Australian Rail Track Corporation

Inland Rail - Narrabri to North Star

State Significant Infrastructure Application Supporting Document

January 2016

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Glossary of terms

Term	Definition
ballast	Gravel or coarse stone used to form the bed of a railway track
crossover	The connection between two tracks allowing trains to cross tracks
culvert	A small channel, pipe or drain that allows water to pass under a road/rail line
curve easing	Replacing existing tight curves (those with a geometrical radius of less than 800 metres) with larger radius curves
cutting	A form of deep excavation in soil or rock
ecologically sustainable development	Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased
embankment	A structure where the rail line is above the natural surface
emission	A substance discharged into the air
freight	Goods transported in bulk by truck, train, ship or aircraft
freight task	The interstate (IS) road freight task is defined by ABS as the amount of tonne-kilometres
Inland Rail	The project being undertaken by ARTC involving the design and construction of an inland rail connection between Melbourne and Brisbane, via Wagga, Parkes, Moree and Toowoomba
level crossing	A place where rail lines and a road cross at the same location
passing loop	A separate section of track that is used to allow one train to safely pass another
the proposal	The construction and operation of the Narrabri to North Star section of Inland Rail
proposal site	The construction footprint, including the area that would be directly affected by construction works
rail corridor	The area of land within which the existing rail infrastructure is located
rail infrastructure	Infrastructure required for the operation of a rail network, which includes tracks, wiring, signalling, stations etc.
sensitive receivers	Land uses which are sensitive to potential noise, air and visual impacts, such as residential dwellings, schools and hospitals
sidings	A short track at the side of and opening on to a railway line
signalling	Rail traffic lights and operational signage
study area	The area including and adjacent to the proposal site, with the potential to be indirectly impacted by activities on the proposal site
track formation	The foundation of the rail track
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	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ARTC	Australian Rail Track Corporation
BTEX	Benzene, toluene, ethylbenzene and xylenes
EEC	Endangered ecological community
EIS	Environmental impact statement
EPA	Environmental Protection Authority
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Australian *Environment Protection and Biodiversity Conservation Act 1999*
Infrastructure SEPP	State Environmental Planning Policy (Infrastructure) 2007
LEP	Local environmental plan
LGA	Local government area
NSW	New South Wales
OEH	Office of Environment and Heritage
PAH	Polycyclic aromatic hydrocarbons
SEARS	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
TPH	Total petroleum hydrocarbons
TSC Act	NSW *Threatened Species Conservation Act 1995*

1. Introduction

1.1 Overview

1.1.1 Inland Rail

The Australian Government has committed to building a significant new piece of national transport infrastructure by constructing an inland railway between Melbourne and Brisbane, via central-west New South Wales (NSW) and Toowoomba in Queensland. The Inland Rail project ('Inland Rail') is a major national project that will enhance Australia's existing national rail network and serve the interstate freight market.

The Inland Rail route, which is about 1,730 kilometres long, would involve:

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

Inland Rail has been divided into 14 projects, seven of which are located in NSW. Two priority construction projects have been identified for the Inland Rail program in NSW:

- Narrabri to North Star – consisting of about 183 kilometres of upgraded track and associated facilities.
- Parkes to Narromine – consisting of about 106 kilometres of upgraded track and associated facilities.

1.1.2 The proposal for which approval is sought

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

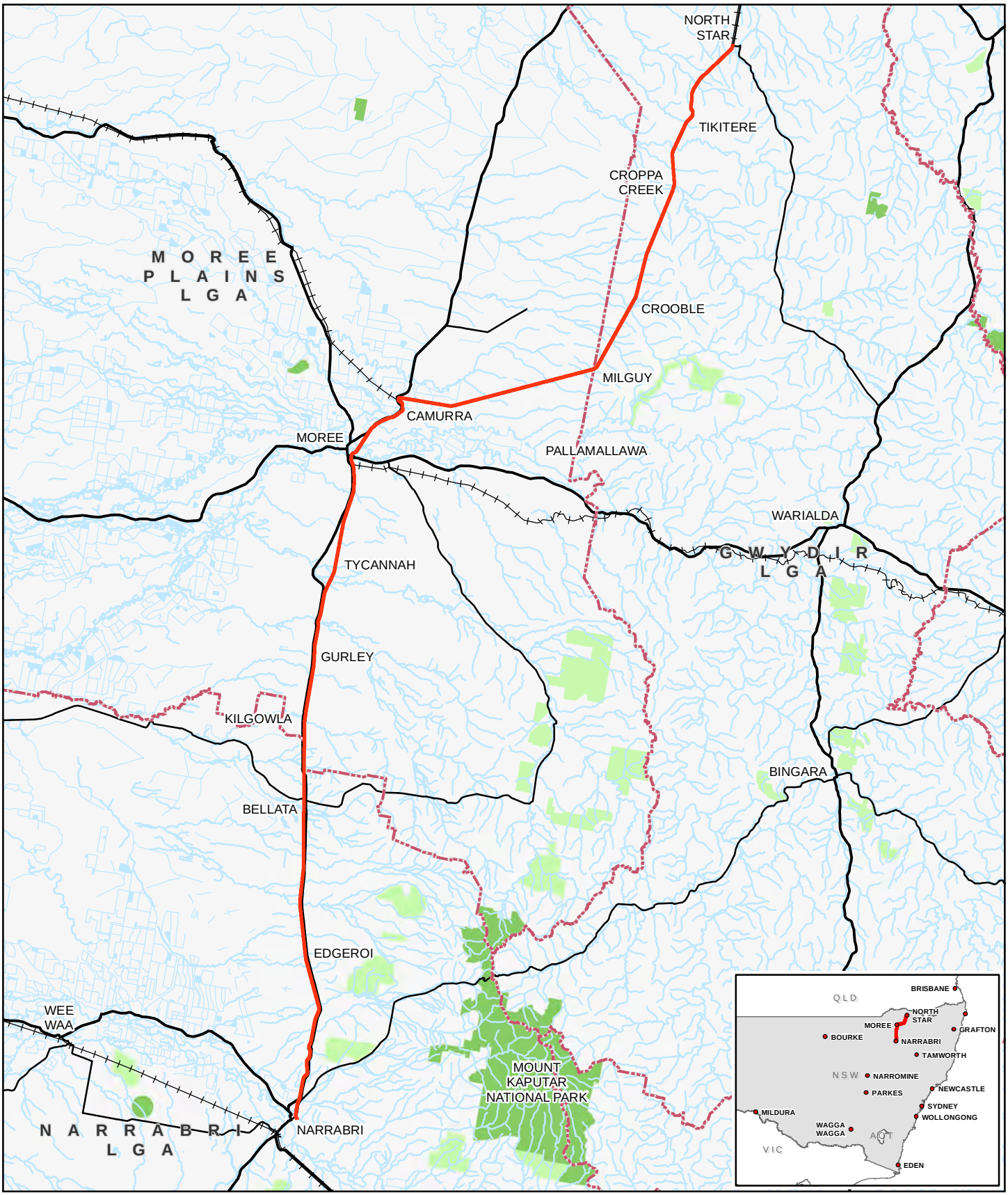
The proposal is subject to assessment under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The capital investment value of the proposal is estimated to be over $50 million, and as a result the proposal is State Significant Infrastructure under *State Environmental Planning Policy (State and Regional Development) 2011*. The proposal is therefore subject to Part 5.1 of the EP&A Act and an environmental impact statement (EIS) is required for the approval of the NSW Minister for Planning.

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

1.2 Overview of the proposal

1.2.1 Location

The proposal is generally located in the existing rail corridor between the town of Narrabri and the village of North Star in NSW (refer Figure 1.1). Further information on the location of the proposal is provided in section 2.



LEGEND

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

Paper Size A4

0 3 6 12 18 24

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Australian Rail Track Corporation
Inland Rail

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Date	30 Oct 2015

Location of the proposal

Figure 1.1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI, DCDB, 2015; Geoscience Australia, 250K Topographic Data Series 3. Created by: gmcdiarmid, tmorton

1.2.2 Key features

The proposal would involve upgrading the existing rail line between Narrabri and North Star, including:

- Upgrading the existing track and track formation.
- Replacement of culverts and bridges.
- Construction of five new passing loops, potentially at Bobbiwaa, Penny's Road, Moree, Coolleearllee and Croppa Creek.
- Rationalisation and upgrading of level crossings.
- Curve easing.
- Construction of a deviation at Camurra to eliminate the existing hairpin curve.

The following ancillary works would also be undertaken:

- Changes to some property access roads and the local road network in some locations as a result of the rationalisation of level crossings.
- Flood immunity works.
- Stormwater drainage works.
- Upgrading signalling and communications.
- Establishing or upgrading existing fencing of the rail corridor.
- Relocation of some services and utilities.

1.2.3 Timing/program

The proposal, which is planned to commence in mid-2018, is expected to take about 18 months to construct.

1.2.4 Operation

Freight train numbers and annual tonnages are expected to increase in the future as follows:

- Moree to North Star - annual average of 9.8 trains per day in 2025 and 16 trains per day in 2040. These would be a mix of grain, intermodal (freight) and other general transport trains. Total annual tonnages would increase to about 10.8 million tonnes in 2025 and about 17.7 million tonnes in 2040.
- Narrabri to Moree - annual average of 10.6 trains per day in 2025 and 16.7 trains per day in 2040. These would be a mix of grain and intermodal (freight) trains. Total annual tonnages would increase to about 11.5 million tonnes in 2025 and about 18.3 million tonnes in 2040.

1.2.5 Capital investment value

The estimated capital investment value of the proposal is about $1,300 million.

1.3 The proponent and future operator

1.3.1 The proponent

ARTC has been tasked with developing a ten year program to deliver Inland Rail, under the guidance of the Australian Government's Inland Rail Implementation Group.

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 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 www.artc.com.au.

1.3.2 Future operator

The proposal would form part of the rail network managed and maintained by ARTC. Train services would be provided by a variety of operators.

1.4 Purpose and structure of this report

This document provides the information required to support the proponent's application in accordance with the requirements of Part 5.1 of the EP&A Act. It describes the proposal and the potential environmental issues, to assist in the preparation of the SEARs for the EIS.

The remainder of this document is structured as follows:

- Section 2 – provides a brief description of the regional location and the proposal site.
- Section 3 – provides an overview of the statutory framework and approval pathway for the proposal.
- Section 4 – provides an overview of the strategic context and need for Inland Rail.
- Section 5 – provides a description of the proposal's key features.
- Section 6 – provides a preliminary assessment of the potential environmental issues associated with the construction and operation of the proposal, and outlines the proposed scope for the EIS.
- Section 7 – describes the proposed approach to consultation for the proposal and the EIS Section 8 – provides the conclusion to the document.

The following definitions have been used in this report:

- The 'proposal site' refers to the area that may be directly impacted by the proposal, in which construction activities would occur.
- The 'study area' consists of land near to and including the proposal site. The study area is the wider area surrounding the proposal site, including land that has the potential to be indirectly impacted by the proposal (for example, as a result of any noise impacts).

2. Site description

2.1 Regional context

The proposal site is located in north-western NSW. The proposal site traverses three local government areas (LGAs), with the southern section of the proposal located in the Narrabri LGA, the middle section in the Moree Plains LGA, and the northern section in the Gwydir LGA (refer to Figure 1.1). The three LGAs are predominantly rural, with the main local industries based around agriculture (mainly cotton and grains) and grazing. Moree Plains and Gwydir Shire both adjoin the NSW–Queensland border.

Narrabri is located in the Narrabri LGA at the southern end of the proposal site. The town is about 447 kilometres south-west of Brisbane, 521 kilometres north-west of Sydney and 939 kilometres north-east of Melbourne. It is located on the Namoi River at the junction of the Kamilaroi and Newell highways. At the 2011 census, Narrabri had a population of 5,890 people.

Moree is located in the Moree Plains LGA about 96 kilometres north of Narrabri. It is located on the Mehi River at the junction of the Newell and Gwydir highways. At the 2011 census, Moree had a population of 9,346 people. Both Moree and Narrabri are important regional towns providing a range of services to the surrounding areas.

The small village of North Star is located at the northern end of the proposal site in the Gwydir LGA. North Star is about 80 kilometres north-east of Moree, and 30 kilometres south of the Queensland border. At the 2006 census, North Star had a population of 327 people in the surrounding area, and a population of around 50 people in the actual village.

The regional context for the proposal site is shown in Figure 2.1.

2.2 Existing rail facilities

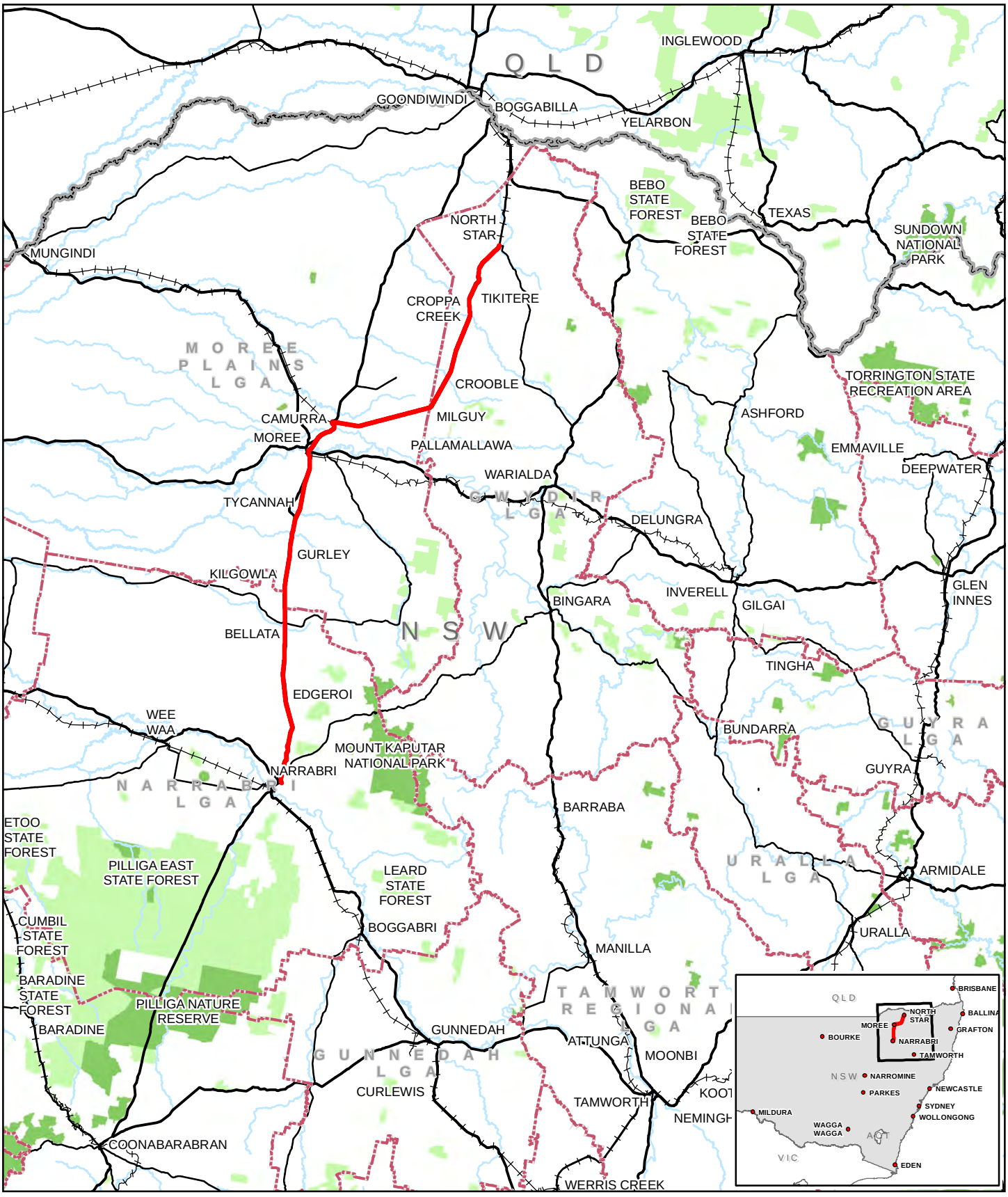
2.2.1 Rail infrastructure

Narrabri and Moree are located on the Mungindi (North West) railway line, which branches from the Main North Line at Werris Creek station and heads north-west through the towns of Gunnedah and Narrabri to Moree.

Narrabri Station opened in 1897, which was when the Mungindi line was extended from Boggabri to Moree. The current Moree station opened in 1904, replacing the original station (located to the north of the existing station), which opened in 1897 when the line was extended from Boggabri.

From Moree, the Mungindi line travels north-west to Mungindi on the Queensland border. The line was closed between Weemelah and Mungindi in 1974 when rail services were withdrawn following flooding. A disused branch line (the Inverell line) is also located between Moree station and Inverell to the west.

North Star is located on the disused Boggabilla line, which branches from the Mungindi line at Camurra (about 10 kilometres north-west of Moree). North Star Station was opened in 1932 with the opening of the Boggabilla line. From Camurra, the Boggabilla line travels north for about 130 kilometres to Boggabilla on the Queensland border. In 1987 the line was truncated at North Star. The remainder of the line was closed to normal operations in 2013 but is still used occasionally.



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- Forestry reserve
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- State border

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0 5 10 20 30 40

Kilometres

Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 55

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Regional location

Figure 2.1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI, DCDB, 2015; Geoscience Australia, 250K Topographic Data Series 3. Created by: gmcdiarmid

Physical characteristics

Track

The existing track is a mixture of track weights (47 and 53 kilograms) mainly supported on steel sleepers. The track was originally constructed for light traffic on the existing sub-grade materials. Over time, the track has been re-ballasted and maintained, but no significant improvements have been made to the track formation.

Sections of track pass through low lying flood prone areas, and wash-aways have occurred in the past after heavy rain events. The maintenance access track is not continuous and can be impassable by two wheel and four wheel drive vehicles after wet weather.

There are about 33 sidings between Narrabri and North Star that provide access to and from the main line for private operations.

Structures

There are 214 bridges and culverts between Narrabri and North Star. These are generally in poor condition and are unlikely to meet the Inland Rail performance specification.

There are 85 public and private level crossings (both active and passive) that would be assessed for potential upgrade, closure or consolidation during the concept design process.

2.2.2 Rail operations

Passenger services

Passenger trains operate between Werris Creek and Moree, with Moree served by NSW TrainLink's daily Northern Tablelands Xplorer service operating to and from Sydney. In the study area, trains stop at Narrabri, Bellata and Moree.

On an annual basis there is currently an average of 1.8 passenger trains per day.

Freight services

Occasional grain/goods trains operate on an as needs basis. Annually there is an average of two grain trains per day carrying about 1.7 million tonnes of grain per year.

Trains using the line have a maximum length of 1,800 metres. Train speeds between Narrabri and Moree are limited to a maximum of 90 to 100 km/h depending on the axle weight with local speed restrictions due to limitations associated with the existing track. Between Moree and North Star, train speeds are limited to a maximum of 80 km/h depending on the axle weight. There are also local speeds restrictions due to existing track condition.

2.3 Description of the proposal site

The majority of works associated with the proposal would be undertaken within the existing corridors for the Mungindi and Boggabilla rail lines, between Narrabri and North Star. This forms the proposal site for the purposes of this document.

The southern end of the proposal site commences in Narrabri just to the south of Narrabri Station, located on the eastern side of Narrabri. The southern end of the proposal site is located at 569.240 kilometres on the Mungindi line (measured from Sydney Central Station). From Narrabri, the proposal site extends along the existing Mungindi line corridor in a north–south direction for a distance of about 94 kilometres, to just south of Moree. In the Narrabri to Moree section, the proposal site is located generally adjacent to the Newell Highway.

Between Narrabri and Moree, the proposal site travels through the villages of Edgeroi, Bellata and Gurley. From just north of Narrabri to about 3.5 kilometres north of Bellata (a distance of about 46 kilometres), the proposal site is located adjacent to (just to the west of) the road corridor for the Newell Highway. At this site, the rail corridor crosses the road and is then located to the east of the highway until it reaches 664.340 kilometres (a distance of about 43 kilometres) on the southern edge of Moree near Bulluss Drive. At this point (about 1.3 kilometres south of Moree Station) the highway deviates to the west through Moree.

The proposal site then passes through Moree along the existing rail corridor. From Moree, the proposal site travels in a north-easterly direction to the locality of Camurra, which is about 10 kilometres to the north-east of Moree. In this section, the proposal site is located to the east of the Newell Highway. At Camurra, the proposal site enters the corridor for the Boggabilla rail line at an existing hair pin turn. Options to provide a minor deviation to eliminate the hair pin turn are currently being investigated.

From Camurra, the proposal site travels to the east, and then to the north through rural lands and the localities of Crooble and Croppa Creek until it reaches the village of North Star (a distance of about 80 kilometres). The existing rail corridor passes to the west of the main residential area of the village. The northern end of the proposal site is located at 758.571 kilometres on the western edge of the village of North Star about 350 metres north of North Star Road.

2.4 Land ownership

The existing rail corridor is owned by the NSW Government (Transport for NSW). Subject to further design, some works would be undertaken outside of the corridor for the Camurra hairpin deviation and associated with other elements such as passing loops and level crossing upgrades. Some site access will be via private land, ARTC have had access agreements in place with these landholders for a number of years.

3. Statutory framework

3.1 Approval pathway

3.1.1 Summary

As outlined in the following sections, *State Environmental Planning Policy (Infrastructure) 2007* provides that the proposal may be carried out without consent. The capital investment value of the proposal is estimated to be over $50 million, 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 5.1 of the EP&A Act and an environmental impact statement (EIS) is required for the approval of the NSW Minister for Planning.

3.1.2 Consideration of requirements under the Environmental Planning and Assessment Act 1979

The EP&A Act and the *Environmental Planning and Assessment Regulation 2000* (the Regulation) provide the framework for development assessment in NSW. The EP&A Act and the Regulation include provisions to ensure that the potential environmental impacts of a development are considered in the decision making process prior to proceeding to construction.

Application of 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. In accordance with section 110(1), ARTC would be the proponent and a determining authority for the proposal. Section 111 imposes a duty on 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 112(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 112, the proposal may significantly affect the environment. As a result, an EIS may be required.

State significant infrastructure and the application of Part 5.1 of the EP&A Act

State Significant Infrastructure is development that is declared under section 115U of the EP&A Act to be State Significant Infrastructure. Under section 115U(3) development may be declared to be State Significant Infrastructure if it is:

'(3) Development that may be so declared to be State significant infrastructure is development of the following kind that a State environmental planning policy permits to be carried out without development consent under Part 4:

(a) infrastructure,

(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.'

Clause 14 and Schedule 3 of *State Environmental Planning Policy (State and Regional Development) 2011* (the State and Regional Development SEPP) operate to make the proposal State Significant Infrastructure (refer section 3.1.3). The proposal is therefore subject to Part 5.1 of the EP&A Act.

Under section 115W of the EP&A Act, the approval of the Minister for Planning is required for State Significant Infrastructure. In accordance with section 115X (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 Director-General.

(3) The application is to be lodged with the Director-General.'

This document provides the information required to support the proponent's application for SEARs in accordance with the requirements of section 115X.

Land owner's consent

Clause 193 of the Regulation provides owner's consent and notification requirements for State Significant Infrastructure projects. Clause 193(1) specifies that:

'The consent of the owner of the land on which State significant infrastructure is to be carried out is required for an infrastructure application or modification request unless the application or request relates to any of the following:

(a) State significant infrastructure proposed to be carried out by a proponent that is a public authority,

(b) critical State significant infrastructure.

(c) State significant infrastructure comprising any one or more of the following:

(i) Linear transport infrastructure,

(ii) Utility infrastructure,

(iii) Infrastructure on land with multiple owners designated by the Secretary for the purposes of this clause by notice in writing to the person making the application or request.'

As the application for the proposal is being made by a public authority and is for linear transport infrastructure, the consent of individual land owners will not be required to make the application. However, the proponent needs to give notice of the application in accordance with the requirements of clause 193(4).

3.1.3 Consideration of relevant environmental planning policies

State Environmental Planning Policy (Infrastructure) 2007

The Infrastructure SEPP clarifies the consent arrangements for infrastructure projects. According to clause 8(1) '*if there is an inconsistency between this Policy and any other environmental planning instrument, whether made before or after the commencement of this policy, this policy prevails to the extent of the inconsistency*'.

The proposal meets the definition of rail infrastructure facilities, which are defined by clause 78 of the Infrastructure SEPP as 'railway tracks, associated track structures, rail freight terminals, sidings and freight intermodal facilities'.

Clause 79(1) provides that development for the purpose of a railway, or for rail infrastructure facilities, may be carried out by or on behalf of a public authority without consent on any land. This clause also specifies the conditions whereby such development can be carried out without consent on land reserved under the *National Parks and Wildlife Act 1974*. As the proposal site is not reserved under the *National Parks and Wildlife Act 1974*, these conditions would not apply.

As a result of the application of clause 79, the proposal is permissible without consent.

State Environmental Planning Policy (State and Regional Development) 2011

Sections 89C(2) and 115U(2) of the EP&A Act provide that a SEPP may declare any development, or any class or description of development, to be State Significant Infrastructure or State Significant Development. The State and Regional Development SEPP provides definitions of State Significant Infrastructure and State Significant Development. The proposal does not meet the definitions of State Significant Development.

Clause 14 of the State and Regional Development SEPP provides that development is State Significant Infrastructure if it is:

- Wholly or partly permissible without development consent under Part 4 of the Act, by virtue of the operation of a SEPP.
- It meets the definitions provided in Schedule 3 to the SEPP.

As noted above, the Infrastructure SEPP provides that the proposal is permissible without consent. Schedule 3 (item 3) of the State and Regional Development SEPP includes the following definition of '*rail infrastructure*':

'*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.*'

The capital investment value of the proposal is estimated to be over $50 million. As the proposal meets this definition it is defined as State Significant Infrastructure.

Other environmental planning instruments

Section 115ZF(2) of the EP&A Act provides that environmental planning instruments do not apply to or in respect of State Significant Infrastructure, except where they apply to the declaration of infrastructure as State Significant Infrastructure.

3.2 Approval requirements under other legislation

3.2.1 Approvals not required

In accordance with Section 115ZG of the EP&A Act, a number of approvals under other Acts are not required to be obtained if a project is approved under Part 5.1:

- Concurrence under Part 3 of the Coastal Protection Act 1979 of the Minister administering that Part of that Act.
- A permit under Section 201, 205 or 219 of the Fisheries Management Act 1994.
- An approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977.
- An Aboriginal heritage impact permit under Section 90 of the National Parks and Wildlife Act 1974.
- An authorisation referred to in Section 12 of the Native Vegetation Act 2003 (or under any Act repealed by that Act) to clear native vegetation or State protected land.

- A bushfire safety authority under section 100B of the Rural Fires Act 1997.
- 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.

In addition, Division 8 of Part 6 of the *Heritage Act 1977* (relating to making heritage orders) does not apply to prevent or interfere with the carrying out of approved State Significant Infrastructure.

3.2.2 Approvals to be applied consistently

Under Section 115ZH of the EP&A Act, the following approvals cannot be refused if necessary for the carrying out of approved State Significant Infrastructure:

- An environment protection licence under Chapter 3 of the Protection of the Environment Operations Act 1997.
- Consent under Section 138 of the Roads Act 1993.

The approval requirements of these Acts as they relate to the proposal are summarised in the following section.

3.2.3 Requirements of other NSW Acts

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* establishes, amongst other things, the procedures for issuing licences for environmental protection on aspects such as waste, air, water and noise pollution control. Environment protection licences 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.

It may be appropriate to either amend this licence to include the operation of the proposal or to obtain a new licence. This would be considered in consultation with the Environment Protection Authority (EPA) during the EIS process.

Roads Act 1993

Under Section 138, Part 9, Division 3 of the *Roads Act 1993,* 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 1993*. As noted above, section 115ZH of the EP&A Act provides that a permit under section 138 of the *Roads Act 1993* cannot be refused if it is necessary to carry out a State Significant Infrastructure project.

3.2.4 Relevant Commonwealth legislation

Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) proposed 'actions' that have the potential to significantly impact on matters of national environmental significance; the environment of Commonwealth land; or that are being carried out by an Australian Government agency, must be referred to the Australian Minister for the Environment for assessment. If the Minister determines that a referred project is a 'controlled action' under the EPBC Act, the approval of the Minister would be required.

The findings of preliminary environmental investigations carried out to date indicate the potential presence of ecological communities listed under the EPBC Act in the study area. ARTC is currently completing further field work to ascertain if it is considered whether the proposal would or would not result in a significant impact on matters of national environmental significance, and hence if it is considered to be a controlled action requiring approval under the EPBC Act. If required a referral will be prepared and submitted to the Australian Government Department of the Environment to determine whether the proposal will need formal assessment and approval under the EPBC Act (that is, whether it would be a controlled action). Once submitted, the proponent will wait for formal advice from the Department in response to the referral.

4. Strategic context and justification

4.1 Strategic context

4.1.1 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 because:

- 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

4.1.2 Project development history and options considered

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

The second study, the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010) (see below), examined the far western corridor in detail and developed the current Inland Rail alignment (as shown in Figure 4.1).

Inland Rail Alignment Study

The commencement of the 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 standard 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:

- Melbourne to Parkes – 670 km of existing Class 1 track and 37 km of greenfield track from Illabo to Stockinbingal bypassing Cootamundra and the Bethungra spiral.
- Parkes to North Star – 307 km of upgraded track and 291 km of greenfield alignment from Narromine to Narrabri.
- North Star to Acacia Ridge – 271 km of greenfield construction, 119 km of existing track upgraded from narrow gauge to dual gauge and 36 km of the existing coastal route.'

The report noted that the existing rail corridor would be used between Narrabri and North Star.

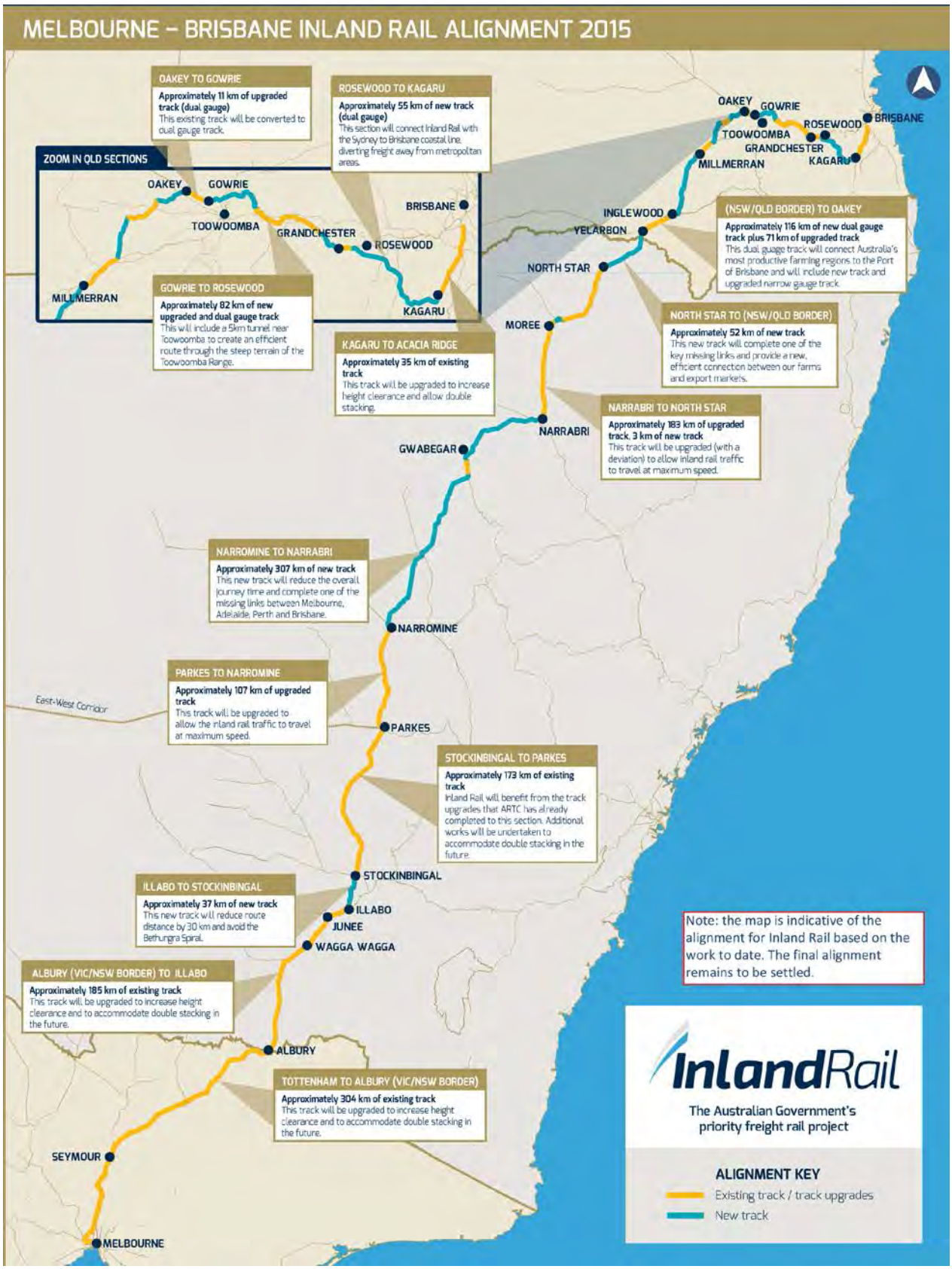


Figure 4.1 Proposed alignment for Inland Rail

The conclusions of the study include:

- There is demand for an inland railway.
- The route for the inland railway would be more than 100 kilometres 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, compared to a transit time on the existing coastal route of about 27 hours and 30 minutes.
- 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.

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, starting with pre-construction activities such as detailed corridor planning, environmental assessments and community consultation. The Minister also announced that a high-level Implementation Group would be formed to drive the project. The alignment identified by the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010) was endorsed by the Implementation Group as the base case for further work.

In 2014, the Implementation Group appointed ARTC to develop a business case and a 10 year delivery plan for Inland Rail. In NSW, ARTC has commenced planning for the two highest priority construction projects:

- Narrabri to North Star (the proposal).
- Parkes to Narromine (subject to a separate application).

ARTC has also commenced planning work on the priority development project in Queensland:

- Gowrie to Grandchester – consisting of 87 kilometres of new dual gauge track including a five to six kilometre long tunnel.

4.1.3 Consistency with Australian and NSW government strategic planning

The proposal is considered to be consistent with relevant transport and economic development strategies, including:

- *NSW 2021* (the State Plan), NSW Government, 2011
- *National Land Freight Strategy*, Commonwealth of Australia, 2012
- *NSW Long Term Transport Master Plan*, Transport for NSW, 2012
- *NSW Freight and Ports Strategy*, NSW Government, 2013
- *Rebuilding NSW* - State Infrastructure Strategy, NSW Government, 2014
- *New England North West Regional Transport Plan,* Transport for NSW, 2013
- *Australian Infrastructure Audit – Our Infrastructure Challenges*, Infrastructure Australia, 2015.

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

4.2 Need for the proposal

4.2.1 Inland Rail

As noted by the *National Land Freight Strategy* (Commonwealth of Australia, 2012) 'The efficient movement of land freight is crucial for Australia's productivity and competitiveness, and affects the lives of every Australian'. The existing rail mode share of freight between Melbourne and Brisbane (averaging the two directions) varies between about 22 to 27 per cent for non-bulk freight, up to about 60 to 90 per cent for commodities transported in bulk (ARTC, 2010).

Continued growth in freight volumes is giving rise to a range of increasingly complex challenges for government, industry and the community. Over the last four decades, the Australian freight task (that is, the amount of freight transport, usually measured in tonnes or tonne-kilometres) has quadrupled, with major increases evident in road and rail transport. Forecasts indicate that the total freight task will continue to grow, and is estimated to nearly double by 2030 based on 2010 levels (Commonwealth of Australia, 2012).

The *National Land Freight Strategy* notes that the infrastructure supporting the movement of land freight, such as road, rail and ports, must be sufficient for the significant projected growth. The strategy identifies a number of challenges facing road and rail freight, including:

- Congestion from increasing numbers of passenger vehicles that can adversely impact on freight vehicle movement.
- The priority given to passenger vehicles over freight vehicles in urban transport.
- Urban encroachment on freight routes and precincts as cities grow in size and density, and the associated community focus on interface issues.

The *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010) indicated that:

- There are likely to be capacity constraints on the existing coastal railway unless significant capital works are undertaken.
- The coastal railway between Sydney and Brisbane would reach capacity around 2052.

The *2015 Australian Infrastructure Audit* (Infrastructure Australia, 2015) notes that the demand for freight rail is projected to grow. It also notes that freight rail will need to play a growing role in the movement of goods between ports and inland freight terminals, and in the movement of containerised and general freight over longer distances.

4.2.2 The proposal

The proposal forms one of the 14 projects required to deliver Inland Rail. The proponent has identified that the proposal is one of three priority projects. Two of these (the proposal and the Parkes to Narromine project) are construction priorities. The other (Gowrie to Grandchester in Queensland) is a development priority.

Development of both the proposal and the Parkes to Narromine project will enable implementation of the Inland Rail program to align with funding availability.

4.3 Key benefits of Inland Rail

Inland Rail will complete 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 about seven hours of travel time between Melbourne and Brisbane.

Trains travelling on this new, more direct route would travel at speeds up to 115 kilometres per hour, and would use significantly less fuel. 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 important contributor to national productivity. It is estimated that, by 2050, Inland Rail will reduce the number of trucks carrying agricultural related freight by about 100,000 semi-trailers per 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:

- Create jobs.
- Support the growth of existing businesses and the launch of new businesses.
- Make exports more competitive.
- Ease congestion on highways and through the Sydney rail network.
- Prevent additional wear and tear on roads and make roads safer.
- Reduce environmental emissions and fuel consumption.

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 5.2 describes the Narrabri to North Star section and the proposed works required, an indicative preliminary review of the main construction activities that would be undertaken is provided in section 5.3, and an outline of the indicative operation and maintenance regime is provided in section 5.4.

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.

5.2 Key features of the proposal

5.2.1 Inland Rail performance specification

The performance specification for Inland Rail defines the minimum operational requirements that provide the basis for the design. Key elements include:

- Maximum train length of 1800 metres, with capacity for later upgrades to suit trains 3600 metres long.
- Single stacked container freight from Melbourne to Parkes, with capacity for later upgrades to double stacked containers, and double stacked container freight from Parkes to Brisbane.
- Maximum design speed of 115 km/hr for freight trains.
- Maximum 30 tonne axle load for freight trains.

5.2.2 Main corridor works

The Inland Rail design team is currently preparing a preliminary concept design for the proposal. Key features of the preliminary concept design are described below. These design elements will be further defined as the concept design progresses.

Track works

Proposed track works would involve upgrading the existing track for a distance of about 183 kilometres, including provision of:

- Upgraded formation.
- New track ballast.
- New heavy duty concrete sleepers.
- New 60 kilogram rail tracks.

Track work may also involve curve easing. If this were to occur, existing tight curves (those with a geometrical radius of less than 800 metres) would be replaced with larger radius curves. This would involve providing new track alignments and straightening the railway. Curve easing may require works outside the existing rail corridor.

A deviation would be constructed at Camurra to eliminate the existing hairpin curve. This would consist of about three kilometres of new track constructed outside the existing rail corridor.

Track formations, earthworks and drainage

Bulk earthworks may be required in some sections along the proposal site. Subject to the outcomes of the concept design process, the earthworks required could range from relatively minor improvements to total reconstruction of the existing track formation, to new track formation for new sections of track.

Further investigations are currently being undertaken to confirm the extent of works likely to be required to meet the Inland Rail performance specification, based on the condition of the existing track formation.

Bulk earthworks could include reusing and/or replacing existing material (with treatment as required) to provide the required subgrade, general fill and structural fill for the track formation. Cut and fill operations would also be required in some areas to achieve the required track grades.

Existing drainage within the rail corridor would also be upgraded to suit the upgraded track formation and address existing drainage issues.

Consideration would be given to appropriate flood immunity when designing all new track formations, embankments, and cuttings for the Inland Rail route.

Culverts and bridges

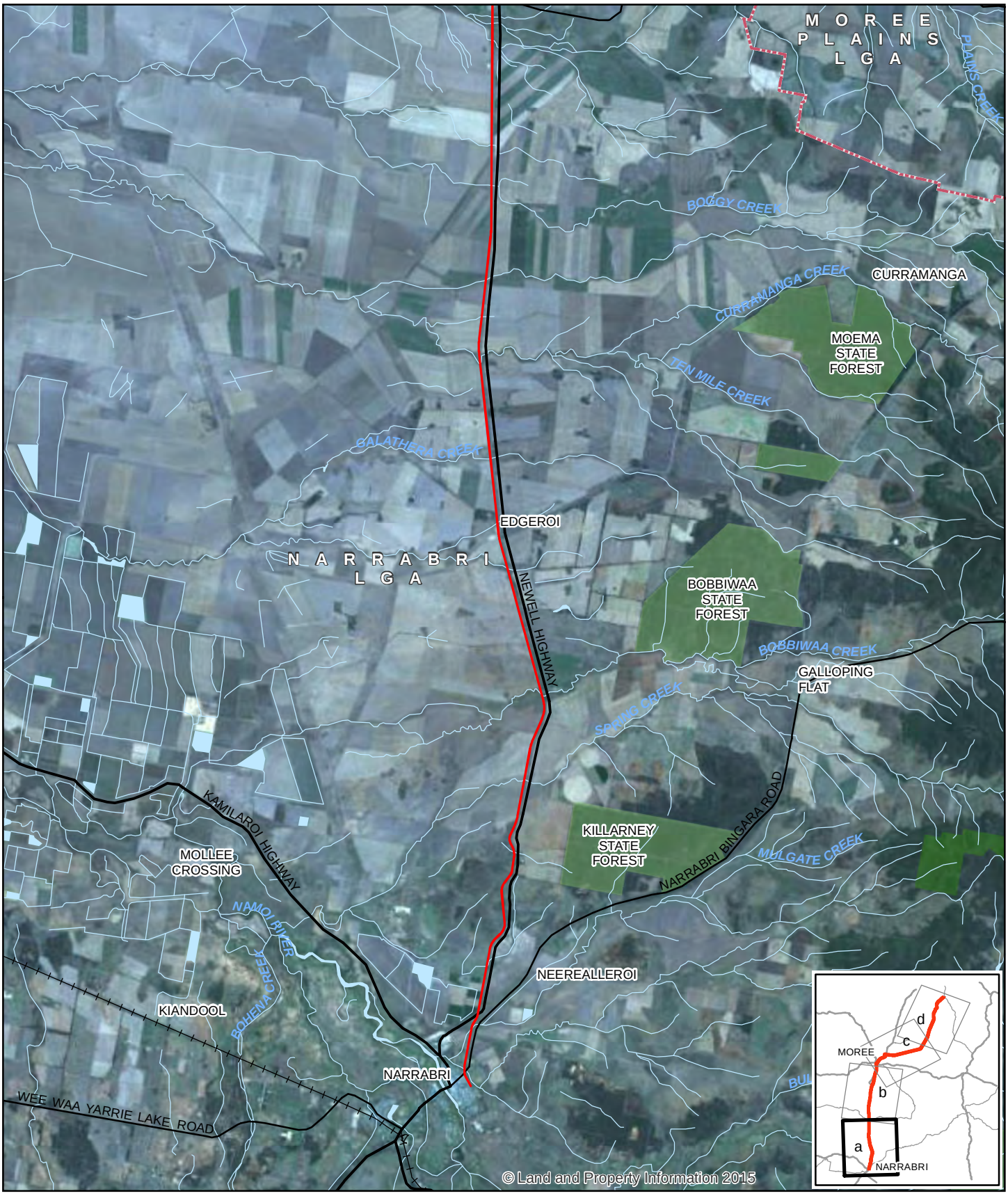
During the concept design process, all structures will be assessed for compliance with the Inland Rail performance specification. Any bridges and culverts that do not comply, have limited life spans, or cannot be feasibly made to comply, would be replaced as part of the proposal.

Passing loops

Five new passing loops would be required to allow trains to pass at the following potential locations:

- Bobbiwaa
- Penny's Road
- Moree
- Coolleearilee
- Croppa Creek.

This would involve constructing new sections of track, each up to about 2165 metres long (to accommodate an 1800 metre long train), roughly parallel to the existing track. The passing loops would be constructed within the rail corridor where possible and would provide for possible future upgrades to accommodate a 3600 metre long train.



LEGEND

- Proposal corridor
- Local Government Area
- Principal road
- Secondary road
- Railway
- Watercourse
- Forestry reserve
- Conservation reserve

Paper Size A4

0 1 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Australian Rail Track Corporation
Inland Rail

Job Number	22-17916
Revision	0
Date	30 Oct 2015

Proposal corridor

Figure 5.1a

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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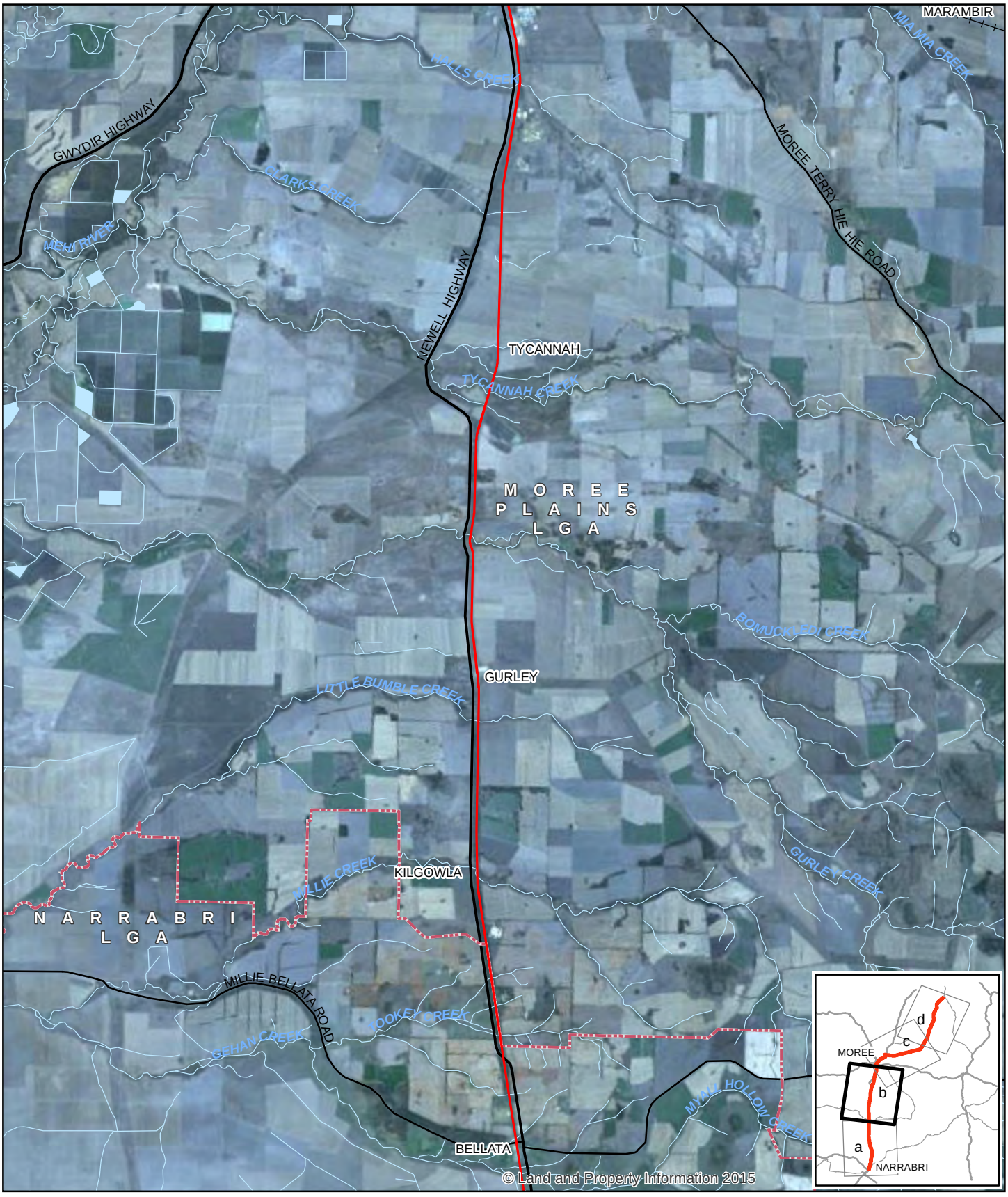

LEGEND

- Proposal corridor
- Local Government Area
- Principal road
- Secondary road
- Railway
- Watercourse

Paper Size A4

0 1 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Australian Rail Track Corporation
Inland Rail

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Proposal corridor

Figure 5.1b

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid

LEGEND

- Proposal corridor
- Local Government Area
- Principal road
- Secondary road
- Railway
- Watercourse
- Forestry reserve
- Conservation reserve

Paper Size A4

0 1 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

Australian Rail Track Corporation
Inland Rail

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Proposal corridor

Figure 5.1c

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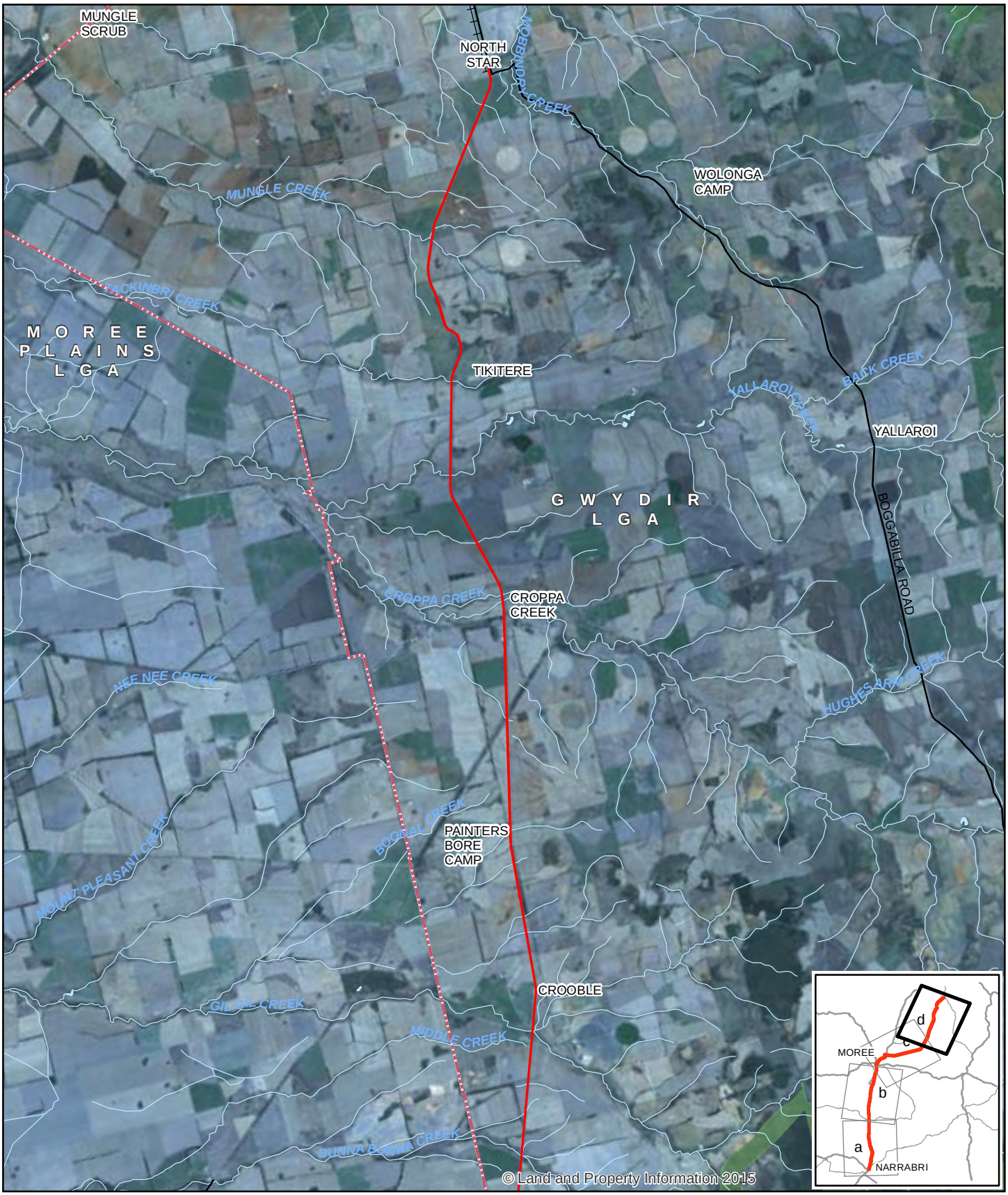

LEGEND

- Proposal corridor
- Local Government Area
- Secondary road
- Railway
- Watercourse
- Forestry reserve

Paper Size A4

0 1 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

Australian Rail Track Corporation
Inland Rail

Job Number	22-17916
Revision	0
Date	30 Oct 2015

Proposal corridor

Figure 5.1d

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Data source: Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid

Road/level crossings

A level crossing feasibility strategy is being 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 would consider:

- Existing safety issues.
- Opportunities for alternative access arrangements.
- Property acquisition and easement requirements.
- Road closure implications under the *Roads Act 1993.*
- Road network, access and local traffic implications.
- Estimated implementation costs.

Sidings

Existing sidings would be upgraded to suit the new track arrangements. Suitable turn outs would be provided within the rail corridor as part of the proposal. Private operators would be responsible for any works outside the rail corridor. Works associated with sidings that are outside the rail corridor do not form part of the proposal.

5.2.3 Overview of proposed works in the main towns

The proposal commences in Narrabri near the existing station, passes through Moree on the existing alignment and ends in the village of North Star. Works in these areas would generally be as described above.

5.2.4 Other ancillary works and infrastructure

Changes to property accesses

Where an existing access to or within a property is proposed to be removed, altered or severed by the closure of a level crossing, additional works to reinstate access to the property may need to be undertaken, pending detailed investigation. This may require works outside the rail corridor.

Changes to local road networks

Changes to some property access roads and the local road network may be required in some locations as a result of the rationalisation of level crossings. In some locations, provision of a new grade separated crossing (in the form of a road or rail bridge) may be required. This may require works outside the rail corridor.

Signalling, power and communications

New and/or upgraded signalling, power and communications would be provided along the proposal site as required. These works, which would mainly be undertaken within the existing rail corridor, would involve the provision of underground and above ground services.

Utilities (such as water, sewer, electrical, gas and telecommunications) located within or crossing the rail corridor may need to be relocated in consultation with the relevant utility owner.

5.3 Indicative construction outline

A preliminary review of the main construction activities that would be undertaken is provided below. The information presented below is indicative only and would be subject to confirmation during future design stages.

5.3.1 Construction sequence

Construction activities would vary along the length of the proposal site 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 redundant structures and material, including:
  - Removal and storage of existing track components and ballast.
  - Demolition of existing sub-structures.
  - Excavation of unsuitable material.
- Construct new structures, including:
  - Placement of suitable formation material.
  - Installation of new culverts and associated structures.
- Track works including as required:
  - Removal and storage of existing track components and ballast.
  - Upgrade existing formation.
  - Construction of cuts and fills.
  - Replacement of ballast.
  - Installation of new track and track components.
- Installation of new services.
- Commissioning works.
- Site rehabilitation.

Some works not essential to the commencement of operations may be deferred and undertaken at a later stage.

5.3.2 Site compounds, work areas and access

The proposal would require the establishment of site compounds and work areas along the entire length of the proposal. These would be located within the existing rail corridor where practicable; however some may need to be located outside the rail corridor where there is insufficient space available or for safety reasons.

Major compounds and storage areas 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 compounds and storage areas would be required at strategic locations along the proposal site, for example near bridges.

Access to the rail corridor and construction areas would be via existing ARTC access roads located off public roads. Should access through private property be required, then this would only be undertaken with permission of the land owner.

5.3.3 Indicative construction program and work hours

The proposal is expected to take about 18 months to construction and is planned to commence in mid-2018.

The majority of construction works are expected to be undertaken during standard working hours. Due to the need for 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.

5.4 Operation of the proposal

5.4.1 Train operations

Passenger train numbers are not predicted to increase in the future.

Occasional grain/goods trains operate on an as needs basis. Annually there is an average of two grain trains per day carrying about 1.7 million tonnes of grain per year. Grain and freight train numbers and annual tonnages are expected to increase as follows:

- Moree to North Star - annual average of 9.8 trains per day in 2025 and 16 trains per day in 2040. These would be a mix of grain, intermodal (freight) and other general transport trains. Total annual tonnages would increase to about 10.8 million tonnes in 2025 and about 17.7 million tonnes in 2040.
- Narrabri to Moree - annual average of 10.6 trains per day in 2025 and 16.7 trains per day in 2040. These would be a mix of grain and intermodal (freight) trains. Total annual tonnages would increase to about 11.5 million tonnes in 2025 and about 18.3 million tonnes in 2040.

Proposed freight train speeds would vary according to axle loads, and range from 80 km/hr (30 tonne) to 115 km/hr (21 tonne) in comparison to existing train speeds that range from 90 to 100 km/h.

5.4.2 Maintenance activities

Standard ARTC maintenance activities would be undertaken during operations. Typically these activities could 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. Preliminary environmental assessment

6.1 Preliminary environmental risk assessment approach

This section provides a preliminary assessment of the potential environmental impacts associated with the proposal. The potential impacts identified in this section are preliminary and based on the current level of design available for the proposal. Some impacts may change as the design progresses and more detail becomes available. These changes will be considered as the environmental impact assessment process continues and the EIS is prepared.

The environmental issues associated with the proposal have been classified in this section as either 'key' or 'other' issues. The classification was based on the findings of preliminary investigations undertaken for the proposal, and experience with other similar projects. An environmental risk workshop was also held with key members of the project team, which assisted in the identification and prioritisation of issues.

The 'key' issues are considered in sections 6.2 to 6.11. These issues would require more detailed investigation, which would be undertaken during the preparation of the EIS. Sections 6.2 to 6.11 provide a summary of the key features of the existing environment, the potential environmental issues associated with the proposal, and the proposed scope of the EIS specialist assessments.

The 'other' issues (considered in section 6.12) are expected to be of lesser consequence than the key issues and would be able to be managed through the application of best practice environmental management, and proposed management measures and safeguards. If unforeseen issues arise based on these investigations, the issues would be further investigated in the EIS.

6.2 Water quality, watercourses and groundwater

6.2.1 Key features of the existing environment

Water quality

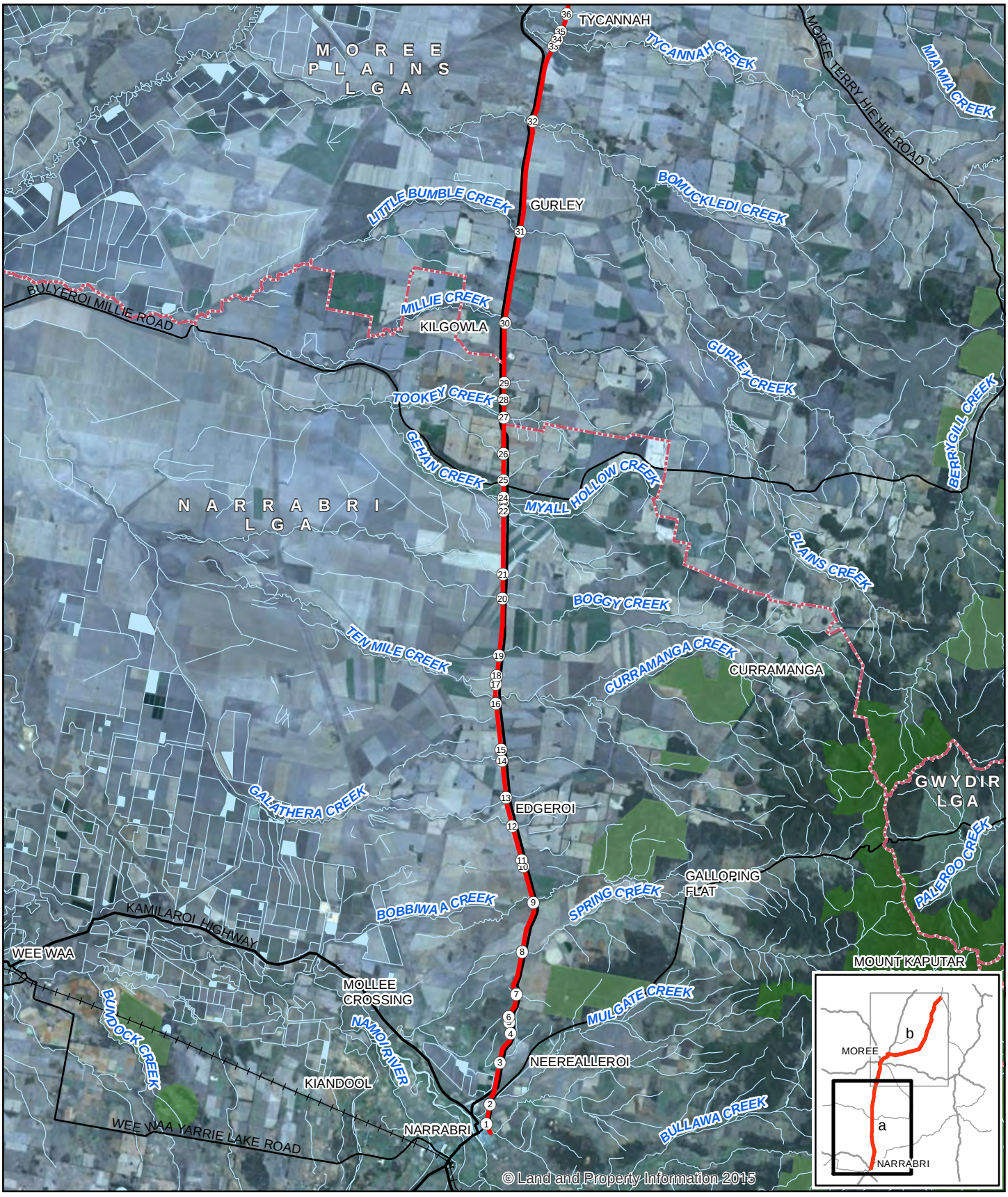
Water quality is regularly monitored at a number of locations in the Gwydir LGA (Gwydir Shire Council, 2012). Green waste, fertilisers, pesticides, and erosion and sedimentation from land degradation contribute to high levels of nutrients and sediment loads in the Gwydir River catchment following periods of high rainfall (Gwydir Shire Council, 2012).

The results of water quality testing undertaken by Moree Plains Shire Council show high total phosphorous level and increasing turbidity due to decreased river flow and increased salinity (Moree Plains Shire Council, 2010).

Land degradation and declining water quality were also identified as priority issues in the Narrabri Shire LGA (Narrabri Shire Council, 2011).

Watercourses

The proposal site crosses about 90 watercourses. These include rivers (Mehi River and Gwydir River), creeks (such as Mulgate Creek, Bobbiwa Creek, Gehan Creek, Tookey Creek and Gil Gil Creek) and other intermittent watercourses and canals constructed to convey irrigation waters. Existing watercourse crossings are shown in Figure 6.1.



LEGEND

- The proposal
- ① Water course crossing
- Local Government Area
- Principal road
- Secondary road
- Railway
- Watercourse
- Forestry reserve
- Conservation reserve

Paper Size A4

0 1.5 3 6 9 12

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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GHD

Australian Rail Track Corporation
Inland Rail

Location of watercourse crossings

Job Number	22-17916
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Date	30 Oct 2015

Figure 6.1a

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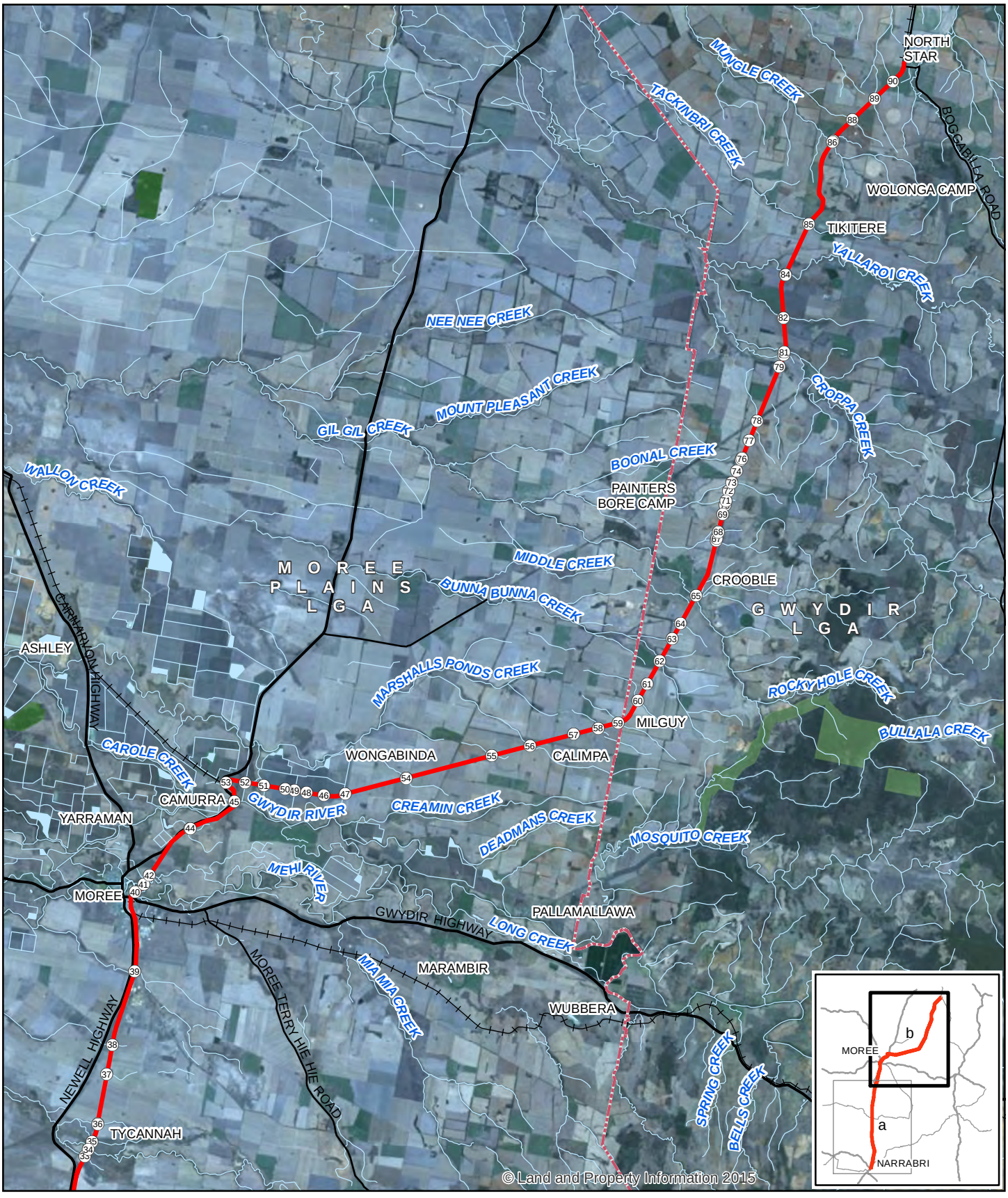

LEGEND

- The proposal
- ① Water course crossing
- Local Government Area
- Principal road
- Secondary road
- Railway
- Watercourse
- Forestry reserve
- Conservation reserve

Paper Size A4

0 1.5 3 6 9 12

Kilometres

Map Projection: Transverse Mercator
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Australian Rail Track Corporation
Inland Rail

Location of watercourse crossings

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Figure 6.1b

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Data source: Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid

Groundwater

Groundwater levels within the study area are anticipated to be typically between 4.8 and 47 metres below ground level, and generally greater than 20 metres below the ground surface (GHD, 2014). Groundwater around Moree and to North Star is generally sourced from the Great Artesian Basin with numerous wells, dams and irrigation channels noted around Moree in particular.

A review of the NSW Water Information Database on 24 September 2014 identified more than 728 registered groundwater bores within about one kilometre of the proposal site. The depths of the bores extended up to 569 metres below ground level, with standing water levels measured between 4.8 and 47 metres below ground level. Drillers' logs indicated that the geology generally comprised alternating layers of alluvium, clay, gravel, sand and rock to the base of the bores. Bedrock, primarily described as basalt, granite and/or shale, was noted at varying depths (GHD, 2014).

6.2.2 Potential issues

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.

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.

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.
- Salinity.

Watercourses

As there would be a number of watercourse crossings along the proposal site, careful management of the potential for erosion and sedimentation during 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 avoid upstream flooding.

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)
- *Managing Stormwater: Urban Soils and Construction Vol 2A Installation of Services* (DECC, 2008b)
- *Managing Stormwater: Urban Soils and Construction Vol 2C Unsealed Roads* (DECC, 2008c)
- Office of Water guidelines for controlled activities.

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

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

6.2.3 Scope of further assessment

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

A groundwater assessment will 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 will involve a desktop review of current hydrogeological conditions to determine the potential construction and operational risks to groundwater. It will include a review of existing data and reports concerning quantity and quality information, as well as publicly available data.

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

6.3 Hydrology and flooding

This section provides a preliminary hydrology and flooding assessment for the proposal. The assessment included a review of relevant literature to evaluate the existing hydrologic and hydraulic conditions within the study area. Documents reviewed included: Narrabri Shire Council (2012), Office of Water (2015a, 2015b), Parsons Brinkerhoff (2007, 2008), SES (2012), URS (2014) and Water Resources Commission (1980, 1986). Historical flood levels and flow data were extracted from publically available databases and subjected to a flood frequency analysis to determine the magnitude of design floods.

6.3.1 Key features of the existing environment

The southern end of the proposal site (at Narrabri) is located on an embankment above the Namoi River which has a one per cent annual exceedance probability flood inundation level. The proposal site traverses the Gwydir River floodplain.

The northern end of the proposal site is located south of the Macintyre River within the Border Rivers basin. South of North Star, the Borders River basin drains to Whalan Creek and then to the Boomi River and Barwon River.

The proposal site is located within an area that has been subject to significant floods. At Boggabilla, flood levels reached about 221 metres Australian Height Datum (AHD) in January 2011. In Moree, the flood level reached 208 metres AHD in November 2011, and about 209 metres AHD in the February 2012 flood, which was the highest recorded flood at Moree.

At Narrabri, the flood level reached about 213 metres AHD in 2000, and about 210 metres AHD in 2010. The second largest recorded flood at Narrabri was in 1971, where the flood level reached about 214 metres AHD.

Since the 1950s, the hydrology within the Macintyre River, Gwydir River and Macquarie River catchments has been impacted by the construction of significant water storages. These impacts include the construction of Coolmunda Dam and Glenlyon Dam (in Queensland) and Pindari Dam in the Macintyre River catchment; Copeton Dam in the Gwydir River catchment; and Keepit Dam and Split Rock Dam in the Macquarie River catchment.

As a result of the 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 2011 and 2012, as discussed above, would include a realistic representation of the impacts of the dam construction works.

The vertical alignment of the existing rail line closely follows the general shape of the ground surface, with an elevation between about 200 (near Moree) to 310 metres AHD (about 30 kilometres from North Star).

6.3.2 Potential issues

Potential flood issues include:

- Impacts of flooding on the construction and operation of the proposal.
- Impacts of the proposal on the hydrology of the catchment, including general drainage, flood flow paths and flood volumes.

Flooding of sections of the proposal site may be influenced by the following two sources:

- High flows in the major rivers and watercourses (regional floods) which result from rainfall over a large portion of the catchment.
- Rainfall over a local catchment draining to an individual bridge or group of culverts in isolation of regional flooding behaviour.

Along the major rivers in the proposal site, the floods 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 extent of ponding of water upstream of the rail line; and lead to scouring downstream of the replacement culverts and reconstructed track.

6.3.3 Scope of further assessment

A specialist assessment will be undertaken to for the EIS and will include:

- A literature review and targeted consultation to identify the historical locations and extents of flooding along the proposal site between Narrabri and North Star.
- A quantitative assessment of the potential flood impacts of the proposal.

The focus of the assessment would be on localised flooding. In large regional flood events it is likely that the floods will overtop the rail corridor as they currently do in some locations. The assessment will quantify the impacts of any bridge/culvert replacement and localised track raising on changes to the design flood levels for a range of flood events. The assessment will also examine the implications for the flood duration at or near culverts.

6.4 Geology, soils and contamination

6.4.1 Key features of the existing environment

Geology and soils

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

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

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

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 (GHD, 2014).

Contamination

A search of the list of NSW contaminated sites notified to the EPA for the Narrabri, Moree Plains and Gwydir LGAs identified 15 contaminated sites. These notifications are mostly attributed to the storage of underground petroleum storage systems at service station properties (GHD, 2014).

A search of the Contaminated Land: Record of Notices database was undertaken. This identified that six properties are currently or formerly regulated under the *Contaminated Land Management Act 1997*. Three of these properties are located within 200 metres of the proposal site as described in Table 6.1.

Table 6.1 Contaminated sites register results within 200 m of the alignment

Town	Street	Property	Contaminants
Moree	Gosport Street	Former Caltex/Golden Fleece Depot	Groundwater plume impacted by total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons and polycyclic aromatic hydrocarbons (PAH). Extends from the property beneath the proposal site and Gosport Street (GHD, 2014)
Moree	Gosport Street	Former Mobil Depot	Groundwater plume impacted by TPH, benzene, toluene, ethylbenzene and xylenes (BTEX), and PAHs. Extends from the property beneath the proposal site and Gosport Street (GHD, 2014)
Moree	Adelaide Street	Former Shell Depot	Soil and/or groundwater impacted by TPH and BTEX. No further detail is provided. This property is about 200 m from the proposal site (GHD, 2014).

A search of the ARTC contaminated land register identified nine potentially contaminated sites adjacent to the proposal site. These include:

- A disused rest house, two former rail siding sites, a FluidRails site, the Newell Highway by-pass and a former grain store in Moree.
- A fire station and grain storage site in Bellata.
- A former Caltex fuel storage depot at North Star.

Across the three LGAs, 50 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.

6.4.2 Potential issues

Geology and soils

Based on initial desktop investigations, there are not considered to be any major issues associated with the nature of the substrate in the study area. 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* (Landcom, 2004).

Contamination

The results of contamination soil sampling undertaken by Coffey (2015) at 44 locations along the proposal site showed that all samples were below the health investigation, health screening levels, ecological investigation levels and ecological screening levels for residential land use.

It is considered unlikely that unknown 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 be implemented to manage any contamination encountered and to minimise the likelihood of spills or leaks during construction and operation.

6.4.3 Scope of further assessment

Geology and soils

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

Contamination

No further contamination testing is required unless significant signs of contamination or different soil conditions are identified during the geotechnical investigations. Samples of any materials that might be considered contaminated will be taken during the geotechnical investigations.

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

6.5 Biodiversity

The following section provides a summary of the results of a preliminary biodiversity assessment of the proposal site, undertaken by Umwelt (Australia) Pty Limited (Umwelt). The assessment included a desktop assessment to identify threatened flora and fauna species, populations and ecological communities listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act), NSW *Fisheries Management Act 1994* (FM Act), and matters of national environmental significance listed under the EPBC Act that may be affected by the proposal.

The desktop assessment included a search of the OEH Atlas of NSW Wildlife database, the Australian Government Department of the Environment (DoE) Protected Matters Search Tool and the Primary Industries Fishing and Aquaculture Records Viewer. The search was undertaken in September 2015 for a 10 kilometre radius around the proposal site.

Rapid field surveys of the proposal site were undertaken between 25 and 29 September 2014 as part of the early investigations for the proposal. In addition, threatened species surveys were undertaken between 30 March and 9 April 2015 at geotechnical test pits along the length of the rail corridor. The proposal site was generally defined by fences located about 20 metres either side of the rail line. In sections where fences were not present, the surveys were extended out to up to about 30 to 40 metres either side of the rail line.

6.5.1 Key features of the existing environment

The proposal site has been subject to substantial disturbance during construction of the rail infrastructure. The proposal site is mainly surrounded by rural land which has been previously disturbed. Small areas of native vegetation occur within the rail corridor. The native vegetation comprises woodland communities with the dominant canopy species including Bimbil Box (*Eucalyptus populnea*), Belah (*Casuarina cristata*), White Cypress Pine (*Callitris glaucophylla*), Silver-leaved Ironbark (*Eucalyptus melanophloia*) and Brigalow (*Acacia harpophylla*); as well as natural and derived native grassland. River Red Gum (*Eucalyptus camaldulensis*) dominated forest is located on the banks of some waterways. Patches of Weeping Myall (*Acacia pendula*) also occur.

No conservation areas are known to occur adjacent to the proposal site; however large linear areas of native remnant vegetation occur adjacent to the rail corridor between Bellata and Moree.

Mapped native vegetation communities within the study area are shown on Figure 6.2.

Flora

Vegetation communities

Database search results identified 14 threatened ecological communities listed under the TSC Act or EPBC Act (refer to Appendix A). The following five threatened ecological communities were identified as likely to occur in parts of the study area:

- Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions (TSC Act) / Brigalow (*Acacia harpophylla* dominant and codominant) (listed as an endangered ecological community (EEC) under the TSC Act and EPBC Act).
- Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions(listed as an EEC under the TSC Act).
- Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregion (TSC Act) / Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (listed as an EEC under the TSC Act and EPBC Act).
- Native Vegetation on Cracking Clay Soils of the Liverpool Plains / Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland (listed as an EEC under the TSC Act and a critically endangered ecological community (CEEC) under the EPBC Act).
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (listed as an EEC under the TSC and EPBC Act).

There are also extensive areas of native grassland that may meet the definition of the Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland CEEC (EPBC Act) between Gurley and Moree.

Further targeted field survey will be undertaken during preparation of the EIS to confirm the extent and condition of threatened ecological communities in and around the proposal site.

Threatened flora species

The desktop search identified 13 threatened flora species (refer to Appendix A). Of these, seven were assessed as having the potential to occur within the proposal site, and three have been recorded in the rail corridor (Finger Panic Grass (*Digitaria porrecta*), Creeping Tick-trefoil (*Desmodium campylocaulon)* and Slender Darling Pea (*Swainsona murrayana*)).

Two threatened flora species were recorded during the March/April 2015 geotechnical test pit surveys - Finger Panic Grass (*Digitaria porrecta*) and Creeping Tick-trefoil (*Desmodium campylocaulon*). Both these species are listed as endangered under the TSC Act. Finger Panic Grass was recorded at two locations within the rail corridor - two plants were recorded about eight kilometres north of Croppa Creek and four plants were recorded just south of Gurley. The identity of this species was confirmed by the National Herbarium of NSW.

A single individual of Creeping Tick-trefoil (*Desmodium campylocaulon*) was recorded about four kilometres north of Croppa Creek. More individuals are likely to be recorded at these locations when more detailed and expansive surveys are undertaken.

The location of the database record of the threatened Slender Darling Pea (*Swainsona murrayana*) near Gurley was inspected, however this species was not identified. Whilst there is suitable habitat for this species at the proposal site, the accuracy of this record was low (within 10 kilometres) and old, with the record being made in 1968.

Fauna

The desktop searches identified 45 threatened fauna species (30 birds, 11 mammals and four reptile species) in the search area (refer to Appendix A). Of these, 20 bird species were identified as having potential to occur within the proposal site. Two bird species were previously recorded within the proposal site:

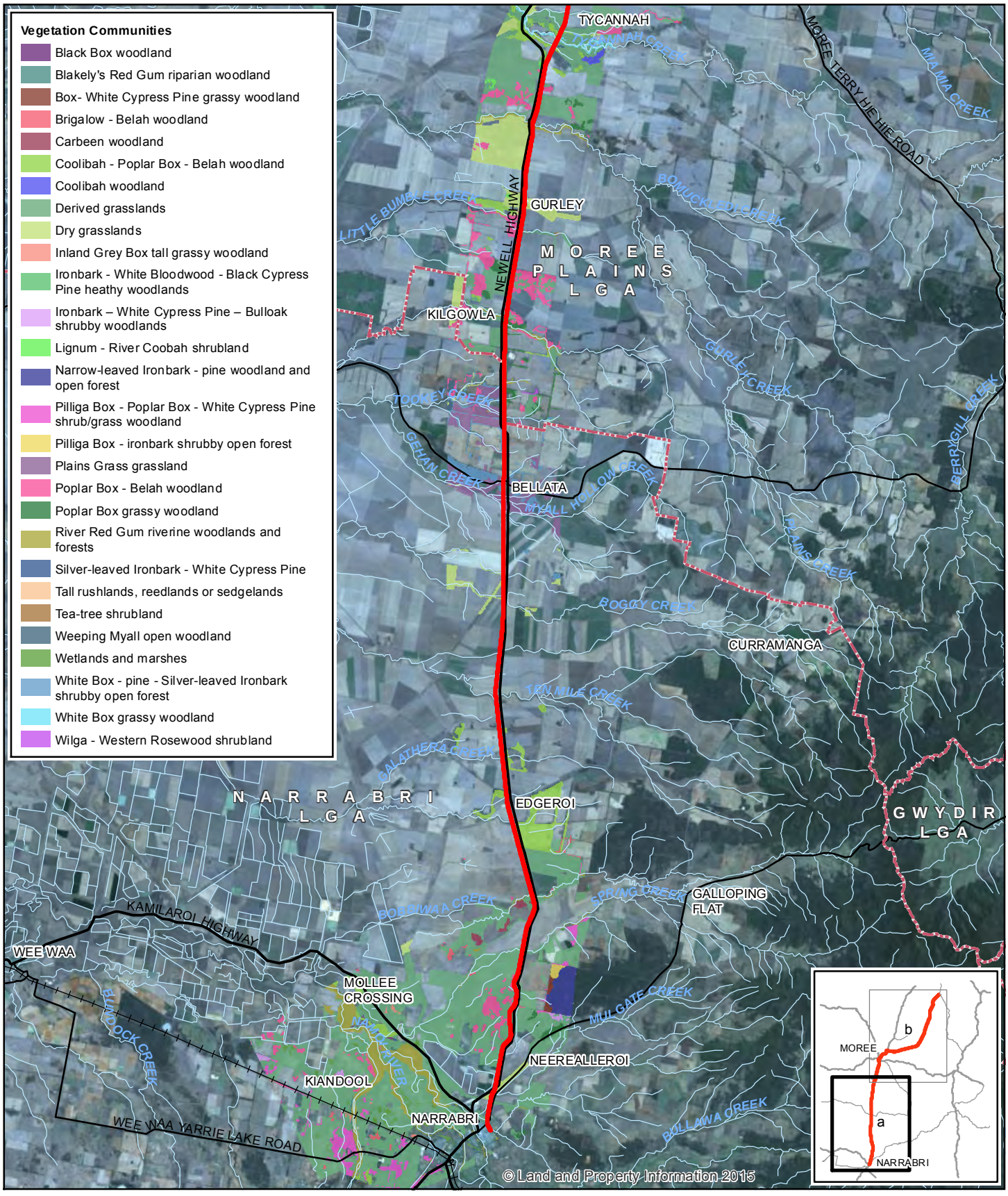
- Grey-Crowned Babbler (*Pomatostomus temporalis temporalis*) (listed as vulnerable under the TSC Act).
- Little Eagle (*Hieraaetus morphnoides*) (listed as vulnerable under the TSC Act).

One mammal species, Black-striped Wallaby (*Macropus dorsalis*) (listed as endangered under the TSC Act), was recorded in the proposal site. The following five mammal species were identified as having potential to occur within the proposal site:

- Large-eared Pied Bat (*Chalinolobus dwyeri)*
- Little Pied Bat (*Chalinolobus picatus*)
- South-eastern Long-eared Bat (*Nyctophilus corbeni*)
- Koala (*Phascolarctos cinereus*)
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*).

The areas of native vegetation within the rail corridor provide potential habitat for a range of threatened flora and fauna species, however the areas of potential habitat within the rail corridor are isolated and fragmented and occur a considerable distance from large woodland remnants.

During the field surveys none of the bridges or culverts were found to contain roosting micro-bats. A number of the concrete bridges contained mud nests of the bird species fairy martin (*Petrochelidon ariel*). This species is not listed as a threatened species. Bridges within and in the vicinity of the proposal site may be used by micro-bat species.



LEGEND

The proposal
Local Government Area
Principal road
Secondary road
Railway
Watercourse

Paper Size A4

0 1.5 3 6 9 12

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Australian Rail Track Corporation
Inland Rail

Job Number	22-17916
Revision	0
Date	30 Oct 2015

Vegetation communities

Figure 6.2a

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

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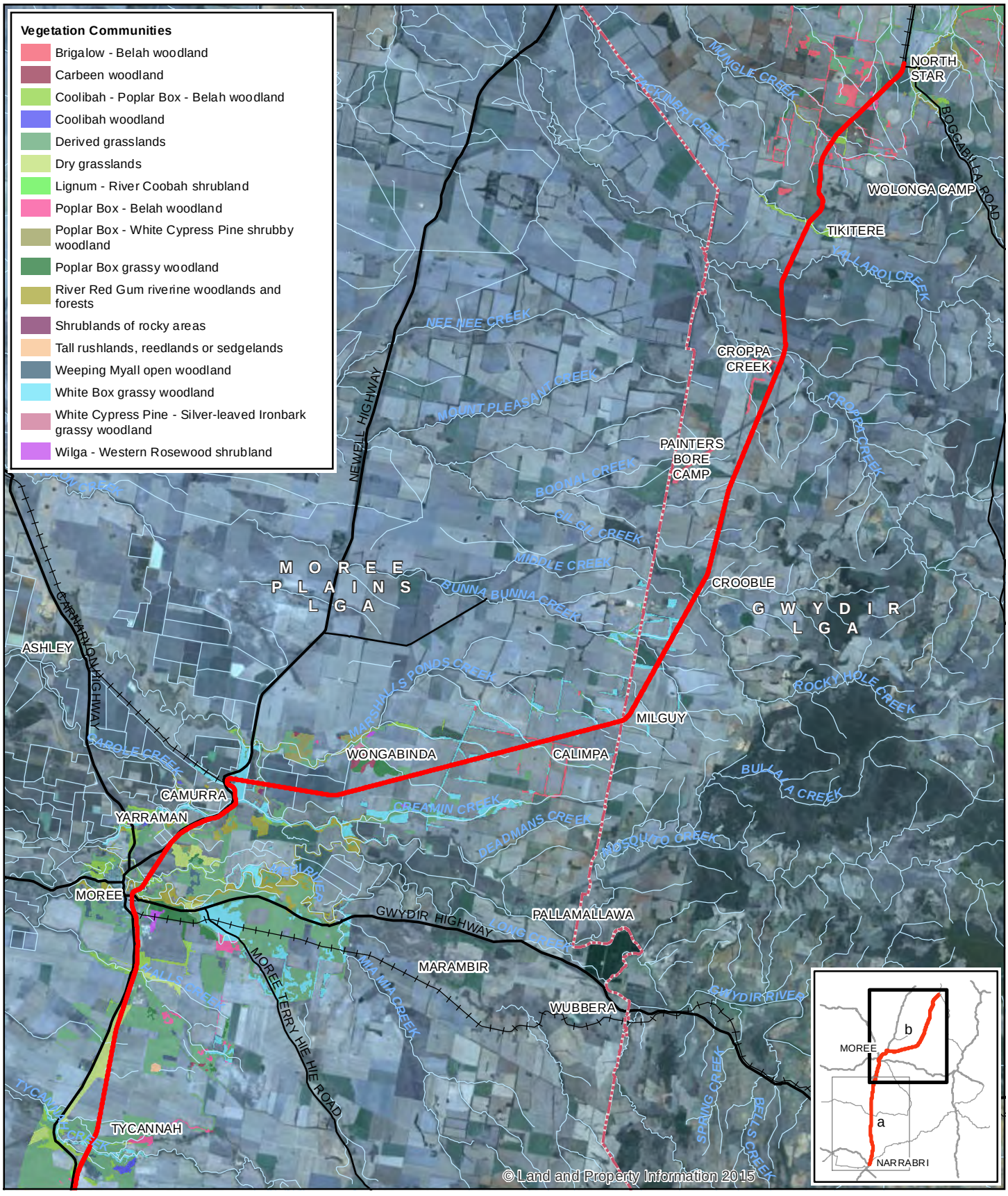
Data source: OEH, vegetation maping, 2015; Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid



LEGEND

- The proposal
- Local Government Area
- Principal road
- Secondary road
- Railway
- Watercourse

Paper Size A4

0 1.5 3 6 9 12

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Australian Rail Track Corporation
Inland Rail

Job Number	22-17916
Revision	0
Date	30 Oct 2015

Vegetation communities

Figure 6.2b

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: OEH, vegetation maping, 2015; Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid

Aquatic species and communities

Database search results identified five threatened freshwater fish species and one aquatic ecological community within the search area (refer to Appendix A). No fish species were identified as likely to occur within the study area. One aquatic EEC, the Lowland Darling River Aquatic Ecological Community, was identified as likely to occur in the proposal site at the crossings of the Mehi and Gwydir rivers near Moree, as well as a small area along Waterloo Creek. The community is listed as an EEC under the FM Act.

Matters of National Environmental Significance

Gwydir Wetlands, which is listed as a wetland of international importance (Ramsar), is located downstream of the proposal site (DoE, 2014). These wetlands are located about 100 kilometres southwest of North Star and are unlikely to be impacted by the proposal.

A search of the Protected Matters Search Tool identified 13 migratory species in the search area. Of these species, five are considered to have the potential to occur within the proposal site (refer to Appendix A).

6.5.2 Potential issues

The main potential impacts of the proposal relate to:

- Direct impacts: clearing of native vegetation within the rail corridor and in areas outside the rail corridor for the deviation at Camurra and other required ancillary activities; loss of fauna habitat and impacts on threatened/migratory species and endangered populations, fauna mortality (from train strikes), disturbance to natural waterways and aquatic habitat from the replacement and/or upgrade works of bridges and culverts.
- Indirect impacts - impacts on terrestrial flora, habitat fragmentation and connectivity, effects on fauna associated with noise and light and aquatic disturbance, and potential impacts on fish.

Other potential impacts relate to biosecurity risks associated with importation and spread of weeds and pests during construction and operation.

6.5.3 Scope of further assessment

A biodiversity assessment will be undertaken as part of the EIS to satisfy the requirements of the NSW *Biodiversity Offset Policy for Major Projects* and the OEH (2014) *Framework for Biodiversity Assessment*. The assessment will build on the ecological survey work already completed for the proposal by Umwelt and will include:

- Detailed vegetation mapping of the rail corridor.
- Targeted surveys for species to identify the occurrence of terrestrial and, where relevant, aquatic flora and fauna (including threatened flora and fauna species, populations and ecological communities).
- Identification of matters for further consideration, and subsequent discussion with OEH to determine how such species or vegetation types will be offset.
- Assessment of impacts on threatened terrestrial flora and fauna species, populations and ecological communities listed under the TSC Act and the EPBC Act and their habitats, and consideration of key threatening processes.
- Assessment of impacts on aquatic and riparian habitat as per the Fisheries NSW policy and guidelines for fish habitat conservation and management
- Assessment of potential biosecurity risks.

- Identification of appropriate management and mitigation measures to avoid, minimise and mitigate the potential biodiversity impacts.
- Offset strategy based on the outcomes of the assessment.

6.6 Aboriginal heritage

The following section provides a preliminary assessment of Aboriginal heritage for the proposal undertaken by Umwelt. The assessment included a search of the OEH Aboriginal Heritage Information Management System (AHIMS) database; a targeted field inspection along existing sections of the rail corridor to record the location, nature and condition of any Aboriginal sites; and a broad scale evaluation of the landscape units with reference to potential cultural heritage considerations.

6.6.1 Key features of the existing environment

A search of the AHIMS database undertaken for a two kilometre radius of the rail corridor identified 23 previously recorded Aboriginal sites. The sites consisted predominantly of artefact scatters/isolated artefacts, with one stone quarry, five scarred trees, one burial, two burials associated with carved trees, one PAD, a habitation structure (Top Camp at Moree) and a bora/ceremonial site.

None of the burial or ceremonial sites are within 50 metres of the proposal site. However, consideration should be given to their presence and the potential sensitivities associated with the area. Similarly, the quarry site recorded 300 metres east of the rail corridor at Halls Creek may reflect a higher frequency of sites containing stone artefacts in the immediate vicinity of the quarry site.

During the initial site inspection, none of the previously recorded sites were identified within the proposal site. This is not unexpected given that many of the previously recorded sites within 50 metres of the rail corridor consist of isolated artefacts/artefact scatters containing relatively low numbers of artefacts and were originally identified in a relatively dynamic environment. However, this does not mean that the sites are no longer present. There have been changes in the visibility and levels of exposure within the relevant areas and therefore previously recorded items may be more difficult to locate.

Two new sites (in addition to the previously recorded sites) were identified during the inspections – one isolated artefact (single silcrete flakes) and one scarred tree.

A number of areas of archaeological sensitivity were identified. These are associated with the Gwydir River, Mehi River, Tycannah Creek, Croppa Creek and Yallaroi Creek. These areas will be assessed as part of the EIS. Other (ephemeral) watercourses are considered to have relatively limited archaeological resources due to previous disturbance from the historical land uses.

6.6.2 Potential issues

Much of the proposal would be undertaken within the rail corridor, where the heavily disturbed nature of the environment is unlikely to yield any Aboriginal heritage values. However, some works would be undertaken in previously undisturbed areas and on landforms with the potential to contain sites and areas of cultural heritage value.

Further archaeological survey work and assessment will be undertaken during the EIS to ensure that recorded archaeological sites and archaeologically sensitive landforms are assessed and managed appropriately.

6.6.3 Scope of further assessment

An Aboriginal cultural heritage and archaeology assessment (ACHAA) will be prepared as part of the EIS in accordance with the requirements of the *National Parks and Wildlife Act 1974* (NSW) and the following guidelines:

- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010).
- *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 Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b).

The assessment will include consultation with relevant stakeholders.

The overall aims of the assessment will be to comprehensively assess any sites of heritage significance; to adhere to all legislation and regulatory guidelines; and ultimately assess the impact of the proposal on items of heritage significance.

The ACHAA will also include mitigation and management measures to minimise impacts on indigenous heritage with consideration to cultural heritage conservation outcomes.

6.7 Non-Aboriginal heritage

The following section provides a preliminary assessment of non-Aboriginal heritage for the proposal undertaken by Umwelt. The assessment included a search of the following databases in September 2015:

- ARTC Section 170 register
- State Heritage Inventory (including State Heritage register)
- Australian Heritage Database (including Commonwealth and National heritage lists)
- Australian Heritage Places Inventory
- *Narrabri Local Environmental Plan 2012*
- *Moree Plains Local Environmental Plan 2011*

A site inspection was also undertaken in September 2014 to identify any potential heritage items within the proposal site.

6.7.1 Key features of the existing environment

Searches of the relevant heritage registers identified one heritage listed item within the proposal site and 11 heritage listed items within the vicinity of the proposal site (refer to Table 6.2).

Table 6.2 Listed heritage items

Item	Location	Listing	Significance	In proposal site?
Mehi River Bridge	Moree – Mungindi Line	Section 170	Local	Yes
Gwydir River Bridge	Camurra – Mungindi Line	Section 170	Local	In vicinity
Moree Station	Moree – Morton St	Section 170 Moree LEP 2011	Local	In immediate vicinity
Victoria Hotel	Moree – 339 Gosport St	Moree LEP 2011	Local	In vicinity
Moree Showground	Moree – Warialda St	Moree LEP 1995	Local	In vicinity
Jellicoe Park	Moree – Jellicoe Park	Moree LEP 1995	Local	In vicinity
A.B. Meppem and Co.	Bellata – 30 Railway Pde	Narrabri LEP 2012	Local	In vicinity
Bellata Police Station and Official Residence	Bellata – 24 Railway Pde	Section 170 Narrabri LEP 2012	Local	In vicinity
Oldhams Smallgoods	Bellata – 26 Railway Pde	Narrabri LEP 2012	Local	In vicinity
Post Office	Bellata – 28 Railway Pde	Narrabri LEP 2012	Local	In vicinity
LS Rowe Stock and Station Agents	Bellata – 40 Railway Pde	Narrabri LEP 2012	Local	In vicinity
Nandewar Hotel	Bellata – Lot 1 Railway Pde	Narrabri LEP 1992	Local	In vicinity

A number of potential heritage items/sites with no current statutory heritage listing were identified within the study area during previous site investigations. These are listed in Table 6.3.

Table 6.3 Potential heritage items within the study area

Item	Location	Description
Croppa Creek Bridge	North of Croppa Creek station	Steel constructed half-through bridge on concrete piers
Surveyors Blaze	South of Milguy station	Surveyors mark on tree
Moveable heritage item	North Star station	Crane arm and associated remains
Communication Line	Adjacent to majority of rail line	Early rail communication line
Culvert/bridges	At watercourses and drainage crossings along the rail corridor	Culvert/bridges – with differing construction techniques including low timber or concrete piers to raise the track, sandbag ‘bricks’ and corrugated iron pipes etc.
Anzac Day Crossing	Just south of Crooble station. (also associated with Croppa Creek Memorial Hall)	Reported to be a regional meeting point prior to departure to WWI and still used today on Anzac Day – likely social and associative significance to the community
Rail infrastructure	Along entire rail line, particularly at station locations	Station signs, landmark signals, rail signage, sidings, platforms, bulkheads, sheds, rail crossings
Villages and former village locations	Along entire rail line, particularly at station locations	Villages established along rail line – eg Gurley, Crooble, Croppa, North Star etc.

Item	Location	Description
Rural infrastructure	Along entire rail line, particularly at station locations	Grain silos and associated sheds, shearing sheds, cattle yards, loading ramps and other rural infrastructure – eg yards and ramps located south of Moree, shearing shed located north of Edgeroi

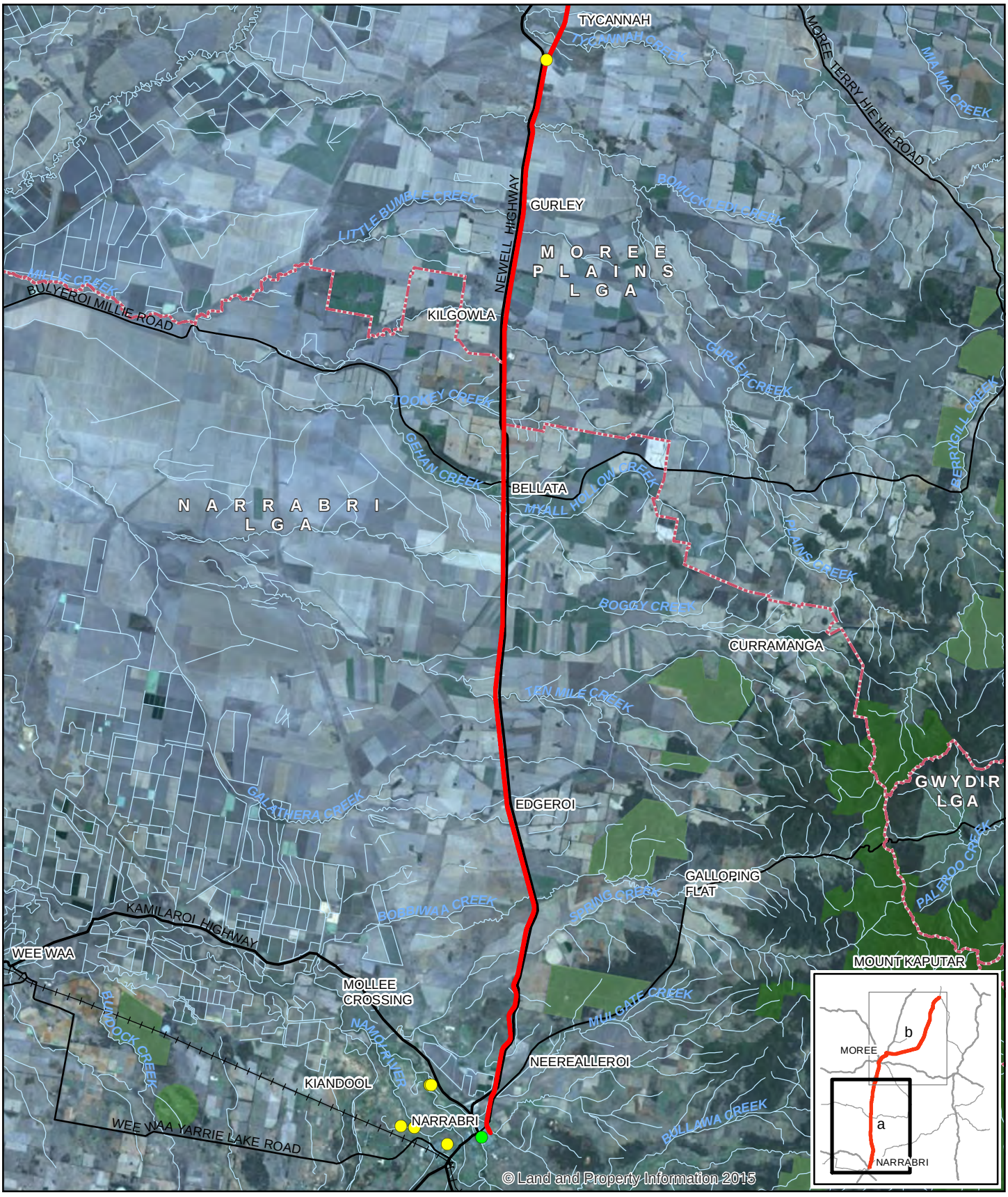
6.7.2 Potential issues

The proposal has the potential to impact on heritage listed items and items of potential heritage significance within the proposal site and the immediate vicinity, including:

- The Mehi River Bridge at Moree
- The Gwydir River Underbridge at Camurra
- Moree Station.

6.7.3 Scope of further assessment

A historical heritage assessment will 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 will 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/investigation is required.



LEGEND

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

Paper Size A4

0 1.5 3 6 9 12

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Australian Rail Track Corporation
Inland Rail

Job Number	22-17916
Revision	0
Date	30 Oct 2015

Location of heritage listed items and historic features

Figure 6.3a

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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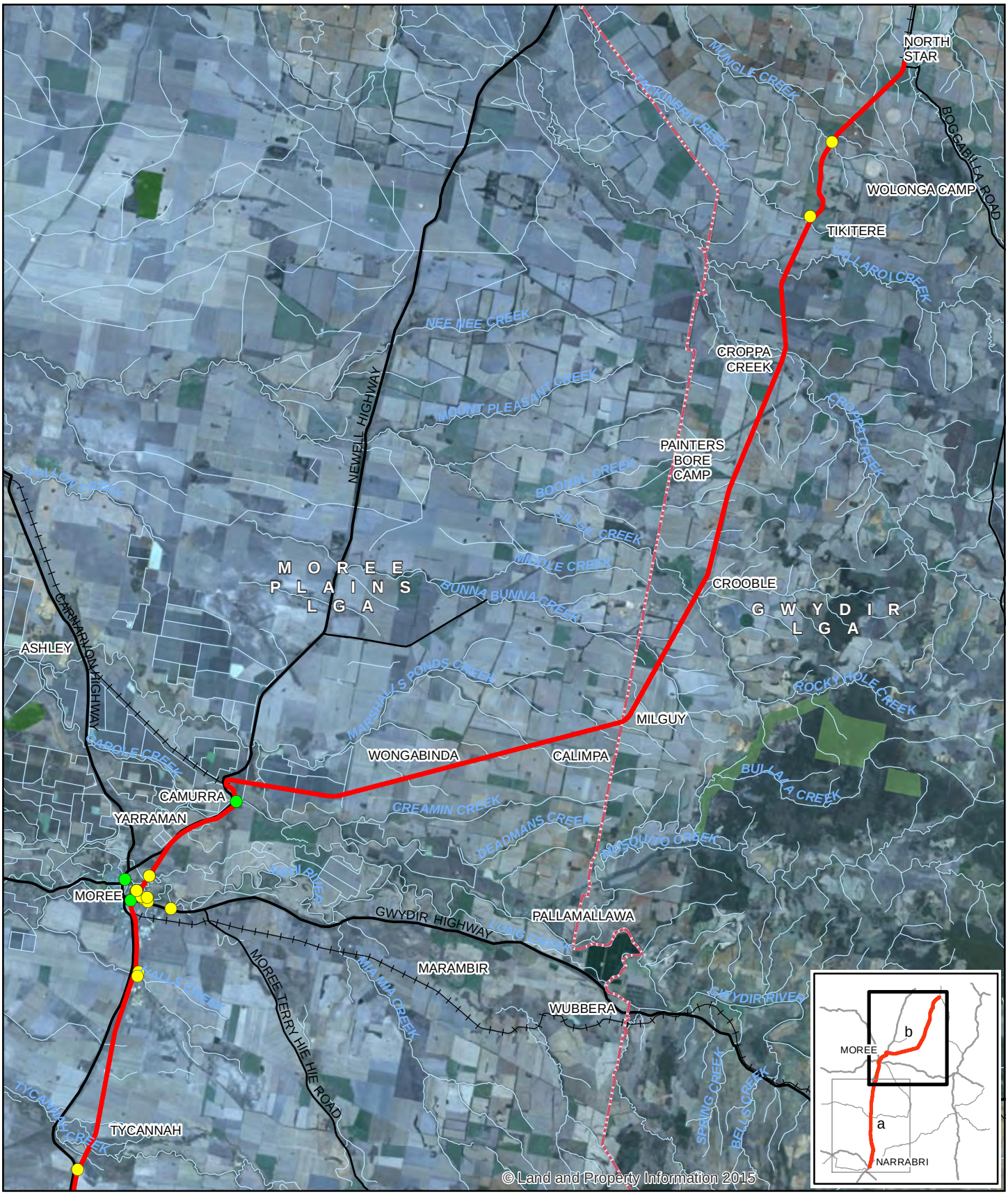
Data source: Umwelt, Heritage mapping, 2015; OEH, Heritage mapping, 2015; ARTC, Hertiage mapping, 2015; Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid



LEGEND

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

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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GHD

Australian Rail Track Corporation
Inland Rail

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Location of heritage listed items and historic features

Figure 6.3b

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Data source: Umwelt, Heritage mapping, 2015; OEH, Heritage mapping, 2015; ARTC, Hertiage mapping, 2015; Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid

6.8 Noise and vibration

6.8.1 Key features of the existing environment

Noise sources

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 the operations of grain storage and handling facilities in the study area.

Noise levels would be higher in the larger towns (particularly Narrabri, Moree).

Sensitive receivers

Sensitive receivers are concentrated in the towns and villages along the proposal site (described in section 2). Other sensitive receivers include scattered dwellings on rural landholdings. The majority of receivers outside the towns are located more than 100 metres from the proposal site. Sensitive receivers located close to the proposal site are shown on Figure 6.4.

6.8.2 Potential issues

Noise and vibration would be generated during the construction and operation of the proposal.

Construction noise and vibration

Potential construction noise and vibration sources would include:

- Noise from mobile and stationary construction plant and equipment.
- Noise from fixed sources such as crushing and batching plant, site compounds and offices.
- Construction traffic noise associated with vehicle movements, primarily spoil haulage.

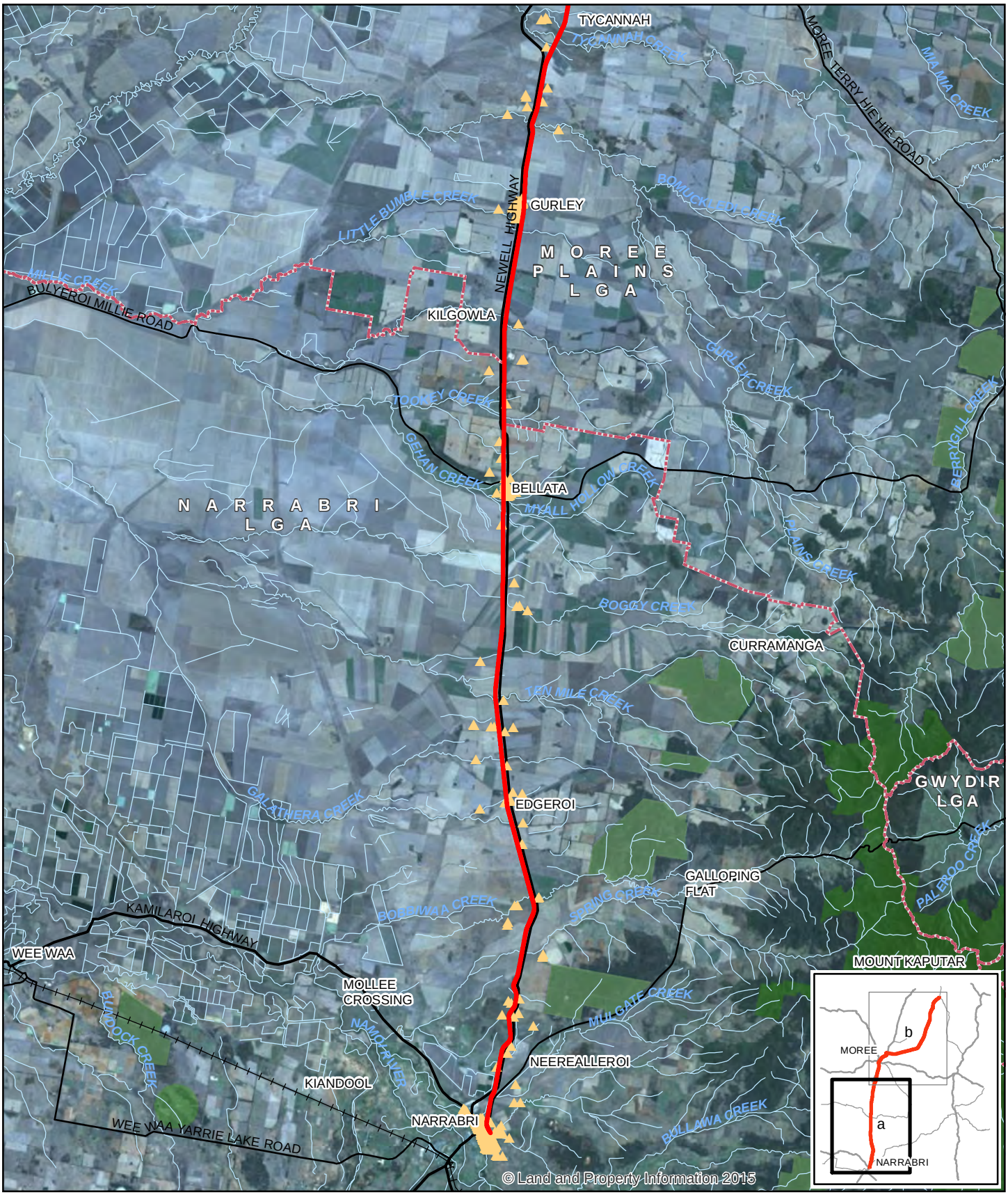
The majority of construction work for the proposal would be undertaken during standard working hours in accordance with the *Interim Construction Noise Guideline* (DECC, 2009). However, there is the potential that some work could be undertaken outside of standard working hours. Examples include:

- 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.

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. Since the proposal is linear, individual sensitive receivers would be affected for limited periods through the construction phase.

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

Potential construction noise and vibration impacts are likely in the developed residential areas within the main towns and villages along the proposal site.



LEGEND

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

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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Australian Rail Track Corporation
Inland Rail

Job Number	22-17916
Revision	0
Date	30 Oct 2015

Sensitive receivers

Figure 6.4a

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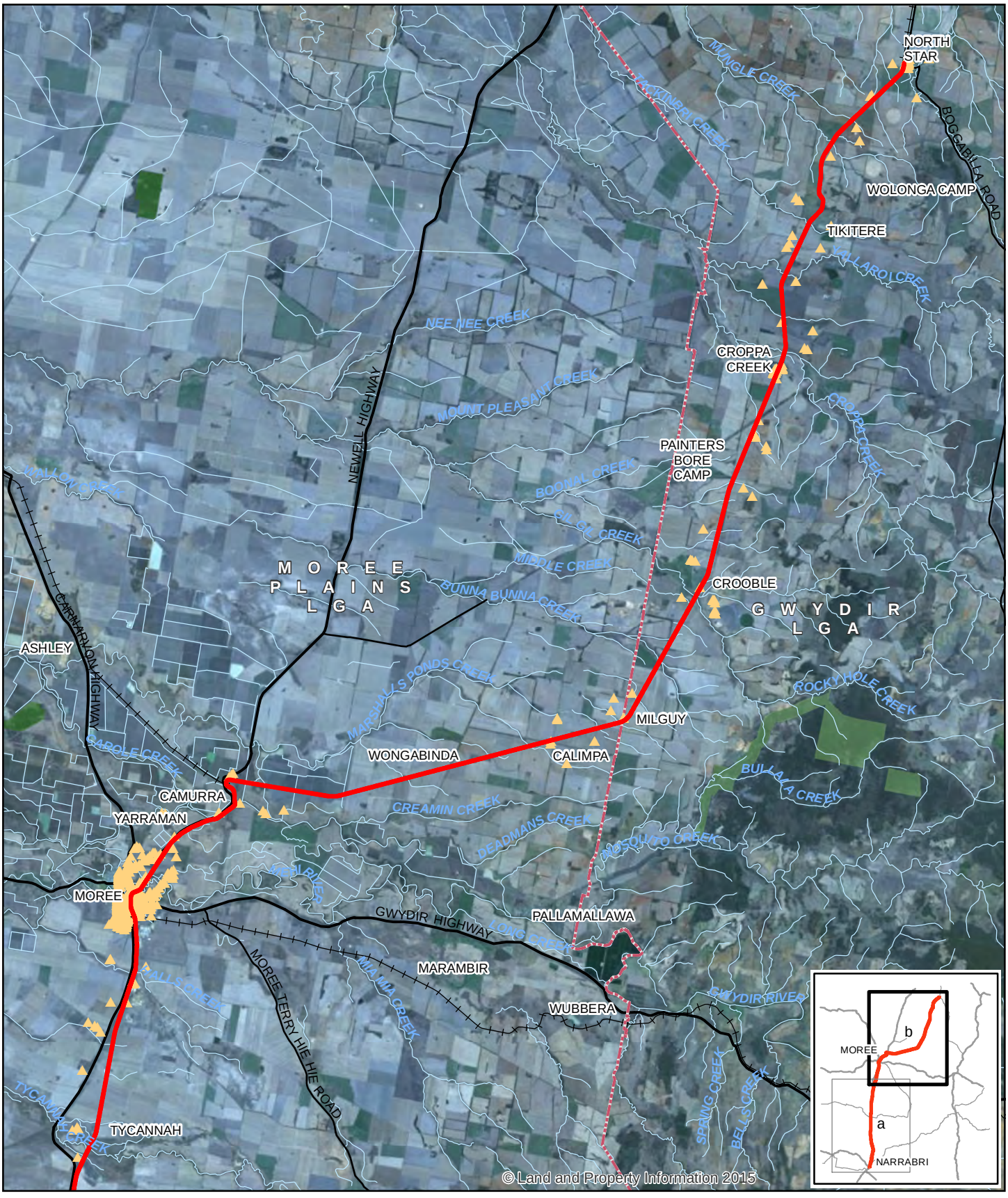
Data source: Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid



LEGEND

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

Paper Size A4

0 1.5 3 6 9 12

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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GHD

Australian Rail Track Corporation
Inland Rail

Job Number	22-17916
Revision	0
Date	30 Oct 2015

Sensitive receivers

Figure 6.4b

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid

Operational noise and vibration

Railway noise and vibration are complex issues, with numerous sources, including:

- Wheel rail interactions.
- Airborne noise from diesel engines (whether stationary at idle or mobile under load) and various other components including the exhaust system, traction motors and gearboxes, cooling system and brakes.
- Structure-borne noise from trains moving over reinforced concrete structures e.g. bridges, tunnels.
- High frequency tonal noise from curve squeal on tight radius curves and brake squeal from freight wagons at low speed.
- Bunching at wagon couplings (braking and acceleration at signals).
- Noise at some track components such as turnouts (special track work that allows trains to pass from one track to another) and bridges.
- Horn noise.
- Maintenance activities e.g. rail grinding, vegetation maintenance, inspections, etc.
- Noise from ancillary rail infrastructure including at points and crossovers, electricity substations and ventilation plant.
- Ground vibration during the movement of trains.
- Vibration at locations where there are discontinuities in the track.
- Vibration transmitted to building structures resulting in low frequency regenerated noise.

Many (but not all) of these noise and vibration sources have impacts that increase in proportion to train speed. For example, noise from the rolling of wheels on rails increases with train speed. However, noise from diesel engines can have a greater impact at lower speeds (as engine noise is not directly proportional to speed, but at lower speeds the locomotives take longer to pass by, thus increasing the exposure time of an individual receiver).

The proposal would allow for an increase in train volumes, lengths and speeds along the rail line, all of which would result in an increase of in noise levels. Although overall rail noise is expected to increase, there may also be potential to reduce local sources of noise (such as wheel-squeal) through the straightening of some curves as part of the proposal.

There is the potential for operation noise and vibration impacts where residential areas are located close to the proposal site, such as within the main towns and villages along the proposal site. Mitigation and management measures will need to be identified as part of the EIS.

6.8.3 Scope of further assessment

A detailed assessment of construction and operation noise and vibration impacts will be undertaken as part of the EIS. The noise and vibration impact assessment will include:

- Identifying noise and vibration sensitive receivers and other places (including structures and heritage items), particularly those in built up areas and close to the rail corridor.
- Documenting key design, construction, operating and modelling assumptions.
- Assessment of noise impacts from construction, including all stationary and mobile sources, construction traffic and blasting (if required).
- Developing a strategy for managing construction noise and vibration, including any proposed out of hours activities.

- Assessment of noise impacts from rail operations and maintenance activities, including consideration of all reasonable and feasible options to mitigate the impacts of operational rail noise and vibration, and any impacts from fixed plant items.
- Developing a strategy developing a strategy for managing operation noise and vibration.

The noise and vibration impact assessment will be undertaken with consideration of relevant legislation and guidelines including:

- *Interim Construction Noise Guideline* (DECC, 2009)
- *Assessing Vibration – a technical guideline* (DECC, 2006)
- *Rail Infrastructure Noise Guideline* (EPA, 2013)
- *NSW Industrial Noise Policy* (EPA, 2000)
- *Road Noise Policy* (DECCW, 2011)

6.9 Air quality

6.9.1 Key features of the existing environment

Background air quality

Air quality in the study area is characteristic of an inland rural area. The main local influences on air quality in the study area are agricultural activities, dust from the operation of the grain storage and handling facilities located in the study area, and road traffic.

Sensitive receivers

Residences, schools, sports grounds, medical facilities and some flora/fauna are considered to be sensitive receivers in relation to potential air quality impacts.

Sensitive receivers are concentrated in the towns and villages along the proposal site (described in section 2). Other sensitive receivers include scattered dwellings on rural landholdings. The majority of these receivers are located more than 100 metres from the proposal site. Sensitive receivers are shown on Figure 6.4.

6.9.2 Potential issues

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 – for example, haul roads and unstablised 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.

Operation of the upgraded rail corridor would result in an increase in the number of diesel freight services operating along the existing operational section of the rail corridor (the Mungindi line section), and the introduction of freight services along the Boggabilla line section. The potential sources of emissions to air, which may affect air quality during operation, are:

- Gaseous emission eg 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.

6.9.3 Scope of further assessment

A specialist air quality assessment will be undertaken for the EIS which will include:

- Identifying 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.

The assessment will be undertaken with consideration of the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC 2005), and the *National Environment Protection Measures for Ambient Air Quality* (DSEWPAC 2001).

6.10 Traffic and transport

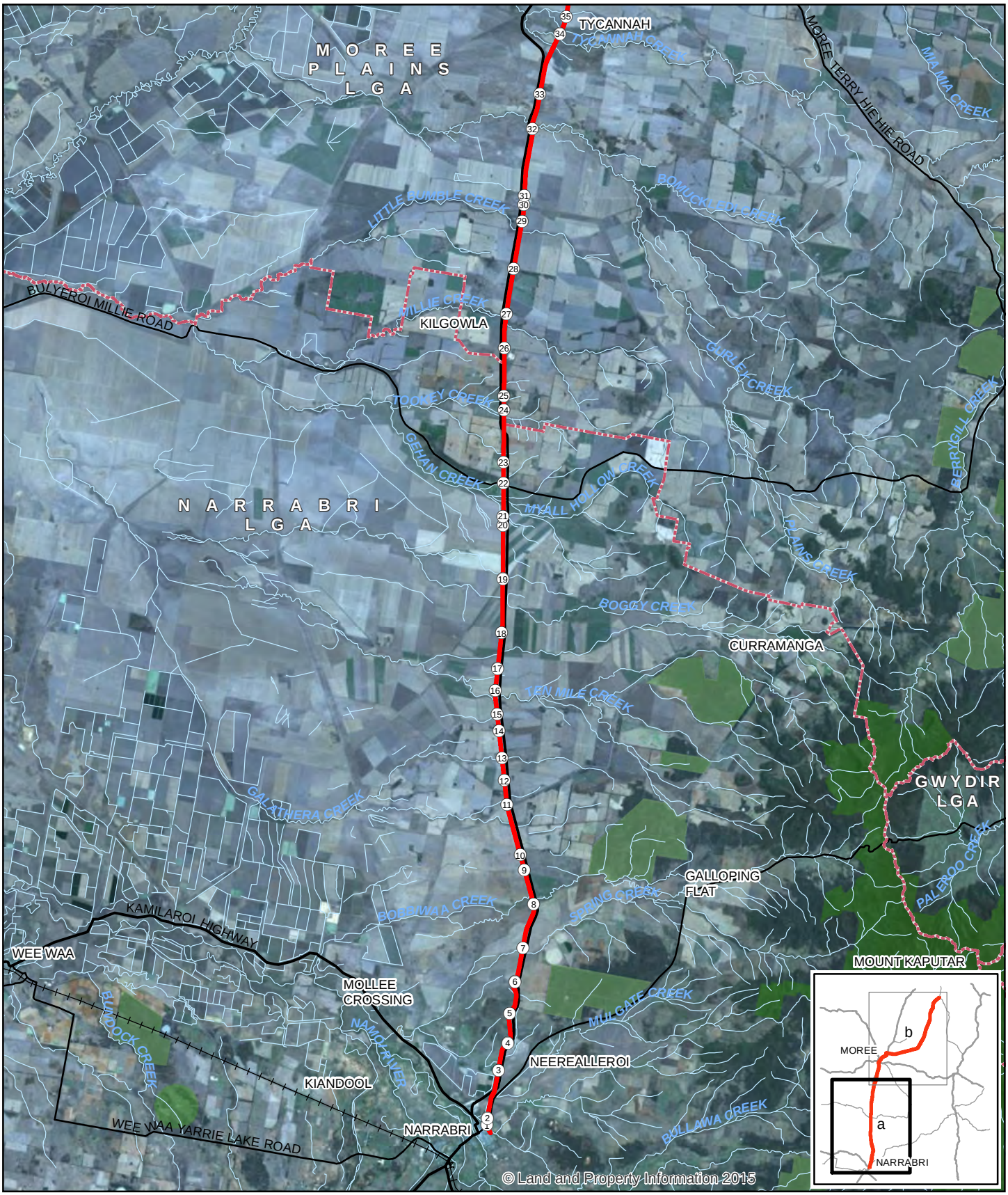
6.10.1 Key features of the existing environment

The road network within the study area consists mainly of local roads and private rural roads. The main road within the study area is the Newell Highway.

The Newell Highway has a posted speed limit of 110 km/h which stretches from Victoria to Queensland. Within the study area, the Newell Highway runs along the rail line between Narrabri and Camurra. The proposal site crosses the Newell Highway twice at about three kilometres north of Narrabri Railway Station and four kilometres north of Bellata.

There are 85 level crossings (36 public and 49 private crossings) within the study area. Of these, three are controlled by active systems (warnings by flashing lights, sounds and/or barriers) and the remaining 82 crossings are controlled by passive systems (warnings provided through signs and line markings).

The road network and locations of the existing level crossings are shown in Figure 6.5.



LEGEND

- ① Level crossing
- The proposal
- Local Government Area
- Principal road
- Secondary road
- Railway
- Watercourse
- Forestry reserve
- Conservation reserve

Paper Size A4

0 1.5 3 6 9 12

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Australian Rail Track Corporation
Inland Rail

Location of existing level crossings

Job Number	22-17916
Revision	0
Date	30 Oct 2015

Figure 6.5a

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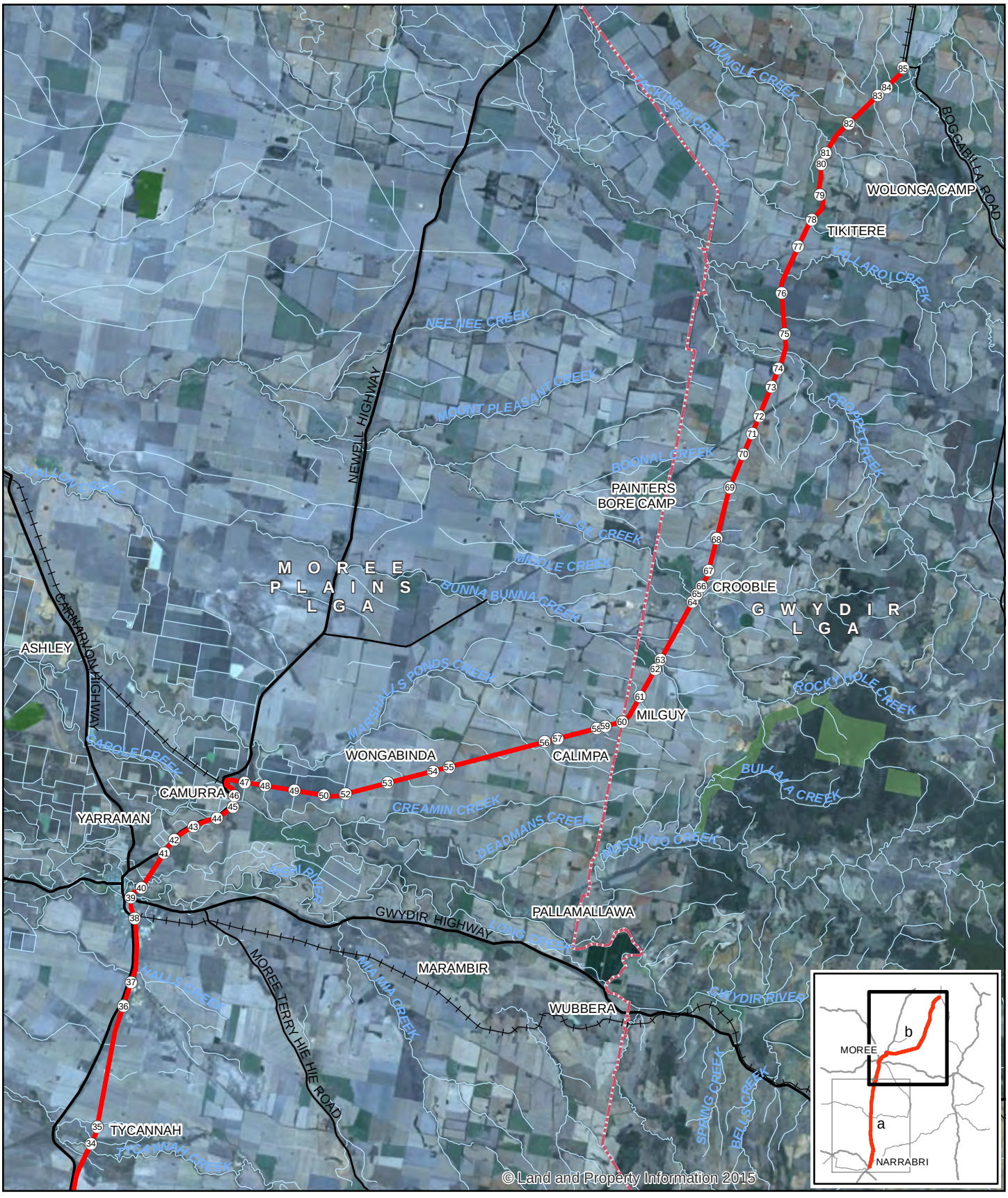

LEGEND

- ① Level crossing
- The proposal
- Local Government Area
- Principal road
- Secondary road
- Railway
- Watercourse
- Forestry reserve
- Conservation reserve

Paper Size A4

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Kilometres

Map Projection: Transverse Mercator
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GHD

Australian Rail Track Corporation
Inland Rail

Location of existing level crossings

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Figure 6.5b

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: Geoscience Australia, 250K Topographic Data Series 3; LPI, Imagery, 2015. Created by: gmcdiarmid

6.10.2 Potential issues

Construction vehicle access to the proposal site would be via the existing road network and access tracks within the rail corridor.

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. Proposed works on level crossings may also result in disruptions to local traffic and temporary access restrictions to private property. Where this occurs, alternative access arrangements would be provided and/or appropriate traffic controls implemented.

Construction activities may also result in temporary impacts on existing rail operations. As the majority of the rail line is currently not operational, construction works would be scheduled to avoid regular rail operations. However, works during track possessions may be required for bridge and major culvert replacements in operational areas. The extent and duration of works during track possessions would be confirmed during the detailed design stage.

During operation, minimal impacts to transport, traffic and access are anticipated as access to the rail line would be via existing corridor access points.

The proposal may result in the permanent closure of some level crossings that are not frequently used or where suitable alternative access exists, or upgrade of existing level crossings to be retained. Consultation with potentially affected landowners would be undertaken during the design stage and closures would only be undertaken following agreement with the property owner, the local council or Roads and Maritime Services.

6.10.3 Scope of further assessment

A specialist traffic, transport and access impact assessment will be prepared for the EIS to consider key aspects such as:

- Identification of haulage routes during construction.
- Construction impacts on the local and regional road and transport network.
- Compatibility of the haulage routes with road capacity/limits.
- Impacts of any temporary or permanent works on level crossings.
- General impacts of construction traffic on public roads.

6.11 Land use, socio-economic and visual issues

6.11.1 Key features of the existing environment

The study area is dominated by agricultural industries, with significant cotton, wheat and livestock industries. Most of the proposal site is located within the existing rail corridor, with these areas dominated by railway uses.

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 agriculture and grazing purposes.

Towns located on and in the vicinity of the proposal site are described in section 2.1.

The majority of the study area has been cleared of the original vegetation. Scattered patches of remnant vegetation remain, mainly in the vicinity of watercourses. Scattered paddock trees can be observed in various locations throughout the study area.

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

- The University of Sydney Plant Breeding Institute adjoins the proposal site and is located about two kilometres north-east of Narrabri.
- A number of grain storage and handling facilities are located in various locations along (adjacent to) the proposal site.
- Two state forests are located in the south of the study area. Killarney State Forest is located about 10 kilometres north-east of Narrabri and 2.2 kilometres east of the proposal site at the nearest point. Moema State Forest is located about 33 kilometres north-east of Narrabri and 11 kilometres east of the proposal site at the nearest point.

6.11.2 Potential issues

Land use

The majority of work associated with the proposal would be undertaken within the existing rail corridor. Subject to further design, some works would be undertaken outside of the corridor for the Camurra deviation and associated with other elements such as passing loops and level crossing upgrades. During construction, there may be temporary changes in land use from the existing use of the proposal site (for example, from rail uses and, disused transport corridor) to construction purposes. During operation, direct land uses impacts would result from any change in use associated with the operation of the proposal and its associated facilities.

Socio-economic

The proposal would have wide economic influences, including enhanced 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.

Further information on the need for and justification of the proposal is provided in section 4. The benefits of the proposal 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.

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, air quality, traffic, and visual impacts, as discussed in sections 6.8, 6.9, 6.10 and 6.11, respectively.

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) as discussed in Section 6.8.

Visual

Construction worksites would have the potential to result in visual impacts for nearby 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 receivers.

During operation, only limited views of the operational line would be available from surrounding receivers except through residential areas. Views of new infrastructure (such as bridges) would be minimal as they are located within rural areas away from receivers and in an existing rail line for the majority of the proposal site.

6.11.3 Scope of further assessment

Land use

A land use and property assessment will be undertaken to confirm specific land uses and premises along the proposal site and the potential impacts of the proposal on property and land use.

Socio-economic

The socio-economic assessment will identify and where possible quantify the potential impacts of the proposal.

The assessment will build on work undertaken to date, providing a detailed assessment of impacts on the community including noise and vibration, actual location of construction sites, traffic changes and other proposal elements. The assessment will identify the likely degree of impact to the communities affected.

The assessment will also identify the nature of the local community affected and the necessary mitigation to minimise the impacts.

Visual

A landscape and visual impact assessment will be undertaken to identify the potential visual impacts of the proposal on the nearest sensitive receivers, such as: public roads, public thoroughfare users, places of residence, work and recreation.

Existing landscape character and sensitivity to change will be identified for each landscape catchment and an impact assessment completed based on the change to the landscape as a result of the proposal.

6.12 Other issues

6.12.1 Waste and resources

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 the construction-site compound.
- 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, 2014). Standard environmental management measures based on these guidelines would be prepared by the construction contractor prior to construction.

Only minimal waste would be generated from general rail operations and maintenance activities.

6.12.2 Hazards and risks

Mitigation measures would be developed to assist in reducing the risks associated with construction. Hazards and risks during construction would be associated with:

- Works conducted within the operating rail corridor.
- Works conducted under or over roads.
- Storage and use of hazardous materials.
- Use of heavy machinery.

These issues would be addressed by the construction contractor prior to the commencement of construction.

During operation, key hazards and risks include the potential for derailments, spills or incidents involving any hazardous cargo.

6.12.3 Sustainability

A sustainability assessment will be undertaken as part of the EIS. The sustainability assessment will:

- Provide an overview of the broad sustainability benefits of the proposal.
- Document how the proposal has addressed, and is consistent with, the principles of ecologically sustainable development.
- Provide context for the need for sustainable outcomes on the proposal.
- Document opportunities to improve sustainable outcomes on the proposal.
- Highlight sustainability opportunities.

6.12.4 Utilities and services

Existing utilities that cross the rail corridor or that are likely to be impacted by the proposal would need to be protected and/or diverted.

Based on preliminary studies, the following utilities may be impacted by the proposal:

- Water and sewer assets maintained by the three councils.
- Electricity assets maintained by Country Energy and Transgrid.
- Gas assets maintained by APA.
- Telecommunications assets owned and maintained by Telstra, Optus etc.

Initial investigations have identified that there are a range of services running parallel to and crossing the rail corridor in some sections of the proposal site. Impacts to utilities will be determined during detailed design.

The proposal would also require installation and/or relocation of existing rail utilities within the corridor.

6.12.5 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 burning 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 will also be undertaken, based on the *Australian National Greenhouse Accounts (NGA) Factors 2008,* prepared by the Australian Government Department of Climate Change.

6.12.6 Climate change

Potential issues could include damage to rail lines due to buckling of track as a result of an increase in temperature, and flooding of the corridor due to more extreme weather events. A climate change risk assessment will be completed and will provide recommendations to minimise the impacts of climate changes.

6.12.7 Cumulative impacts

An assessment of the cumulative impacts will develop a list of major projects occurring in the vicinity of the proposal and identify potential cumulative impacts associated with the interaction of the proposal and other major projects.

7. Consultation

7.1 Consultation approach and strategy

ARTC's values commit the organisation to active engagement with stakeholders and the community. A community engagement plan has been prepared for the Inland Rail project that will guide the consultation activities for the proposal.

7.2 Consultation to date

As a result of the history of Inland Rail and previous consultation undertaken, the proposal is generally known to stakeholders. Consultation undertaken for Inland Rail to date has focussed on consulting with the local councils.

ARTC has identified key stakeholders relevant to the Narrabri to North Star section of the Inland Rail project including the respective councils. Early engagement has occurred with Narrabri Shire Council, Moree Plains Shire Council and Gwydir Shire Council. Consultation workshops were held with Narrabri Shire Council on 3 June 2015, Moree Plains Shire Council on 22 April 2015, and Gwydir Shire Council on 22 June 2015. ARTC will provide further project updates and written notification to the councils during the design, environmental assessment and construction phases. Topics covered during the consultation workshops included:

- Revisiting issues previously raised by the councils and other local stakeholders.
- Sharing technical data relevant to refinement of the alignment.
- Identifying lessons learnt from previous projects in the region.
- Seeking input regarding key local stakeholder groups to be engaged through future consultations.
- Identifying new opportunities and issues associated with the delivery of Inland Rail at a local level.

7.3 Proposed consultation

Formal consultation will be undertaken with the following key stakeholders:

- State and Federal representatives.
- Representative of the Council and executive management at Narrabri, Moree Plains and Gwydir shire councils.
- Australian and State government departments and agencies.
- Business and tourism stakeholders (e.g. Narrabri Chamber of Commerce).
- Agricultural stakeholders (e.g. NSW Farmers Association, Graincorp).
- Freight stakeholders.
- Environment stakeholders (e.g. Border Rivers-Gwydir Catchment Management Authority).
- Service providers (e.g. community, medical, emergency).
- Indigenous groups.
- Community groups.

8. Conclusion and next steps

The proposal is subject to assessment under Part 5 of the EP&A Act. The capital investment value of the proposal is estimated to be over $50 million, 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 5.1 of the EP&A Act and an EIS is required for the approval of the NSW Minister for Planning.

As part of the first step in the approvals process for the proposal, this document supports an application to the Minister seeking the SEARs for the EIS. The document has provided a brief description of the proposal; its statutory and strategic context; and a preliminary assessment of impacts and likely significance.

Upon receipt of the SEARs, ARTC will prepare the EIS and submit it to the Department of Planning and Environment as part of the formal application for approval of the proposal.

The EIS will be prepared in accordance with the EP&A Act, and it will meet the minimum form and content requirements set out in clauses 6 and 7 of Schedule 2 of the Regulation. The EIS will include an environmental risk assessment to identify the potential environmental impacts associated with the proposal.

9. References

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Appendices

Appendix A – Likelihood of occurrence table

Table 1 – Likelihood of occurrence assessment (Umwelt, 2015)

Scientific name	Common name	Status		Likelihood to occur in the study area
		TSC Act	EPBC Act	
Threatened Ecological Communities				
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions (TSC Act) / Brigalow (Acacia harpophylla dominant and codominant) (EPBC Act)		EEC	EEC	Likely to occur
Cadellia pentastylis (Ooline) community in the Nandewar and Brigalow Belt South Bioregions		EEC		Unlikely
Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions		EEC		Likely to occur
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions		EEC		Unlikely
Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregion (TSC Act) / Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (EPBC Act)		EEC	EEC	Likely to occur
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions		EEC		Unlikely
Howell Shrublands in the New England Tableland and Nandewar Bioregions		EEC		Unlikely
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (TSC Act) / Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (EPBC Act)		EEC	EEC	Potential
Marsh Club-rush sedgeland in the Darling Riverine Plains Bioregion		CEEC		Unlikely

Scientific name	Common name	Status		Likelihood to occur in the study area
		TSC Act	EPBC Act	
Native Vegetation on Cracking Clay Soils of the Liverpool Plains / Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland		EEC	CEEC	Likely to occur
Mount Kaputar high elevation and dry rainforest land snail and slug community in the Nandewar and Brigalow Belt South Bioregions		EEC		Unlikely
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (TSC Act) / Weeping Myall Woodlands (EPBC Act)		EEC	EEC	Likely to occur
Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions (TSC Act) / Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (EPBC Act)		EEC	EEC	Unlikely
White Box Yellow Box Blakely's Red Gum Woodland(TSC Act) / White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)		EEC	CEEC	Potential
Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Darling River		EEC (FM Act)		Likely to occur
Flora				
Bertya opponens	Coolabah Bertya		V	Unlikely
Cadellia pentastylis	Ooline	V	V	Unlikely
Commersonia procumbens		V	V	Unlikely
Cyperus conicus		E		Potential
Dichanthium setosum	Bluegrass	V	V	Potential
Desmodium campylocaulon	Creeping Tick-trefoil	E		Recorded in rail corridor
Digitaria porrecta	Finger Panic Grass	E		Recorded in rail corridor
Homopholis belsonii	Belsons Panic	E	V	Potential
Lepidium aschersonii	Spiny Peppercress	V	V	Potential

Scientific name	Common name	Status		Likelihood to occur in the study area
		TSC Act	EPBC Act	
Polygala linariifolia	Native Milkwort	E		Potential
Swainsona murrayana	Slender Darling Pea	V	V	Potential, historical NSW Atlas recorded within the rail corridor
Thesium australe	Austral Toadflax	V	V	Unlikely
Tylophora linearis		V	E	Potential
Fish				
Ambassis agassizii	Western Olive Perchlet	EP (FM Act)		Potential
Bidyanus bidyanus	Silver Perch	V (FM Act)	CE	Potential
Maccullochella peelii	Murray Cod		V	Potential
Mogurnda adspersa	Purple Spotted Gudgeon	E		Potential
Tandanus tandanus	Freshwater Catfish	EP (FM Act)		Potential
Reptiles				
Anomalopus mackayi	Five-clawed Worm-skink	E	V	Potential
Aprasia parapulchella	Pink-tailed Worm-lizard	V	V	Unlikely
Hoplocephalus bitorquatus	Pale-headed Snake	V		Unlikely
Uvidicolus sphyrurus	Border Thick-tailed Gecko	V	V	Unlikely
Birds				
Anseranas semipalmata	Magpie Goose	V		Potential
Anthochaera phrygia	Regent Honeyeater	CE	CE	Unlikely
Ardeotis australis	Australian Bustard	E		Potential
Burhinus grallarius	Bush Stone-curlew	E		Potential
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		Potential
Chthonicola sagittata	Speckled Warbler	V		Potential

Scientific name	Common name	Status		Likelihood to occur in the study area
		TSC Act	EPBC Act	
Circus assimilis	Spotted Harrier	V		Potential
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V		Potential
Daphoenositta chrysoptera	Varied Sittella	V		Potential
Ephippiorhynchus asiaticus	Black-necked Stork	E		Potential
Erythrotriorchis radiatus	Red Goshawk	CE	C	Unlikely
Falco subniger	Black Falcon	V		Potential
Geophaps scripta scripta	Squatter Pigeon (southern)	E	V	Unlikely
Glossopsitta pusilla	Little Lorikeet	V		Potential
Grantiella picta	Painted Honeyeater	V	V	Potential
Hieraaetus morphnoides	Little Eagle	V		Recorded
Lathamus discolor	Swift Parrot	E	E	Potential
Leipoa ocellata	Malleefowl	E	V	Unlikely
Lophoictinia isura	Square-tailed Kite	V		Potential
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V		Potential
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V		Unlikely
Neophema pulchella	Turquoise Parrot	V		Potential
Ninox connivens	Barking Owl	V		Potential
Polytelis swainsonii	Superb Parrot	V	V	Unlikely
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V		Recorded
Rostratula australis	Australian Painted Snipe	E	E, C	Unlikely

Scientific name	Common name	Status		Likelihood to occur in the study area
		TSC Act	EPBC Act	
Stagonopleura guttata	Diamond Firetail	V		Potential
Stictonetta naevosa	Freckled Duck	V		Potential
Tyto longimembris	Eastern Grass Owl	V		Unlikely
Tyto novaehollandiae	Masked Owl	V		Potential
Mammals				
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Potential
Chalinolobus picatus	Little Pied Bat	V		Potential
Macropus dorsalis	Black-striped Wallaby	E		Recorded
Macrotis lagotis	Bilby	PE	V	Unlikely
Nyctophilus corbeni	South-eastern Long-eared Bat	V	V	Potential
Petaurus norfolcensis	Squirrel Glider	V		Unlikely
Phascolarctos cinereus	Koala	V	V	Potential
Pseudomys gouldii	Gould's Mouse	PE	E	Unlikely
Pseudomys pilligaensis	Pilliga Mouse	V	V	Unlikely
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Unlikely
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		Potential
Migratory Species Listed Under International Conventions				
Actitis hypoleucos	Common Sandpiper		B, C, J, R	Unlikely
Ardea alba	Great White Egret, White Egret		J	Potential
Ardea ibis	Cattle Egret		J	Potential
Apus pacificus	Fork-tailed Swift		C, J, R	Unlikely
Calidris acuminata	Sharp-tailed Sandpiper		B, C, J, R	Unlikely
Gallinago hardwickii	Lathams Snipe, Japanese Snipe		C, J, R	Unlikely

Scientific name	Common name	Status		Likelihood to occur in the study area
		TSC Act	EPBC Act	
Hirundapus caudacutus	White-throated Needletail		C, J, R	Potential
Merops ornatus	Rainbow Bee-eater		J	Potential
Myiagra cyanoleuca	Satin Flycatcher		B	Potential
Numenius minutus	Little Curlew		B, C, J, R	Unlikely
Plegadis falcinellus	Glossy Ibis		B	Unlikely
Rhipidura rufifrons	Rufous Fantail		B	Unlikely
Tringa stagnatilis	Marsh Sandpiper		B, C, J, R	Unlikely

The following abbreviations are used in the list:

V	Vulnerable
E	Endangered
EP	Endangered Population
PE	Presumed Extinct
CE	Critically Endangered
EEC	Endangered Ecological Community
CEEC	Critically Endangered Ecological Community
VEC	Vulnerable Ecological Community
FM Act	*Fisheries Management Act 1994*
B	Bonn Convention for Migratory Birds (Bonn)
C	China-Australia Migratory Bird Agreement (CAMBA)
J	Japan-Australia Migratory Bird Agreement (JAMBA)
R	Republic of Korea-Australia Bird Agreement (ROKAMBA)

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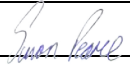
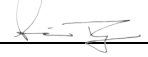
1	K Day	S Pearce		S Page		13/01/16

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