.3. Operation

The Narromine to Narrabri section is expected to have an average weekly demand of up to 8.5 trains per day (2025) with a peak demand of up to 15 trains per day (2040). The new rail line will be a faster, more efficient route that bypasses the Sydney rail network and will enable the use of double stacked trains along its entire length.

Trains would operate 24 hours per day and would be up to 1,800 m in length; carry double stacked containers up to 6.5 m high; and require a vertical clearance of 7.1 m.

1.2.4. Capital investment value

The estimated capital investment value of the proposal is estimated to be in excess of \$50 million. Costing is to be finalised during the detailed design stage.

1.3. The proponent and future operator

1.3.1. The proponent

ARTC is the proponent of the proposal and has been tasked with developing a program to deliver Inland Rail, under the guidance of the Department of Infrastructure and Regional Development. ARTC was created after the Australian and state governments agreed in 1997 to the formation of a 'one stop shop' for all operators seeking access to the national interstate rail network. Across its rail network, ARTC is responsible for:

- Selling access to train operators.
- Development of new business.
- Capital investment in the corridors.
- Management of the network.
- Infrastructure maintenance.

Further information on ARTC can be found at <http://www.artc.com.au>.

1.3.2. Future operator

The proposal would form part of the existing rail network operated and maintained by ARTC. ARTC does not operate trains. Train services would be provided by a variety of operators.

1.4. Purpose and structure of the report

This document contains a preliminary assessment of the proposal and its likely environmental impacts to support the preparation of the SEARs under section 5.16 of the EP&A Act. The SEARs will be prepared by the Secretary of the DP&E in consultation with other relevant government agencies. The structure of this report is as follows:

- Section 1 – Introduction: outlines the key elements of the proposal, and the purpose of this report.
- Section 2 – Strategic context and justification: outline of why the proposal is required and alternatives considered.
- Section 3 – Site description: overview of the regional context of the proposal site.
- Section 4 – Planning and assessment process: outline of the statutory approvals framework for the proposal, including applicable legislation and planning policies.
- Section 5 – The proposal: outlines the scope of works, timeframe and likely activities involved with the proposal.

- Section 6 – Environmental constraints: preliminary assessment of the potential impacts of the proposal on the environment.
- Section 7 – Consultation: includes consultation undertaken to date and what is proposed during the preparation of the EIS.
- Section 9 – Conclusion: outlines the conclusions of the document and the next steps in the process.

1.4.1. Scope of surveys

The assessment of constraints and impacts for the proposal documented in this report are high level and indicative only, with the limits of this report including, for example:

- Geotechnical assumptions are based on limited visual inspections, as access to private land was not available at the time of inspections and therefore site observations were restricted to those areas that could be observed from public roads and access tracks. Due to these land access constraints, geotechnical data is currently limited, with an absence of data for some geotechnical units.
- Apart from the rapid field inspections for ecology and cultural heritage, environmental assumptions are based on desktop information, with no detailed fieldwork, modelling or surveys undertaken to verify actual conditions on the ground. The field surveys were completed without access to private land, so was therefore restricted to public land including public road reserves and State Forests.
- The assessment is based on consideration of potential environmental constraints and impacts within the proposal site. It is noted that the proposal site varies across the alignment, including broad study areas in some sections. Within the broad study areas, potential environmental constraints and impacts have been included for the entire study area. In addition, assessments for some sections of the broad study areas have investigated indicative alignments, with the identified constraints and impacts summary in section 6 based on an initial assessment of the potential worst-case scenario. The potential impacts are therefore only indicative and would be refined during detailed investigations for the EIS.

2. STRATEGIC CONTEXT AND JUSTIFICATION

2.1. Existing rail infrastructure

At present, the only north–south rail corridor in eastern Australia runs from Melbourne to Albury, then through Sydney and to Brisbane, generally along the coast. The concept of an inland railway from Melbourne to Brisbane has been subject to significant analysis due to a number of challenges facing freight transport infrastructure in eastern Australia, including:

- The existing north–south coastal route will reach capacity in the medium term, and additional capacity will be required to service future rail freight demand for interstate and regional freight.
- Rail efficiency and service quality is currently impacting on freight productivity, resulting in higher freight transport costs for consumers.
- Road freight transport has a competitive advantage over rail, making it difficult for rail to increase its market share, with resultant potential for safety, congestion and environmental costs as a result of increased heavy vehicles on roads.
- Rail paths on the coastal route through Sydney are shared between passenger and freight trains, impacting on the reliability of the rail freight supply chain and constraining opportunities for expansion of passenger services.

2.2. Inland Rail development history and options considered

Two major studies have been undertaken in relation to the development of an inland rail route between Melbourne and Brisbane. The first study, completed in 2006, considered potential corridors for the rail line to determine which route would deliver the best economic and financial outcome. This study identified that a ‘far western corridor’ through Parkes would be the best option.

The second study, the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010), examined the far western corridor in detail. The current Inland Rail alignment is shown in Figure 2.1.

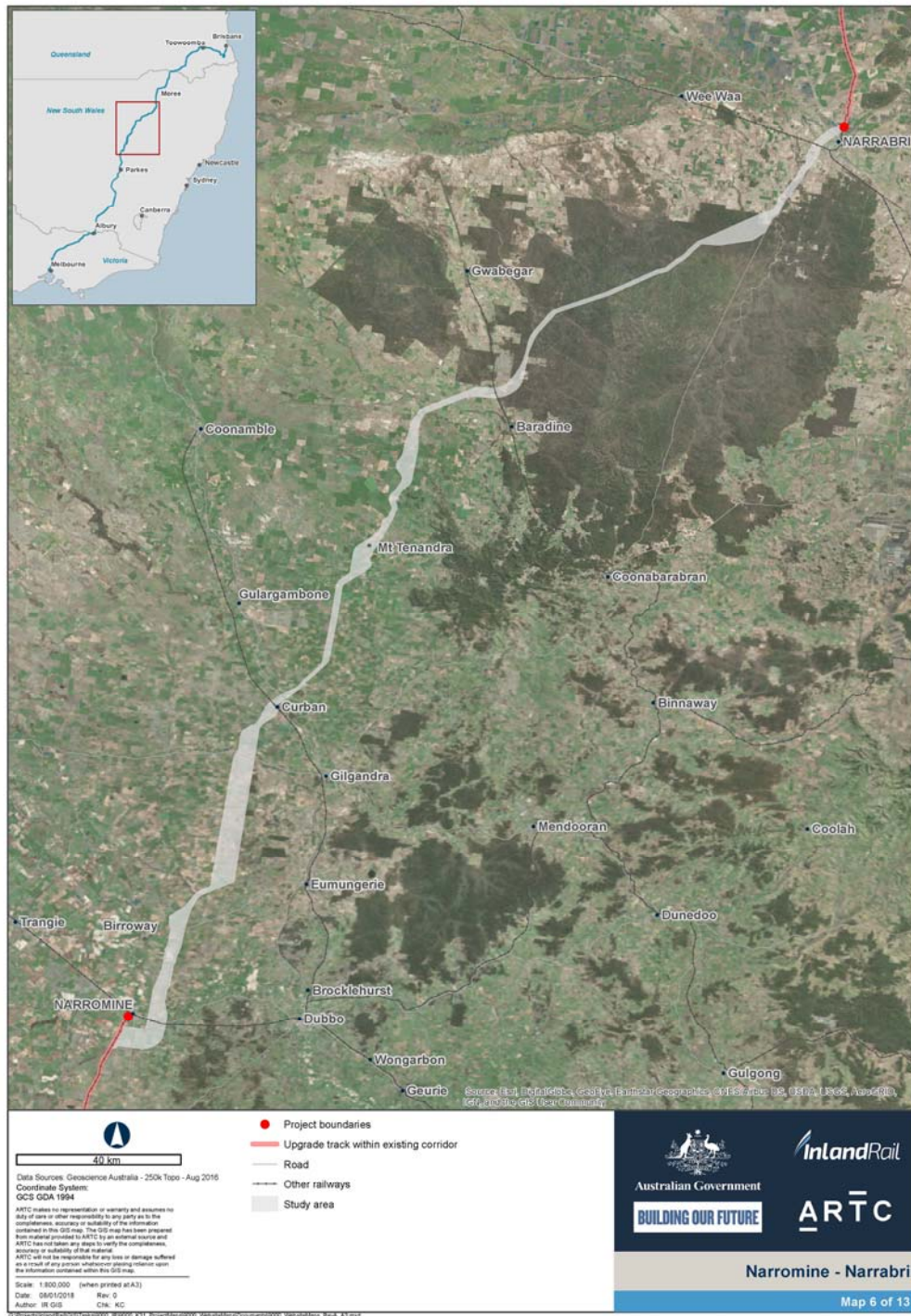
2.2.1. Melbourne–Brisbane Inland Rail Alignment Study

The commencement of the *Melbourne–Brisbane Inland Rail Alignment Study* (‘the study’) was announced by the then Minister for Infrastructure, Transport, Regional Development and Local Government in March 2008. The stated purpose of the study was to determine the optimum alignment, economic benefits and likely commercial success of a new single track dual-gauge inland railway between Melbourne and Brisbane. The study short-listed and analysed a number of route options, and the final report (released by ARTC in July 2010) identified that the proposed alignment comprises a 1,731 km long alignment between Melbourne and Brisbane.

The conclusions of the study include:

- There is demand for an inland railway.
- The route for the inland railway would be more than 100 km shorter than the existing coastal route.
- The preferred alignment could achieve an average Melbourne to Brisbane transit time (terminal to terminal) of less than 24 hours.
- The inland railway would free up rail and road capacity through Sydney.
- The inland railway would achieve a positive economic net present value between 2030 and 2035, and if demand volumes grow more strongly than forecast, viability could be reached sooner.

Figure 2.1 Inland Rail alignment



2.2.2. Work undertaken to date

In November 2013, the Minister for Infrastructure and Regional Development announced that the Australian Government had committed \$300 million to enable the development of Inland Rail to commence. This process began with pre-construction activities such as detailed corridor planning, environmental assessments and community consultation. This funding was subsequently confirmed in the 2014–15 Federal Budget paper entitled Building Australia's Infrastructure.

In 2015, ARTC produced a strategic Programme Business Case (ARTC, 2015) to demonstrate the viability, benefits, costs and risks associated with Inland Rail to the Australian Government for endorsement and for further approval to proceed with the delivery of the Inland Rail programme.

In conjunction with the Programme Business Case, the Inland Rail Implementation Group in 2015 recommended some variations to the corridor from that previously recommended in the 2010 Inland Rail Alignment Study. The report supported the development of Inland Rail and recommended that the Australian Government commit further funding in the 2016-17 Budget for the Inland Rail programme.

The Australian Government has committed a total of \$9.3 billion to deliver Inland Rail.

2.3. Strategic planning context

The proposal is consistent with a number of State and Federal strategic planning documents. These include:

- National Land Freight Strategy, Standing Council on Transport and Infrastructure, 2013.
- NSW: Making it Happen, 2015.
- NSW Long Term Transport Master Plan, Transport for NSW (TfNSW), 2012a.
- NSW Freight and Ports Strategy, TfNSW, 2013a.
- Rebuilding NSW – State Infrastructure Strategy, NSW Government, 2014.
- New England North West Regional Transport Plan, TfNSW, 2013b.
- Murray-Murrumbidgee Regional Transport Plan, TfNSW, 2013c and 2014-15 update.
- Australian Infrastructure Audit – Our Infrastructure Challenges, Infrastructure Australia, 2015.
- Australian Infrastructure Plan – Priorities and Reforms for Our Nation's Future, Infrastructure Australia, 2016.

The EIS would provide further information on relevant strategies and the relationship to the proposal.

2.4. Need for Inland Rail

Freight transport is an essential part of Australia's economic prosperity and competitiveness and a crucial part of many Australian businesses. Freight transport in Australia has quadrupled in the last four decades and is predicted continue to increase to nearly double the 2010 levels by 2030 (National Land Freight Strategy, Standing Council on Transport and Regional Development, 2013). This growth presents a number of challenges but also opportunities for government, industry and the community.

The 2010 Inland Rail Alignment Study report, which was prepared to determine the optimum alignment and economic benefits of Inland Rail, identified that there is demand for an inland railway and that such a railway would achieve a positive economic net present value between 2030 and 2035.

The 2010 Inland Rail Alignment Study and the National Land Freight Strategy also identify a number of constraints that face the current rail line and road freight system, including:

- The existing Sydney–Brisbane route is anticipated to reach capacity by 2052.
- Rail efficiency and service quality is inadequate and passing on higher costs to consumers.
- Inadequate rail services are also encouraging a shift to road freight causing increased congestion, maintenance, safety and environmental issues for roads and highway.
- Priority is given to passenger modes over freight modes in urban transport corridors, adding to the delays in freight rail movements.

These constraints on the current infrastructure coupled with the forecast increasing demand for freight transport indicate a clear need for Inland Rail to provide adequate and efficient freight transport across the east Australian states.

2.5. Need for the proposal

The proposal is integral to the Inland Rail between Melbourne and Brisbane and forms one of the 13 projects required to deliver the programme of works. The Narromine to Narrabri section is about 300 km in length, about 180 km shorter than the existing train network, providing a shorter, faster and more efficient connection. This is critical to the Inland Rail programme achieving an average Melbourne to Brisbane transit time (terminal to terminal) of less than 24 hours.

The proposal:

- Avoids key population centres including Narromine, Gilgandra and Narrabri.
- Avoids key conservation areas including Pilliga National Park and Pilliga State Conservation Area.
- Makes efficient use of public land by passing through extensive areas of state forest including Pilliga East State Forest.

2.6. Key benefits of Inland Rail

Inland Rail will complete a significant section of the national inland rail freight network between Melbourne and Brisbane. By providing a shorter interstate route for freight that does not include travel through the congested Sydney rail network, Inland Rail will save up to 10 hours of travel time between Melbourne and Brisbane.

Trains travelling on this new, more direct route would travel at speeds up to 115 km per hour, and would use significantly less fuel. Furthermore, carbon emissions will be reduced by 750,000 tonnes which is a third of that used for road freight. As a result, Inland Rail would offer a road-competitive freight service that would attract existing and new freight to rail, providing a safe, efficient and sustainable alternative to road transport. By reducing train operating costs and improving service standards, Inland Rail will be an important contributor to national productivity.

It is estimated that, by 2050, Inland Rail will remove 200,000 truck movements from roads each year. The reduction in trucks using the interstate road network would improve road safety, ease congestion and assist local councils through reduced local road maintenance requirements. In addition, by providing a second rail link between Queensland and the southern states, Inland Rail will provide additional resilience and redundancy for the existing rail network.

In summary, Inland Rail will provide the following key benefits:

- Reduction in travel time between Melbourne and Brisbane by up to 10 hours.
- A faster, cheaper, safer, less carbon intensive and more environmentally sustainable alternative to road freight.

- Provision of capacity to meet increasing freight demand.
- Creation of carryover benefits, including cost and time savings, to businesses and consumers that rely on freight.
- Creation and growth of businesses.
- Improvements to road safety, reduced road maintenance costs and reduced congestion through reduction of road freight on interstate highways.
- Creation of capacity for the existing rail line.

2.7. Key benefits of the proposal

The Narromine to Narrabri section is a critical link to the overall Inland Rail connection between Melbourne and Brisbane.

The key benefits of the proposal include:

- Boost to the local economy during construction and operation.
- Opportunities for private operators to develop local freight hubs connecting road and rail transport.
- Job creation during construction and operation, helping to sustain local communities.
- Provides farmers and freight operators with alternative options to access export markets via ports in Brisbane and Melbourne.
- Stimulates competition, reducing cost to market.
- Improves rail network reliability.
- Facilitates local freight travel by rail, taking trucks off the road.
- Contributes towards improved sustainability and reductions in carbon emissions through construction of the Inland Rail programme.

all of which directly support the benefits outlined in section 2.6 for the proposal itself and for Inland Rail more broadly.

2.8. Options considered

In 2016 and 2017, ARTC carried out a detailed review of the Narromine to Narrabri section of Inland Rail. The purpose of the review was to consider the alignment developed in the 2010 Inland Rail Alignment Study and contained in the 2015 Melbourne–Brisbane Inland Rail Programme Business Case. The review was based on preliminary field investigations and consultation with the community and stakeholders (section 7).

Throughout 2016 and 2017, extensive community consultation was undertaken including information sessions, meetings with councils and other key stakeholders, mail outs and landowner meetings (section 7). The consultation informed the development of options based on community feedback. Following further assessment, including preliminary field investigations, this resulted in the development of a number of options across sections of the proposal, as shown in Table 2-1 and Figure 2.2.

The options included the ‘2016 concept alignment’, an option which largely follows the alignment contained in the Melbourne–Brisbane Inland Rail Alignment Study (ARTC, 2010). This option deviates from the previous alignment for a short section at Curban and at the northern end where it uses a section of the existing Walgett rail line to the west of Narrabri. New options developed during this period are referred to as the ‘2017 concept alignment’ in this report. In some sections multiple sub-options were considered, which represented minor differences in alignments however, these are not detailed in this report where there are no significant differences.

Table 2-1 Options

Section	Option	Description
Narromine to Burroway	2017 concept alignment	This option diverts to the east of Narromine and then heads in a northerly direction across the CRN Main Western Line, Mitchell Highway and Macquarie River by a viaduct providing a grade separation before following the alignment of Eumungerie Road.
	2016 concept alignment	This option utilises the ARTC Parkes-Narromine rail line for about 5.5 km before diverting west along the CRN Main Western Line for about 4 km. This option then heads travels north, crossing the Mitchell Highway by grade separation, along an alignment designed to follow cadastral boundaries and road reserves where possible. This option crosses the Macquarie River between Warren Road and Burroway Road.
Burroway to Curban	2017 concept alignment	From the intersection of Collie Road and Old Mill Road, this option follows the alignment of Old Mill Road before diverting north at the intersection of Gilmours Road and Old Mill Road. This option follows the Gilmours Road alignment for about 2 km, before following the alignment of unnamed unsealed roads shown as rights-of-way on cadastre mapping. This option crosses the Oxley Highway about 16.5 km west of Gilgandra, ending about 9.5 km south-west of Curban.
	2016 concept alignment	From the intersection of Collie Road and Old Mill Road, this option follows the alignment of Old Mill Road before diverting north in the vicinity of Goulburn Creek and following cadastre boundaries and Gilmours Road. This option crosses the Oxley Highway about 18.5 km west of Gilgandra, ending about 9.5 km south-west of Curban.
Curban to Mount Tenandra	2017 concept alignment	This option joins the existing CRN Coonamble rail line and heads north west. This option passes the village of Armatree before leaving the CRN Coonamble rail line in the vicinity of Gulargambone and travelling in an easterly direction along Box Ridge Road.

Section	Option	Description
	2016 concept alignment	This option would cross the existing CRN Coonamble rail line at Curban. This option travels in a north-easterly direction, crossing the Castlereagh River south-east of Curban and heading north about 14.5 km after crossing the CRN Coonamble rail line. The alignment heads north following cadastral boundaries and road reserves where possible, before crossing Box Ridge Road about 25 km north-east of Gulargambone.
Mount Tenandra to Baradine	2017 concept alignment	About 400 m after crossing Mungery Road/Gunnawarra Road, this option deviates to the east following cadastre boundaries for about 23.5 km before re-joining the 2016 concept alignment near Barwon, about 9 km south of Baradine Road. While two sub-options were considered here, they only represent minor alignment differences.
Baradine to Narrabri	2017 concept alignment – Pilliga State Forest/Twenty Foot Road sub-option	This option crosses the disused Wallerawang Gwabegar rail line and heads north-east through extensive areas of state forest including Pilliga East State Forest. It then heads north along Twenty Foot Road and re-joins the 2016 concept alignment about 700 m south of the Yarrie Lake Road/Forest Way intersection about 29 km west of Narrabri.
	2017 concept alignment – Pilliga State Forest/Newell Highway sub-option	This option crosses the disused Wallerawang Gwabegar rail line and heads north-east through extensive areas of state forest including Pilliga East State Forest. It then runs parallel to the Newell Highway and re-joins the 2016 concept alignment to the west of Narrabri.
	2016 concept alignment	This option follows the disused Wallerawang Gwabegar rail line in a northerly direction for about 21 km before heading north-east about 7 km south of Gwabegar. The proposal then follows the alignment of Gwabegar Road. Near Bullerawa Creek it deviates to the north past the CSIRO radar facility and joins the Walgett rail line. To the west of Narrabri it deviates to the north-east and re-joins the existing ARTC Mungindi rail line to the north of Narrabri.

These options were subject to a multi-criteria assessment process to examine the potential impacts and benefits. The assessment considered the following criteria to identify on balance, which option in each section was preferred:

- Operational benefits
- Environmental and heritage impacts

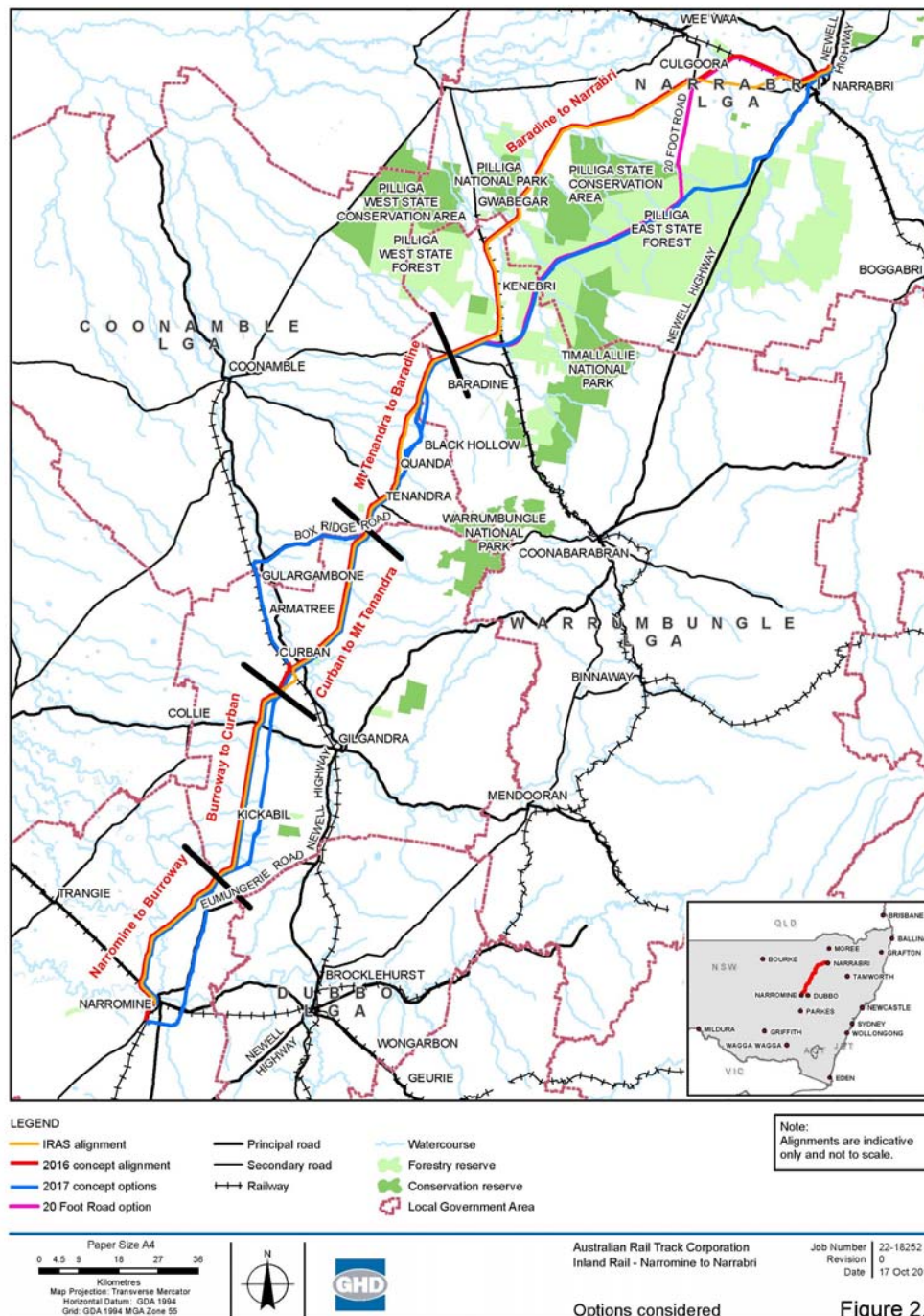
- Safety
- Maintenance
- Road impacts
- Utility impacts
- Structures
- Property impacts
- Land use (existing and future)
- Track design
- Civil and geotechnical
- Capital cost

The assessment identified a preferred option for the Narromine to Narrabri section which was endorsed by ARTC and Commonwealth Department of Infrastructure and Regional Development. The preferred corridor (Figure 1.1) consists of:

- Narromine to Burroway – 2017 concept alignment - Eumungerie Road.
- Burroway to Curban – a corridor encompassing the 2017 concept alignment and 2016 concept alignment.
- Curban to Mount Tenandra – 2016 concept alignment.
- Mount Tenandra to Baradine – 2017 concept alignment (corridor encompassing sub-options).
- Baradine to Narrabri – 2017 concept alignment – Pilliga State Forest/Newell Highway sub-option.

The key benefits of the preferred corridor are described in section 2.7.

Figure 2.2 Options considered



3. SITE DESCRIPTION

This section provides a description of the proposal site and its regional context within central NSW (sections 3.2 and 3.1). The existing rail infrastructure and its operation is described in section 3.4.

3.1. Regional context

The study area is located in central NSW. The proposal site traverses five local government areas (LGAs), with the southern section located in the Narromine and Gilgandra LGAs, the middle section located in the Coonamble and Warrumbungle LGAs, and the northern section located in the Narrabri LGA. The five LGAs are predominantly rural, with the main local industries based around agriculture (dryland livestock grazing and cropping).

Narromine is located in the Narromine LGA at the southern end of the proposal site. The town is about 700 km south-west of Brisbane, 330 km north-west of Sydney and 687 km north-east of Melbourne. It is located on the Macquarie River and the Mitchell Highway. At the 2016 census, Narromine had a population of 4,689 people (ABS, 2017). Narromine is located about 35 km west of Dubbo. There are no national parks or state conservation areas located in the vicinity of the proposal site within the Narromine LGA, with the Cowal State Forest located to the west of the southern extent of the proposal site.

Gilgandra is located in the Gilgandra LGA to the east of the proposal site. The town is about 340 km north-west of Sydney, 620 km south-west of Brisbane and 750 km north-east of Melbourne. At the 2016 census, Gilgandra had a population of 3,126 people (ABS, 2017). Gilgandra is located about 60 km north of Dubbo, which is an important regional service centre. The Drillwarrina National Park is located in the Gilgandra LGA, east of the proposal site. The Warrumbungle National Park (discussed below) is also located within the Gilgandra LGA.

Coonamble is located in the Coonamble LGA to the west of the proposal site. The town is located about 420 km north-west of Sydney, 590 km south-west of Brisbane and 830 km north-east of Melbourne. At the 2016 census, Coonamble had a population of 2,750 people (ABS, 2017). The Pilliga West State Conservation Area and Pilliga West State Forest are located in the Coonamble LGA, Narrabri and Warrumbungle LGAs, west of the proposal site.

Coonabarabran is located in the Warrumbungle LGA to the east of the proposal site. The town is located about 340 km north-west of Sydney, 557 km south-west of Brisbane and 826 km north-east of Melbourne. At the 2016 census, Coonabarabran had a population of 3,290 (ABS, 2017). The Warrumbungle National Park is located in the Warrumbungle LGA to the east of the proposal site. The Warrumbungle National Park was included in the National Heritage List on 15 December 2006 and occupies an area of 23,311 hectares.

Narrabri is located in the Narrabri LGA at the northern end of the proposal site. The town is about 447 km south-west of Brisbane, 521 km north-west of Sydney and 939 km north-east of Melbourne. It is located on the Namoi River at the junction of the Kamilaroi and Newell highways. At the 2016 census, Narrabri LGA had a population of 7,606 people (ABS, 2017). The proposal site between Baradine and Narrabri crosses the disused Wallerawang Gwabegar rail line north of Baradine in the southern section of the Merriwindi State Forest, before heading north-east through Baradine State Forest, Cumbil State Forest, Euligal State Forest and the Pilliga East State Forest. Pilliga State Conservation Area and Pilliga National Park are located north of the proposal site and Timallallie National Park is located south of the proposal site.

As the proposed alignment leaves the Pilliga East State Forest, it passes the proposed location of the Narrabri Gas Project water treatment plant, before following the Newell Highway south of Narrabri and crossing the Walgett rail line north-west of Narrabri. The proposal site crosses the Namoi River floodplain west of Narrabri, crossing Wee Waa Road north-west of Narrabri and following the alignment of the Newell Highway. North of Narrabri the proposal interacts with the Mungindi rail line before joining the Narrabri to North Star section of Inland Rail about 4 km north of the Narrabri railway station.

The regional context for the proposal site is shown in Figure 3.1.

3.2. Description of the proposal site

The proposal is for about 300 km of single track rail line through private and public property in a “greenfield” environment. The proposal would provide a new direct route between Narromine and Narrabri.

The southern end of the proposal site commences about 1.6 km north-east of The McGrane Way/Craigie Lea Lane intersection at Narromine and about 5.6 km south-west of the Narromine railway station. The southern end of the proposal site is located at 811.500 km on the line, measured from the Melbourne start point of the Inland Rail. The proposal would interact with ARTC’s Parkes to Narromine rail line for about 300 m before branching off in an easterly direction for about 5.9 km to the south of Narromine. The proposal then travels in a northerly direction on the eastern side of Narromine, crossing the Country Regional Network (CRN) Main Western Line, Mitchell Highway and Macquarie River by a viaduct that would provide grade separation. It then continues in a northerly direction along Eumungerie Road and Gilmours Road before crossing the Oxley Highway and heading north-east.

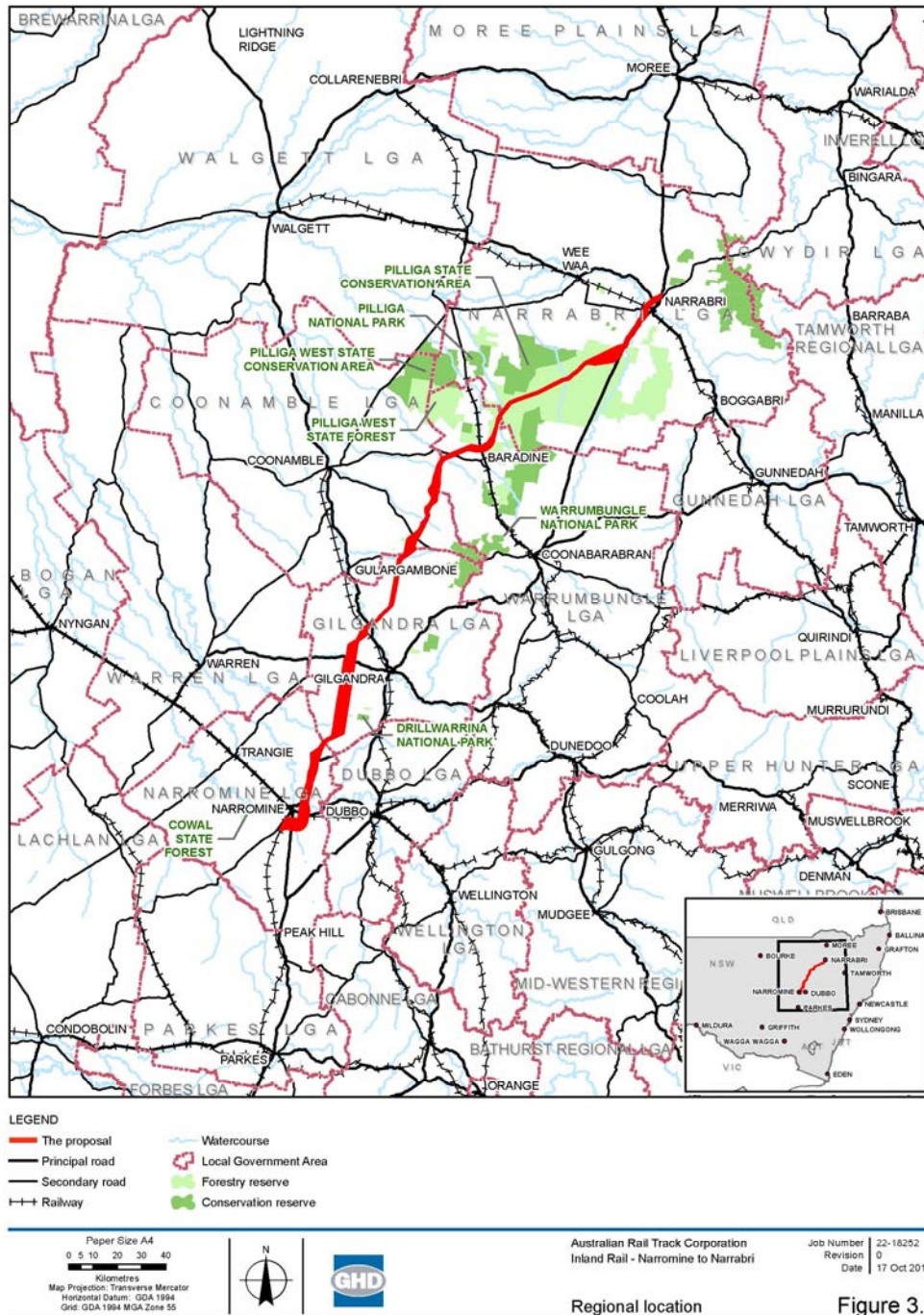
The proposal site crosses the existing CRN Coonamble rail line at Curban near the NSW GrainCorp Limited (GrainCorp) grain storage and handling facility at Curban. The proposal site then travels in a northerly direction towards Mount Tenandra. North of Mount Tenandra the proposal site is predominantly a greenfield section which traverses land primarily cleared for agricultural (cropping and livestock) industries (section 6.7); however, where possible, the alignment would be designed to follow cadastral boundaries and road reserves.

In the northern end of the proposal site, there are large sections of the proposal site located in areas dominated by vegetation associated with state forests (section 6.7.1). The proposal site crosses the disused Wallerawang Gwabegar rail line north of Baradine in the southern section of the Merriwindi State Forest, before heading north-east through Baradine State Forest, Cumbil State Forest, Euligal State Forest and the Pilliga East State Forest. As the proposal leaves the Pilliga East State Forest, it passes near the proposed location for the Narrabri Gas Project water treatment plant, before following the Newell Highway south of Narrabri and crossing the Walgett rail line north-west of Narrabri.

As the proposal site extends through the western outskirts of Narrabri it is located in the vicinity of, and crosses, land used for grazing/cropping, commercial/industrial, and travelling stock reserve. This includes the Narrabri West intermodal terminal servicing grains, cotton, pulses, oil seed and oil seed meal for stock feed; and the Narrabri North intermodal terminal servicing cotton lint, grain (including bulk transport) and pulses.

The proposal site crosses the Namoi River floodplain west of Narrabri on a viaduct, which continues over Wee Waa Road and Kamilaroi Highway to the north-west of Narrabri. After the Kamilaroi Highway, it continues on an embankment before following the Newell Highway for 1.2 km and joining the Narrabri to North Star section of Inland Rail about 4 km north of the Narrabri railway station.

Figure 3.1 Regional location



3.3. Land ownership

Full or partial acquisition of properties would be required to construct and operate the proposal. The proposal site is located on both public and private land. The majority of the proposal site passes through private land used for agricultural purposes. The proposal site interacts with existing rail corridors for the Parkes to Narromine, Main Western, Coonamble, Wallerawang Gwabegar (no longer operational), Walgett and Mungindi rail lines which are owned by the NSW Government (TfNSW). Some site access would be via private land, permission from the land owner would be sought where access through private property is required.

3.4. Existing rail facilities

3.4.1. Overview

The proposal site is predominately greenfield. However, the proposal interacts with six existing rail lines (Figure 5.1) that are part of the ARTC and CRN networks:

- Connection from ARTC's Parkes-Narromine rail line at Narromine, utilising about 0.3 km of existing rail line.
- Crossing the existing CRN Main Western Line to the east of Narromine.
- Crossing the CRN Coonamble rail line at Curban, which operates between Coonamble and Dubbo, and involving about 3 km of amendments to the existing line. Crossing the disused Wallerawang Gwabegar rail line north of Baradine.
- Crossing the existing Walgett rail line west of Narrabri. The Walgett rail line branches from ARTC's Main North Line at Narrabri and passes through the towns of Wee Waa and Burren before ending in the town of Walgett.
- Joining ARTC's Mungindi rail line on the northern side of Narrabri to connect with the Narrabri to North Star section of Inland Rail via Moree. This includes about 0.4 km of amendments to ARTC's Mungindi line.

3.4.1.1. Passenger services

Passenger trains operate on the Main Western and the Mungindi rail lines. It is noted, in relation to the Main Western rail line, that passenger trains do not operate in the vicinity of the proposal site (at Narromine); passenger trains operate only as far as Dubbo. The Mungindi rail line operates a daily passenger train from Werris Creek to Moree.

3.4.1.2. Freight services

The Parkes-Narromine rail line is used by grain trains at an average of three to four trains per day (both directions), with up to 10 trains on a peak day. These trains carry about two million tonnes of grain per year. Trains carrying ore produced by the Northparkes mine also travel along the line from the Goonumbla rail siding bound for Port Kembla at an average rate of one train per day.

The Walgett rail line is used primarily for haulage of wheat and other agricultural produce from western NSW. The Main Western rail line is used for grain/goods transport with freight volumes estimated at 8.6 million tonnes per year in 2011 and forecast to 17.5 million tonnes per year in 2031 (TfNSW, 2013a). The Coonamble rail line is used for seasonal grain transport from numerous silos along the line. The Mungindi rail line is used for passenger and goods transport (mainly wheat), operating to Moree for passengers and North Star for goods on a demand-based arrangement.

4. PLANNING AND ASSESSMENT PROCESS

4.1. Overview

The proposal is declared to be State significant infrastructure (SSI) and will be assessed under Division 5.2 of the EP&A Act. In summary:

- under *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP), the proposal is classified as ‘development for the purpose of a railway or rail infrastructure on behalf of a public authority’ and so may be carried out without development consent under the EP&A Act;
- where development is permissible without consent, it can be declared to be SSI by a SEPP, usually *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP);
- relevantly the SRD SEPP provides two potential avenues for the project to be declared to be SSI:
 - where ARTC is carrying out the proposal and the capital investment value is greater than \$50 million (clause 14 and item 3 of Schedule 3 of the SRD SEPP); and
 - where ARTC has formed the opinion that the proposal is likely to significantly affect the environment (clause 14 and item 1 of Schedule 3 of the SRD SEPP);
- ARTC has formed the opinion that both of these situations will apply, and the proposal is therefore declared to be SSI.

The sections below provide more detail on the EP&A Act and its operation in respect of the proposal.

4.2. Environmental Planning and Assessment Act 1979

The EP&A Act and *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) establish a framework for the assessment and approval of developments in NSW. They also provide for the making of environmental planning instruments, including state environmental planning policies (SEPPs) and local environmental plans (LEPs), which determine the permissibility and approval pathway for development proposals and form a part of the environmental assessment process.

4.2.1. Part 5 of the EP&A Act

Part 5 of the EP&A Act defines the assessment process for proposals that do not require development consent. Section 5.5 requires a determining authority to ‘*examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity*’.

Section 5.7(1) provides that ‘*a determining authority shall not carry out an activity, or grant an approval in relation to an activity ... that is likely to significantly affect the environment (including critical habitat) or threatened species, populations or ecological communities, or their habitats, unless (a) the determining authority has obtained or been furnished with and has examined and considered an environmental impact statement in respect of the activity*’.

In accordance with the requirements of section 5.7, ARTC has formed the opinion that the proposal is likely to significantly affect the environment and, as a result, an EIS is required.

As such the proposal is SSI under Schedule 3 of the State and Regional Development SEPP, as detailed in section 4.1 above. The proposal therefore becomes subject to the assessment and approval process in Division 5.2 of the EP&A Act.

4.2.2. Division 5.2 of the EP&A Act

Division 5.2 of the EP&A Act establishes an assessment and approval regime for SSI. Division 5.2 applies to development that is declared to be SSI by an SEPP.

Under section 5.12(3), development cannot be SSI unless it is of a kind that may be carried out without development consent under Part 4 of the EP&A Act and comprises:

- (a) infrastructure, or*
- (b) other development that (but for this Part and within the meaning of Part 5) would be an activity for which the proponent is also the determining authority and would, in the opinion of the proponent, require an environmental impact statement to be obtained under Part 5.*

As indicated in sections 4.2 and 4.2 above, the proposal satisfies these requirements.

Under section 5.14 of the EP&A Act, the approval of the Minister for Planning is required for SSI before it can be carried out. In accordance with section 5.15 (Application for approval of State significant infrastructure):

'(1) The proponent may apply for the approval of the Minister under this Part to carry out State significant infrastructure.

(2) The application is to:

- (a) describe the infrastructure, and*
- (b) contain any other matter required by the Secretary.*

(3) The application is to be lodged with the Secretary.'

Under Division 5.2 of the EP&A Act, the planning and approvals process includes the following key steps:

1. Submission of a State Significant Infrastructure application with the supporting document to the Secretary of the DP&E under section 5.15 of the EP&A Act, to seek the Secretary's Environmental Assessment Requirements (SEARs) - this document is the supporting document for the application.
2. Preparation and submission of an EIS under section 5.16(2) of the EP&A Act, addressing the requirements of the EP&A Act and EP&A Regulation and the matters outlined in the SEARs.
3. Public exhibition of the EIS for a minimum of 30 days.
4. Assessment of the application and EIS by the DP&E and preparation of the Secretary's environmental assessment report (section 5.18 of the EP&A Act).
5. Determination of the application by the Minister.

Clause 192 of the EP&A Regulation requires that an application for approval of the NSW Minister for Planning to carry out SSI must include:

- Details of any approval that would, but for section 5.23 of the EP&A Act, be required for the carrying out of the SSI; and
- Details of any authorisations that must be given under section 5.24 of the EP&A Act if the application is approved; and
- A statement as to the basis on which the proposed infrastructure is SSI, including, if relevant, the capital investment value of the proposed infrastructure.

Section 5.16 of the EP&A Act provides for the declaration of critical State significant infrastructure (Critical SSI). Critical SSI projects are high priority infrastructure projects that are essential to the State. Section 5.16 of the EP&A Act provides that any SSI may also be declared to be critical SSI, if it is 'of a category that, in the opinion of the Minister, is essential for the State for economic, environmental or social reasons.' As critical SSI, the proposal would be permissible without consent under clause 16(a) of the SRD SEPP. However, the proposal would remain subject to assessment under Division 5.2 of the EP&A Act and requires the approval of the Minister for Planning.

4.2.3. Land owner's consent

Clause 193(1) of the EP&A Regulation provides that consent of individual land owners would not be required to make the SSI application because the proposal:

- Is on behalf of a public authority, and ARTC is a public authority for the purposes of clause 193; or
- Is for linear transport infrastructure.

However, the proponent must give notice of the application in accordance with clause 193(4), either:

- by notice to relevant land owners, no later than 14 days after the application has been made; or
- by advertisement published in a newspaper circulating in the area in which the infrastructure is to be carried out, at least 14 days before the EIS which relates to the infrastructure is placed on public exhibition.

4.2.4. State environmental planning instruments

4.2.4.1. State Environmental Planning Policy (Infrastructure) 2007

The infrastructure SEPP aims to assist in the delivery of public infrastructure across the state through consistent planning and assessment regimes for public infrastructure. Clause 79 of the infrastructure SEPP permits development on any land for 'the purpose of a railway or rail infrastructure' to be carried out on behalf of a public authority without consent', so the project is permissible without consent.

Typically, the provisions of the Infrastructure SEPP prevail over other environmental planning instruments unless the work is located on land reserved under the *National Parks and Wildlife Act 1974* (NPW Act) or is regulated by State Environmental Planning Policy (Coastal Management) or *State Environmental Planning Policy (State and Regional Development) 2011*. As the proposal is not located on land reserved under the NPW Act, nor under any of the above SEPPs, those exclusions would not apply.

As set out above, the consequence of the proposal being permissible without development consent is that, among other things, the proposal is capable of being declared to be SSI.

4.2.4.2. State Environmental Planning Policy (State and Regional Development) 2011

Clauses 14 and 15 of SRD SEPP provides for SSI and clause 16 provides for Critical SSI. Clause 14 states that development is SSI if it:

- Is wholly or partly permissible without consent under Part 4 of the EP&A Act, by virtue of operation of a SEPP (such as the Infrastructure SEPP); and
- Meets the definitions provided in Schedule 3 to the State and Regional Development SEPP.

Clause 16 states that development is Critical SSI if it:

- May be carried out without development consent under Part 4 of the EP&A Act, and

- Is declared to be SSI for the purposes of the EP&A Act if it is not otherwise so declared, and
- Is declared to be critical SSI for the purposes of the EP&A Act.

The proposal is declared to be SSI for two reasons. First, item 1 of Schedule 3 of the SRD SEPP declares that infrastructure for which the proponent is the determining authority and which would, in the opinion of the proponent, require an EIS to be obtained is SSI. Because the proposal is permissible without consent under the Infrastructure SEPP, ARTC is a determining authority under the EP&A Regulation, and ARTC has determined that the proposal is likely to significantly affect the environment, an EIS would be required and, consequently, the proposal falls within item 1 of Schedule 3.

Second, item 3 of Schedule 3 of the State and Regional Development SEPP declares '*development for the purpose of rail infrastructure by or on behalf of the Australian Rail Track Corporation that has a capital investment value of more than \$50 million*' to be SSI. The capital investment value of the proposal is estimated to be over \$50 million so it is declared to be SSI.

4.2.5. Local environmental planning instruments

The proposal is located on land which is subject to the Gwydir Local Environmental Plan 2013 and Moree Plains Local Environmental Plan 2012. As the proposal is being assessed under Division 5.2 of the EP&A Act, the permissibility and consent provisions of these plans do not apply.

4.2.6. Legislation and approvals that do not apply

Section 5.23 of the EP&A Act provides that a number of additional approvals, permits or licences that would otherwise be triggered for development in NSW are not required for an approved State Significant Infrastructure project. The approvals not required for State Significant Infrastructure include:

- Approvals under Part 4 and excavation permits under section 139 of the *Heritage Act 1977*.
- Permits under section 201, 205 and 219 of the *Fisheries Management Act 1994*.
- Aboriginal heritage impact permits under section 90 of the *National Parks and Wildlife Act 1974*.
- A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*.
- Bushfire safety authority under section 100B of the *Rural Fires Act 1997*.

4.2.7. Approvals to be applied consistently

Section 5.24 of the EP&A Act provides that a number of other approvals, if required for an approved SSI project, cannot be refused and must be granted on terms which are substantially consistent with the SSI approval. These approvals include:

- An environment protection licence under Chapter 3 of the POEO Act 1997.
- Consent under Section 138 of the *Roads Act 1993*.

4.3. Other relevant legislation

4.3.1. Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes, amongst other things, the procedures for issuing environment protection licences for specific activities relating to waste, air, water and noise pollution

control. EPLs are generally required for scheduled activities or scheduled development work. The definitions of scheduled activities provided in Schedule 1 include:

33 Railway systems activities.

1. This clause applies to railway systems activities, meaning:

(a) The installation, on site repair, on-site maintenance or on site upgrading of track, including the construction or significant alteration of any ancillary works.

(b) The operation of rolling stock on track.

The proposal meets this definition and would therefore require an environment protection licence. ARTC would obtain an environment protection licence for construction of the proposal.

In relation to operation, ARTC currently holds a licence to carry out railway systems activities on other parts of the NSW rail network. The construction of new track, greater than five kilometres in length, would require a modification to this licence or a new licence to be obtained, due to condition A1.2 of the existing EPL. This would be considered in consultation with the Environment Protection Authority (EPA) during the EIS process.

4.3.2. Roads Act 1993

Under section 138, Part 9, Division 3 of the Roads Act, a person must not impact or carry out work on or over a public road other than with the consent of the appropriate roads authority. Construction of the proposal may impact on public road reserves under the control of various authorities. The proponent would seek the necessary approvals under the Roads Act. As noted above, section 5.24 of the EP&A Act provides that a permit under section 138 of the Roads Act cannot be refused if it is necessary to carry out a State Significant Infrastructure project.

4.4. Commonwealth legislation

4.4.1. 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 Department of the Environment and Energy (DoEE) for projects, or 'actions', that are likely to have a significant impact on a matter of national environmental significance or the environment on Commonwealth land. The Australian Government Minister for the Environment and Energy determines whether the approval of the Minister would be required for a referred project. If so, that project is a controlled action under the EPBC Act.

The findings of preliminary environmental investigations carried out to date indicate the potential presence of threatened species and ecological communities listed under the EPBC Act in the study area. ARTC has formed the opinion that the proposal has the potential for significant impacts on protected matters. Therefore, the proposal is being referred to the Australian Government Minister for the Environment and Energy through the preparation of a separate referral.

The bilateral agreement between the Commonwealth of Australia and NSW relating to environmental assessment allows the Minister for the DoEE to rely on specified environmental impact assessment processes under the EP&A Act in assessing actions under the EPBC Act.

4.4.2. Native Title Act 1993

The Commonwealth *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*.

5. THE PROPOSAL

5.1. Overview

This section provides a brief description of the proposal, including the infrastructure required, indicative construction activities, and the proposed operation, maintenance, and management arrangements.

To provide the context for the proposal, section 5.1.1 describes the proposed features and specifications of the Inland Rail, an indicative preliminary review of the main construction activities that would be undertaken is provided in section 5.3, along with an outline of the indicative operation and maintenance regime in section 5.4. The proposal site is shown on Figure 5.1.

The key characteristics that make up the proposal (infrastructure, construction and operation) would continue to be refined and expanded upon following submission of this application. Further developed and updated information would be provided in the EIS.

5.1.1. Inland Rail performance specifications

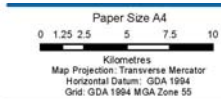
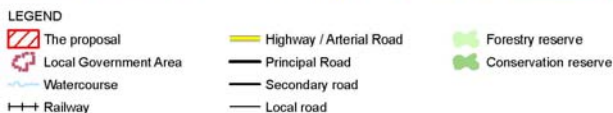
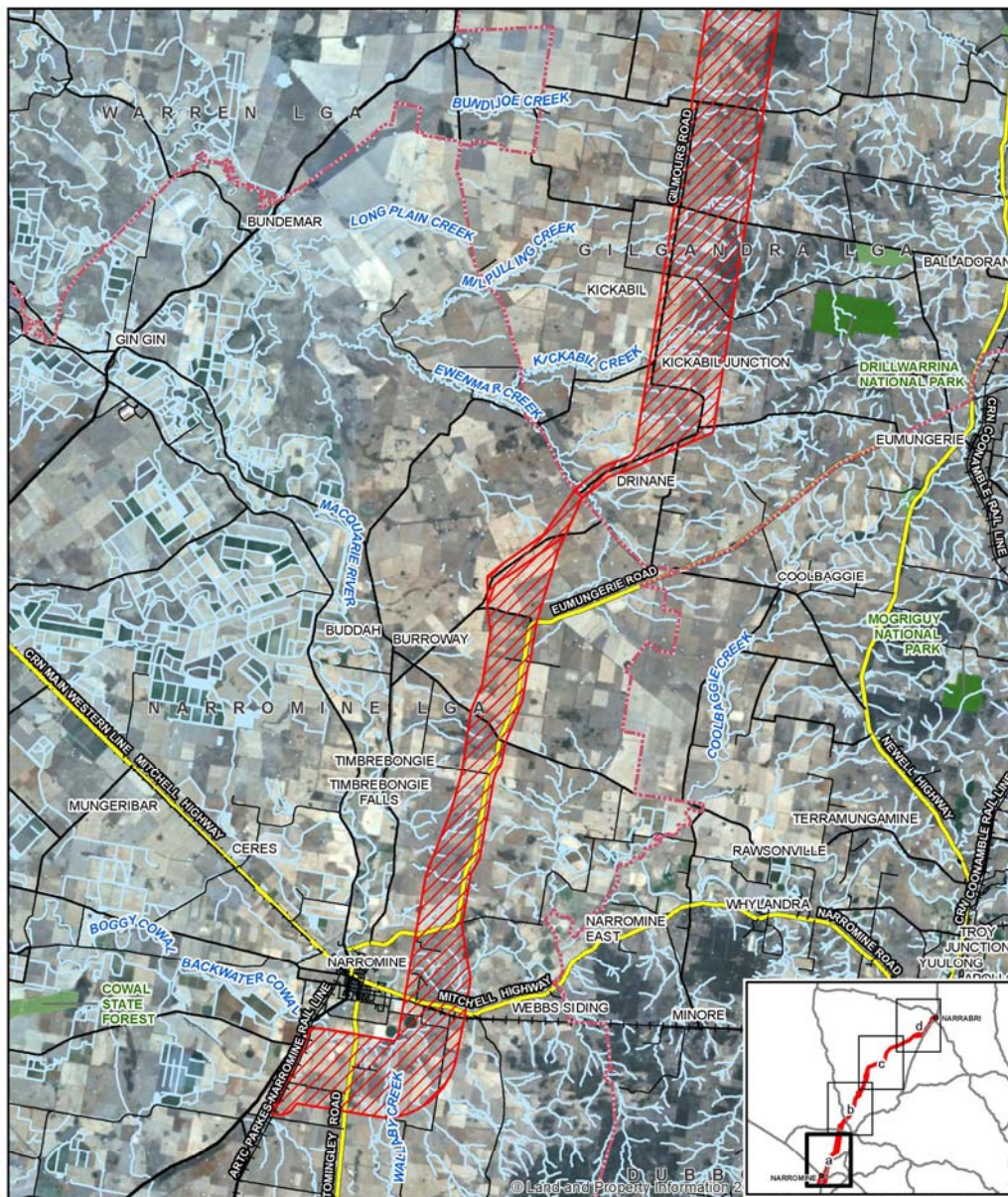
The minimum operational requirements of the design are specified by the performance specification for Inland Rail. Key elements include:

- Maximum train length of up to 1,800 m, with capacity for later upgrades to suit trains 3,600 m long.
- Maximum design speed of 115 km/h for freight trains.
- 7.1 m clearances for double stacked operation.
- Maximum 21 tonne axle load at 115 km/h, 25 tonnes at 80 km/h, with future proofing for 30 tonnes at 80 km/h.

5.1.2. Proposal timeframe

Construction is anticipated to commence in 2020 and is expected to take about 48 months. This is indicative only at this stage. The construction commencement time and construction duration would be firmed up, and may be revised as the assessment of the proposal progresses.

Figure 5.1 The proposal



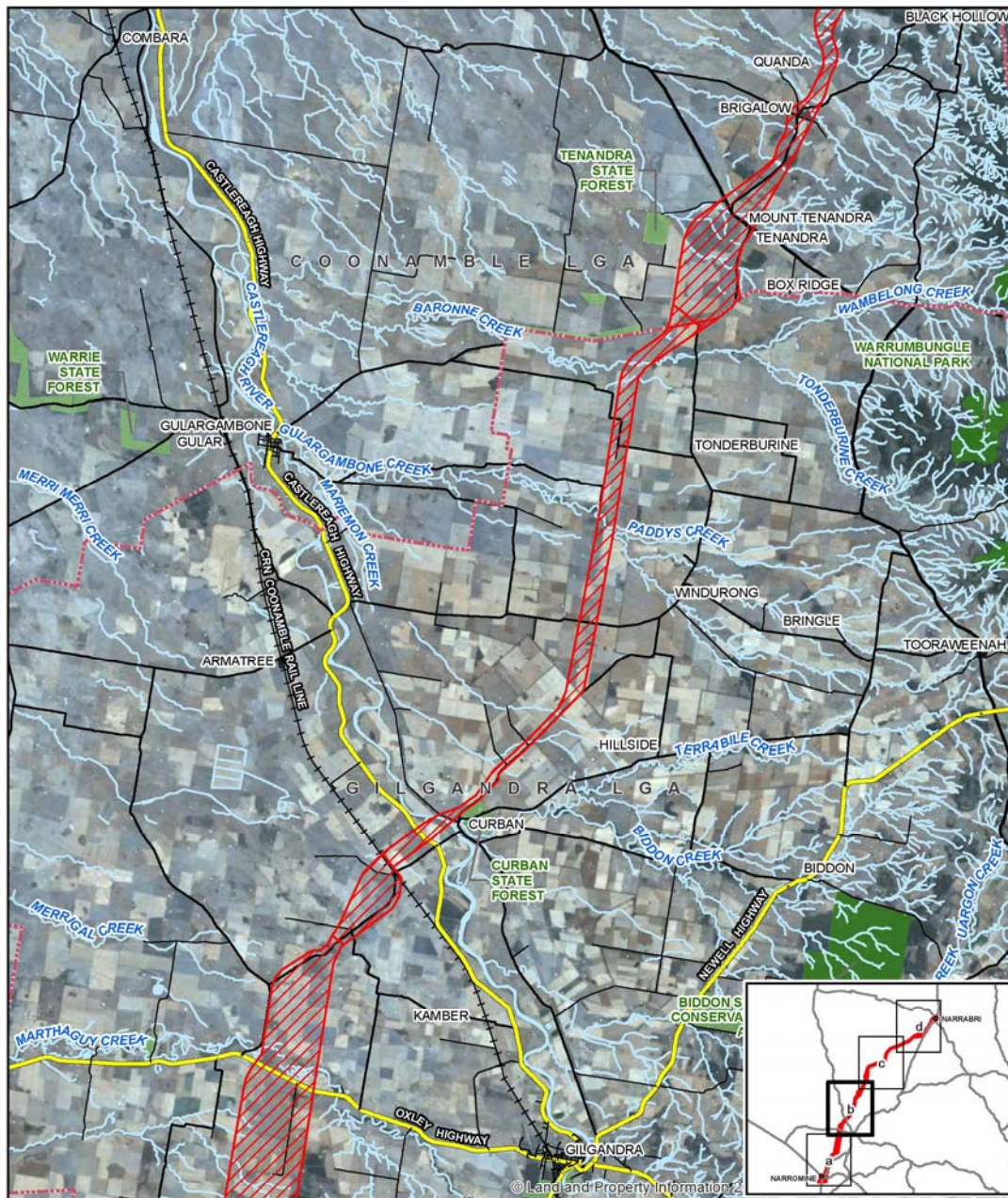
Australian Rail Track Corporation
Inland Rail - Narromine to Narrabri

Job Number 22-18252
Revision 0
Date 17 Oct 2017











The proposal

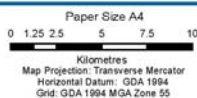
Figure 5.1a

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LEGEND

- | | | |
|---|---|--|
|  The proposal |  Highway / Arterial Road |  Forestry reserve |
|  Local Government Area |  Principal Road |  Conservation reserve |
|  Watercourse |  Secondary road | |
|  Railway |  Local road | |



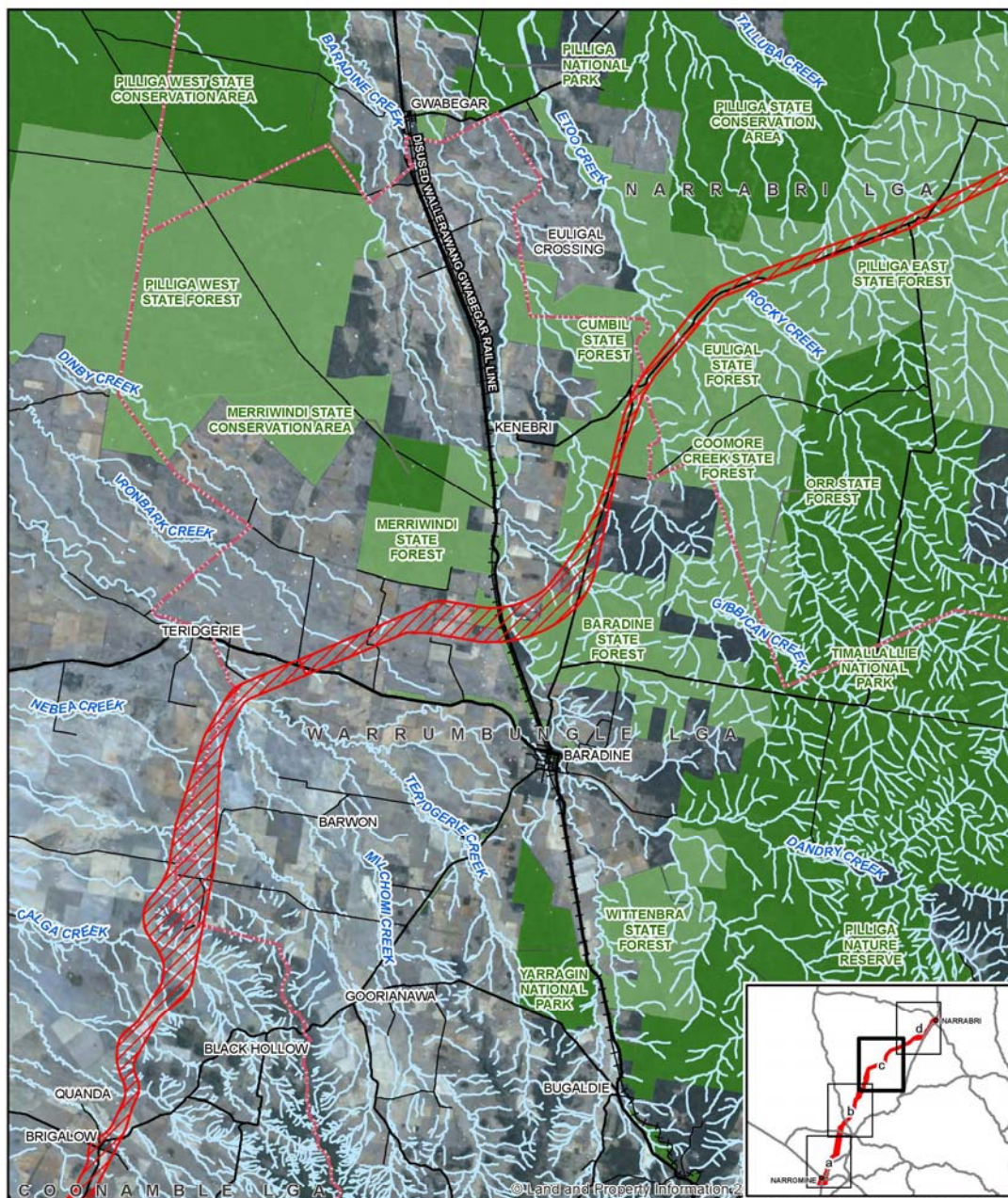
Australian Rail Track Corporation
Inland Rail - Narromine to Narrabri

Job Number 22-18252
Revision 0
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The proposal

Figure 5.1b

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Data source: LPI, DCDB/DTDB/Aerial imagery, 2015; Geoscience Australia, 250K Topographic Data Series 3. Created by: gmc/dm/dm



LEGEND

- The proposal
- Local Government Area
- Watercourse
- Railway
- Principal Road
- Secondary road
- Local road
- Forestry reserve
- Conservation reserve

Paper Size A4
0 1.25 2.5 5 7.5 10
Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



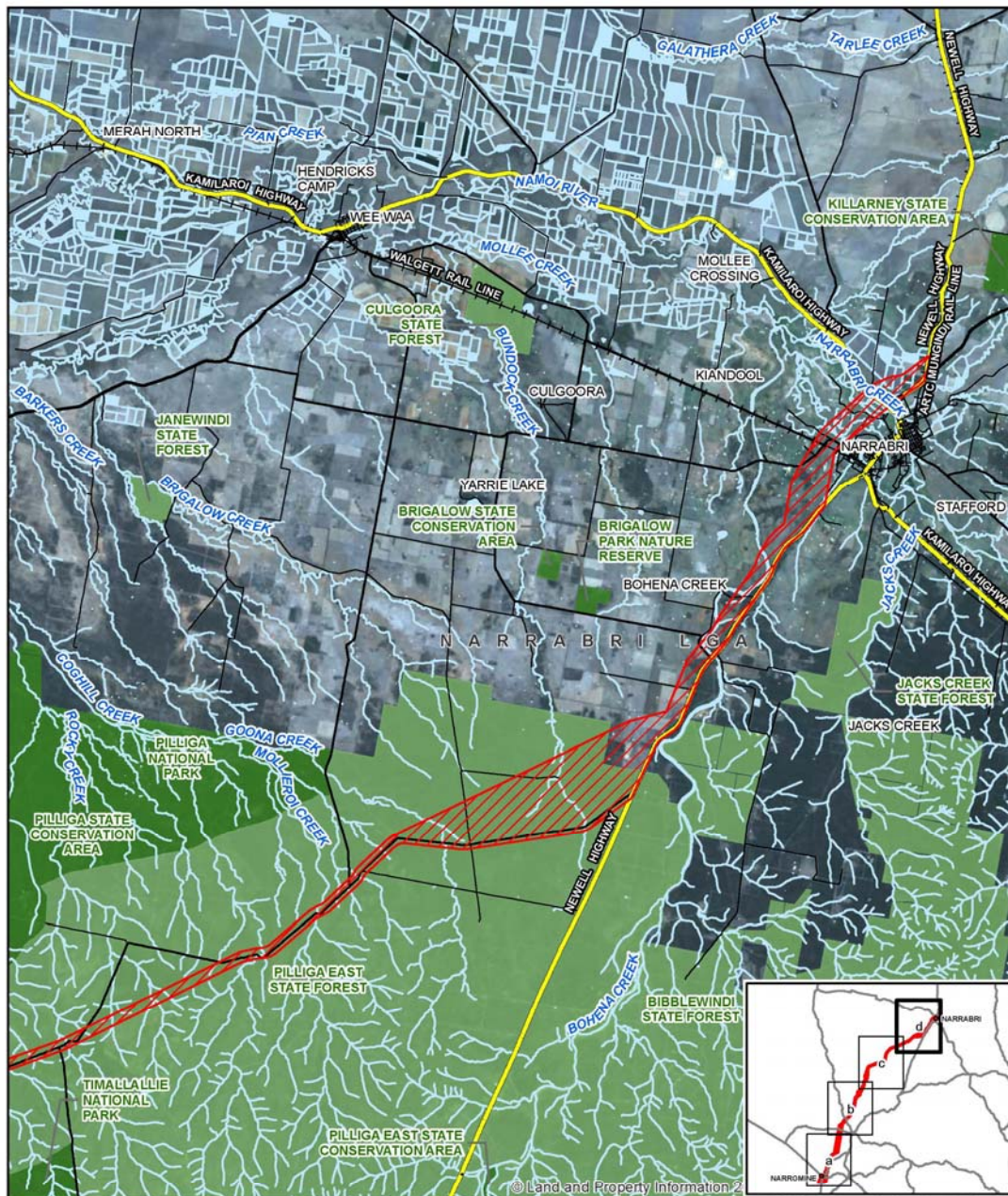
Australian Rail Track Corporation
Inland Rail - Narramine to Narrabri

Job Number 22-18252
Revision 0
Date 17 Oct 2017










The proposal

Figure 5.1c

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LEGEND

- | | | |
|---|---|--|
|  The proposal |  Highway / Arterial Road |  Forestry reserve |
|  Local Government Area |  Principal Road |  Conservation reserve |
|  Watercourse |  Secondary road | |
|  Railway |  Local road | |

Paper Size A4
0 1.25 2.5 5 7.5 10
Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Australian Rail Track Corporation
Inland Rail - Narromine to Narrabri

Job Number 22-18252
Revision 0
Date 17 Oct 2017

The proposal

Figure 5.1d

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Data source: LPI, DCDB/DTDB/Aerial imagery, 2015; Geoscience Australia, 250K Topographic Data Series 3. Created by: gmc/dm/dm

5.2. Scope of works

The Inland Rail project team is currently progressing the design for the proposal. Key features of the design are described below. The proposal site is comprised of a broad corridor with widths varying between 350 m and 4.6 km to allow for an optimal alignment to be further refined during the design process. This will allow for route optimisation and other value engineering opportunities to be investigated during subsequent design development, community engagement, environmental assessment and approvals processes. The final alignment and project corridor will be defined during the EIS and design development phases. The resulting proposal site width will be wide enough to accommodate the project.

The key features of the proposal, as currently designed, are included below and are subject to further design and refinement:

- About 300 km of rail track construction including rail embankments and cuttings.
- Construction of about 262 culverts and underbridges.
- Construction of about 118 level crossings, including public roads and private crossings.
- Construction of seven crossing loops.
- Five bridges taking major roads over the new rail line (grade separated crossings).
- Viaducts taking the new rail line over the Macquarie River floodplain and the Namoi River / Narrabri Creek flood plain.
- Junctions with existing rail lines to allow trains to travel between networks (where required).

The presently estimated number of culverts, bridges and level crossings have been provided above and would be subject to further refinement in the design process.

5.3. Construction of the proposal

Typical construction activities associated with the proposal are discussed below.

Pre-construction and enabling

Pre-construction and enabling works are those activities that would typically be undertaken before the start of substantial construction in order to make ready the key construction sites and provide protection to the public. Enabling works included in this application include:

- Demolishing buildings and other structures that are not a State or local heritage item.
- Supply of power, water and other services.
- Adjusting, modifying and protecting existing utilities and services.
- Transport network modifications.
- Carrying out heritage investigations, protection and archival recordings.
- Vegetation clearance.
- Establishing ancillary construction facilities (including compounds and access tracks), and associated mitigation measures.
- Installation of environmental mitigation measures (including erosion and sedimentation control, temporary exclusion fencing for sensitive areas, at-property acoustic treatment).

Excluded works from this application might include:

- Geotechnical, contamination and environmental investigations such as but not limited to borehole drilling or excavations, treatment of contaminated sites.

- Other tests, surveys, sampling or investigations of existing buildings, bridges and other third party assets.
- Service relocations that would be of minimal environmental impact.
- Minor vegetation clearance associated with any of the works described above.

These works may be determined as Exempt Development under the provisions of Clause 82 and Schedule of the Infrastructure SEPP. Otherwise the works may require a separate assessment (e.g. review of environmental factors prepared in accordance with the EP&A Act).

It is noted that while construction of the proposal is likely to require storage areas for railway materials, borrow pits and/or quarries, they do not form part of the proposal.

New single gauge track

The proposed works would involve constructing about 300 km of new single gauge track, including provision of:

- Track ballast.
- Heavy duty concrete sleepers.
- Rail tracks.

The proposal would involve about 3.7 km of amendments to existing rail lines (section 3.4) and include provision of:

- Upgraded formation.
- New track ballast.
- New heavy duty concrete sleepers.
- New rail tracks.

In addition, about 15.5 km of track would also be required for the construction of seven (7) crossing loops.

Track formations, earthworks and drainage

Bulk earthworks may be required in some sections of the proposal site. Subject to the outcomes of the concept design process, the earthworks require the construction of track formation through the majority of the proposal site and the potential reconstruction of existing track formation where the proposal site interacts with the existing rail lines discussed in section 3.4.

Further investigations are currently being undertaken to confirm the extent of works likely to be required to meet the Inland Rail performance specifications. Drainage within the proposal site would be designed to suit the new/upgraded single gauge track with consideration of appropriate flood immunity when designing all track formations, embankments and cuttings for the Inland Rail route.

Culverts and bridges

The proposal would require the construction and/or reconstruction of about 262 culverts and underbridges and five bridges. The estimated number and location of culverts and bridges would be subject to further refinement in the design process.

A viaduct is proposed that would provide a grade separated crossing of the Mitchell Highway and Macquarie River. In addition, where the proposal crosses the floodplain of the Namoi River, a viaduct is proposed that would also provide a grade separated crossing for two local roads in the floodplain plus the Kamilaroi Highway.

Where the proposal crosses highways or major arterial roads, a new bridge would be constructed to take the road over the proposed railway, forming a grade separation. Roads that have been identified for grade separation are:

- Tomingley Road
- Eumungerie Road
- Oxley Highway
- Castlereagh Highway

The interaction of the proposal site with existing rail lines (section 3.4) is still being investigated and would be refined and expanded upon following submission of this application.

During the concept design process, all structures would be assessed for compliance with the Inland Rail performance specification. Any existing bridges and culverts that do not comply, have limited life spans, or cannot be feasibly made to comply, would be replaced as part of the proposal.

Crossing loops

Initial modelling indicates the proposal would require construction of seven crossing loops to allow trains to pass at a number of locations about 40 km apart. However, these design elements would be further defined as engineering designs are developed. The provision for crossing loops would involve constructing new sections of track, each up to 2.2 km long (to accommodate an 1,800 m long train), parallel to the proposed alignment. The crossing loops would be constructed within the rail corridor and would provide for possible future upgrades to accommodate a 3,600 m long train.

Road and level crossings

Road and level crossings would be required where the rail line interacts with existing roads to maintain access over the rail line. The proposal would require about 118 road/level crossings (private and public). However, the estimated number and location of road/level crossings would be subject to further refinement in the design process.

A level crossing feasibility strategy has been prepared. The aim of the strategy is to reduce safety risks associated with existing crossings whilst minimising disruption to property owners and local road users. The strategy considers:

- Existing safety issues.
- Opportunities for alternative access arrangements.
- Property acquisition and easement requirements.
- Road closure implications under the Roads Act.
- Road network, access and local traffic implications.
- Estimated implementation costs.

Construction hours

Where practicable, construction works would be undertaken during standard working hours in accordance with the Inland Rail NSW Construction Noise & Vibration Framework and the Interim Construction Noise Guideline (DECC, 2009). Due to the need for some works within an operational rail corridor, some construction activities would be undertaken Outside of standard working hours.

Construction activities would vary along the length of the proposal depending on the works to be undertaken, local conditions and track operational requirements. A typical construction sequence is as follows:

- Establish construction work sites and environmental controls.
- Undertake enabling works, including the excavation, installation and relocation of services.
- Remove existing structures and vegetation clearing.

- Construct new structures, including:
 - Placement of suitable formation material.
 - Installation of new culverts and associated structures.
- Track works including as required:
 - Construction of cuts and fills.
 - Installation of new track, track components and ballast.
- Installation of signalling infrastructure and other services.
- Commissioning works.
- Site rehabilitation.

The anticipated construction methodology and sequencing would be identified in EIS.

5.3.1. Other ancillary works and infrastructure

Ancillary works would include works to signalling and communications, signage, fencing, and services and utilities.

During construction, the proposal would require the establishment of construction compounds along the entire length of the proposal. These would be located within the proposal site where practicable; however some may need to be located adjacent to the proposal site where there is insufficient space available or for safety reasons.

Major compounds would be located preferably on disturbed land, close to major access roads and clear of sensitive environmental areas and residences as far as possible. A number of smaller storage areas would be required at strategic locations along the proposal site, for example near bridges.

In addition to the construction compounds which are subject to further feasibility analysis and design definition in the EIS, the following may form part of the project scope:

- Batch plants.
- Camp accommodation for construction workers.
- Construction water supply and storage.
- Substantial environmental impact mitigation measures.
- Rail sidings.
- Access through private properties, requiring access agreements.
- Changes to property access.
- Changes to local road network.
- Quarries and borrow pits
- Relocation of utilities and services.

The location and impacts of potential ancillary facilities, including the need for the above, would be considered in the EIS and refined during the design process.

5.4. Operation of the proposal

Projected train movements across the entire Inland Rail route (round trips, most heavily trafficked section of Inland Rail) is expected to be up to 123 trains per week in 2024-25 with a peak demand in 2049-50 where train numbers are expected to reach up to 174 per week (ARTC, 2015). However, the Narromine to Narrabri section is expected to have a much lower frequency with an average weekly demand of about 8.5 trains per day (2025) with a peak demand of

about 15 trains per day (2040). The new rail line would be a faster, more efficient route that bypasses the Sydney rail network and would enable the use of double stacked trains along its entire length.

Trains would operate 24 hours per day and would be up to 1,800 m in length; and require a clearance of 7.1 m. Proposed freight train speeds would vary according to axle loads, and range from 80 km/hr (25 tonne) to 115 km/hr (21 tonne).

5.4.1. Maintenance activities

Standard ARTC maintenance activities would be undertaken during operations. Typically these activities would involve minor maintenance works such as bridge and culvert inspections, through to major maintenance such as reconditioning of track and topping up of ballast as required.

6. ENVIRONMENTAL CONSIDERATIONS

6.1. Overview

This section provides a preliminary assessment of the potential environmental impacts that are likely to be associated with the construction and operation of the proposal. This assessment has been based on the current level of design for the proposal. Some impacts may change as the design progresses and more detail becomes available. These changes would be considered as the environmental impact assessment process continues and the EIS is prepared.

The environmental issues identified in this section have been classified as either 'key' or 'other' environmental issues. This classification was based on the likely significance of the identified environmental impacts from the findings of the preliminary investigations undertaken for the proposal and experience with other similar projects.

The 'Key' environmental issues are defined as those impacts that are considered to require further detailed investigation during the preparation of the EIS as they would result in a moderate to high impact on the environment. These issues are considered in sections 6.2 to 6.9 and include:

- Biodiversity (section 6.2).
- Non-Aboriginal heritage (section 6.4).
- Topography, geology and soils (section 6.6).
- Noise and vibration (section 6.8).
- Aboriginal heritage (section 6.3).
- Hydrology, flooding and water quality (section 6.5).
- Land use, socio-economic and visual issues (section 6.7).
- Traffic and transport (section 6.9).

The 'Other' environmental issues are defined as those impacts that are not expected to be as significant and would be manageable through the application of industry standard environmental management measures. These issues are considered in section 6.10–6.17 and include:

- Air quality (section 6.10).
- Waste and resource use (section 6.12).
- Climate change (section 6.14).
- Utilities and services (section 6.16).
- Cumulative impact (section 6.17).
- Contamination (section 6.11).
- Greenhouse gas and energy (section 6.13).
- Hazards and risks (section 6.15).

KEY ENVIRONMENTAL ISSUES

6.2. Biodiversity

The following section provides a summary of the results from a preliminary assessment of the proposal site undertaken by Umwelt (Australia) Pty Limited (Umwelt) and GHD.

The assessment included a desktop assessment and literature review to identify threatened flora and fauna species, populations and ecological communities listed under the *Biodiversity Conservation Act 2016* (BC Act) and FM Act. In addition, the desktop and literature review has identified matters of national environmental significance listed under the EPBC Act that may be impacted by the proposal.

The desktop assessment included a search of the NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife database, the EPBC Protected Matters Search Tool and the NSW Department of Primary Industries (DPI) Fishing and Aquaculture Records Viewer (DPI, 2017). The searches were undertaken in July 2017 with a 10 km buffer of the proposal site (the study area).

The literature review utilised regional vegetation mapping covering the proposal site. The two main regional vegetation mapping projects that were utilised through the literature review are provided below:

- Reconstructed and Extant Distribution of Native Vegetation in the Central West Catchment (DEC, 2006a).
- Border Rivers Gwydir/Namoi Regional Native Vegetation Mapping (OEH 2015a).

Rapid field surveys of the proposal site were undertaken in April and October 2016, and April 2017 by Umwelt as part of the preliminary investigations for the proposal, totalling 15 person days. The surveys focussed on informing the desktop constraints mapping and proposal site identification, with the survey comprising rapid vegetation assessments to ground truth areas of likely high ecological constraint.

The field survey was completed without access to private land and was therefore restricted to public land including roadsides and state forests. Consideration of ecological constraints included analysis of vegetation in proximity to the proposal site, and subsequent extrapolation of communities occurring within the proposal site that were not publically accessible.

Potential impacts to native vegetation/habitats (including threatened ecological communities (TECs) listed under the BC Act and EPBC Act is listed in Table 6-1 and shown on Figure 6.1. The proposal site is comprised of a broad corridor to allow for an optimal alignment to be further refined during the design process, as shown in Figure 1.1. During the preliminary investigations indicative alignments for the proposal were investigated to inform the preferred corridor selection process. The potential impacts listed in Table 6-1 and shown on Figure 6.1 are therefore only indicative and would be refined during detailed investigations for the EIS.

6.2.1. Existing environment

6.2.1.1. Flora

6.2.1.1.1. Vegetation communities

The desktop assessment and literature review identified 11 TECs listed under the BC Act or EPBC Act (Appendix A) as potentially occurring in the vicinity of the proposal site. The following six TECs were recorded within the proposal site during preliminary field surveys:

- Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions (BC Act)/Brigalow (*Acacia harpophylla* dominant and co-dominant) (EPBC Act).
- Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregion (BC Act)/Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (EPBC Act).
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (BC Act)/Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia (EPBC Act).
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (BC Act)/Weeping Myall Woodlands (EPBC Act).

- Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland (EPBC Act).
- White Box Yellow Box Blakely's Red Gum Woodland (BC Act)/White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act).

One vegetation community currently nominated for listing as a TEC under the EPBC Act was also identified within the proposal site (Poplar Box Grassy Woodland on Alluvial Plains). This potential listing for this community was due for determination in April 2017; however, it is still yet to be determined.

Further targeted field surveys would be undertaken during preparation of the EIS to confirm the extent and condition of TECs in and around the proposal site. The presence of known TECs represents a key ecological constraint to the proposal.

6.2.1.1.2. Threatened flora

The desktop assessment and literature review identified 18 threatened flora species (Appendix A) occurring or predicted to occur within 10 km of the proposal site. Of these, the following 18 species were assessed as having the potential to occur within the proposal site:

- *Commersonia procumbens* / *Androcalva procumbens* (Vulnerable – BC Act and EPBC Act).
- Ooline (*Cadellia pentastylis*) (Vulnerable – BC Act and EPBC Act).
- Bluegrass (*Dichanthium setosum*) (Vulnerable – BC Act and EPBC Act).
- Austral pipewort (*Eriocaulon australasicum*) (Endangered – BC Act EPBC Act).
- Belson's panic (*Homopholis belsonii*) (Endangered – BC Act and Vulnerable – EPBC Act).
- *Homoranthus darwinioides* (Vulnerable – BC and EPBC Act).
- Spiny peppergrass (*Lepidium aschersonii*) (Vulnerable – BCC Act and EPBC Act).
- *Philothea ericifolia* (Vulnerable – EPBC Act).
- A leek orchid (*Prasophyllum sp Wybong*) (Critically Endangered – EPBC Act).
- Slender darling pea (*Swainsona murrayana*) (Vulnerable – BC Act and EPBC Act).
- *Tylophora linearis* (Vulnerable – BC Act and Endangered EPBC Act).
- *Cyperus conicus* (Endangered – BC Act).
- Finger Panic Grass (*Digitaria porrecta*) (Endangered –BC Act).
- Pine Donkey Orchid (*Diuris tricolor*) (Vulnerable –BC Act).
- Native Milkwork (*Polygala linariifolia*) (Endangered –BC Act).
- Tarengo Leak Orchid (*Prasophyllum petilum*) (Endangered – EPBC Act).
- Small purple-pea (*Swainsona recta*) (Endangered – BC act and EPBC Act).
- Greenhood Orchid (*Pterostylis cobarensis*) (Vulnerable –BC Act).

The areas of native vegetation within the proposal site provide potential habitat for a range of threatened flora species. In the north of the study area, the proposal site traverses a large area of bushland within the Pilliga East State Forest; however, native vegetation for the majority of the proposal site, outside this area, occurs as isolated and fragmented patches within a predominantly disturbed agricultural landscape. Field surveys would be conducted for the EIS to confirm presence of threatened species and their habitat within the proposal site.

6.2.1.2. Threatened terrestrial fauna

The desktop review identified a total of 58 threatened fauna species (38 birds, 15 mammals and five reptile species) as occurring or having potential to occur within the study area (OEH, 2017, DotEE 2017). A preliminary likelihood of occurrence assessment has been completed and based on known records or likely presence of suitable habitat a total of 56 threatened terrestrial fauna species have potential to occur within the proposal site. These species are provided in Appendix A.

The areas of native vegetation within the proposal site provide potential habitat for a range of threatened fauna species. In the north of the study area the corridor will go through a large area of bushland within the Pilliga East State Forest. For the remainder of the proposal site native vegetation occurs as isolated and fragmented patches within a predominantly disturbed agricultural landscape. Field surveys would be conducted for the EIS to confirm presence of threatened species and their habitat within the proposal site.

6.2.1.3. Aquatic species and communities

Database search results identified seven threatened freshwater fish species, one endangered population and one aquatic ecological community as having potential to occur within the study area (DotEE 2017, DPI 2017).

The threatened freshwater fish species are:

- Trout Cod (*Maccullochella macquariensis*).
- Murray Cod (*Maccullochella peelii*).
- Eel Tailed Catfish (*Tandanus tandanus*).
- Flathead Galaxias (*Galaxias rostratus*).
- Purple Spotted Gudgeon (*Mogurnda adspersa*).
- Silver Perch (*Bidyanus bidyanus*).
- Olive Perchlet (Western Population of Olive Perchlet).

One aquatic endangered ecological community (EEC) (Lowland Darling River Aquatic Ecological Community) was identified during preliminary field surveys as present within the proposal site. This community was recorded at crossings of multiple rivers and creeks. This community is listed as an EEC under the FM Act.

A preliminary assessment of the likelihood of occurrence determined that there is potential habitat for all eight of these species within the proposal site (refer to Appendix A). Field surveys would be conducted for the EIS to confirm presence of threatened species and their habitat within the proposal site.

6.2.1.4. Other matters of National Environmental Significance

Four wetlands listed as wetlands of international importance (Ramsar) were identified by the EPBC Protected Matters Search Tool as occurring downstream of the proposal site. The four wetlands are:

- Banrock Station Wetland Complex.
- Coorong and lakes Alexandrina and Albert.
- Macquarie Marshes.
- Riverland.

Banrock Station Wetland Complex, Coorong and lakes Alexandrina and Albert and Riverland Ramsar wetlands are all within South Australia and are unlikely to be impacted by the proposal. Macquarie Marshes Ramsar wetlands are

south of Carinda, NSW and more than 100 km west of the proposal site. These wetlands are unlikely to be impacted by the proposal.

6.2.2. Potential impacts

The main potential impacts of the proposal include:

- Clearing of vegetation within the proposal site and for ancillary activities.
- Loss of fauna habitat and impacts on threatened species and endangered populations.
- Disturbance to natural waterways and aquatic habitat from the replacement and/or upgrade works of bridges and culverts.
- Habitat fragmentation and connectivity issues for flora and fauna.
- Potential for wildlife to be struck by operating trains.

Potential impacts to native vegetation/habitats (including TECs) is listed in Table 6-1 and shown on Figure 6.1. The proposal site is comprised of a broad corridor with widths varying between 350 m and 4.6 km to allow for an optimal alignment to be further refined during the design process, as shown in Figure 1.1. During the preliminary investigations, indicative alignments for the proposal were investigated to inform the preferred corridor selection process. The potential impacts listed in Table 6-1 and shown on Figure 6.1 are therefore only indicative and would be refined during detailed investigations for the EIS. Clearing of the corridor, with an average width of 40 m, would be required to allow for construction and to maintain the safe operation of the railway.

Further, the preliminary investigations undertaken to date have focused on mapping of TECs and as such, there is limited available information regarding other native vegetation communities.

Table 6-1 Summary of potential ecological constraints along the proposal site

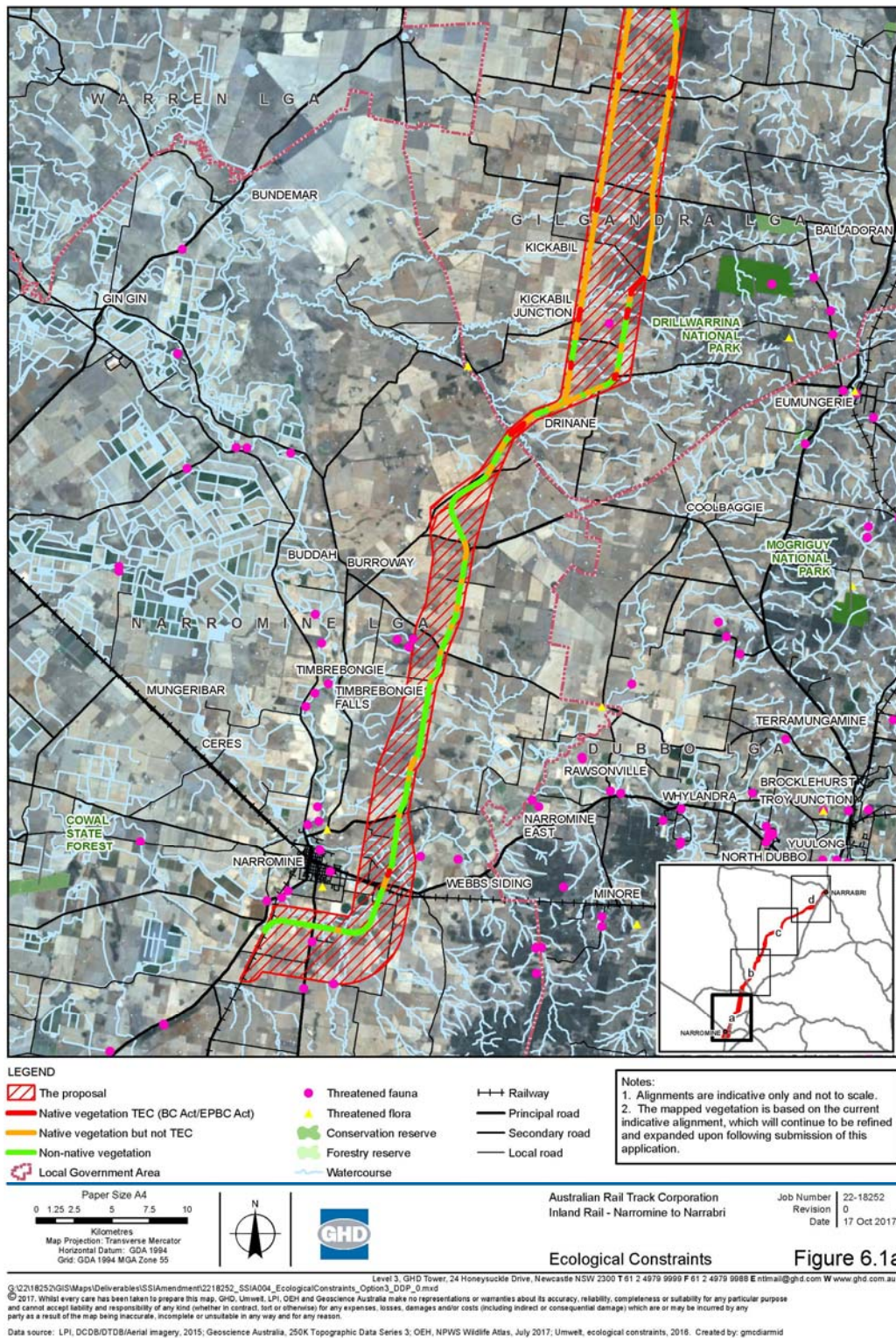
ECOLOGICAL CONSTRAINT RATING	LENGTH (M)	% OF PROPOSAL SITE
Green – Non-native vegetation	112,812	37.57
Orange – Native vegetation but not TEC	161,317	53.73
Red – Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions (TEC - BC Act)/Brigalow (Acacia harpophylla dominant and co-dominant) (TEC – EPBC Act).	2,075	0.69
Red - Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregion (TEC – BC Act)/Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (TEC – EPBC Act).	2,228	0.74
Red - Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (TEC – BC Act)/Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (TEC – EPBC Act).	8,225	2.74

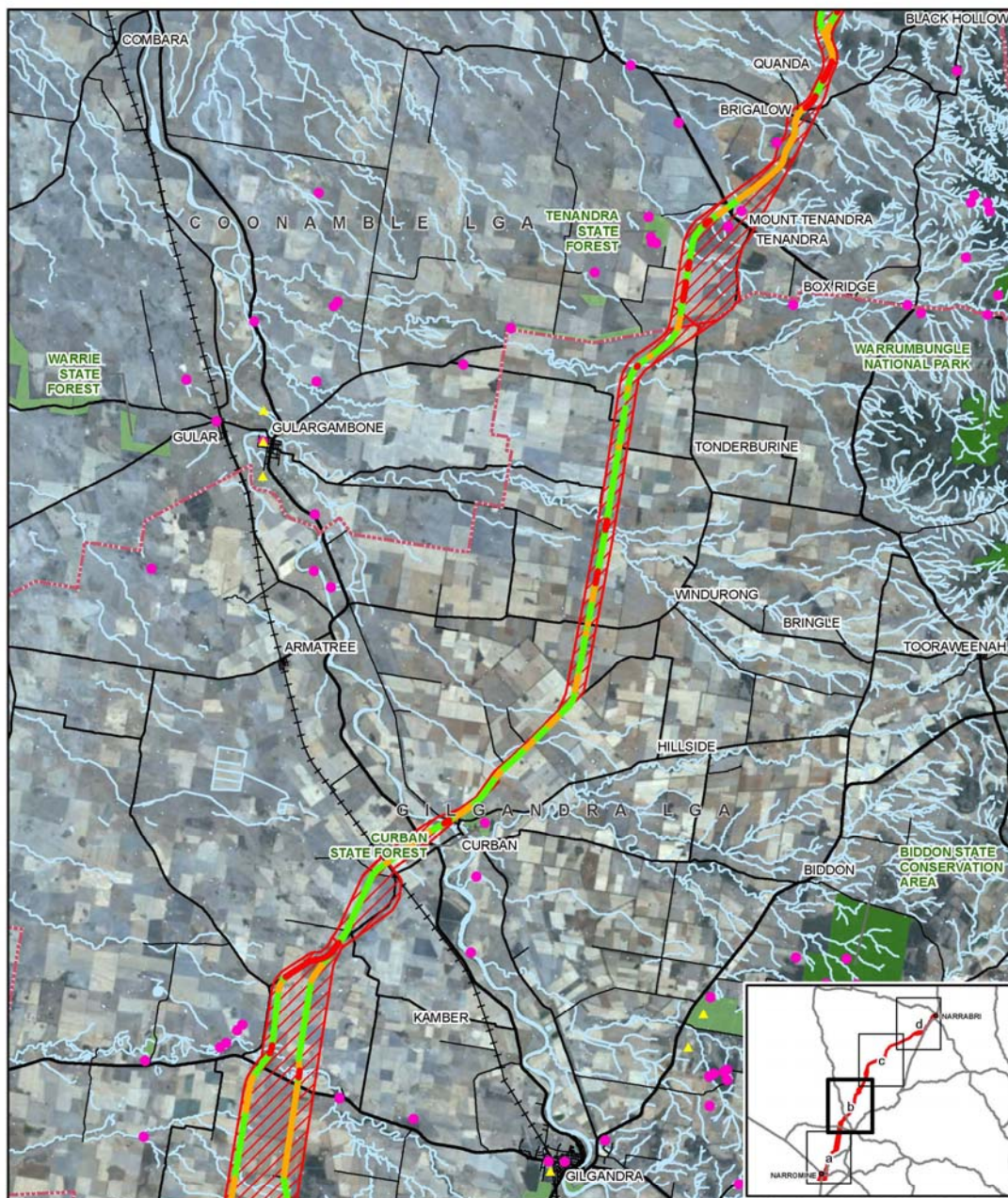
ECOLOGICAL CONSTRAINT RATING	LENGTH (M)	% OF PROPOSAL SITE
Red - Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (TEC – BC Act)/Weeping Myall Woodlands (TEC – EPBC Act).	2,790	0.93
Red - Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland (CEEC – EPBC Act).	6,513	2.17
Red - White Box Yellow Box Blakely's Red Gum Woodland (TEC – BC Act)/White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC – EPBC Act).	4,280	1.43
Total	300,240	100

Based on the preliminary investigations undertaken to date the proposal site contains extensive areas of native vegetation, including TECs, these areas would provide important habitat for threatened fauna and flora species. TECs represent a key ecological constraint to the proposal. In particular, there are extensive areas of remnant and regenerating woodland and large areas of grassland including:

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (BC Act)/Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (EPBC Act).
- Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland (EPBC Act) between Quanda and Baradine as well as between Yarrie Lake and Narrabri.

Figure 6.1 Ecological constraints





LEGEND

- The proposal
- Native vegetation TEC (BC Act/EPBC Act)
- Native vegetation but not TEC
- Non-native vegetation
- Local Government Area

- Threatened fauna
- Threatened flora
- Conservation reserve
- Forestry reserve
- Watercourse

- Railway
- Principal road
- Secondary road
- Local road

Notes:
 1. Alignments are indicative only and not to scale.
 2. The mapped vegetation is based on the current indicative alignment, which will continue to be refined and expanded upon following submission of this application.

Paper Size A4
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 Kilometres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



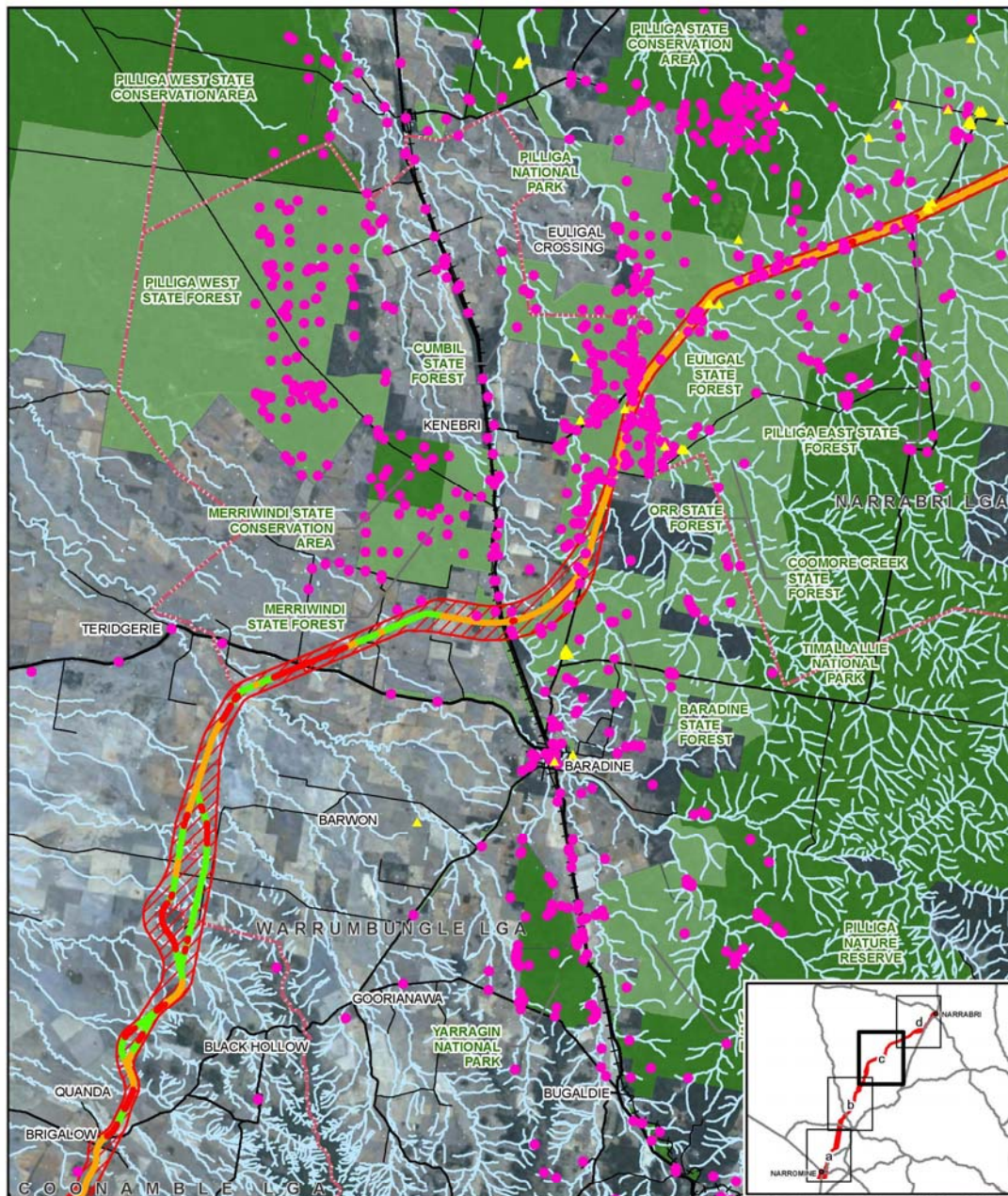
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 Inland Rail - Narromine to Narrabri

Job Number 22-18252
 Revision 0
 Date 17 Oct 2017

Ecological Constraints

Figure 6.1b

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 Data source: LPI, DCDB/DTDB/Aerial imagery, 2015; Geoscience Australia, 250K Topographic Data Series 3; OEH, NPWS Wildlife Atlas, July 2017; Umwell, ecological constraints, 2016. Created by: gmdiamid



LEGEND

- The proposal
- Native vegetation TEC (BC Act/EPBC Act)
- Native vegetation but not TEC
- Non-native vegetation
- Local Government Area

- Threatened fauna
- Threatened flora
- Conservation reserve
- Forestry reserve
- Watercourse

- Railway
- Principal road
- Secondary road
- Local road

Notes:
 1. Alignments are indicative only and not to scale.
 2. The mapped vegetation is based on the current indicative alignment, which will continue to be refined and expanded upon following submission of this application.

Paper Size A4
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 Kilometres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



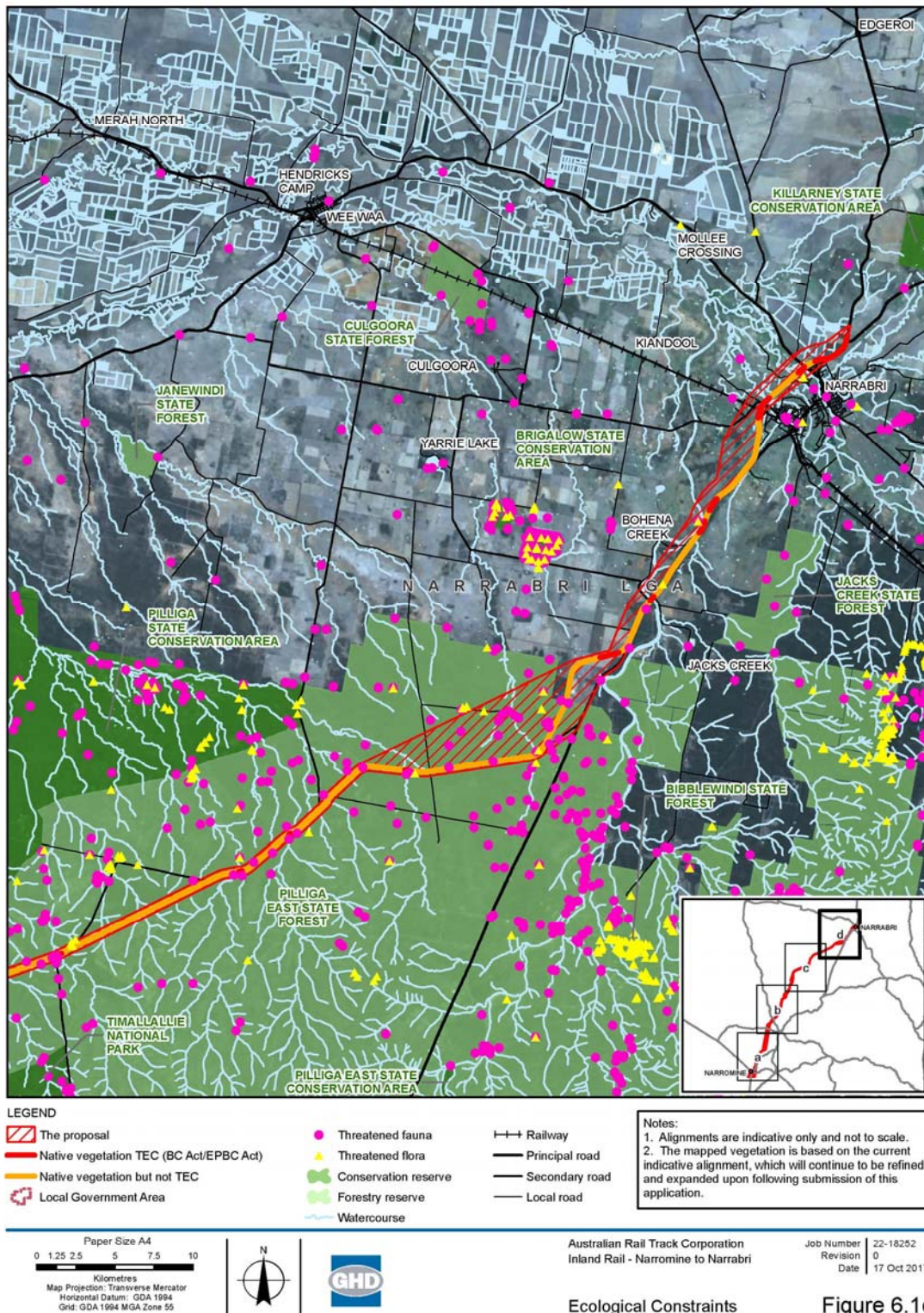
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Ecological Constraints

Figure 6.1c

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 Data source: LPI, DCDB/DTDB/Aerial imagery, 2015; Geoscience Australia, 250K Topographic Data Series 3; OEH, NPWS Wildlife Atlas, July 2017; Umwell, ecological constraints, 2016. Created by: gmdiamid



Ecological Constraints

Figure 6.1d

6.2.3. Scope of further assessment

A biodiversity assessment will be undertaken in accordance with the Biodiversity Assessment Method (BAM) as required under the BC Act. This assessment will result in a Biodiversity Development Assessment Report (BDAR) which will identify how ARTC will avoid and minimise impacts, any potential impacts that could be characterised as serious and irreversible according to the specified principles and any offset obligations required to offset the likely biodiversity impacts of the project. The assessment will also have regard to the extent of any impacts on matters under the EPBC Act.

6.3. Aboriginal heritage

A preliminary assessment of Aboriginal heritage was undertaken by Umwelt. The assessment included:

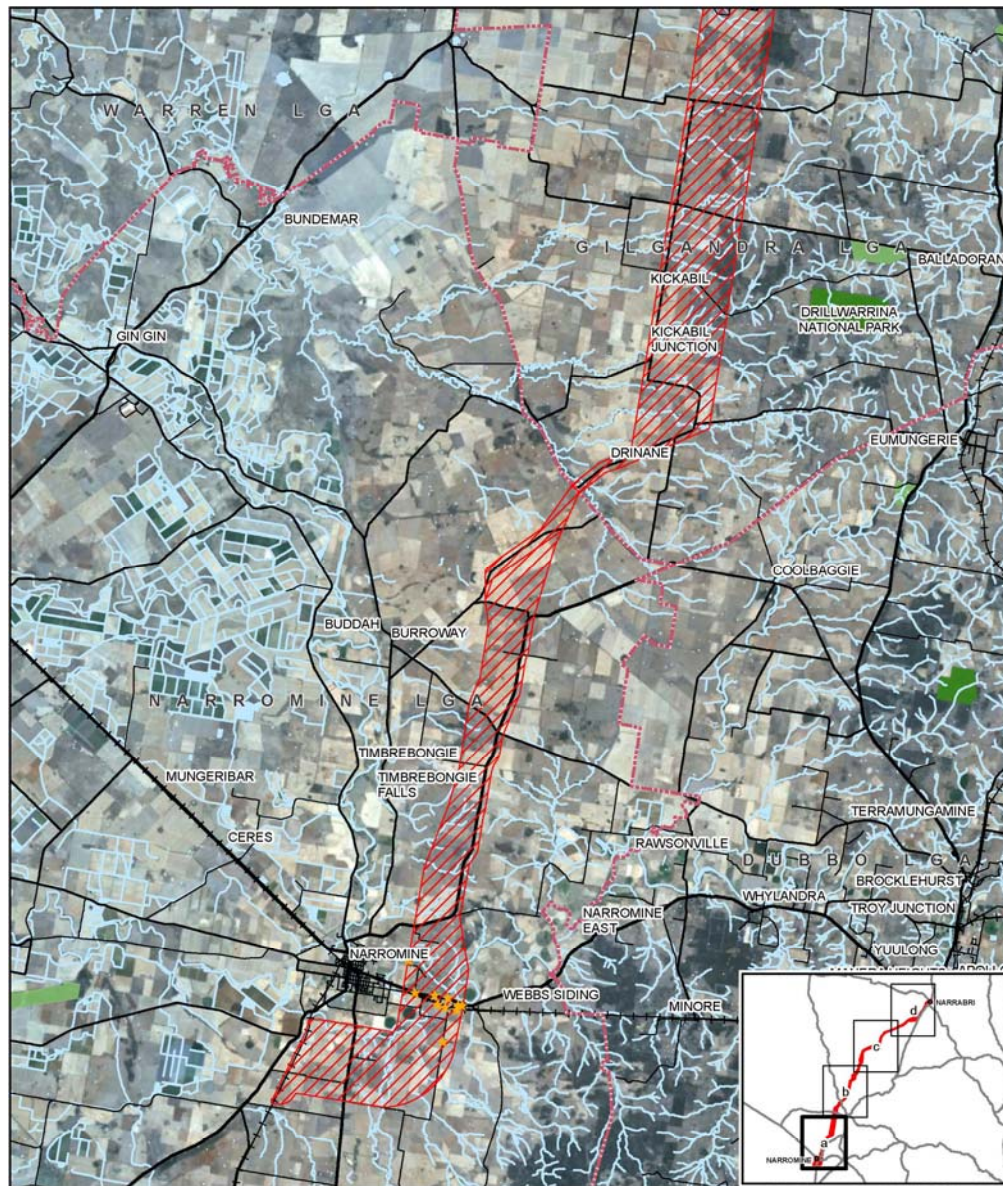
- A review of available site data based on a search of the OEH Aboriginal Heritage Information Management System (AHIMS) database.
- A search of the Native Title Tribunal website to identify Native Title claims in the vicinity of the proposal site.
- Targeted field inspections of selected portions of the proposal site, where accessible without accessing private land, in April and October 2016, and April 2017. The archaeological survey adhered to a targeted assessment pro-forma, with locations for rapid survey chosen based on the results of AHIMS data searches, previous archaeological investigations and landscape predictive modelling. In addition, the survey was also adapted in field to undertake assessments to supplement both the AHIMS data results and the desktop landform predictive modelling.
- Use of the above information to identify potential impacts to Aboriginal cultural heritage associated with the proposal and recommendations for further investigation.

6.3.1. Existing environment

Searches of the AHIMS database were undertaken for the proposal site and included provision of a buffer area surrounding the proposal site (the study area), with results shown on Figure 6.2. These searches identified 22 previously recorded sites located within the study area.

The majority of previously recorded sites are scarred trees and artefact scatters. Key sensitive sites identified in the AHIMS database include a grinding groove, burial and carved tree and habitat structure. Due to private property access constraints, archaeologically significant areas and landforms were unable to be inspected for this report and as such, the proposal site could contain sensitive landforms and sites.

Figure 6.2 Location of heritage listed items and historic features



LEGEND

- | | | | |
|------------------------------------|-----------------------|----------------|----------------------|
| The proposal | Local Government Area | Principal road | Forestry reserve |
| Aboriginal heritage | Watercourse | Secondary road | Conservation reserve |
| Land subject to Native Title claim | Railway | Local road | |

Paper Size A4
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Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



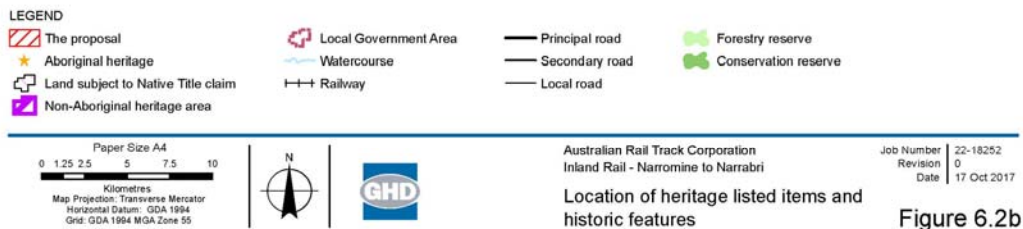
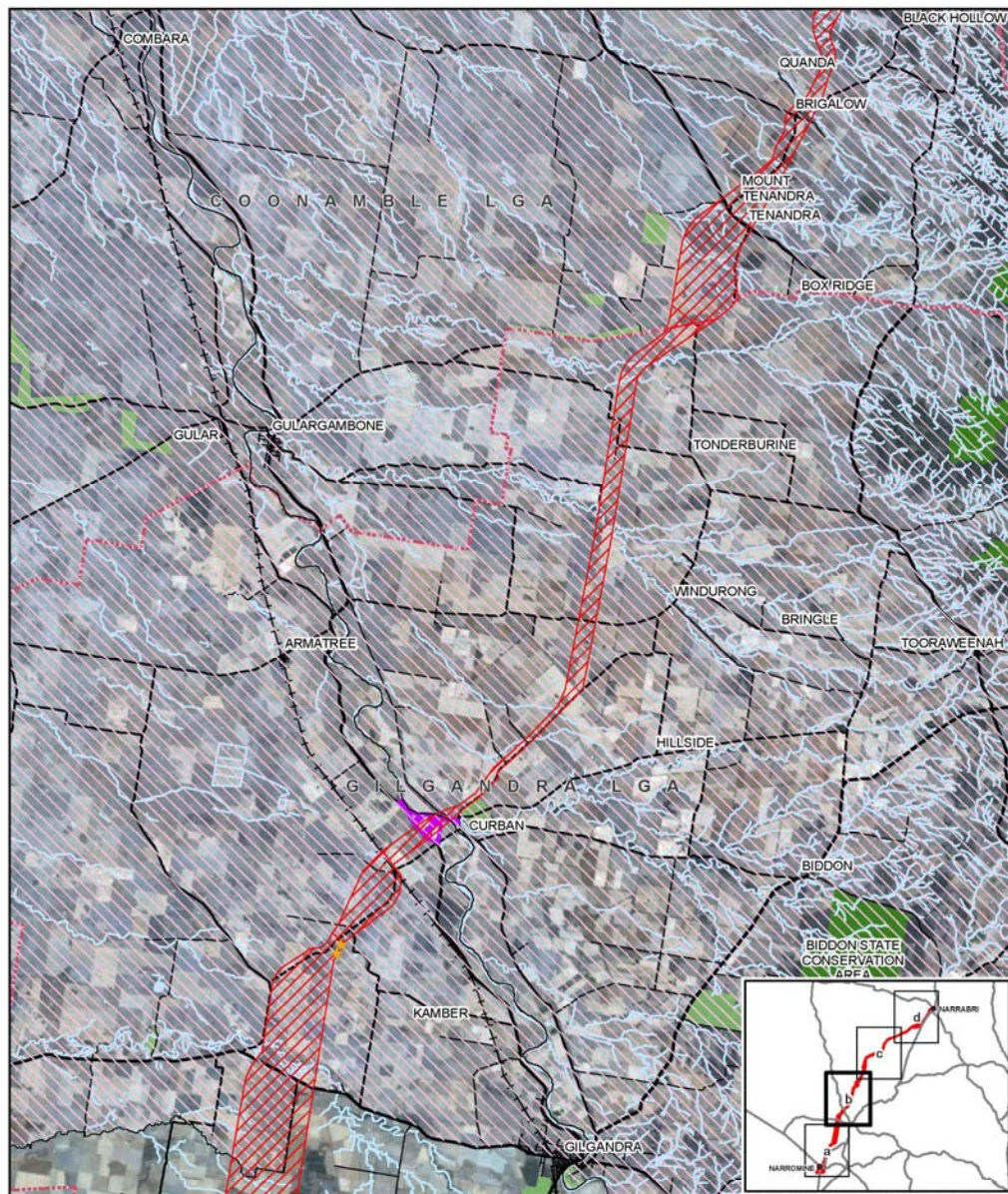
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Location of heritage listed items and historic features

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Date 17 Oct 2017

Figure 6.2a

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Data source: LPI, DCDB/DTDB/Aerial imagery, 2015; Geoscience Australia, 250K Topographic Data Series 3; OEH, AHIMS database, 2016; DPE, heritage data, 2016; Umwelt, archeology sites, 2016. Created by: gmcidarmid

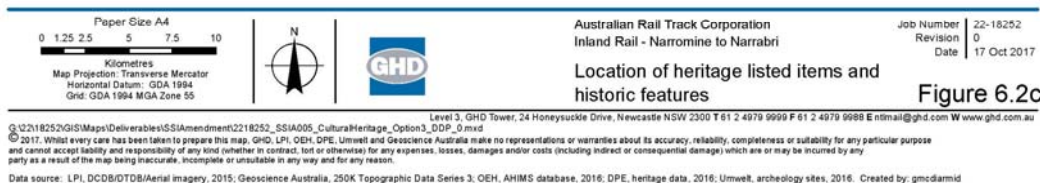
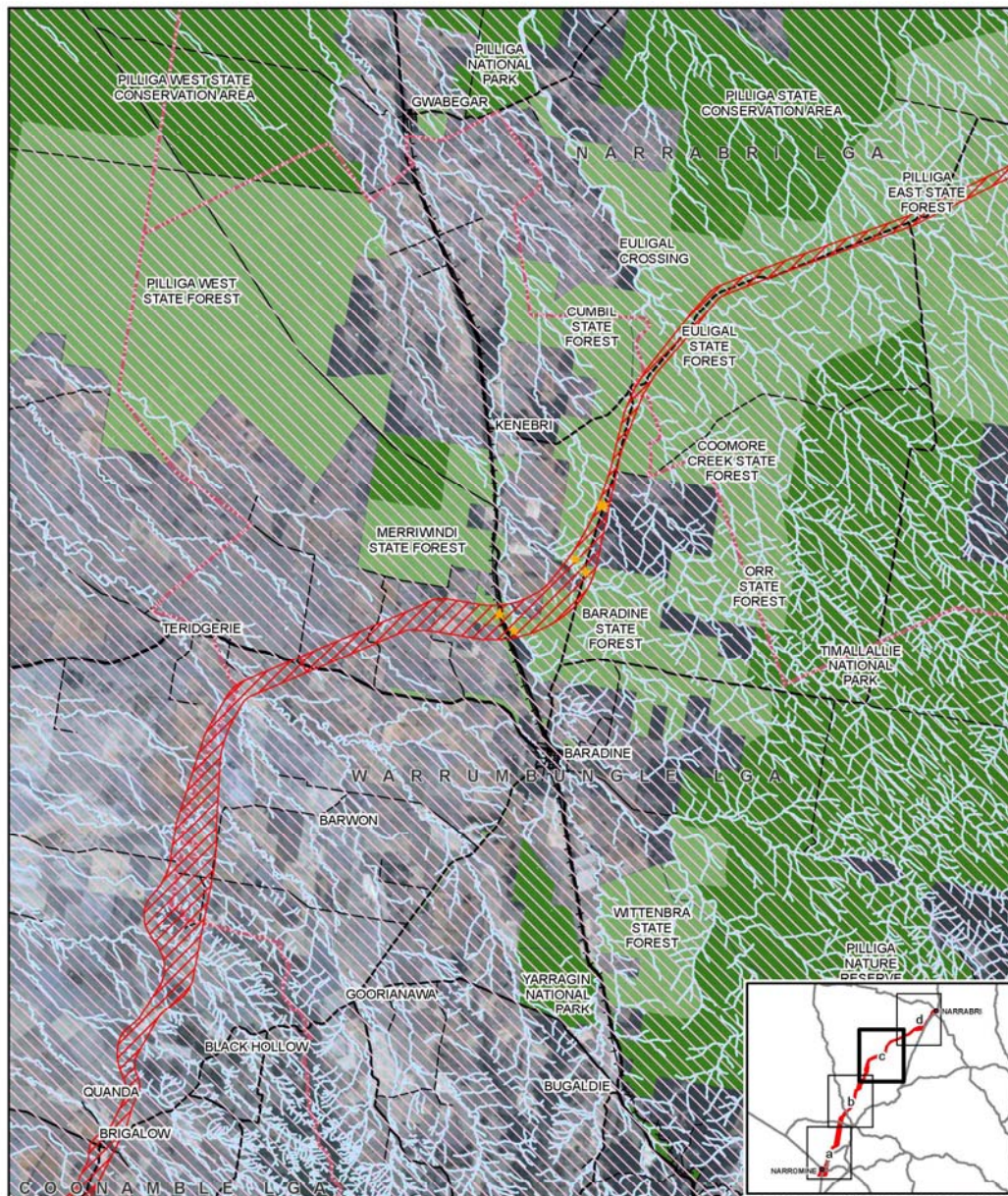
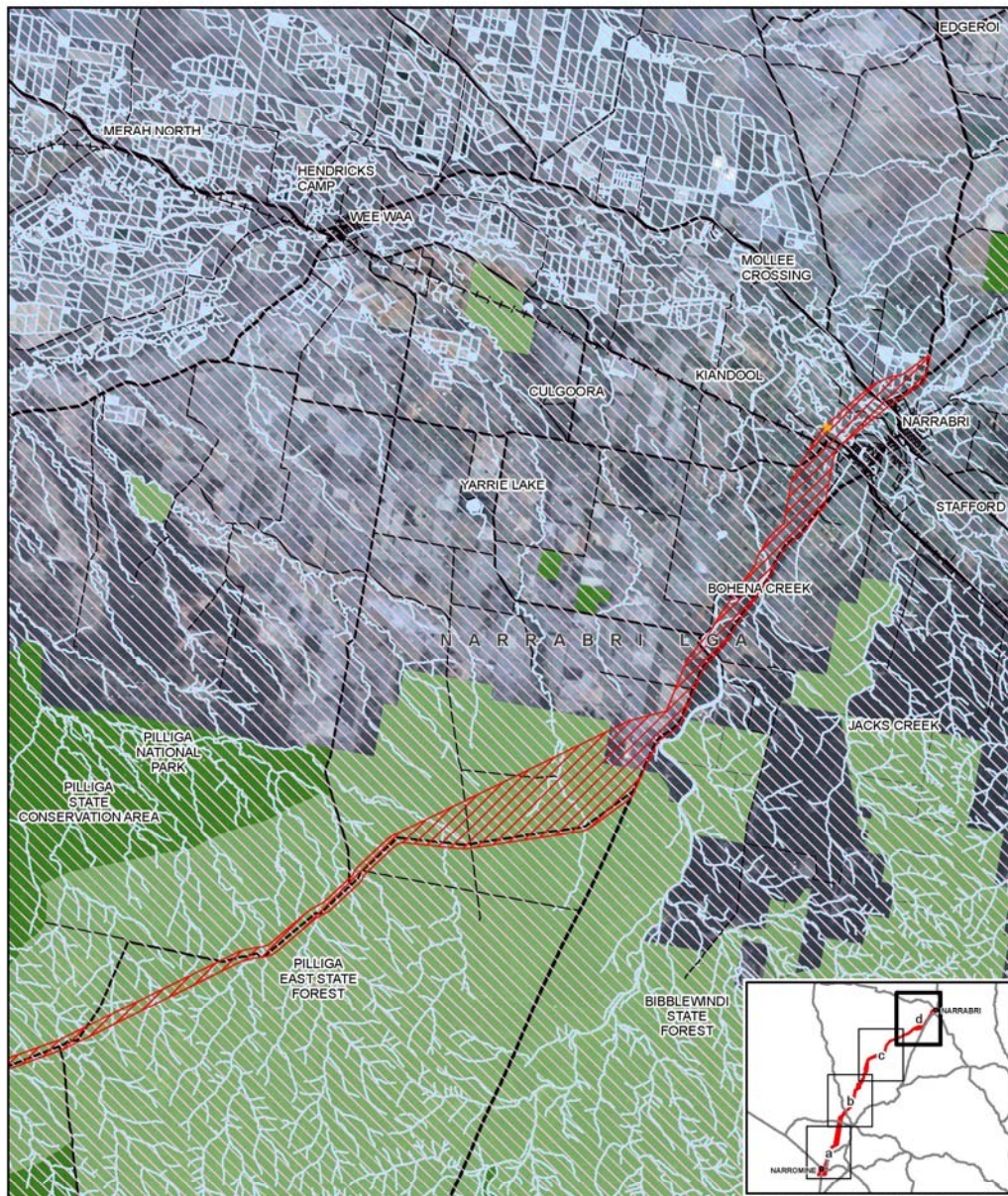


Figure 6.2c



LEGEND

- | | | | |
|------------------------------------|-----------------------|----------------|----------------------|
| The proposal | Local Government Area | Principal road | Forestry reserve |
| Aboriginal heritage | Watercourse | Secondary road | Conservation reserve |
| Land subject to Native Title claim | Railway | Local road | |

Paper Size A4
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 Kilometres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



Australian Rail Track Corporation
 Inland Rail - Narromine to Narrabri

Location of heritage listed items and
 historic features

Job Number 22-16252
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Figure 6.2d

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 Data source: LPI, DCDB/DTDB/Aerial imagery, 2015; Geoscience Australia, 250K Topographic Data Series 3; OEH, AHMS database, 2016; DPE, heritage data, 2016; Unimark, archeology sites, 2016. Created by: gmc/dmrid

The former Narrabri Aboriginal cemetery is recorded as being located on privately owned land adjacent to the Namoi River on the north-western side of Narrabri. The site is recorded as a former mission cemetery within the study area. At the time of the original site recording, there was no surface evidence of this site. It is possible that members of the local Aboriginal community would be able to provide further information for this site and that it may be of very high significance to the local community.

In addition to the AHIMS search, it is noted that the Gilgandra Local Environmental Plan (LEP) references the presence of 'Aboriginal marked rocks' on an area of land bordering Terrabile Creek at Curban, one kilometre from the indicative centreline for the proposal site. Currently, no further information is available on this potential site. However, this record indicates that grinding grooves/rock engravings may occur if suitable sandstone is exposed within the base of the creek.

Archaeological predictive modelling identified a number of archaeological sensitive areas, finding that water resources and the immediate surrounds are highly sensitive archaeological zones. A number of areas of archaeological sensitivity were identified. The sections of the proposal site in proximity to Baradine Creek, Castlereagh River, Marthaguy Creek and the Namoi River are all considered to have high or very high archaeological potential. The sections in proximity to Baronie Creek, Etoo Creek, Cubbo Creek, and Tenegie Creek are assessed to have moderate or moderate to high archaeological potential. In addition, Bundijoe Creek, Milpulling Creek, Pint Pot Creek, Native Dog Creek, Goulburn Creek and Emogandry Creek were all identified as being archaeologically sensitive. These areas would be subject to detailed archaeological and cultural assessment as part of the EIS.

The search of the Native Title Tribunal Native Title Vision website identified that the proposal site intersects two Native Title claim areas. The portion of the proposal site north of Boothaguy Creek to the Castlereagh River at Curban is located within the boundaries of an active Native Title claim held by the Ngemba, Ngiyampaa, Wangaaypuwan and Wayilwan people (NC2012/001). The remainder of the proposal site north of Curban to Narrabri is within the boundaries of an active Native Title claim held by the Gomeroi People (NC2011/006).

6.3.2. Potential impacts

Much of the proposal would be undertaken in greenfield areas, requiring disturbance in potentially undisturbed areas and on landforms with the potential to contain sites and areas of cultural heritage value. However, it is noted the proposal site passes through large areas of land disturbed by existing agricultural practices including dryland grazing and cropping and forestry operations.

It would be necessary to undertake further archaeological survey work and assessment during the EIS, to ensure that recorded and potential archaeological sites and archaeologically sensitive landforms are assessed and managed appropriately.

It would also be necessary to confirm (if possible), the location of former Narrabri Aboriginal cemetery on the north-western side of Narrabri. The noted potential for additional burials to occur in similar landforms bordering Baradine Creek dictates that any further investigations would have to consider methods to identify or refine the potential for burials along this watercourse, which is bordered by the proposal site for a length of 15 km.

6.3.3. Scope of further assessment

An Aboriginal cultural heritage and archaeology assessment would be prepared as part of the EIS in accordance with the Guide to Investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011) and the following guidelines:

- Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW, 2010c).

- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011).
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010a).
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010b).

The assessment would include consultation with the relevant stakeholders and Aboriginal parties, including Native Title parties.

The assessment would describe and assess the significance of any Aboriginal objects and/or places that may be impacted by the proposal and provide options to avoid, mitigate or manage the harm to those object and/or places.

6.4. Non-Aboriginal heritage

In order to identify if any listed historical heritage items are located within of in the vicinity (500 m) of the proposal site, desktop searches were conducted of the following heritage registers and local planning instruments:

- NSW State Heritage Register and State Heritage Inventory.
- Australian Heritage Places Inventory.
- Australian Heritage Database (including Commonwealth and National heritage lists).
- Register of the National Estate (non-statutory list).
- ARTC section 170 Register.
- Narromine Local Environmental Plan (LEP) 2011.
- Gilgandra LEP 2011.
- Coonamble LEP 2011.
- Warrumbungle LEP 2013.
- Narrabri LEP 2012.

6.4.1. Existing environment

6.4.1.1. Heritage listings

The searches indicate that one listed item is located within the vicinity (500 m) of the proposal site and the proposal site crosses one heritage listed item (Woodvale Park Private Cemetery, Curban) (OEH, 2017). (Table 6-2 and Figure 6.2).

Table 6-2 Listed heritage items in the vicinity of the proposal site

Item Name	Location	Listing and Significance
Curban Inn Archaeological Site	East Coonamble Road – Lot 7012, DP 1073845	Gilgandra LEP 2011 (local)
Woodvale Park Private Cemetery, Curban	Castlereagh Highway – Lot 1, DP 657745	Gilgandra LEP 2011 (local)

It is noted that, while there are additional listed items in the broader areas of Gilgandra, Warrumbungle, Coonamble, Narromine and Narrabri LGAs, and there are also individually listed homesteads, these are not considered to be within the vicinity of the proposal site (i.e. within 500 m) and would not be impacted.

6.4.1.2. Potential heritage items with no statutory listing

A number of potential heritage items have been identified during preliminary investigations of the proposal site. These are listed in Table 6-3.

Table 6-3 Potential heritage items with no statutory listing

Item Name	Location	Distance from proposal centre line
Drinane former public school	North side of Old Mill Road (within Lot 410 DP 1157693)	In proposal site
Former Rail Line	Wallerawang Gwabegar Rail Line	In proposal site
Former Terrabile (Curban) Village	Curban	About 150 m south-east.
Potential grave sites/pioneer markings	3096 Mitchell Highway, Narromine	In proposal site
Potential non-listed homesteads, farm sites, former village sites	Along entire proposal site.	
Potential non-listed sites related to former forestry operations	Along proposal site, in areas including: <ul style="list-style-type: none"> • Curban State Forest. • Merriwindi State Forest. • Baradine State Forest. • Cumbil State Forest. • Euligal State Forest. • Pilliga East State Forest. 	

6.4.2. Potential impacts

The proposal has the potential to impact the following identified listed or non-listed heritage items:

- Woodvale Park Private Cemetery, Curban.
- Drinane former public school.
- Potential grave sites/pioneer markings at 3096 Mitchell Highway, Narromine.
- Former Wallerawang Gwabegar rail line.

It is noted that the potential impact to other non-listed heritage items is unknown at this stage and would be subject to further assessment as part of the EIS.

6.4.3. Scope of further assessment

A historical heritage assessment would be prepared in accordance with relevant standards and guidelines, including the *NSW Heritage Manual 1996*, *Archaeological Assessments and Assessing Heritage Significance* and with consideration of the principles contained in the Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance.

This would include an assessment of the impact of the proposal on any sites, bridges or other structures of potential historical heritage value and the identification of measures where further management or investigation is required.

6.5. Hydrology, flooding and water quality

This section provides a preliminary hydrology, flooding and water quality assessment for the proposal. The assessment included a review of relevant literature such as the Narrabri Flood Study Review (URS, 2014), Narrabri Shire Council Management Plan 2011-2015 (Narrabri Shire Council, 2011), NSW Water Information (DPI – Water, 2017) and Water resources and management overview Macquarie-Bogan catchment (NSW Office of Water, 2011) to identify and evaluate existing hydrologic and hydraulic conditions within the proposal site. Narramine, Gilgandra, Coonamble, Warrumbungle and Narrabri LEPs have also been reviewed to identify watercourses, flood prone land and groundwater vulnerability.

6.5.1. Existing environment

6.5.1.1. Hydrology and flooding

The proposal crosses three rivers (Macquarie River, Castlereagh River and Namoi River) and in the order of 121 creeks and other intermittent unnamed watercourses and canals constructed to convey irrigation waters. Key waterways include Baradine Creek, Marthaguy Creek, Baronne Creek, Etoo Creek, Cubbo Creek, Tenegie Creek, Bundijoe Creek, Milpulling Creek, Pint Pot Creek, Native Dog Creek, Goulburn Creek and Emogandry Creek (Figure 6.3).

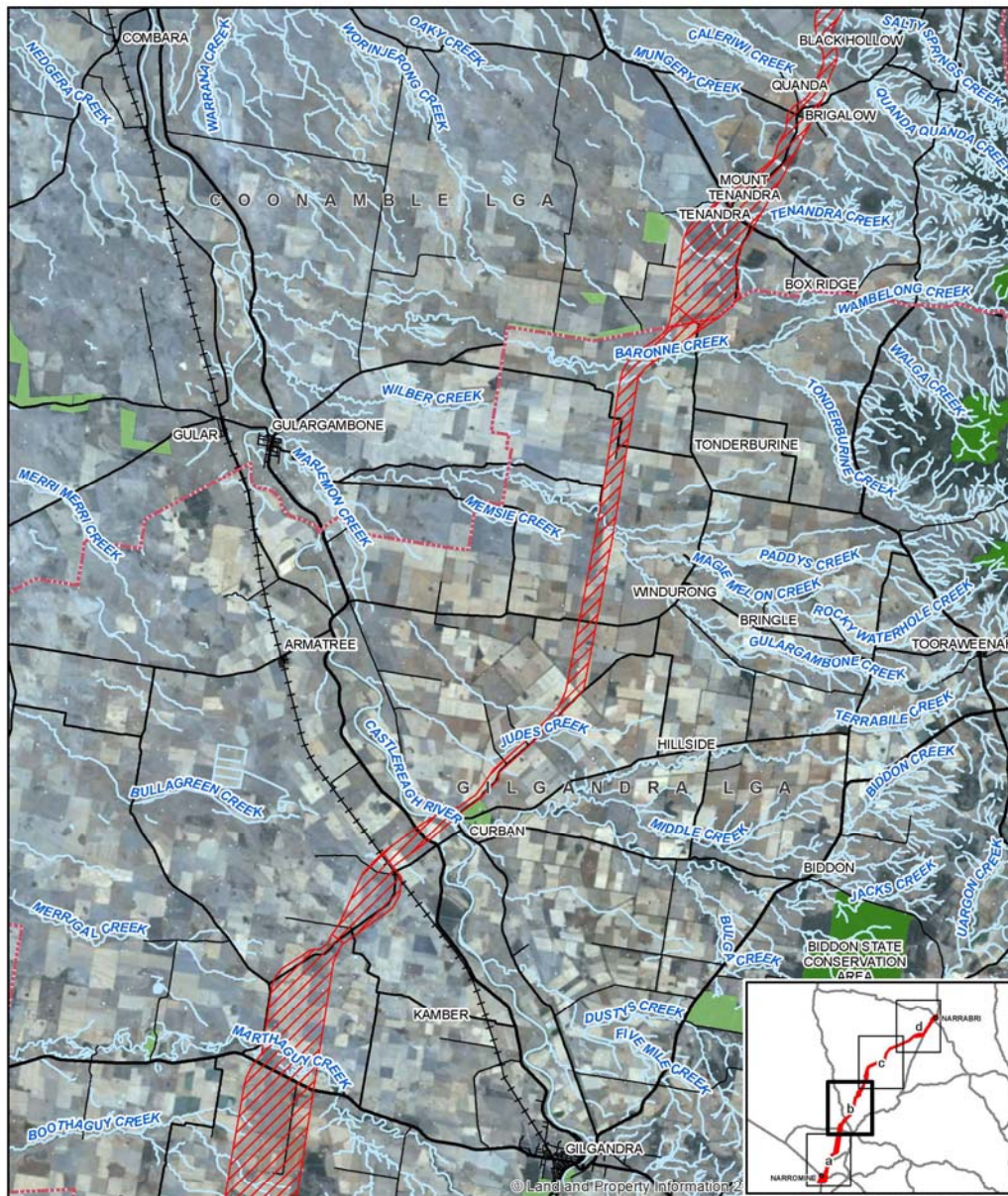
The southern extent of the proposal site is located within an area that has been subject to significant floods. At Baroona, 12 km upstream of Narramine, the Macquarie River was recorded as reaching 245 m Australian height datum (AHD), along with a similar level in 1990. LEP mapping for the Narramine LGA indicates the proposal site traverses flood planning areas.

The Narramine gauge, which operated from 1913 to 1978, recorded a maximum water level of 252 m AHD in 1955 (NSW Office of Water, 2015). The 1955 flood is reported to have overtopped the Mitchell Highway and the adjacent rail line to spread southward over the floodplain. Works have reportedly been completed in this area to restrict the magnitude of any overflow for an event of the same magnitude.

Should a repeat of the 1955 flood occur at Narramine, without the historical breakout that occurred, then it is possible that the flood level at Narramine would be higher than that reported in 1955. It is not possible to accurately identify the magnitude of the change in flood level; however, it would most likely be in the order of up to a few centimetres.

Flows within the Macquarie River catchment at Narramine have been impacted by the construction of significant water storages since the floods of the 1950s. The storages include Burrendong Dam and Cudgegong Dam (DPI – Water, 2017).





LEGEND

- The proposal
- Local Government Area
- Watercourse
- Principal road
- Secondary road
- Local road
- Railway
- Forestry reserve
- Conservation reserve

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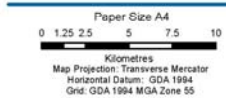
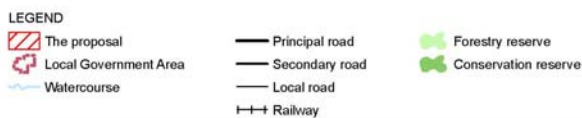
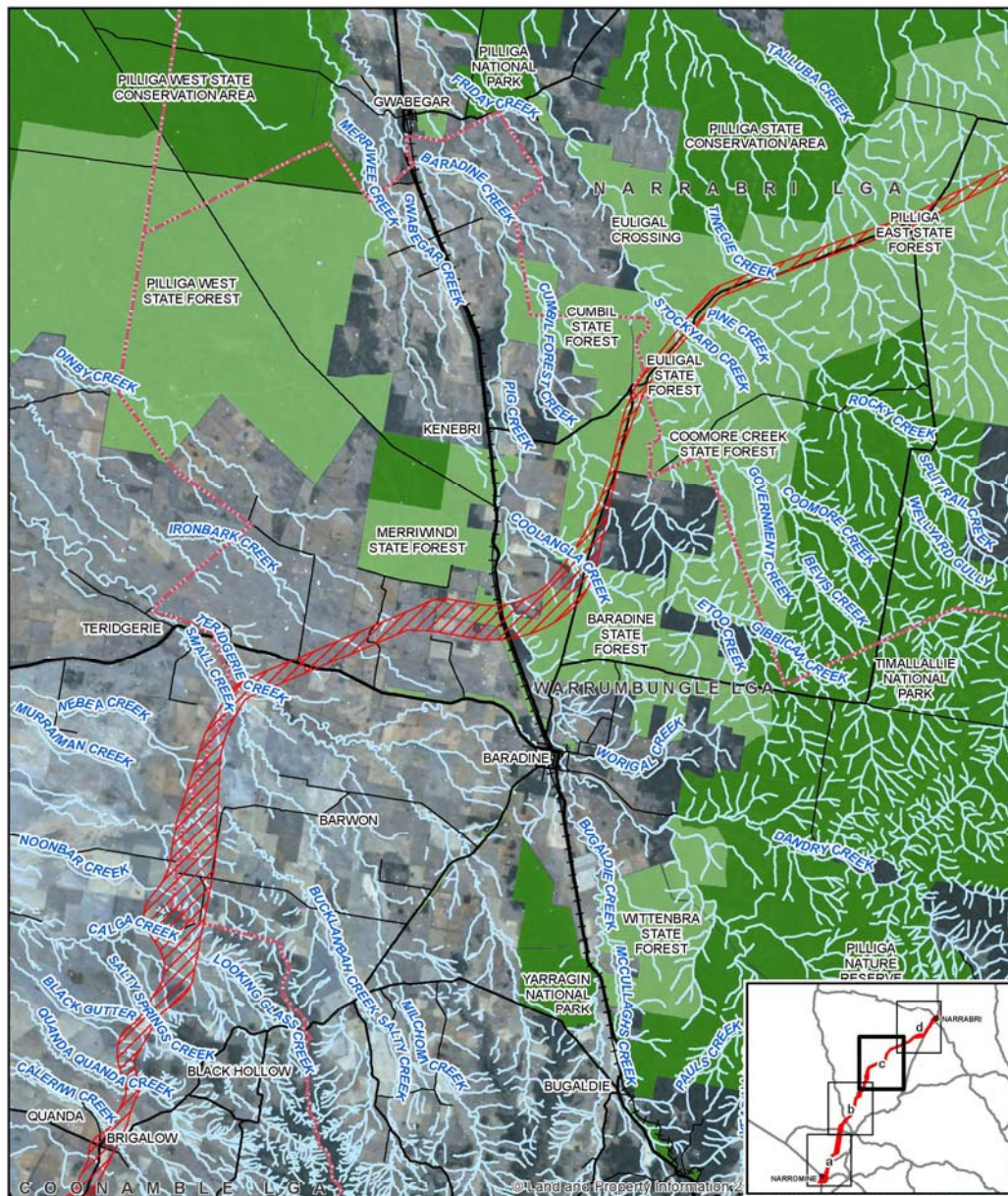
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Watercourses

Figure 6.3b

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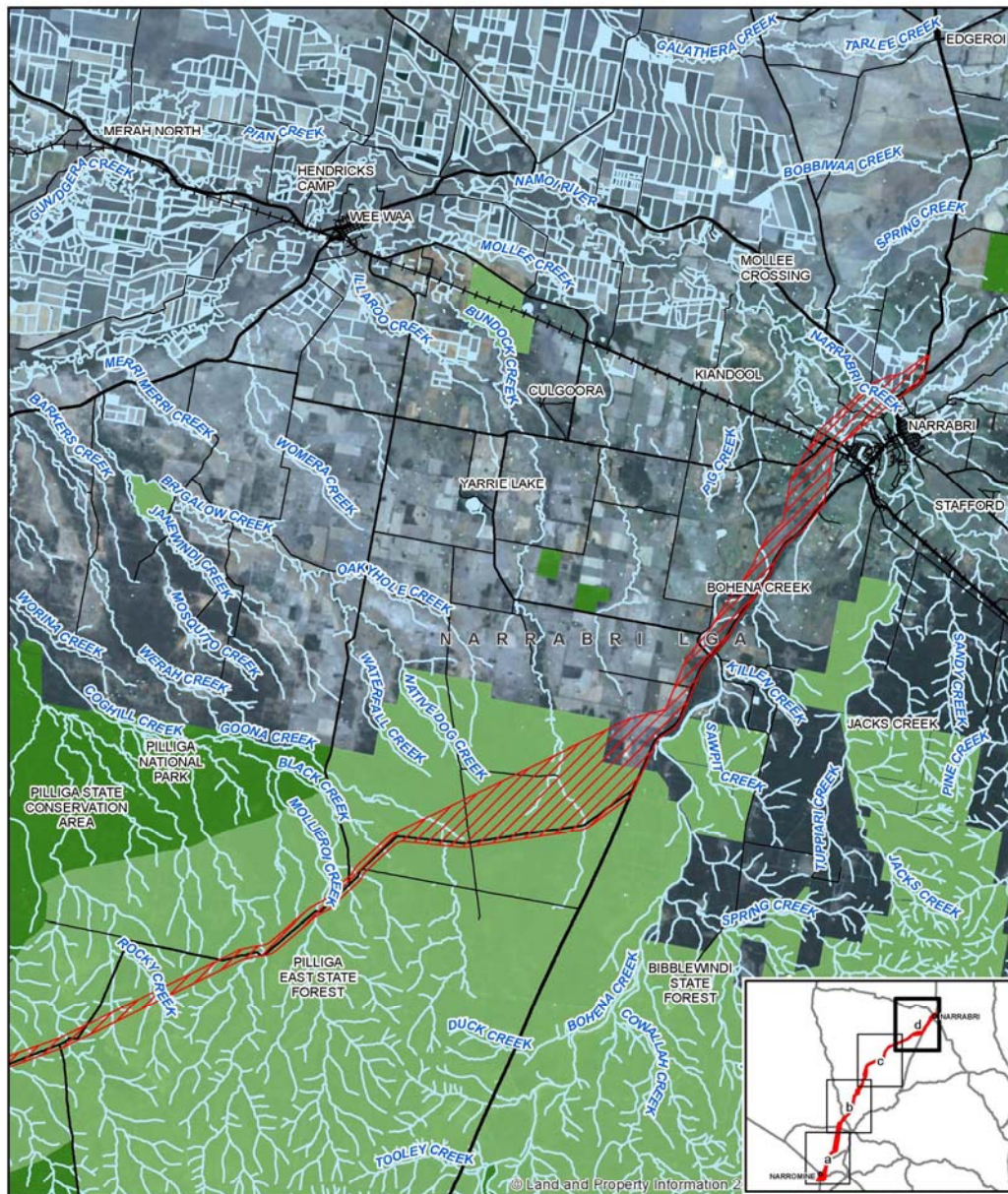
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


Watercourses

Figure 6.3c

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LEGEND

-  The proposal
-  Local Government Area
-  Watercourse
-  Principal road
-  Secondary road
-  Local road
-  Railway
-  Forestry reserve
-  Conservation reserve

Paper Size A4
0 1.25 2.5 5 7.5 10
Kilometres
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Horizontal Datum: GDA 1994
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Watercourses

Figure 6.3d

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Data source: LPI, DCDB/DTDB/Aerial imagery, 2015; Geoscience Australia, 250K Topographic Data Series 3. Created by: gmediamid

The middle section of the proposal traverses a number of creeks, which are tributaries to Castlereagh River. The Castlereagh River is an unregulated river with no major public water storage dams. However, there are a number of smaller dams and weirs in the Castlereagh River basin, one of which is the Timor Dam, which is a water supply dam for the town of Coonabarabran. The proposal site crosses the Castlereagh River south-west of the village of Curban.

Through the Pilliga East State Forest, the proposal site traverses a number of creeks and unnamed waterways, which are tributaries to the Namoi River to the north.

At the northern end of the proposal site near Narrabri, the proposal traverses the Namoi River floodplain. About 2.5 km upstream of Narrabri, the Namoi River divides into two branches – the Namoi River and Narrabri Creek. These two branches re-join 10 km downstream of Narrabri. Each of the two branches, Namoi River and Narrabri Creek, are gauged upstream of Narrabri. They do not record the same flood levels for a particular flood event.

Significant historical floods in recent memory have included 1955, 1956, 1971, 1974, 1976, 1984, 1998, 2000, and 2010. These are listed in reported levels at both the Namoi River gauge and the Narrabri Creek gauge, to obtain a complete record. The 2000 flood was listed as having a level of 212.5 m AHD as compared to the 1955 flood at 213.5 m AHD. When considering records from only one of the two gauges only the Namoi River the 1955 flood lists as being higher than the Namoi River record.

WRM Water and Environment Pty Ltd (WRM) (2016), found the 1 per cent AEP at the Narrabri gauge to be 9.4 mRL, which is marginally lower than the 1955 flood (9.44 mRL). WRM (2016) estimated the AEP of the 1955 flood to be between 1 per cent and 0.5 per cent AEP (i.e. between the 100 and 200 year Average Recurrence Interval (ARI)).

Since the 1950s, the hydrology within the Namoi River catchment has been impacted by the construction of significant water storages. These impacts include the construction of Keepit Dam and Split Rock Dam in the Namoi River catchment.

As a result of the water storage works, should a rainfall similar to that which occurred in early floods, such as that of 1955, occur today then the flood levels would most probably be lower than those which occurred in 1955. The flood levels for the events of 2000 and 2010, as discussed above, would include a realistic representation of the impacts of the dam post-construction.

The proposal crosses the Namoi River downstream of Narrabri township and thus the flood level is lower than in Narrabri township.

6.5.1.2. Water quality

The southern extent of the proposal site is situated in the Macquarie-Bogan catchment, within which the Bogan River and the Macquarie River are the dominant river systems. The Macquarie-Bogan catchment covers an area of more than 74,000 km². The headwaters of the Macquarie River originate in the Great Dividing Range south of Bathurst, and the river flows in a north-westerly direction for about 960 km until it joins the Barwon River near Brewarrina.

Land use in the Macquarie-Bogan catchment is dominated by agriculture with over 80 per cent of the catchment used for grazing. Dryland cropping, which accounts for nine per cent of land use in the catchment, occurs primarily in the middle and lower parts of the catchment (NSW Office of Water, 2011).

Due to the extensive agricultural land uses within the study area, water quality is anticipated to be generally poor as a result of pesticides, herbicides, fertilisers and sedimentation of waterways. Land degradation and declining water quality were also identified as priority issues in the Narrabri Shire LGA (Narrabri Shire Council, 2011).

6.5.1.3. Groundwater

A search of the NSW Water Information Database on 2 August 2017 identified 274 registered groundwater bores within the study area and within one km of the indicative centreline for the proposal. The depths of the bores extend up to 592 m below ground level, with standing water levels measured between three and 55 m below ground level. Drillers' logs indicated that the geology generally comprised alternating layers of alluvium, clay, gravel and sand underlain by bedrock. Bedrock, primarily described as sandstone and/or shale, was noted at varying depths.

Local environment plan mapping for four of the LGAs indicates the proposal site traverses areas of groundwater vulnerability in the southern and middle sections of the proposal site within the Narramine, Gilgandra, Warrumbungle, and Coonamble LGAs. Groundwater vulnerability mapping is not available for Narrabri LGA.

6.5.2. Potential impacts

6.5.2.1. Hydrology and flooding

Potential flood issues include:

- Impacts of flooding on the construction and operation of the proposal. Upstream of the proposal there could be increased flood levels and some redirection of flows to culvert and bridge structures, while downstream of proposed structures there could be increased local flow velocities that may impact the natural environment, waterway forms or buildings.
- Impacts on emergency service management as a result of potential changes to road overtopping frequencies and levels.
- Impacts of the proposal on the hydrology of the catchment, including general drainage, flood flow paths and flood volumes.
- Impacts to agricultural land in relation to extent and duration of inundation as a result of the impacts to the hydrology of the catchment and the duration of these impacts.

Flooding of sections of the proposal site may occur during high flows in major rivers as a result of rainfall over a large portion of the catchment, or rainfall over a local catchment draining to an individual underbridge or group of culverts in isolation of regional flooding behaviour. Along the Macquarie River, floods can spill from the main watercourse and spread large distances laterally across the floodplain.

The proposal has the potential to impact flooding resulting from both local rainfall and runoff events and regional flood events. Construction may result in temporary impacts to the behaviour of the local surface water systems. These impacts could include a temporary loss of floodplain storage and temporary redistribution of flood flows as a result of the presence of stockpiles and works within flow paths. These impacts would be short term and temporary, and would only be an issue if a flood event occurred during construction.

The presence of structures associated with the proposal (such as embankments, culverts and bridges) could impact upstream and downstream flood behaviour, change the duration and extend of ponding water upstream of the rail line, and lead to scouring downstream of the replacement culverts and reconstructed track.

6.5.2.2. Water quality

Construction activities may impact on water quality, either:

- Directly, by:
 - Erosion of watercourse banks and beds during watercourse crossings and resultant sedimentation.

- Contamination of water during watercourse crossings.
- Indirectly, by:
 - The generation of sediment-laden overland run-off which flows to watercourses.
 - Contamination of overland run-off which flows to watercourses.

Potential sources of contamination may include:

- Spillage of oils, machinery fuels, etc.
- Litter.
- Construction materials, including alkaline cement, paint, etc.
- Soils used in landscaping and rehabilitation activities.

As there would be a number of watercourse crossings along the proposal site, careful management of the potential for erosion and sedimentation during construction of these crossings would be required. Erosion and sediment control and flow diversion measures would be implemented for watercourse crossings with consideration of the need to minimise upstream flooding. Any pollutants entering watercourses would have the potential to impact on water quality by increasing turbidity and suspended particle levels, altering pH (alkaline cement material), or by increasing hydrocarbon levels.

If inadequately controlled, changes to water quality could impact on the aquatic ecology of watercourses and/or any downstream water users.

Erosion and sediment control prevention measures would be implemented as part of all construction activities. Substantial effort and attention would be given to preventing soil erosion and sedimentation of surface water runoff, both as part of land based construction, and during construction involving watercourse crossings or impacts to waterbodies.

Standard controls to prevent erosion and sedimentation would be implemented for each construction activity. The practices and controls would be based on the practices described in the following guidelines:

- Managing Stormwater: Urban Soils and Construction Vol 1 (Landcom, 2004).
- Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (DECC, 2008a).
- Department of Primary Industries – Water guidelines for controlled activities.

All erosion and sediment control measures, determined as part of the preparation of the EIS and the detailed design for the proposal, would be designed, implemented and maintained in accordance with the above guidelines.

The operation of the proposal has the potential to generate the following pollutants:

- Sediment and gross pollutants – from movement of soils during rainfall events and gross pollutants such as coal dust, litter, cargo spillages.
- Metals – from abrasion, for example brake pads, track and points wear.
- Organics compounds from oils and lubricants, including hydrocarbons, poly-aromatic hydrocarbons (PAHs), volatile organic compounds and phenolics.
- Nutrients and sulphates.
- Herbicides/pesticides – from maintenance practices to control weeds.

6.5.2.3. Groundwater

Construction is not anticipated to impact on groundwater resources. Trenching would be relatively shallow compared to the likely depth of the water table and is not likely to intercept groundwater aquifers or their flow systems. Substantial dewatering is not expected to be required. Any dewatering that may be required is likely to be superficial and associated with managing local and recent rainfall at the worksite. Based on the results of available data, it is expected that negligible groundwater flows would occur towards trenching works.

There is potential for construction activities to cause contamination of soils and therefore groundwater as a result of oil and/or fuel leaks from operating construction equipment. However, based on the implementation of standard construction management measures, the depth to groundwater and the results of vulnerability mapping, the likelihood and potential significance of these impacts is considered to be low.

The proposal does not include any deep cuts along the proposed alignment and is therefore considered unlikely to impact on groundwater.

The need may arise to extract groundwater or surface water for construction purposes. If this occurs, the necessary approvals would be obtained if required.

6.5.3. Scope of further assessment

6.5.3.1. Hydrology and flooding

A hydrology and flooding assessment would be undertaken for the EIS and would include:

- A description of the existing hydrological regime for any surface and groundwater resources likely to be impacts by the proposal, including stream orders.
- Assessment of the impact of the construction and operation of the proposal and any ancillary facilities on surface and groundwater hydrology, including:
 - Natural processes within rivers and floodplains that affect the health of the system and landscape health, aquatic connectivity and access to habitat.
 - Direct or indirect increases in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
 - Minimising the effects of proposed stormwater and wastewater management during construction and operation on natural hydrological attributes and on the capacity of existing stormwater systems where discharges are proposed through such systems.
 - Water take from all surface and groundwater sources, with estimates of annual volumes during construction and operation.
- Identification if any requirements for baseline monitoring of hydrological attributes.
- Assessment and modelling of the impacts on flood behaviour during construction and operation for a range of flood events.

The assessment would quantify the impacts of any bridge/culvert installations and include considerations of flood levels for a range of flood events. The assessment would also examine the implications for the flood duration at or near culverts.

6.5.3.2. Water quality, watercourses and groundwater

Specialist water impact assessments for surface and ground water quality would be undertaken as part of an EIS, with consideration of flooding and hydrology. Specialist assessments would include:

- Documentation of the ambient NSW Water Quality Objectives and environmental values for the receiving waters relevant to the proposal, including the indicators and associated trigger values or criteria.
- Identification and estimation of the quality and quantity of all pollutants with potential to be introduced as a result of the proposal, identifying their source and discharge point. This would include consideration of potential impacts on the environment and human health.
- Identification of the rainfall event for which water quality protection measures have been designed.
- Assessment of the significance of impacts.
- Demonstration of how construction and operation of the proposal would ensure NSW Water Quality Objectives are, or would continue to be, met.

Recommendations for the management of water quality during construction would be provided in the EIS. Preliminary erosion and sediment control options would be proposed for the main watercourse crossings. Particular attention would be paid to watercourses classified as either unstable or prone to erode.

A groundwater assessment would be undertaken to determine the existing ground conditions and the need for any groundwater works during the construction phase to minimise groundwater contamination or monitoring groundwater conditions, if required. This would involve a desktop review of current hydrogeological conditions to determine the potential construction and operational risks to groundwater. It would include a review of existing data and reports concerning quantity and quality information, as well as publicly available data.

A qualitative groundwater impact assessment would be completed using the information collated from the data review. This would include assessing the potential impacts of the proposal on groundwater levels, quality and quantity during construction and operation.

Specialist assessments for surface and groundwater quality would be undertaken with consideration of relevant legislations and guidelines, including:

- NSW Water Quality and River Flow Objectives.
- Using the ANZECC Guidelines and Water Quality Objectives in NSW (DEC, 2006b).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000).
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DECC, 2008b).
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (DECC, 2008).

6.6. Topography, geology and soils

A preliminary geotechnical assessment was undertaken by Jacobs Group (Australia) Pty Limited (Jacobs). The assessment included:

- Desktop review of existing reports and data.
- Ground truthing and geological mapping with visit to potential quarry sites.
- Limited targeted intrusive geotechnical investigations comprising test pitting (conducted between 19 and 22 April 2016, 28 to 29 June 2016 and 18 to 19 July 2016) and shallow boreholes (conducted between 27 and 29 June 2016, with a second phase performed between 3 and 8 August 2016).

- Soil and rock samples collected during the geotechnical investigation were subject to laboratory testing.

At the time of the completion of geotechnical investigations, access to private land had not been granted and therefore site observations were restricted to those areas that could be observed from public roads and access tracks.

6.6.1. Existing environment

6.6.1.1. Geology and soils

The presence of the elevated Great Dividing Range to the east, and the lower-lying and typically flat riverine plain of the Great Australian Basin to the west dictate the regional geology within the vicinity of the proposal site. The oldest bedrock in the area are within the foothills of the Great Dividing Range, dominated by horizontally bedded Jurassic and Cretaceous quartz sandstone and shale, with limited conglomerates.

Significant flood basalt deposits associated with Neogene volcanism are located in the vicinity of the Warrumbungles, forming the more elevated and pronounced hillsides in the central section of the proposal site. Vast colluvial and alluvial deposits have formed through prolonged erosion of highland areas of the Great Dividing Range, with these deposits having been deposited westward into the Great Australian Basin. These sediments comprise stream deposit colluvial fans of coarse sands and gravels in the valleys upslope, becoming finer-grained alluvial sediments further down the valley. Evidence of larger stream courses of Quaternary age occur as long, sand-filled channels and clay plains with shallow depressions between ridges in which rainwater collects.

In general, ground conditions were consistent with those presented in available geological mapping and existing geotechnical reports for the study area. The geotechnical materials encountered along the proposal site have been classified to provide relevant geological and geotechnical context for the engineering and construction of the project and include:

- Black soils – presence of these soils has been inferred from available soil mapping within close proximity to mapped basalt outcrops where, given the appropriate climatic conditions, black soils are often located.
- Grey, brown and red clays – presence of these soils has been inferred from available soil mapping at the northern end of the proposal site and in close proximity to mapped basalt outcrops. Grey, brown and red clays are often observed in alluvial soils derived from weathered basalts.
- Solodic soils – these soils have been encountered within test pits over areas of mapped older Quaternary alluvium/colluvium. Significantly, the lower clay-rich horizon is typically sodic and prone to dispersive erosion.
- Red or brown earths – to date these soils have been encountered within test pits in areas overlying weathered Cretaceous/Jurassic sedimentary rocks.
- Other soils – anticipated at some active stream beds though not yet encountered within geotechnical investigations.
- Highly to moderately weathered sedimentary rocks – these materials have been encountered below red or brown earths at about 2.5 m depth in test pits and boreholes in areas mapped as Cretaceous/Jurassic sedimentary rocks.
- Highly to moderately weathered basalt – although not yet encountered, these materials would be anticipated to comprise very low to high strength variably weathered basalt, possibly with high strength basalt corestones.
- Slightly weathered to fresh sedimentary rocks – not yet encountered within geotechnical investigations, although would be anticipated at depth in areas mapped as Jurassic or Cretaceous sedimentary rocks.
- Slightly weather to fresh basalt – not yet encountered within geotechnical investigations, although would be anticipated at depth in areas mapped as Tertiary basalts in the vicinity of the Warrumbungles.

Given the distance of the proposal site from the coast and the elevation of the areas, no acid sulfate soils are expected or known to occur along the proposal site.

6.6.1.2. Topography

The topography of the proposal site is dictated by its location relative to the more elevated and rugged Great Dividing Range to the east, and the lower-lying and typically flat Great Australian Basin to the west. The proposal site primarily runs along the foot slopes of the Great Dividing Range. As such, relief is slight, with the terrain flat to gently undulating and hillslopes typically less than 10 degrees. However, within the central portion of the alignment, in the vicinity of the Warrumbungles, the topography becomes more pronounced with moderate slopes on the flanks of isolated hillsides.

Reduced levels along the proposal site are typically between 240 m AHD to 270 m AHD, but attain a maximum level of about 300 m AHD at Mount Tenandra to the west of the Warrumbungles.

The topography is punctuated by a large number of incised creeks and rivers, which drain westward towards the Great Australian Basin from the more elevated areas in the east. The Pilliga East State Forest is associated with more elevated terrain, with a number of gullies and drainage features observed to be trending northward, traversing lower relief alluvial fans and the floodplain of the Namoi River and Narrabri Creek where the topography is more subdued.

6.6.2. Potential impacts

Based on initial desktop investigations, there are not considered to be any major issues associated with the nature of the substrate throughout the majority of the proposal site. However, between Curban and Baradine Road geological mapping indicates black soils are likely present throughout the area.

Black soils can result in higher rail embankments and deeper structural fill layers to manage the shrink/swell properties of these highly reactive soils. Constructability over black soil areas can also be an issue with regard to the workability of the soils and machine access in wet conditions. This would likely require specific design and construction treatment, including increased quantities of structural fill and formation material.

The potential for saline soils to be present in the proposal area also requires further investigation.

Along the majority of the proposal site, with the implementation of appropriate management measures, no significant impacts associated with the erosion of soils, water logging and instability during construction are expected. Potential impacts can be managed effectively through engineering controls, such as retaining walls and foundation treatment, and the implementation of construction management measures. These measures would include erosion and sediment control measures, as detailed in the Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and discussed in section 6.5.3.1.

6.6.3. Scope of further assessment

Targeted geotechnical investigations would be undertaken as part of the design development process.

Consideration of soils and geology, and contamination would form part of the EIS process, including:

- Assessing whether salinity is likely to be an issue, determining the presence, extent and severity of soil salinity within the proposal footprint.
- Consideration of the proposal's impacts on soil salinity and how it may affect groundwater.
- Assessment of impacts on soil and land resources.

This would be undertaken with consideration of relevant legislations and guidelines, including:

- Urban and Regional Salinity – guidance given in the Local Government Salinity Initiative booklets.
- Landslide risk management guidelines in Australian Geomechanics Society (2007).
- Soil and Landscape Issues in Environmental Impact Assessment (DLWC, 2000).
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (DECC, 2008).

Potential impacts from erosion and groundwater vulnerability would be addressed in the assessments described in section 6.5.3.

6.7. Land use, socio-economic and visual impacts

Narromine, Gilgandra, Coonamble, Warrumbungle and Narrabri LEPs maps and Australian Bureau of Statistics (ABS) data have been used in the desktop study to describe the socio-economic characteristics of the area and identify the different land uses across the proposal site.

6.7.1. Existing environment

6.7.1.1. Land use

The study area is dominated by agricultural industries, with significant cropping and livestock industries. The Narrabri, Gilgandra and Narromine LGAs are dominated by cereal, other broad acre, and hay production cropping; supported by dryland grazing of beef cattle and sheep, and wool production (NSW Trade and Investment, 2011). The Coonamble and Warrumbungle LGAs are dominated by dryland grazing of beef cattle and sheep, and wool production; supported by cereal, other broad acre and hay production cropping.

The majority of the study area has been cleared of the original vegetation for agricultural activities generally consistent with those described above, with scattered patches of remnant vegetation remain, mainly in the vicinity of watercourses, nearby state forests and hilled areas unsuitable for agriculture. Most of the state forest areas have been intensively harvested. Scattered paddock trees can be observed in various locations throughout the study area.

Other key features/land use in the vicinity of the proposal site include:

- Grain storage and handling facilities located on the CRN Coonamble rail line at Curban, on the Walgett rail line at Narrabri and off the Newell Highway north-west of Narrabri.
- Commercial/industrial area west and north-west of Narrabri (refer to section 3.2).
- Sections of the proposal site traverse sections of the Merriwindi State Forest, Baradine State Forest, Cumbil State Forest, Euligal State Forest and Pilliga East State Forest and borders Curban State Forest.
- A number of state forests, state conservation areas and national parks are located in the vicinity of the proposal site including Tenandra State Forest (1.5 km west), Drillwarrina National Park (4.7 km east), Coomore Creek State Forest (1.5 km east), Pilliga State Conservation Area (1.6 km north), and Jacks Creek State Forest (730 m south).
- The Narrabri Industrial Estate, the Commercial Estate and Wee Waa Road precinct west and north-west of Narrabri.

6.7.1.2. Socio-economic

A review of the 2016 census data (ABS, 2017) was undertaken to identify the community profile and economic environment of the five LGAs applicable to the proposal site and is summarised in Table 6-4.

Table 6-4 Socio-economic characteristics of the Narromine, Gilgandra, Coonamble, Warrumbungle and Narrabri LGAs

Characteristic	Narromine	Gilgandra	Coonamble	Warrumbungle	Narrabri
Population	6,444	4,236	3,918	9,384	13,084
• Male (%)	49.9	49.4	49.7	50	49.9
• Female (%)	50.1	50.6	50.3	50	50.1
Aboriginal or Torres Strait Islander Population (%)	19.9	14.1	30.1	9.8	12.2
Employment ¹					
• Full time (%)	62	59.4	61.4	57.4	62.8
• Part time (%)	25.2	28.8	23.9	29.1	25.1
Main Industry of Employment ¹	Sheep, beef cattle and grain farming (18.4%)	Sheep, beef cattle and grain farming (25.1%)	Sheep, beef cattle and grain farming (27.8%)	Sheep, beef cattle and grain farming (23.6%)	Sheep, beef cattle and grain farming (11.7%)
Dwelling tenure					
• Owned outright (%)	38.8	41.8	40.6	46.4	32.1
• Owned with a mortgage (%)	28.8	25.2	22.3	23	31.4
• Rented (%)	27.9	27.7	30.9	25.8	31.8
• Other tenure type (%)	0.9	1.6	1.6	1.3	0.6
• Tenure type not state (%)	3.7	3.5	4.7	3.5	4.2

Note 1: Employment data for the 2016 Census is unavailable, as such data from the 2011 Census has been used (ABS, 2011).

6.7.1.3. Visual

The proposal site traverses a predominately rural area, with rural properties surrounding the vast majority of the proposal site. The land surrounding the proposal site is used for cropping and dryland grazing purposes. The proposal site is also located in the vicinity of a number of towns and villages, including Narromine and Narrabri. Towns located in the vicinity of the proposal site are described in section 3.1. Sensitive receivers are concentrated in the towns and villages along the proposal site. Other sensitive receivers include scattered dwellings on rural landholdings. The majority of receivers outside the towns are located more than 100 m from the proposal site (Figure 6.4).

The main roads within the proposal site include the Newell Highway, Castlereagh Highway, Oxley Highway and the Mitchell Highway, which are discussed further in section 6.9.

6.7.2. Potential impacts

6.7.2.1. Land use

The majority of work associated with the proposal would require the acquisition of land currently used for agricultural purposes, resulting in a permanent change of land use and potential severance of properties. During construction, there may be temporary changes in land use from the existing uses for temporary access tracks, and laydown and compound areas. During operation, direct land uses impacts would result from any change in use associated with the operation of the proposal and its associated facilities. The EIS would investigate options for the movement of equipment and stock across the proposal site.

The proposal site also traverses minor areas of the Merriwindi State Forest, Baradine State Forest, and Cumbil State Forest and borders Curban State Forest. In addition, the proposal site traverses more significant areas of the Euligal State Forest and Pilliga East State Forest.

Consultation with NSW Forestry (section 7) has indicated that the state forest areas within the proposal site are less productive with the more productive areas located to the east and west of the proposal site. As such, the proposal would not significantly impact proposed harvesting operations.

Due to the majority of the proposal site being located over agricultural lands there is limited proposed development other than ongoing agricultural and state forest activities.

Extensive consultation with the community, local councils, land owners and other key stakeholders has been undertaken for the proposal as described in (section 7). As a result of this consultation and review of council plans, known proposed developments near the proposal site include possible future rural residential areas located south-east of Narrabri and north-east of Narromine and various small scale rural residential development applications. The proposal site traverses the area north-east of Narromine and includes a broad corridor to enable the final alignment to take into account potential development of this area.

Where the proposal site exits the Pilliga East State Forest it would pass through the project area for the proposed Santos Narrabri Gas Project and pass near to the proposed water treatment plant. This project is still subject to planning approvals with Santos currently preparing a submissions report following public exhibition of the EIS. ARTC has undertaken consultation with Santos (section 7) and will continue to do so to ensure any interactions with the proposal are managed.

6.7.2.2. Socio-economic

The proposal would have wide economic influences, including enhancing efficiencies and capacity for transporting goods along the interstate rail network. It would reduce the growth of heavy vehicles on the road (Commonwealth of Australia, 2012), which would have positive benefits to future road congestion, and the associated economic and social costs.

Wider economic impacts would also relate to the generation of economic multipliers on account of investment in a major new form of public infrastructure, as well as the direct and indirect generation of local and regional employment and service opportunities.

The benefits of the proposal would relate to the benefits of Inland Rail overall, including:

- Creating jobs.
- Supporting the growth of existing businesses and the launch of new businesses.

- Making Australia's exports more competitive.
- Easing congestion on highways and through the Sydney rail network.
- Preventing additional wear and tear on roads and making roads safer.
- Reducing environmental emissions and fuel consumption.

In the short term, not all of the economic impacts of the proposal are likely to be positive. The construction of the proposal may temporarily negatively affect the day-to-day operation of businesses located near construction work sites. However, this may be offset through construction activity generating additional local expenditure through local shops and services which would have a positive impact.

In the long term, negative impacts of the proposal would be the loss of agricultural land acquired for the proposal, resulting in a reduction in production and the associated economic impact. Impacts to agricultural land also include the potential severance of properties, either where the alignment runs through a lot or where landowners have land on both sides of the proposal site.

The scope and significance of the social impacts are also likely to vary. Many of the social impacts during the construction phase may be adverse as a result of amenity based impacts such as noise (section 6.8), air quality (section 6.10), traffic (section 6.9), and visual impacts (discussed below).

During operation, potential amenity based impacts such as noise and vibration are likely to occur in areas where the proposal is situated within close proximity to sensitive receivers (such as residential areas and town centres).

6.7.2.3. Visual

Inland rail would have a visual impact on the local environment. The proposal site predominantly passes through rural areas used for cropping and grazing with a low density. The rail track would have a similar visual appearance to other single track railways in the area, such as the Coonamble Line, Wee Waa Line or the Main Western Railway. About 78 km of the route passes through the state forests around the Pilliga areas. This area is sparsely populated and the railway would be screened by trees.

Proposed rail viaducts over the Mitchell Highway and Macquarie River to the east of Narromine and over the Namoi River floodplain to the west of Narrabri would be visible from roads and nearby residences.

The operation of trains carrying double stacked containers would increase the visual impact for nearby receivers.

Construction worksites would also have the potential to result in visual impacts for nearby sensitive receivers. The majority of these sites would be located away from receivers within rural areas. However, some sites (within the main towns) would be located in close proximity to nearby sensitive receivers. It is noted that, while the proposal is in the vicinity of the towns of Narromine and Narrabri, the proposal site does not go through these towns.

6.7.3. Scope of further assessment

6.7.3.1. Land use

A land use and property assessment will be undertaken to confirm the specific land uses, properties and owners that would be affected by the proposal. The assessment would include consideration of:

- Agricultural land use impacts in accordance with current guidelines.
- Specific land uses and premises along the proposal site and the potential impacts of the proposal on property and land use.

- Biosecurity risk and management measures relating to the potential spread of pests, diseases and weeds along the proposal site.
- Impact on significant mineral resources including operating mining or extractive industries or known resources, current and future exploration activities in the area.
- Encroachment into adjoining road reserves and any Crown land affected by the proposal.

The assessment would be undertaken with consideration of relevant legislation and guidelines, including:

- Infrastructure proposals on rural lands guide (DPI, 2013).
- Landuse Conflict Risk Assessment Guide (DPI, 2011).
- Local Environmental Planning instruments (Narrabri Shire Council (2012), Narromine Shire Council (2011), Gilgandra Shire Council (2011), Coonamble Shire Council (2011), and Warrumbungle Shire Council (2013)).

6.7.3.2. Socio-economic

A socio-economic assessment will be undertaken to assess the social and economic impacts on the community as a result of the construction and operation of the proposal. This assessment would include details of the local community, their nature and values, details of potential noise, vibration and visual impacts, likely traffic and access impacts to the community. The assessment will also identify the nature of the community affected, the likely degree of impact and the necessary mitigation to minimise the impacts. The assessment would include consideration of:

- Social and economic impacts in accordance with current guidelines.
- Impacts from construction and operation on potentially affected properties, businesses, recreational users and land and water users, including property acquisitions and adjustments, access, and amenity.
- The assessment would also identify the nature of the local community affected and the necessary mitigation to minimise the impacts.

The assessment would be undertaken with consideration of relevant legislation and guidelines.

6.7.3.3. Visual

A landscape and visual assessment will be undertaken to identify the potential visual impacts on sensitive receivers from the construction and operation of the proposal. This assessment would include details of the potential impacts on sensitive receivers, viewpoints and amenity impacts during construction. The existing landscape character and its sensitivity to change will also be described and will identify the impact resulting from the construction and operation of the proposal. The assessment would include consideration of:

- Visual impact of the proposal and ancillary infrastructure on views, streetscapes and buildings, heritage items and the local community. Visual impact assessment would need to include figures and drawings to illustrate mitigation of potential impacts to visual amenity.
- Existing landscape character and sensitivity to change would be identified for each landscape catchment and an impact assessment completed based on the change to the landscape as a result of the proposal.

The assessment would be undertaken with consideration of relevant legislation and guidelines including:

- AS4282-1997 Control of the obtrusive effects of outdoor lighting.
- Beyond the Pavement: Urban Design Policy, Procedures and Design Principles (RMS, 2014).
- NSW Sustainable Design Guidelines Version 3.0 (TfNSW, 2013d).
- Technical Guideline for Urban Green Cover in NSW (OEH, 2015b).

6.8. Noise and vibration

6.8.1. Existing environment

Background noise in the majority of the study area is considered to be characteristic of rural areas with low ambient noise levels. Noise would be associated with farming activities, road traffic, rail operations and operation of grain storage and handling facilities. Noise levels would be higher in the larger towns, particularly Narromine and Narrabri, where there is increased activities including commercial/industrial operations.

Sensitive receivers are concentrated in the towns and villages along the proposal site. Other sensitive receivers include scattered dwellings on rural landholdings. The majority of receivers outside the towns are located more than 100 m from the proposal site. Sensitive receivers located close to the proposal site are shown on Figure 6.4, which is based on interpretation of aerial photography. It is noted the proposed location of the Narrabri Gas Project water treatment plant at Bohena Creek is located in the vicinity of the proposal site.

6.8.2. Potential impacts

There would be noise and vibration generated by the construction and operation of the proposal which would alter the existing noise environment.

6.8.2.1. Construction

Potential noise and vibration sources during construction would include:

- Operation of mobile and stationary construction plant and equipment.
- Noise from fixed sources such as crushing and batching plant, site compounds and offices.
- Noise associated with construction traffic and vehicle movements.

Where practicable, construction works would be undertaken during standard working hours in accordance with the Interim Construction Noise Guideline (DECC, 2009). However, there is the potential that some work could be undertaken outside of standard working hours. Examples include:

- Construction works requiring road occupancy or railway possessions.
- Construction works at a sufficient distance from sensitive receivers so that the noise impacts are maintained below the relevant noise criteria levels.
- Due to the need for some works within an operational rail corridor, some construction activities would be undertaken during track possessions on a 24-hour basis.
- Other activities, such as delivery of oversized plant and materials, may also need to be undertaken outside standard hours.

The degree of impact from construction noise would depend on the relative exposure of sensitive receivers and the type and duration of construction activities in the area. However, as the proposal is linear, impacts on individual sensitive receivers during the construction phase would be for limited periods. Potential vibration impacts to the proposed Narrabri Gas Project water treatment plant at Bohena Creek would also require careful consideration.

Vibration generated by construction activities typically dissipates to negligible levels within 50 to 200 m, depending on the type of activity and local geology. Therefore, widespread impacts from construction vibration are not anticipated.

6.8.2.2. Operation

The operation of a railway would result in the generation of noise including:

- Wheel rail interactions.
- High frequency wheel squeal on tight radius curves and brake squeal from freight wagons at low speed.
- Horn noise.
- Maintenance activities (e.g. rail grinding, inspections).
- Ground vibration from train movements.
- Idling diesel engine, exhaust system, cooling system and motor system noises.

Many of these noises are dependent on the nature of operation of the trains. The above noise sources would represent a long-term impact on the local environment. However, the proposal would benefit the communities of Narromine, Coonamble, Gilgandra and Narrabri by diverting freight trains on to the new rail line.

6.8.3. Scope of further assessment

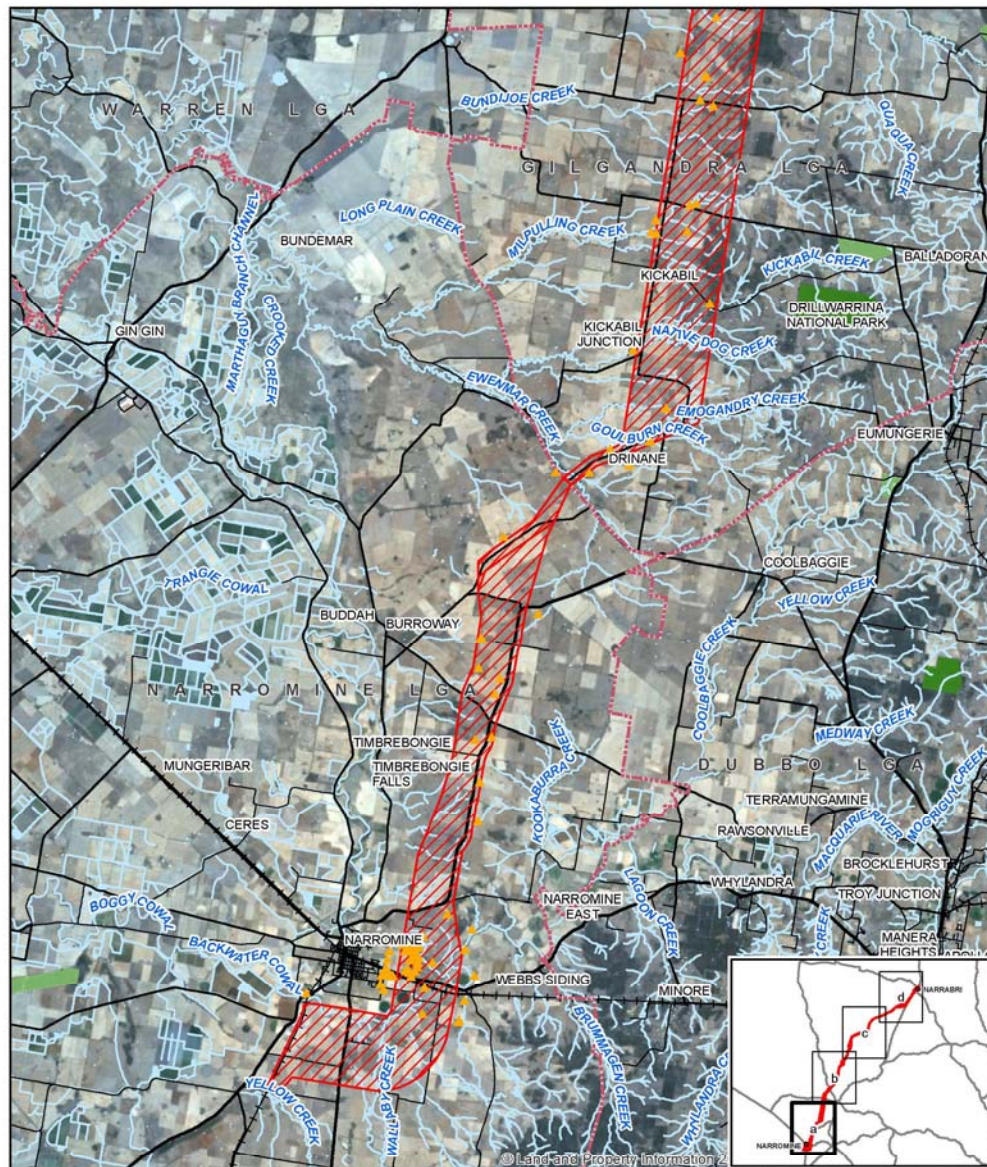
A detailed noise and vibration assessment would be undertaken and would include:

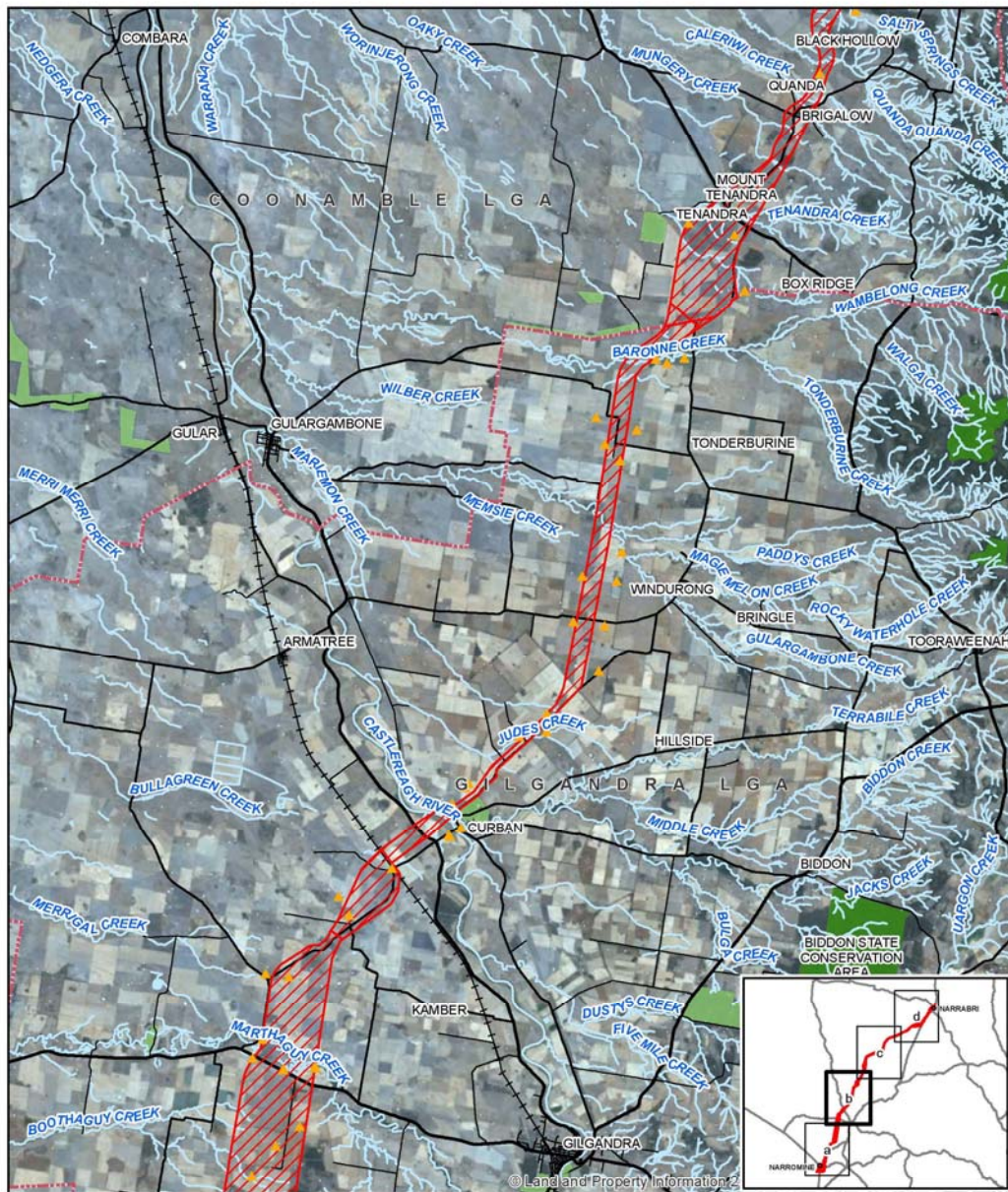
- Identification of sensitive receivers within the proposal site.
- Assessment of construction noise levels on sensitive receivers and development of mitigation measures to manage impacts.
- Assessment of operational noise levels on sensitive receivers, including typical and high-volume scenarios, and identification of management measures, including any feasible and reasonable measures to mitigate impacts.
- Assessment of construction and operational noise and vibration in accordance with relevant NSW noise and vibration guidelines (refer below), with consideration of impacts to the structure integrity and heritage significance of items (including Aboriginal places and items of historic heritage).
- Documenting of design, assessment and modelling assumptions and approaches.
- Carrying out noise monitoring at appropriate locations.
- Demonstration that blast impacts (if required) would be capable of complying with the current guidelines.
- Identification of opportunities to reduce noise impacts through design or management measures.

The assessment would be undertaken with regard to the Interim Construction Noise Guidelines (DECC, 2009), the Rail Infrastructure Noise Guidelines (EPA, 2013), the Inland Rail Noise Strategy and other relevant guidelines including:

- Assessing Vibration – a technical guideline (DECC, 2006).
- NSW Industrial Noise Policy (EPA, 2000).
- NSW Road Noise Policy (DECCW, 2011).
- Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC, 1990).
- Construction Noise Strategy (TfNSW, 2012b).
- Environmental Noise Management Manual (RTA, 2001).
- Development Near Rail Corridors and Busy Roads – Interim Guideline (DoP, 2008).
- Noise Mitigation Guideline (RMS, 2015a).
- Noise Criteria Guideline (RMS, 2015b).
- NSW Sustainable Design Guidelines Version 3.0 (TfNSW, 2013d).
- German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures.

Figure 6.4 Sensitive receivers





LEGEND

- | | | |
|-----------------------|----------------|----------------------|
| The proposal | Principal road | Forestry reserve |
| Sensitive receiver | Secondary road | Conservation reserve |
| Local Government Area | Local road | |
| Watercourse | Railway | |

Paper Size A4
0 1.25 2.5 5 7.5 10
Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



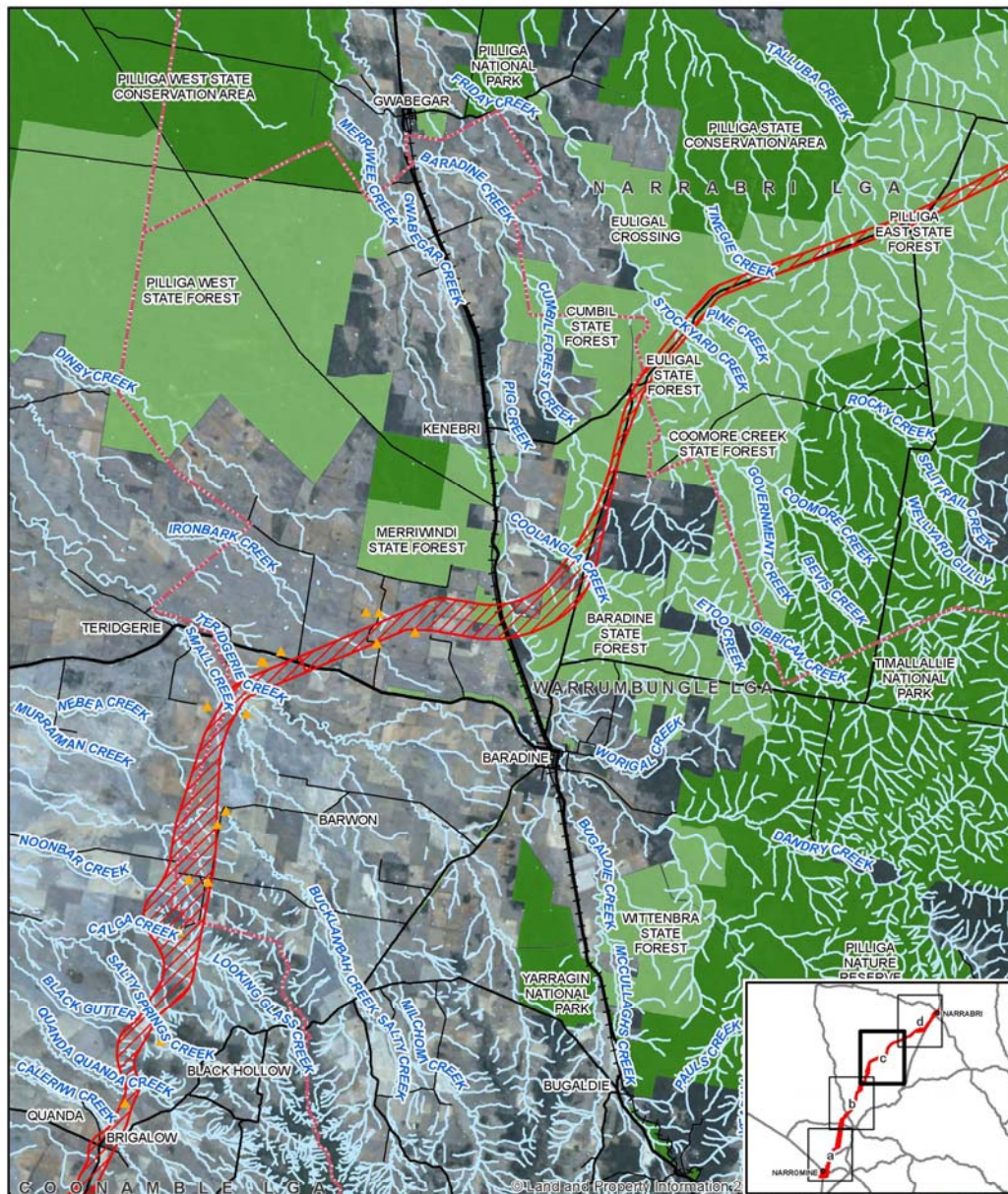
Australian Rail Track Corporation
Inland Rail - Narromine to Narrabri

Job Number 22-18252
Revision 0
Date 17 Oct 2017

Sensitive Receivers

Figure 6.4b

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Data source: LPI, DCDB/OTDB/Aerial imagery, 2015; Geoscience Australia, 250K Topographic Data Series 3. Created by: gmdamind



LEGEND

- The proposal
- ▲ Sensitive receiver
- Local Government Area
- Watercourse
- Principal road
- Secondary road
- Local road
- + + + Railway
- Forestry reserve
- Conservation reserve

Paper Size A4
0 1.25 2.5 5 7.5 10
Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



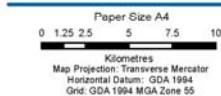
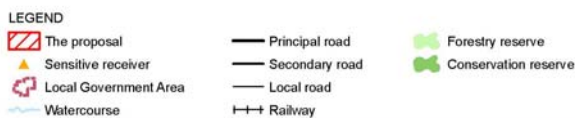
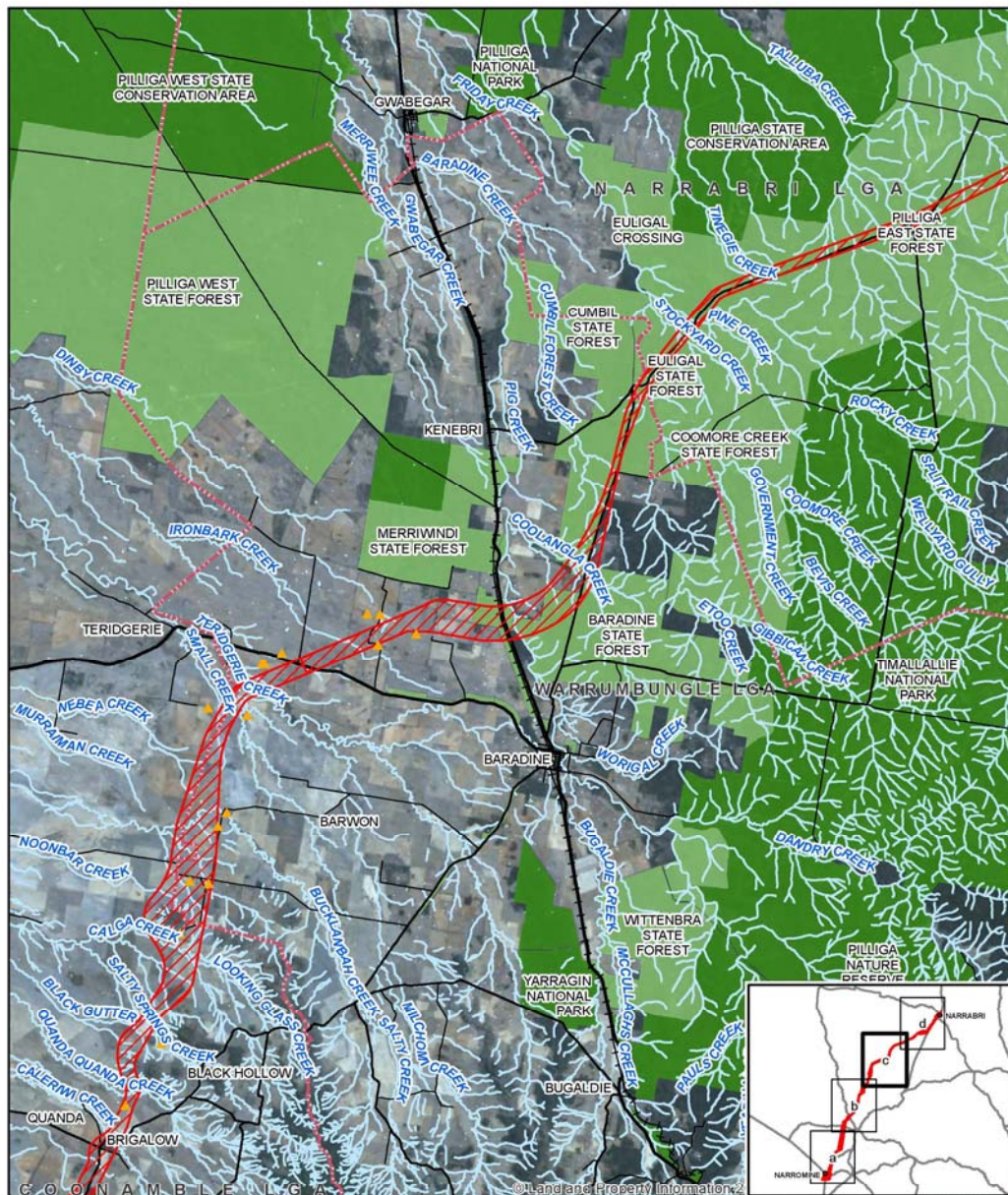
Australian Rail Track Corporation
Inland Rail - Narromine to Narrabri

Job Number 22-18252
Revision 0
Date 17 Oct 2017

Sensitive Receivers

Figure 6.4c

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Australian Rail Track Corporation
Inland Rail - Narramine to Narrabri

Job Number 22-18252
Revision 0
Date 17 Oct 2017

Sensitive Receivers

Figure 6.4c

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Data source: LPI, DCDB/OTDB/Aerial imagery, 2015; Geoscience Australia, 250K Topographic Data Series 3. Created by: gmdclmrd

6.9. Traffic and transport

6.9.1. Existing environment

6.9.1.1. Road network

The road network within the study area consists mainly of local roads and private rural roads which vary between 50 and 80 km/h. The highways within the study area include the Newell Highway, Castlereagh Highway, Kamilaroi Highway, Oxley Highway, and the Mitchell Highway. All these highways have posted speed limits of 110 km/h. The road network and major highways and roads in proximity to the proposal is shown in Figure 5.1.

The Newell Highway stretches from Victoria to Queensland. Within the study area, the Newell Highway is traversed by the proposal at Narrabri.

The Castlereagh Highway stretches from Lithgow to the Carnarvon Highway in Queensland. Within the study area, the Castlereagh Highway is traversed by the proposal at Curban.

The Kamilaroi Highway is a 605 km highway in north-western NSW and within the study area is traversed by the proposal north-west of Narrabri.

The Oxley Highway stretches from Nevertire to Port Macquarie. Within the study area, the Oxley Highway is traversed by the proposal between Nevertire and Gilgandra.

The Mitchell Highway stretches central and south-western regions of Queensland to the northern and central-western regions of NSW. Within the study area, the Mitchell Highway is traversed by the proposal at Narromine.

6.9.1.2. Rail network

The existing rail network in the area includes the:

- ARTC's Parkes-Narromine rail line at Narromine.
- CRN Main Western Line at Narromine.
- CRN Coonamble rail line at Curban, operating between Coonamble and Dubbo.
- Disused Wallerawang Gwabegar rail line north of Baradine.
- Walgett rail line west of Narrabri.
- ARTC's Mungindi rail line on the northern side of Narrabri.

The existing rail network is described in section 3.4.

6.9.2. Potential impacts

The proposal would potentially cross the Newell Highway, Castlereagh Highway, Kamilaroi Highway, Oxley Highway, Eumungerie Road and the Mitchell Highway and a number of local and main roads (Figure 5.1).

Construction vehicle access to the proposal site would be via the existing road network and access tracks, some of which would need to be constructed for the proposal. Some site access would be via private land, permission from the land owner would be sought where access through private property is required.

Construction of the proposal would result in temporary impacts to traffic and access within the study area, and an increase in heavy vehicle movements on the local road network. The proposed works may result in disruptions to local traffic and temporary restrictions to private property. Where this occurs, alternative access arrangements would be provided and/or appropriate traffic controls implemented.

Level crossings and bridges would need to be provided to allow vehicle access over the rail line. There would also be some traffic and access impacts when the construction of the rail line interfaces with the road. This would potentially result in restricted access and traffic impacts to the local area during construction. The proposal may result in the permanent closure or adjustment of some private access roads. In addition, there would be operational impacts associated with the inclusion of level crossing across the proposal site associated with public road and private property access. Consultation with potentially affected landowners would be undertaken during the design stage and closures or adjustments would only be undertaken following consultation with the landowner, the local council and/or Roads and Maritime Services.

Construction activities may also result in temporary impacts on existing rail operations, as track possessions would be required for tie in works. This would result in some disruptions to existing rail operations during construction; however, construction works would be scheduled to minimise impacts to rail operations on these lines. The extent and duration of works during track possessions would be need to be confirmed during the detailed design stage.

During operation, minimal impacts to transport, traffic and access are anticipated as access to the proposal site would be via corridor access points constructed during the construction phase.

6.9.3. Scope of further assessment

A detailed traffic and access impact assessment would be prepared as part of the EIS and would include:

- Identification of vehicle movements and access and haulage routes during construction, including the number, frequency and size of construction related vehicles.
- Identification and assessment of impacts to major roads, including the need to close, divert or reconfigure elements of the road network associated with construction.
- Identification of traffic and access impacts to the local road networks and private properties.
- Assessment of severance issues associated with agricultural activities including machinery access and rotational grazing.
- Mitigation measures to manage potential adverse impacts from the construction phase.
- The types and number of train movements on existing lines and the potential impacts to these train paths due to track possession requirements.
- Assessment and modelling of operational transport impacts of the proposal for both road and rail including:
 - Existing and forecast demand and traffic volumes.
 - Travel time analysis.
 - Performance of key interchanges and intersections through a level of service analysis.
 - Impacts to the operation of any road services (bus and public transport infrastructure).
 - Wider traffic interactions.
 - Identification of measures to mitigate potential impacts.
- Assessment of the feasibility of level crossings (updates to existing and proposed) with consideration to safety assessments and the operation of level crossings with regard to interaction of location traffic and train operations.

A traffic, transport and access impact assessment would be undertaken with consideration of relevant legislations and guidelines, including:

- Guide to Traffic Management – Part 3 Traffic Studies and Analysis (Austroads, 2007).
- Guide to Traffic Generating Developments Version 2.2 (RTA, 2002).

- Cycling Aspects of Austroads Guides (Austroads, 2014).
- NSW Bicycle Guidelines v 1.2 (RTA, 2005).
- Planning Guidelines for Walking and Cycling (DIPNR, 2004).
- NSW Sustainable Design Guidelines Version 3.0 (TfNSW, 2013d).
- Central West Regional Transport Plan (TfNSW, 2013e).
- Western Regional Transport Plan (TfNSW, 2013f).
- Construction of New Level Crossing Policy (TfNSW, 2013g).
- NSW Freight and Port Strategy (TfNSW, 2013a).

OTHER ISSUES

6.10. Air quality

Ambient air quality in the proposal site would be characteristic of rural areas, which have low particulate matter and pollutants in the air. The main factors affecting the air quality in the proposal site would include road traffic, agricultural activities, grain storage and handling facilities and prevailing meteorological conditions. Air pollution would be higher in the larger towns, particularly Narromine and Narrabri, where there is increased activities including commercial/industrial operations.

Sensitive receivers are concentrated in the towns and villages along the proposal site. Other sensitive receivers include scattered dwellings on rural landholdings. The majority of receivers outside the towns are located more than 100 m from the proposal site. Sensitive receivers located close to the proposal site are shown on Figure 6.4, which is based on interpretation of aerial photography.

The potential sources of emissions to air, which may affect air quality during construction, are:

- Gaseous emissions from mobile and stationary construction plant and equipment and construction vehicles.
- Vehicle and mobile plant movement on paved and unpaved road and haulage routes.
- Wind erosion of exposed areas (e.g. haul roads and unstabilised stockpiles).
- Handling and transfer of materials, including the loading and unloading of spoil and other materials.
- Bulk earthwork operations, such as excavation, clearing of groundcover and topsoil, blasting, spreading of topsoil.

Operational impacts would be the operation of diesel trains along the proposal site. The potential sources of emissions to air, which may affect air quality during operation, are:

- Gaseous emission (e.g. nitrogen dioxides, carbon monoxide and different fractions of particulates (dust) from diesel fuel consumed during operation of locomotives).
- Other minor sources of dust emissions – for example, from brake pads, wheels and rails wear.

A specialist air quality impact assessment would be undertaken as part of the EIS. The air quality impact assessment would include:

- Identification of sensitive receivers and places with potential for impact.
- Documenting key design, construction, operating and modelling assumptions.
- Identifying relevant meteorological conditions.
- Justifying the modelling approach.
- Documenting the characteristics of emissions and their effect on local and regional air quality conditions.

An air quality impact assessment would be undertaken with consideration of relevant legislations and guidelines, including:

- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DEC, 2005a).
- Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC, 2005b).
- Technical Framework – Assessment and Management of Odour from Stationary Sources in NSW (DEC, 2006d).

6.11. Contamination

This section included a review of the NSW EPA Contaminated Land: Record of Notices database and NSW EPA contaminated sites register for the Narromine, Gilgandra, Coonamble, Warrumbungle and Narrabri LGAs.

A search of the list of NSW contaminated sites notified to the EPA for the Narromine, Gilgandra, Coonamble, Warrumbungle and Narrabri LGAs identified various contaminated sites. These notifications are mostly attributed to the storage of underground petroleum storage systems at service station properties. None of these sites are located within 200 m of the site.

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

A search of the ARTC contaminated land register did not identify any potentially contaminated sites adjacent to the proposal site. The nearest contaminated site is the NSW Grain Board site located 500 m east of the proposal site at Narromine.

Where the proposal interacts with existing rail facilities, there is potential for contamination resulting from existing operations (e.g. spills and leaks from trains). There is also potential for contamination to be present associated with agricultural activities (crop/pasture spraying, dip sites and chemical/fuel storage), grain silo operations and commercial/industrial areas, in particular near Narromine and Narrabri.

Across the five LGAs, 37 issued licenses were identified from a search of the EPA's register of EPLs. The licenses relate to agricultural and industrial uses. The majority of these activities are considered low risk, or are located at a distance from the proposal site where the risk of impact to the proposal site is low.

It is considered unlikely that unknown significant contamination would be encountered during construction. However, the proposal would have the potential to result in contamination of the surrounding soils as a result of any spills and leaks from construction equipment and site compounds. There is also the potential for contamination to occur during operation, as a result of spills and leaks from trains. Standard measures would need to be implemented to manage any contamination encountered and to minimise the likelihood of spills or leaks during construction and operation.

Targeted geotechnical investigations would be undertaken as part of the design development process. Consideration of whether the land is likely to be contaminated and whether remediation is required would be undertaken in accordance with current guidelines, including:

- Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land (DUAP & EPA, 1998).
- Guidelines for Consultants Reporting on Contaminated Sites (OEH, reprinted 2011b).
- Guidelines for the NSW Site Auditor Scheme (EPA, 2017).
- Guidelines for the Assessment and Management of Groundwater Contamination (EPA, 2007)
- Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015).
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (DECC, 2008).

Further sampling for waste classification would be required prior to the off-site disposal of soils. All waste classification would be done in accordance with NSW EPA (2014a) Waste Classification Guidelines, Part 1: Classifying Waste.

6.12. Waste and resource use

Waste produced during construction would include:

- Spoil from excavation.
- Spoil and groundwater (if groundwater is encountered) that is potentially contaminated.
- Surplus construction materials.
- General domestic waste.
- Waste from construction site compounds.
- Wastewater from dewatering activities such as groundwater (if groundwater is encountered), stormwater and construction site run-off.

The waste produced and encountered on-site would be managed in accordance with the Waste Classification Guidelines (EPA, 2014a). Standard environmental management measures based on these guidelines would be prepared by the construction contractor prior to construction.

During operation and maintenance activities, only minimal waste would likely be generated.

Waste would be considered in the preparation of the EIS, assessing predicted waste generation during construction and operation including:

- Classification of wastes and an estimate of the quantity of each waste classification.
- Identification of waste handling procedures, including likely stockpile locations and volumes.
- Management measures and waste minimisation and reuse opportunities.

An assessment of waste would include consideration of relevant legislations and guidelines, including:

- Waste Classification Guidelines – Part 1: Classification of Waste (EPA 2014a).
- NSW Waste Avoidance and Resource Recovery Strategy (EPA 2014b).
- NSW Sustainable Design Guidelines Version 3.0 (TfNSW, 2013d).
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (DECC, 2008a).

6.13. Greenhouse gas and energy

During construction, the proposal has the potential to generate greenhouse emissions by the burning of fuels (use of equipment and machinery), the materials used and the clearance of vegetation.

During operation, greenhouse emissions would be generated by the operation of the rail line. Emissions would predominately be from the use of diesel.

The operation of the line would assist in reducing the amount of freight moved by road, which would potentially result in emission of greenhouse gases by freight vehicles.

A Scope 1 greenhouse gas assessment would also be undertaken, based on the Australian National Greenhouse Accounts Factors 2008, prepared by the Australian Government Department of Climate Change.

6.14. Climate change

Due to the anticipated timing of the proposal, impacts due to climate change would not be expected to be significant during the construction phase of the proposal. Operationally, potential issues from climate change would include damage and buckling in tracks due to more extreme temperature variations and more extreme weather events (e.g. flooding of the rail corridor). Climate change adaptations would be considered in the design process of the proposal. A climate change risk assessment would be completed and would provide recommendations to minimise the impacts of climate changes.

The following government guidelines would be considered as relevant during the preparation of the climate change risk assessment:

- Commonwealth Scientific and Industrial Research Organisation's Climate Change in Australia Technical Report 2007 (this is based on the Intergovernmental Panel on Climate Change's Fourth Assessment Report, 2007).
- ISO 31000-2009; Risk Management – Principles and Guidelines.
- AS 5334 – Climate Change Adaptation for Settlements and Infrastructure.
- Australian Government's Climate Change Impacts and Risk Management – A Guide for Business and Government (2006).
- AS/NZS 3100:2009 Risk Management – Principles and Guidelines.
- Technical Guide for Climate Change Adaptation for the State Road Network (Roads and Maritime Services, in draft).

6.15. Hazards and risks

Hazards and risks associated with the construction of the proposal would include:

- The use and storage of hazardous chemicals.
- The use of heavy machinery.
- Works conducted in an operational rail corridor.
- Works within, over or adjacent to an operating roadway.

Construction hazards and risks would be managed through the application of standard mitigation measures, which would be developed prior to construction.

Potential operational hazards and risks would include train accidents (including derailment, collision or impact), level crossing collisions, spills from train and equipment (such as oil and cleaning chemicals) and accidents involving hazardous cargo. These risks would be managed through design and the application of education programs, and standard mitigation measures and plans (such as emergency response plans).

Construction and operational hazards and risks would be further investigated during the preparation of the EIS.

6.16. Utilities and services

The proposal would require any intersecting utilities to be relocated or protected. Based on preliminary desktop analysis, the following utilities may be impacted by the proposal:

- Water and sewer assets maintained by Narromine Shire Council and Narrabri Shire Council.
- Electricity assets maintained by Essential Energy.
- Telecommunications assets owned and maintained by Telstra, Optus etc.

Due to double stacked clearance requirements it can be assumed that typically all crossings would require the services to be modified. If there is insufficient clearance then raising or relocation of power lines or undergrounding might be required to provide clearance.

The proposal would also require installation of rail utilities within the greenfield areas of the proposed corridor and relocation of existing rail utilities within the CRN Coonamble and the Walgett rail lines where there is interaction with the proposal site.

All construction activities would be carried out in consultation with relevant land owners and infrastructure and services providers to minimise impact.

A more detailed investigation of existing utilities and services would be undertaken during the design process, with impacts to utilities would need to be determined during preparation of the EIS.

6.17. Cumulative impacts

An assessment of the cumulative impacts would include a description of any major projects occurring in the vicinity of the proposal and identify potential cumulative impacts associated with the development and the proposal.

The cumulative impact assessment would also need to provide consideration for the other Inland Rail projects. In particular, the projects that adjoin to the Narromine to Narrabri section, which include the Parkes to Narromine and Narrabri to North Star sections.

7. SUSTAINABILITY

A sustainability assessment would be undertaken as part of the EIS. The sustainability assessment would be prepared in accordance with the Inland Rail sustainability strategy, NSW Sustainable Design Guidelines Version 3.0 (TfNSW, 2013d) and the Infrastructure Sustainability (IS) Rating Scheme developed by the Infrastructure Sustainability Council of Australia (ISCA). The assessment would:

- Document how the proposal would address and achieve the principles of ecologically sustainable development.
- Describe the sustainability benefits of the proposal.
- Provide context for the need for sustainable outcomes on the proposal.
- Document opportunities to improve sustainable outcomes on the proposal, including:
 - Opportunities to utilise renewable and local materials in the construction phase.
 - Opportunities to utilise renewable energies and meet other sustainability outcomes.

8. CONSULTATION

8.1. Overview

Stakeholder and community consultation for Inland Rail is an integral part of informing scoping investigations for the proposal.

In 2010 the Australian Government completed the Melbourne–Brisbane Inland Rail Alignment Study (ARTC, 2010) to determine if an inland railway line is required. In late 2013, the then Deputy Prime Minister, the Hon Warren Truss MP, established an Inland Rail Implementation Group (IRIG) to develop a delivery programme for the implementation of Inland Rail. The IRIG was chaired by former Deputy Prime Minister, the Hon John Anderson AO, with senior representatives from the Australian, New South Wales, Queensland and Victorian governments, and ARTC.

To support the IRIG investigations, ARTC was tasked with developing the Inland Rail Programme Business Case (ARTC, 2015), including a ten year delivery schedule, cost estimate, development strategy and a detailed analysis of the economic benefits of Inland Rail. The Inland Rail Implementation Group took a consultative approach, engaging with a broad range of stakeholders including potential future users as well as individuals, communities and others who would live and work along the alignment to understand the breadth of issues associated with Inland Rail.

The IRIG delivered the Inland Rail Programme Business Case (ARTC, 2015) to the Australian Government in September 2015. At this time, the Melbourne–Brisbane Inland Rail Alignment Study (ARTC, 2010) was endorsed by the IRIG and is the base case for further work by ARTC.

A Phase 2 Feasibility Assessment is expected to start in the second half of 2017 and would include detailed engineering and environmental investigations within the proposal site and development of an alignment that would form the basis for the EIS.

Key stakeholders for the proposal include, but are not limited to:

- Australian Government (Deputy Prime Minister Barnaby Joyce MP, Department of Infrastructure and Regional Development, IR-IG and PCCG).
- Members of Parliament (Federal Member for Parkes and State Member for Barwon MP).

- NSW Government (TfNSW, Roads and Maritime Services, Department of Planning and Environment, National Parks and Wildlife Office, NSW Forestry, Department of Primary Industry – Agriculture and Water, Department of Agriculture and Water Resources, Department of the Environment and Heritage and Local Land Services).
- Representatives of local council at Narromine Shire Council, Gilgandra Shire Council, Coonamble Shire Council, Warrumbungle Shire Council and Narrabri Shire Council.
- Regional Councils (Orana Regional Organisation of Councils).
- Landowners within and surrounding alignment options being considered.
- Business, freight and agricultural industry stakeholders (e.g. Pacific National, GrainCorp, Asciona, Narrabri & District Chamber of Commerce).
- Community groups (e.g. Coonamble Streets Ahead, Narrabri Country Women's Association).
- Farmers groups (e.g. NSW Farmers Association, Cotton Australia, Namoi Cotton Cooperative and Macquarie Cotton Growers Association).
- Environment Peak bodies and local groups (e.g. NSW Greens, Australian Wildlife Conservancy, Environmental Defenders Office).
- Local Aboriginal Land Councils, cultural knowledge holders and native title holders or claimants (Narromine Local Aboriginal Lands Council, Ngarru Mayin Elders Corporation, Native Title Claimants).
- Service providers (e.g. telecommunications, utilities, medical and emergency).
- Other (e.g. I.A. Watson Wheat Research Centre, CSIRO Australia Radio Telescope Narrabri, Siding Springs Observatory, Coonamble Aero Club, Narromine Airport/Museum/Gliding Club and Sports Aircraft Association of Australia).

8.2. Consultation strategy and objectives

The engagement objectives for the proposal have been to introduce the Inland Rail programme and the Narromine to Narrabri section to stakeholders and the local community. The other objective has been to gather a preliminary understanding of the area through local engagement and carrying out preliminary technical investigations across the proposal site.

The focus of the community engagement is to provide clear, effective information on the proposal and to engage with stakeholders to identify and respond to suggestions and concerns where appropriate.

The strategic objectives of the consultation strategy were to:

- Build awareness, understanding and support among customers, stakeholders and the community for Inland Rail.
- Harness the sense of ownership, cultivating and amplifying advocates.
- Create an active dialogue with customers, communities and other stakeholders.
- Actively seek opportunities to create value for money legacy outcomes for stakeholders while not compromising the scope, program and budget. This could include, for example, identifying opportunities to improve local road/rail interfaces where it benefits the programme and improves community safety and amenity.
- Support (through internal communication and engagement), knowledge transfer within ARTC in order to maximise the value of the investment.

A community engagement plan was prepared for the Inland Rail programme and will guide the consultation activities for the Phase 2 Feasibility Assessment. ARTC's values documented within the plan commit the organisation to active engagement with stakeholders and the community.

8.3. Consultation to date

8.3.1. Inland Rail Programme

ARTC staff and consultants have undertaken consultation with stakeholders, landowners and the community. A summary of the consultation activities to date includes:

- ARTC has engaged with Narromine, Gilgandra, Coonamble, Warrumbungle and Narrabri councils.
- Initial landowner consultation commenced in early 2016 to provide access to private properties for preliminary field investigations. This was followed by consultation on the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010).
- In early 2016 a series of information sessions were held throughout the study area consulting on the alignment from the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010).
- Feedback from landowner and broad community consultation in early 2016 was the catalyst for ARTC to consider alternative route options .
- ARTC continued to engage with landowners while undertaking further review of the Melbourne–Brisbane Inland Rail Alignment Study (ARTC, 2010) and developing options based on community feedback.
- Mail out to over 17,000 residences across the study area inviting consultation on the proposed options at upcoming information sessions.
- In November 2016 community information sessions were held to gather further feedback on the new options.
- The community engagement team has established and maintained relationships with landowners and responded to landowners who have come forward and requested further information and consultation.
- During March and April 2017 the community engagement team conducted over 400 face-to-face meetings with property owners/tenants across options that were further refined following the November information sessions as well the 2016 concept alignment.
- Landowners have also written to ARTC and political stakeholders identifying their preferred alignment.
- Consultation with landowners would continue during the design development, environmental planning and approvals, and construction phases of the proposal.

8.3.2. The proposal - informing and scoping investigations

Consultation and engagement activities have focused on engaging with the local community including landowners, Councils and regional community groups. Consultation activities have included providing information and gathering feedback from stakeholders and the local community allowing us to gain an understanding of the issues and opportunities across the proposal site. Engagement has focused on building awareness, understanding and supporting customers, stakeholders, and the community.

Engagement activities have involved tools such as dedicated project 1800 number and email address, newsletters, face-to-face engagement, advertisements, workshops, community information sessions, factsheets, social media, and updates to the Inland Rail website. Engagement with local councils, Federal and State Members of Parliament for the proposal has also been undertaken during this time.

Table 8-1 outlines the stakeholder and community engagement carried out with identified stakeholders between 2016 and 2017.

Table 8-1 Consultation summary

Stakeholders	Activity
NSW Aboriginal Land Council	Ongoing face-to-face meetings with NSW Land Council and the Local Aboriginal Land Councils. Initial email contact made in December 2015 and meeting held in February 2016. In addition, face-to-face meetings were also held with relevant land councils in May 2017 to discuss the options.
Narrabri Shire Council	Ongoing face-to-face meeting with executive staff, general manager and council officers since June 2015. Meetings held in June 2015, February, April 2016, October 2016. An additional meeting was held with the Mayor in October 2016. An email informing General Mangers about upcoming information sessions and provided advertisement to place on Council website was sent in October 2016. Telephone call in March 2017 to Council General Managers about landowner consultation on options taking place. The project team attended a face-to-face meeting in May 2017 with senior council staff to provide an update on consultation held in March and April 2017.
Warrumbungle Shire Council	Ongoing face-to-face meeting with executive staff, general manager and council officers since March 2016. Meetings held in March and May 2016. Phone call with councils in May 2016 to advise of geotechnical investigations and media release. Face-to-face meeting held with Warrumbungle Shire Council in October 2016. An email informing General Mangers about upcoming information sessions and provided advertisement to place on Council website was sent in October 2016. Telephone call in March 2017 to Council General Managers about landowner consultation on options taking place. A face-to-face meeting was held with technical staff in May 2017 to provide an update on consultation held in March and April 2017.
Gilgandra Shire Council	Ongoing face-to-face meeting with executive staff, general manager and council officers since March 2016. Meetings held in March and May 2016. In April 2016 a meeting was arranged to discuss geotechnical investigations in road corridor. Phone call with councils in May 2016 to advise of geotechnical investigations and media release.
Narromine Shire Council	Ongoing face-to-face meeting with executive staff, general manager and council officers since June 2015. Meetings held in June 2015, April and October 2016. An email informing General Mangers about upcoming information sessions and provided advertisement to place on Council website was sent in October 2016. A further telephone conversation was held on 30 November 2016. Telephone call in March 2017 to Council General Managers about landowner consultation on options taking place. The project team attended the Narromine Shire Council meeting on March 2017. In May 2017 a face-to-face meeting was held with Council General Manager, Mayor, technical staff and consultant preparing land use strategy, this also provided the opportunity to give update on consultation held in March and April 2017.
Coonamble Shire Council	Ongoing face-to-face meeting with executive staff, general manager and council officers since March 2016. Meetings held in March and May 2016. Phone call with councils in May 2016 to advise of geotechnical investigations and media release. Face-to-face meeting with the Council Executives and the Mayor in July 2016.

Stakeholders	Activity
Landowners	<p>Face-to-face consultation with 25 landowners between 20 April and 4 May 2016. At meetings property access for engineering and environmental preliminary investigations was discussed.</p> <p>Further phone calls to 25 landowners inform of information sessions was undertaken on 19 May 2016.</p> <p>In July 2016 we undertook 10 individual meetings with landowners and three group kitchen chats with 29 landowners attending.</p> <p>In September 2016 project hydrologists met with landowners in five individual meetings and one group meeting to discuss flooding issues and modelling.</p> <p>Between 13 March and 21 April 2017 further face-to-face meetings were held to discuss the options. A total of 400 meetings were organised with either individuals or groups.</p> <p>In May 2017 a notification was send to landowners regarding Federal Budget allocation to the Inland Rail Programme.</p>
CSIRO	<p>Face-to-face meeting held in May 2016. Attendees included staff from Sydney, Parkes and Narrabri Facilities and discussions involved the potential issues/impact on Narrabri radio telescope.</p>
Wider Stakeholders	<p>Email to invite stakeholders to workshops in Narrabri, Narromine and Gilgandra in May 2016. Three community information sessions were held with about 180 attendees.</p> <p>Further invite only stakeholder workshops were held on 31 May and 1 and 2 June 2016 and included Councillors/Council Executives, NSW Farmers Association, Local Land Services, National Parkes and Wildlife, Office of Environment and Heritage, Department of Primary Industry, and community progress associations and peak bodies.</p> <p>In late October 2016, 17,000 flyers informing of information sessions were distributed in: Gwabegar, Coonabarabran, Pilliga, Wee Waa, Narrabri, Baradine, Narromine, Eumungerie, Gilgandra, Gulargambone and Coonamble. Flyers were posted to all stakeholders in the database and provided to Councils to place on counter tops.</p> <p>Newspaper adverts were also placed in October and November 2016 along with local radio advertisement.</p> <p>An information session was held in:</p> <ul style="list-style-type: none"> • Narrabri on 14 November 2016 with 106 attendees. • Baradine on 15 November with 37 attendees. • Coonamble on 16 November with 33 attendees. • Coonabarabran on 17 November with 20 attendees. • Curban on 17 November 2016 with 39 attendees. • Gilgandra on 18 November 2016 with 21 attendees. • Narromine on 19 November 2016 with 51 attendees. <p>Advertisements were placed in local papers (Narrabri, Coonabarabran, Parkes and Dubbo) in February 2017 informing of the LiDAR survey.</p>
Coonamble Farmers	<p>Project team presented to the NSW Farmers Association – Coonamble Branch Annual General Meeting, held at the Coonamble bowling club in June 2016. About 100 farmers attended the meeting which was facilitated by Coonamble Deputy Mayor and President of the Coonamble Farmers Association.</p>
NSW Farmers Association (Region 3)	<p>Face-to-face meeting was held with the NSW Farmers Association in October 2016.</p>

Stakeholders	Activity
NSW Farmers Association (Region 1)	Face-to-face meeting was held with the NSW Farmers Association in October 2016.
NSW Forestry and NSW National Parkes and Wildlife Service	Face-to-face meeting was held with the NSW Forestry and NSW National Parkes and Wildlife Service in October 2016.
Office of Environment and Heritage (Dubbo)	Face-to-face meeting was held with the Office of Environment and Heritage in October 2016.
Roads and Maritime Services	Face-to-face meeting was held with Roads and Maritime Services in May 2017.
Narrabri Chamber of Commerce	A briefing was provided to the Narrabri Chamber of Commerce in March 2017.
Kevin Humphries, MP	Telephone briefing with Kevin Humphries, State Member for Barwon in August 2016 followed by an email in August and September 2016. Further email was sent on October 2016 and an email, telephone conversation and face-to-face meeting was held in November 2016. A further email was sent on December 2016 and February and March 2017. In May 2017 an email regarding the Federal budget allocation was sent.
Mark Coulton, MP	Telephone meeting with Mark Coulton, Federal Member for Parkes in September 2016 followed by an email notification in September and October 2016. A further email was sent on December 2016. A meeting was held on 18 January 2017 followed by an email in February and March 2017. In May 2017 a face-to-face meeting to provide an update on the project and recent consultation was held and this was followed by an email regarding the Federal budget allocation. Regular ongoing consultation.

8.3.3. Consultation outcomes

Through the engagement activities, stakeholders and the community have had the opportunity to view project material, make an enquiry, or put forward feedback. Suggested alignment options, inter-operability between existing rail lines and inland rail and integration with collection points made by stakeholders and community have been investigated.

Table 8-2 outlines a summary of the key feedback received to date and how this would be considered in defining the scope of the EIS.

Table 8-2 Consultation feedback

Topic	Key issue	EIS
Property	Concern about impacts to prime farming and agricultural land.	The EIS would assess the social and economic impacts of the proposal.

Topic	Key issue	EIS
	Concern about impacts to infrastructure such as fences, sheds, houses and dams.	The EIS would assess the social and economic impacts of the proposal and consider and identify where the design can implement measures to avoid and minimise impacts.
	Concern about the decrease in property values as a result of the rail line being in close proximity to houses or property (noise, vibration and visual amenity).	The EIS would assess the social and economic impacts of the proposal.
	Concern about land acquisition calculations, process, timing and livelihood impacts.	ARTC property policies and procedures would support this work and would be assessed as part of the socio-economic assessment for the EIS.
	Concern for implications of property/paddock severance on farm activity, operability and viability (e.g. movement of large agricultural machinery and cattle)	The EIS would assess temporary and permanent impacts upon land use.
Economy	Concern for local suppliers not supported with contract management training.	The EIS would assess the social and economic impacts of the proposal and consider and identify where the proposal can benefit the local economy.
	Concern for loss of economic opportunity for towns by-passed by rail line.	The EIS would assess economic impacts of the proposal.
Environment	Concern about the unstable soils caused by the geotechnical conditions.	The EIS would include geotechnical assessments and identify how impacts would be managed during construction and operation of the proposal (section 6.6.3).
	Concern for how watercourses would be crossed and the length of culverts proposed.	The EIS would include an assessment of watercourses impacted by the proposal and how impacts would be managed during construction and operation of the proposal (section 6.5.3).
	Concern about the impacts on bore water which is used for farm and agricultural purposes.	The EIS would include an assessment of groundwater impacted by the proposal and how impacts would be managed during construction and operation of the proposal (section 6.5.3).
	Concern with levels and changes to surface water flows and increased flooding on properties.	The EIS would assess and model the impacts on flood behaviour during construction and operation (section 6.5.3).
	Concern about weed infestation and biosecurity.	The EIS would assess biosecurity and identify measures to avoid and minimise impacts.

Topic	Key issue	EIS
	Concern for potential impact on Aboriginal heritage items and native title claimants.	The EIS would assess the Aboriginal cultural heritage impacts of the proposal and consider and identify where the design can implement measures to avoid and minimise impacts (section 6.3.3).
	Concern for impact on flora and fauna, such as the High Park Estate in Narromine and the Pilliga scrub conservation area.	The EIS would assess the biodiversity impacts of the proposal and consider and identify where the design can implement measures to avoid and minimise impacts (section 6.2.3).
	Concern for proximity of the rail line to houses and associated noise and vibration issues.	The EIS would assess the noise and vibration impacts of the proposal and consider and identify where the design can implement measures to avoid and minimise impacts (section 6.8.3).
	Concern for visual impacts and changes to the landscape and vista.	The EIS would assess visual impacts of the proposal and consider and identify where the design can implement measures to avoid and minimise impacts.
Community	Concern for future sustainability of timber cutters in the area who derive their living from the Pilliga forest.	The EIS would assess the social and economic impacts of the proposal.
	Concern from landowners and business operators about project uncertainty and length in decision making.	The EIS would include details of the consultation process and methodology.
	Concern regarding community impacts associated construction compounds, security and disruption to social amenity.	The EIS would assess the social impacts of the proposal and consider and identify where the design can implement measures to avoid and minimise impacts.
	Concern regarding community severance and fragmentation as a result of the rail line.	The EIS would assess the social and economic impacts of the proposal.
	Concern regarding community safety at level crossings including the location, number, type and maintenance responsibility.	The EIS would assess the social impacts of the proposal.

8.4. Consultation during preparation of the EIS

ARTC and the Inland Rail project team would continue to consult with stakeholders and the community during the preparation of the EIS. Consultation activities which would be undertaken during the preparation of the EIS are outlined in sections 8.4.1 to 8.4.4.

8.4.1. Inland Rail communications

Inland Rail communications would continue throughout the preparation of the EIS and would include a dedicated 1800 community information line, email address, social media, newsletter updates, and project website updates (Table 8-3).

8.4.2. Proposal Community Engagement Lead

The Community Engagement Lead dedicated to the proposal would continue their role as a vital link in maintaining close and ongoing contact with local communities and stakeholders during preparation of the EIS. The Community Engagement Lead is the key 'on the ground' project representative and would continue to seek to understand local issues and provide this feedback to the project team.

8.4.3. Stakeholder and community engagement

ARTC would continue to provide project updates and written notification to the councils, state and federal MPs, stakeholder groups, landowners and the local community during the preparation of the EIS and the design phase.

Community updates and an information line would continue to be run by ARTC to allow stakeholders and members of the community to keep up to date with the progress of Inland Rail.

8.4.4. Community contact and information

The community contact details outlined in Table 8-3 would remain in place for the preparation of the EIS and the planning and approval process.

Table 8-3 Community contact and information points available during the planning and approval process

Activity	Detail
Community information line (Toll free)	1800 732 761
Community email address	InlandRailNSW@artc.com.au
Inland Rail website	http://inlandrail.artc.com.au
Postal address	Inland Rail Australian Rail Track Corporation GPO Box 2462, Queen Street, Brisbane, QLD 4000
Community Engagement Lead	A Community Engagement Lead is dedicated to this project.

8.5. Public exhibition of EIS

Public exhibition of the EIS would be for a minimum of 30 days as stated in section 5.17 of the EP&A Act.

Advertisements would be placed in local media giving information regarding the proposal and display of the EIS.

During the exhibition period, government agencies, stakeholders and the community would be able to review the EIS and would have the opportunity to make a written submission to the Department of Planning and Environment for consideration in its assessment of the project.

Consultation activities during the public exhibition of the EIS would be consistent with those undertaken for the proposal scope exhibition and would include:

- Community Information sessions.
- Local newspaper advertising.

- Inland Rail website updates.
- Stakeholder meetings.
- Government stakeholder engagement.

8.6. Consultation during construction

Should the proposal be approved, ARTC would continue to consult with stakeholders and the community during construction in accordance with the conditions of approval. Further information about the consultation activities and tools during the construction phase would be provided in the EIS.

9. CONCLUSION AND NEXT STEPS

The proposal is subject to assessment under the EP&A Act. The capital investment value of the proposal is estimated to be over \$50 million, and ARTC has formed the view that the proposal is likely to significantly affect the environment and, as a result the proposal is State Significant Infrastructure under *State Environmental Planning Policy (State and Regional Development) 2011*. The proposal is therefore subject to Part 5, Division 5.2 of the EP&A Act and an EIS is required as part of the process of seeking the approval of the NSW Minister for Planning. In addition, ARTC is seeking to have the proposal declared critical State significant infrastructure under Schedule 5 of the *State Environmental Planning Policy (State and Regional Development) 2011*.

As part of the first step in the approvals process for the proposal, this document supports an application to DP&E seeking the SEARs for the EIS. The document has provided a brief description of the proposal; its statutory and strategic context; stakeholder and community engagement undertaken to inform the design; and a preliminary assessment of impacts and likely significance.

Upon receipt of the SEARs, ARTC would prepare the EIS and submit it to the DP&E as part of the formal application for approval of the proposal.

The EIS would include the following:

- A detailed description of the proposal including its components, construction activities and potential staging.
- A comprehensive assessment of the potential impacts on the key issues including a description of the existing environment, assessment of potential direct and indirect and construction, operation and staging impacts.
- Description of measures to be implemented to avoid, minimise, managed, mitigate, offset and/or monitor the potential impacts.
- Identify and address issues raised by stakeholders.

The next stage in the environmental assessment would be progressing to an EIS which would be prepared in accordance with the EP&A Act and would meet the minimum form and content requirements set out in clauses 6 and 7 of Schedule 2 of the EP&A Regulation.

An EPBC Act referral would be made to the Australian Government Department of the Environment and Energy to seek a determination on whether the project is a controlled action requiring assessment under the EPBC Act.

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SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
Flora					
Commersonia procumbens / Androcalva procumbens		V	V	Predicted to occur in the locality (DotEE, 2017).	Occur at edge of cliffs habitat unlikely to occur
Bertya opposens		V	V	Previously recorded within the locality (OEH 2017) Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
Cadellia pentastylis	Ooline	V	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
Cyperus conicus		V		Previously recorded within the locality (OEH 2017).	Species or species habitat likely to occur within area
Dichanthium setosum	Bluegrass	V	V	Previously recorded within the locality (OEH 2017). Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
Digitaria porrecta	Finger Panic Grass	V		Species or species habitat likely to occur within area.	Species or species habitat likely to occur within area
Diuris tricolor	Pine Donkey Orchid	V		Previously recorded within the locality (OEH 2017).	Species or species habitat likely to occur within area
Eriocaulon australasicum	Austral Pipewort	E	E	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area

SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
<i>Homopholis belsonii</i>	Belson's Panic	E	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Homoranthus darwinioides</i>		V	V	Predicted to occur in the locality (DotEE, 2017).	
<i>Lepidium aschersonii</i>	Spiny Peppergrass	V	V	Previously recorded within the locality (OEH 2017). Predicted to occur in the locality (DotEE, 2017).	
<i>Philotheca ericifolia</i>			V	Previously recorded within the locality (OEH 2017). Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Polygala linariifolia</i>	Native Milkwort	E		Previously recorded within the locality (OEH 2017).	Species or species habitat likely to occur within area
<i>Pterostylis cobarensis</i>	Greenhood Orchid	V		Previously recorded within the locality (OEH 2017).	Species or species habitat likely to occur within area
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid		E	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Prasophyllum sp. Wybong</i>	Leek Orchid		CE	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Swainsona murrayana</i>	Slender Darling-pea	V	V	Previously recorded within the locality (OEH 2017). Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area

SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
<i>Swainsona recta</i>	Small purple-pea	E	E	Previously recorded within the locality (OEH 2017). Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Tylophora linearis</i>		V	E	Previously recorded within the locality (OEH 2017). Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
Reptiles					
<i>Anomalopus mackayi</i>	Five-clawed Worm-skink	E	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Aprasia parapulchella</i>	Pink-tailed Worm-lizard	V	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Delma impar</i>	Striped Legless Lizard	V	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Hoplocephalus bitorquatus</i>	Pale Headed Snake	V		Previously recorded within the locality (OEH 2017).	Species or species habitat likely to occur within area
<i>Uvidicolus sphyrurus</i>	Border Thick-tailed Gecko	V	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
Birds					
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area

SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
<i>Anseranas semipalmata</i>	Magpie Goose	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Ardeotis australis</i>	Australian Bustard	E		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Artamus cyanopterus</i>	Dusky Woodswallow	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Burhinus grallarius</i>	Bush Stone-curlew	E		Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE	Predicted to occur in the locality (DotEE, 2017).	Species habitat unlikely to occur
<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Calyptorhynchus banksii samueli</i>	Red-tailed Black Cockatoo	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Chthonicola sagittata</i>	Speckled Warbler	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area

SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
<i>Circus assimilis</i>	Spotted Harrier	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Epthianura albifrons</i>	White-fronted Chat	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Erythrorhynchus radiatus</i>	Red Goshawk	CE	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Falco subniger</i>	Black Falcon	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Glossopsitta pusilla</i>	Little Lorikeet	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Grantiella picta</i>	Painted Honeyeater	V	V	Previously recorded in the locality (OEH, 2017). Predicted to occur in the locality (DotEE, 2017).	Breeding known to occur within the area

SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat unlikely to occur within area
<i>Hieraaetus morphnoides</i>	Little Eagle	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Lathamus discolor</i>	Swift Parrot	E	CE	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Leipoa ocellata</i>	Malleefowl	E	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Lophoictinia isura</i>	Square-tailed Kite	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Melanodryas cucullata</i>	Hooded Robin (south eastern form)	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Neophema pulchella</i>	Turquoise Parrot	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area

SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
<i>Ninox connivens</i>	Barking Owl	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Petroica phoenicea</i>	Flame Robin	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Petroica boodang</i>	Scarlet Robin	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	V		Previously recorded in the locality (OEH, 2017).	Present – recorded during preliminary field surveys
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	Previously recorded in the locality (OEH, 2017). Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Stictonetta naevosa</i>	Freckled Duck	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Stagonopleura guttata</i>	Diamond Firetail	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area

SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
<i>Tyto longimembris</i>	Eastern Grass Owl	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
Fish					
<i>Maccullochella macquariensis</i>	Trout Cod	E	E	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Maccullochella peelii</i>	Murray Cod		V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Macquaria australasica</i>	Macquarie Perch	E	E	Predicted to occur in the locality (DotEE, 2017).	
<i>Tandanus tanfanus</i>	Eel Tailed Catfish	V	V	Predicted to occur in the locality (DPI, 2017).	Species or species habitat likely to occur within area
<i>Galaxias rostratus</i>	Flathead Galaxias	CE	CE	Predicted to occur in the locality (DPI, 2017).	Species or species habitat likely to occur within area
<i>Mogurnda adspersa</i>	Purple Spotted Gudgeon	E		Predicted to occur in the locality (DPI, 2017).	Species or species habitat likely to occur within area
<i>Bidyanus bidyanus</i>	Silver Perch	V		Predicted to occur in the locality (DPI, 2017).	Species or species habitat likely to occur within area
Western Population of Olive Perchlet Olive Perchlet		EP		Predicted to occur in the locality (DPI, 2017).	Species or species habitat likely to occur within area
Mammals					

SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
<i>Aepyprymnus rufescens</i>	Rufous Bettong	V		Previously recorded in the locality.	Species or species habitat likely to occur within area
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Chalinolobus picatus</i>	Little Pied Bat	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Macropus dorsalis</i>	Black-striped Wallaby	E	E	Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V	Predicted to occur in the locality (DotEE, 2017). Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Petaurus norfolcensis</i>	Squirrel Glider	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Petauroides volans</i>	Greater Glider	V	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area

SCIENTIFIC NAME	COMMON NAME	STATUS		NATURE OF RECORD	LIKELIHOOD OF OCCURRENCE
		BC ACT / FM ACT	EPBC ACT		
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Phascolarctos cinereus</i>	Koala	V	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Pseudomys pilligaensis</i>	Pilliga Mouse	V	V	Predicted to occur in the locality (DotEE, 2017). Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Predicted to occur in the locality (DotEE, 2017).	Species or species habitat likely to occur within area
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V		Previously recorded in the locality (OEH, 2017).	Species or species habitat likely to occur within area
<i>Vespadelus troungtoni</i>	Eastern Cave Bat	V		Previously recorded in the locality (OEH, 2017).	

Status: CE Critically Endangered. E Endangered. V Vulnerable. EP Endangered Population

Likelihood of occurrence

Databases Searched

The following databases were searched to determine threatened biota that has been previously recorded or is predicted to occur within the proposal site.

NSW Wildlife Atlas- records within 10 km.

EPBC Online Search- buffered for 10km from centre line of the proposed alignment.

I&I Records viewer- Narrabri LGA.

Likelihood of Occurrence

The likelihood of occurrence is defined as follows:

Known Species known to occur within the site (e.g. breeding and foraging habitat; foraging habitat; movement corridors).

High Presence of potential high value habitat (e.g. breeding and foraging habitat; important movement corridors).

Moderate Presence of potential medium value habitat (e.g. disturbed breeding conditions; constrained foraging habitat; movement corridors).

Low Presence of potential low value habitat (e.g. disturbed conditions; isolated small habitat area; fragmented movement corridors).

None No preferred habitat or corridors present.

Matters considered in determining the likelihood of occurrence include:

- ▶ Known natural distributions including prior records (database searches) and site survey results.
- ▶ Geological/ soil preferences.
- ▶ Specific habitat requirements (e.g. aquatic environs, seasonal nectar resources, tree hollows etc).
- ▶ Climatic considerations (e.g. wet summers; snow fall).
- ▶ Home range size and habitat dependence.
- ▶ Topographical preferences (e.g. ridgetops, coastal headlands, midslopes, closed depressions).

Table A **Threatened Biota Known or Predicted from the Locality, Habitat Association and Likelihood of Occurring within the proposal site**

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)		E	E	<p>The vegetation is usually dominated by <i>Acacia harpophylla</i> (Brigalow) with or without <i>Casuarina cristata</i> (Belah), and with or without <i>Eucalyptus</i> trees. <i>Eucalyptus</i> trees may be scattered or form an emergent layer that is taller than the Brigalow canopy. <i>Eucalyptus</i> species commonly present include <i>E. argophloia</i> (Chinchilla White-gum), <i>E. brownii</i> (Reid River Box), <i>E. cambageana</i> (Blackbutt, Coowarra Box, Dawson Gum), <i>E. largiflorens</i> (Black Box) <i>E. microcarpa</i> (Grey Box), <i>E. moluccana</i> (Grey-topped Box), <i>E. pilligaensis</i> (Gum-topped Box, Ribbon Gum, Mallee Box, Molly Box, Narrow-leaved Grey Box), <i>E. populnea</i> (Poplar Box, Bimble Box) or less often <i>E. coolabah</i> (Coolibah).</p> <p>In some areas <i>Casuarina cristata</i>, <i>Acacia argyrodendron</i>, <i>A. melvillei</i>, <i>A. omalophylla</i>, <i>Eucalyptus populnea</i> or <i>E. pilligaensis</i> may be locally dominant and more abundant than Brigalow, and form pockets of vegetation within or on the margins of the Brigalow ecological community In New South Wales, <i>Casuarina cristata</i> favours less well drained sites, and <i>Eucalyptus populnea</i> better drained areas (New South Wales Scientific Committee 2002; Butler 2007).</p>	<p>Recorded within Proposal site (Umwelt 2016)</p>	<p>Occurs Recorded at one location within the proposal site (refer to figure 3-2)</p>	<p>8.3 Ha</p>

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived native Grasslands of South-eastern Australia		E	E	Inland Grey Box Woodland occurs on fertile soils of the western slopes and plains of NSW, generally where average rainfall is 375-800mm pa and mean maximum annual temperature is 22-26°C. The community is highly degraded over most of its range and generally survives with a relatively intact overstorey but modified shrub and/or ground layers through grazing or pasture activities. The characteristic Grey Box (<i>Eucalyptus microcarpa</i>) is often found in association with <i>Eucalyptus populnea</i> subsp. <i>bimbi</i> , <i>Callitris glaucophylla</i> , <i>Brachychiton populneus</i> , <i>Allocasuarina luehmarii</i> , <i>Eucalyptus melliodora</i> or sometimes <i>Eucalyptus albens</i> . Shrubs are typically sparse or absent but may be locally common. A variable ground layer of grass and herbaceous species is present at most sites.	Recorded within Proposal site (Umwelt 2016)	Occurs Recorded at 2 locations within the proposal site (refer to figure 3-2)	32.9 ha
Weeping Myall Woodlands		E	E	This community typically occurs on red-brown earths and heavy textured grey and brown alluvial soils in areas receiving between 375-500mm rainfall per annum in the Murray-Darling basin. The community varies from low to low open woodland, with a tree layer to 10m. Weeping Myall (<i>Acacia pendula</i>) is always one of the dominant species or often the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plants and an open to continuous groundcover of grasses and herbs. The structure and composition of the ground and understorey varies with latitude, and in some areas the shrub layer may be eliminated by clearing or heavy grazing.	Recorded within Proposal site (Umwelt 2016)	Occurs Recorded at two locations within the proposal site (refer to figure 3-2)	11.2 ha

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
Natural Grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland			CE	<p>This ecological community occurs from the Darling Downs in Queensland to Dubbo in NSW and incorporates the Liverpool and Moree Plains. This ecological community occurs within the Brigalow Belt South Bioregion and Border Rivers-Gwydir, Central West, Namoi, Condamine, Burnett Mary and Fitzroy Basin Natural Resource Management Regions. Native grasslands typically composed of perennial native grasses. They are found on soils that are fine textured (often cracking clays) derived from either basalt or alluvium on flat to low slopes (< 1 degree). A tree canopy is usually absent, but when present, comprises ≤10% projective foliage cover (DSEWPac 2011b).</p>	Recorded within Proposal site (Umwelt 2016)	Occurs Recorded at 2 locations within the proposal site (refer to figure 3-2)	26.0 ha

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland		E	CE	<p>White Box Yellow Box Blakely's Red Gum Woodland is an open woodland or forest community, and is characterized by White Box (<i>Eucalyptus albens</i>), Yellow Box (<i>E. melliodora</i>) and Blakely's Red Gum (<i>E. blakelyi</i>). Intact sites contain a high diversity of plant species, including dominant and additional tree species, shrubs, climbers, grass species and a high diversity of herbs. Intact stands that contain diverse upper and mid-storeys and groundlayers are rare. Modified sites include the following areas where the main tree species are present ranging from an open woodland formation to a forest structure, with the groundlayer predominantly being composed of exotic species. On sites where the trees have been removed, only the grassy groundlayer and some herbs remain. The Commonwealth listing of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland differs slightly from the NSW listing. Areas that are part of the listed ecological community must have either an intact tree layer and predominately native ground layer or an intact native ground layer with a high diversity of native plant species but no remaining tree layer. Box-Gum Woodland is found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW.</p>	<p>Recorded within Proposal site (Umwelt 2016)</p>	<p>Occurs Recorded at three locations within the proposal site (refer to figure 3-2)</p>	<p>17.1 ha</p>

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
Coolibah-Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregions			E	<p>This EEC is a broad-scale ecological community that ranges from western New South Wales through to eastern Queensland. The ecological community typically occurs on the inland floodplains of northern NSW and southern Queensland that are associated with the Darling River system and the southern part of the Fitzroy River system. This eucalypt woodland is typically found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands and stream levees. The typical structure of the Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions is a open woodland to woodland with a tree canopy layer dominated by eucalypts, a sparse to absent mid (or shrub) layer and a variable ground layer. The main tree species in the canopy of the woodland are Coolibah (<i>Eucalyptus coolabah</i> subsp. <i>coolabah</i>) and/or Black Box (<i>Eucalyptus largiflorens</i>). Other trees that may be present include: <i>Acacia salicina</i> (Cooba), <i>Acacia stenophylla</i> (River Cooba), <i>Casuarina cristata</i> (Belah), <i>Eremophila bignoniiflora</i> (Eurah), <i>Eucalyptus camaldulensis</i> (River Red Gum) and <i>Eucalyptus populnea</i> (Bimble Box, Poplar Box).</p>	Recorded within Proposal site (Umwelt 2016)	Occurs- Recorded at 2 locations within the proposal site (refer to figure 3-2)	8.9 ha

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
Poplar Box Grassy Woodland on Alluvial Plains			Proposed E listing	<p>The nominated "Poplar Box Grassy Woodland on Alluvial Plains" covers native grassy eucalypt woodland where poplar/bimble box is the main tree canopy species present. Other tree species may occasionally occur depending on the characteristics of the site, these include <i>Callitris glaucophylla</i> (white cypress pine), <i>Casuarina cristata</i> (belah), <i>Eucalyptus coolabah</i> (coolibah), <i>Eucalyptus largiflorens</i> (black box), <i>Eucalyptus melanophloia</i> (silver-leaved ironbark), <i>Eucalyptus microcarpa</i> (inland grey box) and <i>Eucalyptus pilligaensis</i> (narrow-leaved grey box).</p> <p>The mostly grassy understorey of the Poplar Box Grassy Woodland can vary in composition depending on local hydrological conditions, rainfall, landscape position, soil type and season. It will also vary depending on fire, grazing and other management regimes. Parts of the ecological community may occasionally have patchy or scattered shrubs, particularly during droughts when hardy plants such as chenopods (saltbush) become more prevalent.</p> <p>The ecological community mostly now occurs as scattered remnant patches inland of the Great Dividing Range in New South Wales and Queensland, within the Brigalow Belt North, Brigalow Belt South, Cobar Peneplain, Darling Riverine Plains, NSW South Western Slopes and Riverina IBRA bioregions.</p>		Present- recorded at numerous locations within proposal site.	185 ha

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
Threatened Flora Species							
<i>Bertya opposens</i>	Narrow-leaved Bertya	E	E	Medium shrub to 2m high that occurs only on the New England Tablelands of NSW. It is now known only from two small populations in the Oxley Wild Rivers National Park but was once more widespread on the Tablelands. A third population was recently discovered in Oxley Wild Rivers National Park in 2006. The species grows among rocks or in thin soils close to cliff-edges in dry woodland with she-oaks, wattles and tea-trees.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Unlikely – Rail is unlikely to be constructed near cliff-edges	
<i>Androcalva procumbens</i>		V	V	Grows in sandy sites, often along roadsides. Known to occur in <i>Eucalyptus dealbata</i> and <i>Eucalyptus sideroxylon</i> communities, <i>Melaleuca uncinata</i> scrub, under mallee eucalypts with a <i>Calyx</i> tetragona understorey, and in a recently burnt Ironbark and Callitris area. Also in <i>Eucalyptus fibrosa</i> subsp. nubila, <i>Eucalyptus dealbata</i> , <i>Eucalyptus albens</i> and <i>Callitris glaucophylla</i> woodlands north of Dubbo.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate – May occur in White Box and Callitris communities within Pilliga east state forest.	
<i>Cadellia pentastylis</i>	Ooline	V	V	<i>C. pentastylis</i> appears to favour low- to medium-nutrient soils of sandy clay or clayey consistencies. It is found along the western edge of the North West Slopes from north of Gunnedah to west of Tenterfield where annual rainfall is between 500 to 750 mm Forms a closed or open canopy mixing with eucalypt and cypress pine species. Presence appears to be strongly correlated with low-medium nutrient soils of sandy clay or clay consistency.	Predicted to occur within 10km (DoEE 2017)	Moderate/High potential habitat present within Callitris woodland	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Dichanthium setosum</i>	Bluegrass	V	V	This grass is less than a metre occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, as well as in Queensland and WA. Associated with heavy basaltic black soils and red-brown loams with clay subsoil. Often found in moderately disturbed areas, and appears to have wide environmental tolerances.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate/High suitable habitat in natural grassland areas as well as disturbed pasture land	
<i>Eriocaulon australasicum</i>	Austral Pipewort	E	E	Known in NSW from only a few collections from habitat described as 'wet places along the Murray towards junction of Murrumbidgee' In populations near Braidwood and in the Pilliga. It grows in mud in ephemeral water bodies.	Predicted to occur within 10km (DoEE 2017)	Moderate/High small amounts of suitable habitat present within wetland and marsh areas	
<i>Homopholis belsonii</i>	Belson's Panic	V	V	Occurs on northwest slopes and plains, north of Warialda between Wee Waa, Goondiwindi and Glen Innes. Grows in dry woodland, often on poor soils though also found in basalt-enriched sites and alluvial clay soils. Habitat and ecology poorly known.	Predicted to occur within 10km (DoEE 2017)	Moderate/High potential habitat present in woodland area	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Homoranthus darwinioides</i>		V	V	<p>Rare in the central tablelands and western slopes of NSW, occurring from Putty to the Dubbo district. It is found west of Muswellbrook between Merriwa and Bylong, and north of Muswellbrook to Goonoo SF. Goonoo SF is established as a definite locality. Grows in various woodland habitats with shrubby understoreys, usually in gravely sandy soils.</p> <p>Landforms the species has been recorded growing on include flat sunny ridge tops with scrubby woodland, sloping ridges, gentle south-facing slopes, and a slight depression on a roadside with loamy sand.</p> <p>Associated species include <i>Callitris endlicheri</i>, <i>Eucalyptus crebra</i>, <i>E. fibrosa</i>, <i>E. trachyphloia</i>, <i>E. beyeri</i> subsp. <i>illaquens</i>, <i>E. dwyeri</i>, <i>E. rossii</i>, <i>Leptospermum divaricatum</i>, <i>Melaleuca uncinata</i>, <i>Calytrix tetragona</i>, <i>Allocasuarina</i> spp. and <i>Micromyrtus</i> spp.</p>	Predicted to occur within 10km (DoEE 2017)	Moderate/High Potential habitat present within various woodland vegetation types	
<i>Prasophyllum</i> sp. Wybong			CE	<p>It is known from seven populations in eastern NSW near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell and Tenterfield. Leek orchids are generally found in shrubby and grassy habitats in dry to wet soil; <i>Prasophyllum</i> sp. Wybong is known to occur in open eucalypt woodland and grassland. It is a perennial orchid, appearing as a single leaf over winter and spring. The species flowers in spring and dies back to a tuber over summer and autumn (DSEWPac 2011b).</p>	Predicted to occur within 10km (DoEE 2017)	Moderate/High - may occur within open woodland and grassland communities	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Lepidium aschersonii</i>	Spiny Peppergrass	V	V	This species is not widespread, occurring in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). A recent survey has located several populations at Narrabri, from where the species had last been recorded in 1899. Also known from the West Wyalong, Barmedman and Temora areas, although most records are old. Found on ridges of gilgai clays dominated by Brigalow (<i>Acacia harpophylla</i>), with <i>Austrodanthonia</i> and/or <i>Austrostipa</i> species in the understorey. The species grows as a component of the ground flora, in grey loamy clays. Vegetation structure varies from open to dense Brigalow, with sparse grassy understorey and occasional heavy litter.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate/High May occur within Brigalow communities, numerous records within or surrounding proposal site.	
<i>Philotheca ericifolia</i>		V	V	<i>Philotheca ericifolia</i> occurs is known only from the upper Hunter Valley and Pilliga to the Peak Hill districts of NSW. Records for <i>P. ericifolia</i> are scattered over a range of more than 400 km between West Wyalong and the Pilliga Scrub. This species is known to occur chiefly in dry sclerophyll forest and heath on damp sandy flats and gullies. It has been collected from a variety of habitats including heath, open woodland, dry sandy creek beds, and rocky ridge and cliff tops.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate/High potential habitat present within dry sclerophyll forests and open woodlands	
<i>Swainsona murrayana</i>	Slender Darling Pea	V	V	Found throughout NSW, from the Jerilderie and Deniliquin areas, the Hay plain, near Broken Hill and in various localities between Dubbo and Moree The species appears to prefer clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams, and appears in association with bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with <i>Maireana</i> species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate/High potential habitat present within black box and grassland communities as well and in floodplains and depression within proposal site	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Tytophora linearis</i>		V	E	Found in the Barraba, Mendooran, Temora and West Wyalong districts in the northern and central western slopes of NSW. Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of <i>Eucalyptus fibrosa</i> , <i>Eucalyptus sideroxylon</i> , <i>Eucalyptus albens</i> , <i>Callitris endlicheri</i> , <i>Callitris glaucophylla</i> and <i>Allocasuarina luehmannii</i> . Flowers in spring, with flowers recorded in November or May with fruiting probably 2 to 3 months later.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate/High potential habitat present within <i>Callitris</i> and <i>Bullock</i> dominated communities. Numerous records within or surrounding proposal site	
Threatened Fauna Species							
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	This species favours permanent freshwater wetlands with tall dense reedbeds particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.) with adjacent shallow, open water for foraging. It is widespread but uncommon and may be found over most of NSW except the far north-west. It hides during the day amongst dense reeds or rushes and feeds mainly at night on frogs, fish, yabbies, spiders, insects and snails.	Predicted to occur within 10km (DoEE 2017)	Moderate – May occur within wetland and marsh areas	
<i>Grantiella picta</i>	Painted Honeyeater	V	V	This species of small bird feeds primarily on the fruits of mistletoes growing on woodland eucalypts and acacias. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. This species is nomadic, occurring at low densities throughout its range. Most breeding occurs on the inland slopes of the Great Dividing Range in NSW, and this is where the greatest densities of this species are found.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Likely - may occur within numerous vegetation communities recorded within proposal site where mistletoes are present	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Calidris ferruginea</i>	Curllew Sandpiper	E	CE	Breeds in northern hemisphere. In Australia generally occupies littoral and estuarine habitats. In NSW mainly found in intertidal mudflats on sheltered coasts. Roosts on beaches, spits or islands on the coast/in wetlands, or in saltmarsh on rocky shores.	Predicted to occur within 10km (DoEE 2017)	Low – No suitable habitat present within study area.	
<i>Lathamus discolor</i>	Swift Parrot	E	CE	Migratory, travelling to the mainland from March to October. Breeds in Tasmania from September to January. On the mainland, it mostly occurs in the southeast foraging on winter flowering eucalypts and lerps, with records of the species between Adelaide and Brisbane. Principal over-winter habitat is box-ironbark communities on the inland slopes and plains. <i>Eucalyptus robusta</i> , <i>Corymbia maculata</i> and <i>C. gummifera</i> dominated coastal forests are also important habitat.	Predicted to occur within 10km (DoEE 2017)	Moderate - May occur seasonally over winter in box-ironbark communities.	
<i>Leipoa ocellata</i>	Malleefowl	V	V	Occurs in semi-arid to arid mallee country in the south-west of NSW. Its NSW stronghold is centred on Mallee Cliffs NP, extending east to Balranald and with scattered records north to Mungo NP. There are also populations in the Scotia mallee (W of the darling River), central NSW (chiefly Yathong, Nombinnie and Round Hill NR), and Dubbo (Goonoo forest). Occasional records exist from the Pilliga, around Cobar and Goulburn River NP. Inhabits predominately mallee communities, apparently preferring areas of sandy soil, abundant leaf litter, dense canopy and an abundance of food shrubs and herbs (especially legumes). Less frequently found in other eucalypt woodlands such as <i>Eucalyptus microcarpa</i> , <i>Ironbark</i> and <i>E. populnea</i> woodlands with thick understorey, and Mulga and native Cypress Pine communities.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate - small area of potential habitat within Pilliga East SF	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Rostratula benghalensis</i>	Painted Snipe (was Australian Painted Snipe)	E	V, M	Normally found in permanent or ephemeral shallow inland wetlands, either freshwater or brackish. This cryptic species nests on the ground amongst tall reed-like vegetation near water. It emerges from the dense growth at dusk to feed on mudflats and the water's edge taking insects, worm and seeds. This species prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate – may occur in wetland and marshes within the proposal site	
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	This species inhabits dry open forest and woodlands, particularly Box-Ironbark woodland and riparian forests of River Sheoak, with an abundance of mature trees, high canopy cover and abundance of mistletoes. This species breeds in only three known key areas: the Capertee Valley and the Bundarra-Barraba region in NSW and Chiltern-Albury in Victoria. In NSW they are confined to the two main breeding areas and surrounding fragmented regions. Non-breeding flocks are sporadically seen in coastal areas, foraging in flowering Spotted Gum and Swamp Mahogany forests, presumably in response to drought or resource availability.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate - May occur seasonally in areas of box – ironbark woodland and riparian forests	
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	Generally inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. It nests in hollows in small colonies, often with more than one nest in a single tree. It forages up to 10 km from nesting sites, primarily in grassy box woodland, feeding mainly on grass seed and herbaceous plants, fruits, berries, nectar, buds, flowers, insects and grain.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate – potential habitat present within box gum and cypress pine woodlands and river red gum forests where there are suitable hollows	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Maccullochella macquariensis</i>	Trout Cod	E	E	There are 3 known breeding populations in NSW: a naturally occurring population below Yarrowonga Weir in the Murray River, a stocked population in the Murrumbidgee River at Narrandera and a translocated population in Cataract Dam in coastal NSW. There are stocked (breeding unconfirmed) populations within the Murray, Murrumbidgee and Macquarie Rivers, and in Talbingo Dam in Kosciusko NP (NSW DPI 2006b). The species occurs in a range of habitats, but is strongly associated with the presence of woody debris and snags (NSW DPI 2006b).	Predicted to occur within 10km (DoEE 2017)	Moderate – May occur within waterways within proposal site	
<i>Maccullochella peelii</i>	Murray Cod	V	V	Occurs throughout the Murray-Darling Basin. Can live in a wide range of habitats, from clear, rocky streams in the upper western slopes regions of New South Wales to the slow flowing, turbid rivers and billabongs of the western plains. Generally, they are found in waters up to 5m deep and in sheltered areas with cover from rocks, timber or overhanging banks. The presence of wood debris has been shown to be the primary factor determining Murray cod presence (Kearney and Kildea 2001).	Predicted to occur within 10km (DoEE 2017)	Moderate – May occur within waterways within proposal site	
<i>Tandanus tandanus</i>	Eel Tailed Catfish	V	V	Once widespread and abundant throughout the Murray-darling system, has declined rapidly and in NSW is currently only regularly observed in the Macquarie catchment upstream of Warren, the Castlereagh catchment upstream of Mendooran, the Namoi catchment upstream of Wee Waa, the Gwydir catchment upstream of Moree and the Border Rivers catchment upstream of Goondiwindi. Present in a range of riverine and lake habitats, preferring sluggish or still waters. Found in both clear and turbid waters, in areas ranging from mud to gravel to rock substrates. Now rare in riverine habitats in inland NSW and Queensland but can be found in farm dams (DPI 2011b).	Predicted to occur within 10km (DPI 2017)	Moderate – May occur within waterways within proposal site	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Galaxias rostratus</i>	Flathead Galaxias	CE	CE	Despite extensive scientific sampling over the past 15 years there have been very few recorded sightings of Flathead Galaxias. They have not been recorded and are considered locally extinct in the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers. The species is now only known from the upper Murray River near Tintaldra and wetland areas near Howlong.	Predicted to occur within 10km (DPI 2017)	Low – unlikely to occur within waterways of proposal site	
<i>Macquaria australasica</i>	Macquarie Perch	V	E	Occurs in the upper reaches of the Lachlan, Murrumbidgee and Murray Rivers, and in parts of the Hawkesbury and Shoalhaven catchment areas. Inhabits river and lake habitats, especially the upper reaches of rivers and their tributaries. Requires clear water with deep, rocky holes and abundant cover (including aquatic vegetation, woody debris, large boulders and overhanging banks). Spawning occurs in spring and summer in shallow upland streams or flowing sections of river systems.	Predicted to occur within 10km (DoEE 2017)	Moderate – May occur within waterways within proposal site	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	This species roosts in camps generally located within 20 km of a regular food source and are commonly found in gullies, close to water and in vegetation with a dense canopy. This species is known to forage in areas supporting subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps on the nectar and pollen of native trees, in particular eucalypts, melaleucas and banksias. Grey-headed Flying-fox show a regular pattern of seasonal movement with much of the population moving to northern NSW and QLD during May and June to exploit winter flowering tree species (Eby and Law 2008). This species will also forage in urban gardens and cultivated fruit crops.	Predicted to occur within 10km (DoEE 2017)	Moderate – potential foraging habitat present within proposal site	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Phascolarctos cinereus</i>	Koala	V	V	The Koala has a fragmented distribution throughout eastern Australia. It is limited to areas of preferred feed trees (includes any of over 70 eucalypt and 30 non-eucalypt species) in eucalypt woodlands and forests.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEHS 2017)	High – numerous records and large amounts of suitable habitat present within proposal site	
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	This species is distributed between south-eastern QLD to NSW from the coast to the western slopes of the divide. This species roosts in caves, rock crevices and mines and has been most commonly recorded from dry sclerophyll forests and woodlands. In southern Sydney appears to be largely restricted to the interface between sandstone escarpments and fertile valleys (DSEWPaC 2011b). <i>C. dwyeri</i> is an insectivorous species that flies relatively slowly over the canopy or along creek beds (Churchill 2008).	Predicted to occur within 10km (DoEE 2017)	Moderate – potential habitat present	
<i>Pseudomys pilligaensis</i>	Pilliga Mouse	V	V	This species of small rodent occurs in Pilliga Scrub on an isolated area of low-nutrient deep sand predominantly in recently burnt moist gullies, areas dominated by broombush and areas containing an understorey of kurricabah (<i>Acacia burrowii</i>) with a bloodwood (<i>Corymbia trachyphloia</i>) overstorey in the pilliga region of NSW. They seem to prefer areas with a high species diversity and dense low shrub layer. The species is thought to live in burrows and is nocturnal.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEHS 2017)	Moderate – potential habitat present within Pilliga East SF	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	This species has a preference for mature wet forest habitats, particularly in areas of 600mm rainfall p.a., but has been recorded from a range of environments including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Den sites are found in hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces. Females occupy home ranges of up to 750 ha and males up to 3,500 ha, which are usually traversed along densely vegetated creek lines.	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate potential habitat present	
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat		V	Little known about the biology or social structure of these bats - rarely recorded and scattered distribution. Limited distribution that is restricted to the Murray-Darling Basin and western slopes in south-eastern Australia. Occur in a wide range of habitats including River Red Gum, Black Box, Allocasuarina, Belah, Mallee, open woodlands and savannahs, but are most common in box, ironbark and cypress open forests and buloke woodlands of inland northern NSW (Churchill 2008). In SA known to roost in tree hollows less than 3m above the ground with multiple small entrances, elsewhere they roost in fissures in branches and under exfoliating bark. Tree hollows used as maternity sites (Churchill 2008).	Predicted to occur within 10km (DoEE 2017) Recorded within 10km of proposal site (OEH 2017)	Moderate – potential habitat present	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Petauroides volans</i>	Greater Glider		V	The Greater Glider is a large gliding marsupial that feeds exclusively on eucalypt leaves and buds. Greater Gliders shelter during the day in tree hollows and at night movements are primarily restricted to gliding between tree canopies. Adult Greater Gliders occupy a relatively small home range with an average size of 1 to 3 ha from which they rarely disperse. The distribution of the Greater Glider includes the ranges and coastal plain of eastern Australia, where it inhabits a variety of eucalypt forests and woodlands. Presence and density of Greater Gliders is related to soil fertility, eucalypt tree species, disturbance history and density of suitable tree hollows.	Predicted to occur within 10km (DoEE 2017)	Moderate – potential habitat present	
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	Occurs from the Shoalhaven north to the Queensland border. Now mostly extinct west of the Great Dividing Range, except in the Warrumbungles and Mt Kaputar. Occurs on rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Diet consists of vegetation in adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Predicted to occur within 10km (DoEE 2017)	Low – alignment unlikely to impact on rocky escarpments	
<i>Underwoodisaurus sphyrurus</i>	Border Thick-tailed Gecko	V	V	This species of small Gecko occurs on rocky hills with dry open eucalypt forest or woodland with boulders, rock slabs, fallen timber and deep leaf litter in the tablelands and slopes of northern NSW as far south as Tamworth and west to Moree. The species is most common in the granite country of the New England Tablelands.	Predicted to occur within 10km (DoEE 2017)	Moderate potential habitat present	
<i>Anomalopus mackayi</i>	Five-clawed Worm-skink	E	V	This species of lizard occurs within grassy White-box woodland and River Red Gum-Coolibah-Bimble Box woodland, as well as grassy paddocks with scattered trees on the lower slopes of slight rises on the North West Slopes and Plains of north-east NSW. Permanent burrows are formed under logs and litter.	Predicted to occur within 10km (DoEE 2017)	Moderate – potential habitat present in redgum and white box communities	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Delma impar</i>	Striped Legless Lizard	V	V	Occurs in the Southern Tablelands, South-west Slopes and possibly the Riverina. Found in natural or secondary grassland or open areas in grassy eucalypt woodland. May occur in modified grasslands with high exotic grass cover. Shelters in base of grass tussocks, under rocks or logs or in soil cracks (Smith and Robertson 1999).	Predicted to occur within 10km (DoEE 2017)	Moderate – potential habitat present in natural and derived grasslands	
<i>Aprasia parapulchella</i>	Pink-tailed Worm-lizard	V	V	Populations occur in the Queanbeyan/Canberra district, Cooma, Yass, Bathurst, Albury and West Wyalong areas. Inhabits grassland and open woodland with substantial embedded rock cover in sunny situations. Recorded in both native and non-native grasslands. Usually recorded under small rocks (150 - 600 mm basal area) shallowly embedded in the soil (2 - 5 cm, and use ant burrows under these rocks.	Predicted to occur within 10km (DoEE 2017)	Moderate – potential habitat present in natural and derived grasslands and open woodlands	
Migratory Species							
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		CAMBA	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats (Marchant & Higgins 1993) (OEH 2014).	Predicted to occur within 10km (DoEE 2017)	Unlikely - suitable habitat not present	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Hirundapus caudacutus</i>	White-throated Needletail		CAMBA, JAMBA, ROKAMBA	White-throated Needletails often occur in large numbers over eastern and northern Australia. White-throated Needletails are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees (Morcombe, 2004). Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks.	Predicted to occur within 10km (DoEE 2017)	Unlikely – mostly aerial species, may occasionally fly over proposal site.	
<i>Merops ornatus</i>	Rainbow Bee-eater		JAMBA	This species is widespread in Australia, except in desert areas, and breeds throughout most of its range. The Rainbow Bee-eater is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites such as quarries, cuttings and mines to build its nesting tunnels (Morcombe, 2004).	Predicted to occur within 10km (DoEE 2017)	Moderate – potential habitat in woodland and cleared farmland area	
<i>Myiagra cyanoleuca</i>	Satin Flycatcher		Bonn	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is typically found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests	Predicted to occur within 10km (DoEE 2017)	Unlikely – suitable habitat unlikely to be present	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Rhipidura rufifrons</i>	Rufous Fantail		Bonn	Inhabits wet sclerophyll forests often in gullies dominated by Tallow-wood (<i>Eucalyptus microcorys</i>) and others with a dense shrubby understorey often including ferns.	Predicted to occur within 10km (DoEE 2017)	Unlikely – suitable habitat unlikely to be present	
<i>Ardea alba</i>	Great Egret		JAMBAi	This species is common throughout Australia, with the exception of the most arid areas. Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands (Morcombe, 2004).	Predicted to occur within 10km (DoEE 2017)	Moderate - potential habitat in wetland and marsh areas	
<i>Ardea ibis</i>	Cattle Egret		JAMBA	This species is most widespread in south-eastern Australia from Bundaberg, Queensland to Port Augusta, South Australia. The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. Will also forage at garbage dumps, and is often seen with cattle and other stock (Morcombe, 2004).	Predicted to occur within 10km (DoEE 2017)	Moderate - potential habitat in wetland, marsh, woodland and grassland areas	
<i>Gallinago hardwickii</i>	Latham's Snipe		CAMBA, JAMBA, ROKAMBA	Latham's Snipe is a non-breeding migrant to the south east of Australia. They are seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. They also use crops and pasture (Morcombe, 2004).	Predicted to occur within 10km (DoEE 2017)	Moderate – potential habitat in wetland and marsh areas	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Rostratula benghalensis (sensu lato)</i>	Painted Snipe		Marine	This species occurs across Australia, the areas of most sensitivity to the species are those wetlands where the birds frequently occur and are known to breed. The Australian Painted Snipe is usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. It is a cryptic bird that is hard to see and often overlooked. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats.	Predicted to occur within 10km (DoEE 2017)	Moderate – potential habitat in wetland and marsh areas	
<i>Apus pacificus</i>	Fork-tailed Swift		CAMBA, JAMBA, ROKAMBA	Almost exclusively aerial, occurring over inland plains sometimes foothills.	Predicted to occur within 10km (DoEE 2017)	Unlikely – mostly aerial species, may occasionally fly over proposal site.	
<i>Actitis hypoleucos</i>	Common Sandpiper		Bonn, CAMBA, JAMBA, ROKAMBA	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties.	Predicted to occur within 10km (DoEE 2017)	Moderate – may occasionally utilise wetland and marsh areas within proposal site	
<i>Calidris ferruginea</i>	Curllew Sandpiper		CAMBA, JAMBA, ROKAMBA	Occur around the coasts and are also quite widespread inland, though in smaller numbers. In NSW, they are widespread east of the Great Divide, especially in coastal regions. Mainly occur on intertidal mudflats in sheltered coastal areas. Also recorded inland, though less often, including around ephemeral and permanent lakes.	Predicted to occur within 10km (DoEE 2017)	Unlikely – no permanent lakes present within proposal site	

Scientific name	Common name	TSC Act/FM Act	EPBC Act	Habitat association	Nature of record	Likelihood of occurrence	Preliminary assessment of area of potential habitat impacted
<i>Calidris melanotos</i>	<i>Pectoral Sandpiper</i>		Bonn, JAMBA, ROKAMBA	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands	Predicted to occur within 10km (DoEE 2017)	Moderate – may occasionally utilise wetland and marsh areas within proposal site	
<i>Calidris acuminata</i>	<i>Sharp Tailed Sandpiper</i>		Bonn, CAMBA, JAMBA, ROKAMBA	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur	Predicted to occur within 10km (DoEE 2017)	Moderate – may occasionally utilise wetland and marsh areas within proposal site	
<i>Tringa stagnatilis</i>	<i>Marsh Sandpiper</i>		Bonn, CAMBA, JAMBA, ROKAMBA	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks.	Predicted to occur within 10km (DoEE 2017)	Moderate – may occasionally utilise wetland and marsh areas within proposal site	
<i>Plegadis falcinellus</i>	<i>Glossy Ibis</i>		CAMBA	Occurs throughout eastern and northern Australia, east of the Kimberley and Eyre Peninsula. Largest areas of prime habitat are inland and northern floodplains, with largest numbers in the Top End and Channel Country. Preferred habitats are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. Breeds at limited locations, with most records from the Murray Darling Basin (NSW), western Riverina (VIC), south-east (SA), Channel Country (Qld/ SA) and lower Ord/Keep Rivers (WA).	Recorded within 10km of proposal site (OEI 2017)-	Moderate – may occasionally utilise wetland and marsh areas within proposal site	

All information in this table is taken from NSW DECCW Threatened Species profiles (OEI 2016) unless otherwise stated. The codes used in this table are: CE – Critically Endangered; E – Endangered; V – Vulnerable; EP – Endangered Population; CEEC – Critically Endangered Ecological Community; EEC – Endangered Ecological Community, Bonn -Bonn Convention for Migratory Birds, CAMBA–China–Australia Migratory Bird Agreement, JAMBA - Japan-Australia Migratory Bird Agreement, ROKAMBA -Republic of Korea-Australia Bird Agreement