

CHAPTER 01

Introduction

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

ARTC

INLAND
RAIL 
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1. Introduction

This chapter introduces and provides a key description of the Narrabri to North Star Phase 2—Moree to Camurra North (N2NS Phase 2) Inland Rail (the proposal). It describes the location, key features, timing and operation and provides the objectives for the proposal and Inland Rail.

1.1 Overview

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

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

- ▶ using the existing interstate rail line through Victoria and southern NSW
- ▶ upgrading about 400 km of existing track, mainly in western NSW
- ▶ providing about 600 km of new track in northern NSW and south-east Queensland.

Inland Rail has been divided into 13 sections, seven of which are located in NSW. Each of these projects can be delivered and operated independently, with tie-in points on the existing railway.

In 2015, the Australian Rail Track Corporation Ltd (ARTC) (the proponent) developed a 10-year program to deliver Inland Rail by 2025 (now revised to 2027). ARTC was created in 1997 after the Australian Government and state governments agreed 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
- ▶ developing new business
- ▶ capital investment in the corridors
- ▶ managing the network
- ▶ infrastructure maintenance.

Further information on ARTC and Inland Rail can be found at artc.com.au and inlandrail.com.au.

1.2 The proposal

ARTC is seeking approval to construct and operate the N2NS Phase 2 Moree to Camurra North section of Inland Rail (the proposal).

The N2NS section of Inland Rail was declared a Critical State Significant Infrastructure (CSSI) project (SSI 7474) under the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). Phase 1 of N2NS was approved by the Minister for Planning and Public Spaces under the EP&A Act on 13 August 2020. Initially, the whole of N2NS was referred to the (then) Australian Government Department of Agriculture, Water and the Environment (DAWE) under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) and was declared to be a 'controlled action.' The referred proposal was then varied to relate only to Phase 1 of N2NS, and Phase 1 was approved by the Minister for the Environment under the EPBC Act on 1 October 2020. The proposal was referred to (then) DAWE on 3 June 2020 and was declared a controlled action on 20 July 2020.

In 2017, an Environmental Impact Statement (EIS) was prepared for the entire N2NS section of the Inland Rail program. Since then, the alignment within what is now N2NS Phase 2 has changed (IRDJV, 2019). Specifically, modifications are required to upgrade approximately 13 km of the existing rail track and formation from Moree to the Camurra North hairpin, including the crossings of the Mehi and Gwydir rivers and the construction of 1.6 km of new track and formation to bypass the Camurra hairpin on the Weemelah line at Camurra (the Camurra bypass).

The track upgrade involves changes to the vertical and horizontal alignment to improve the flood immunity of the rail line, as well as a new greenfield section in the north to allow for a bypass of the current hairpin turn. The original N2NS EIS did not assess these changes. Consequently, this section of the N2NS alignment was removed from the original project and, therefore, requires separate assessment under the EP&A Act and the EPBC Act. The Phase 2 component of N2NS (that is, the proposal) is the subject of this EIS, and the original N2NS project (excluding the section from Moree to Camurra North) is referred to as Phase 1.

1.2.1 Location

The proposal is primarily an upgrade of the existing rail corridor between Moree and Camurra North, with a small portion (about 1.6 km) of greenfield re-alignment. ARTC is seeking approval under Division 5.2 of the EP&A Act to construct and operate the N2NS Phase 2 section of Inland Rail. The location of the proposal is shown in Figure 1-1.

1.2.2 Key features

The key features of the proposal are:

- ▶ enhancement of about 13.7 km of existing track through minor adjustments to the vertical and horizontal alignment, and the construction of about 1.6 km of new rail corridor, including rail embankments
- ▶ demolition and reconstruction of eight underbridges at Mehi River, Gwydir River, Skinners Creek, Duffys Creek and at four other un-named water courses
- ▶ installation of approximately 1,100 new flood-relief box culverts along the formation
- ▶ three new signalised level crossings at Gwydirfield Road, the Rocks Road and Back Pally Road, replacing the existing level crossings
- ▶ realignment and changes to six private level crossings (including closure of one private level crossing)
- ▶ new turnout between the Gwydir River and Back Pally Road, immediately north of the new Gwydir underbridge, to provide a connection to the Inland Rail I/North Star line to the east and the Weemelah line to the west
- ▶ decommissioning and removal of the Camurra hairpin and the associated formation, through the construction of the greenfield Camurra bypass, providing connections to the existing rail lines to the east and the Weemelah line to the west
- ▶ reconstruction of a new rail spur for the Weemelah line.

Associated works would include installation of signalling systems, signage, fencing, drainage, the relocation of services and utilities, where necessary, and the formation of rail maintenance access roads (RMARs) within the rail corridor adjacent to the line. The construction and operation of the proposal would also require the following ancillary facilities:

- ▶ construction access and haul roads linking to the surrounding public road network
- ▶ construction storage and laydown areas
- ▶ associated earthworks for the construction of pads for piling rigs and cranes at underbridge locations.

Additional ancillary facilities could also include mobile batch plant, accommodation for construction workers and construction water supply and storage.

The proposal would require temporary occupation and permanent acquisition of land along the alignment. A total of 27 lots is currently estimated and would likely be impacted by permanent land acquisition, including approximately 4 hectares (ha) of private land within 12 lots and 9 ha of Crown land within 15 lots.

Once operational, the proposal would form part of the rail network managed and maintained by ARTC, with trains operated by a variety of operators. Inland Rail, in its entirety, would be operational when all 13 sections are complete. Prior to the completion of the entire Inland Rail program, N2NS Phase 2 would form part of the existing network serving grain operations on currently active rail lines to North Star and Weemelah. Therefore, use of the proposal could occur prior to operation of Inland Rail in its entirety, following the completion of both the proposal and N2NS Phase 1.

Maximum train speeds would range from 80 to 115 km per hour (km/h), except through Moree, where the maximum train speed would be 60 km/h due to track geometry and safety.

Based on current demand forecasting, N2NS Phase 2 is expected to have an average of about 11 trains per day travelling between Camurra and Moree in 2027. This would increase to about 20 trains per day in 2040.

An overview of the features of the proposal is shown in Figure 1-2. Further details of the proposal are in Chapter 7: Proposal features and operation.

1.2.3 Timing and operation

Construction is anticipated to commence in 2024 and the proposal is expected to take about 24 months to construct.

The N2NS section of Inland Rail is currently forecast to have an average demand of up to 11 trains per day in 2027 and up to 20 trains per day in 2040. The new rail line would be a faster, more efficient route that bypasses the Sydney rail network, enabling the use of double-stacked trains along its entire length.

Further information on the construction and operation of the proposal is provided in Chapter 7: Proposal features and operation and Chapter 8: Construction of the proposal.

1.2.4 Value of the proposal

The approximate value of the proposal is \$160 million.

1.3 Objectives of the proposal and Inland Rail

The objectives of the proposal are to:

- ▶ provide upgraded rail infrastructure that meets the Inland Rail specifications, to enable trains using the Inland Rail corridor to travel between Narrabri and North Star, connecting with other sections of Inland Rail to the north and south
- ▶ revise the horizontal alignment of N2NS Phase 2 section of Inland Rail corridor and undertake extensive curve-easing analysis for the alignment to produce the best outcome for the proposal and the most efficient operational requirements, particularly at the Camurra hairpin
- ▶ minimise the potential for environmental and community impacts, by maximising use of the existing rail corridor.

The overall objectives of Inland Rail are to:

- ▶ provide a rail link between Melbourne and Brisbane that is inter-operable with train operations to Perth, Adelaide and other locations on the standard-gauge rail network, to serve future rail freight demand and stimulate growth for inter-capital and regional and bulk rail freight
- ▶ provide an increase in productivity that will benefit consumers through lower freight transport costs
- ▶ provide a step-change improvement in rail service quality in the Melbourne to Brisbane corridor and deliver a freight rail service that is competitive with road
- ▶ improve road safety, ease congestion, and reduce environmental impacts by moving freight from road to rail
- ▶ bypass bottlenecks within the existing metropolitan rail networks and free up train paths for other services along the coastal route
- ▶ act as an enabler for regional economic development along the Inland Rail corridor.

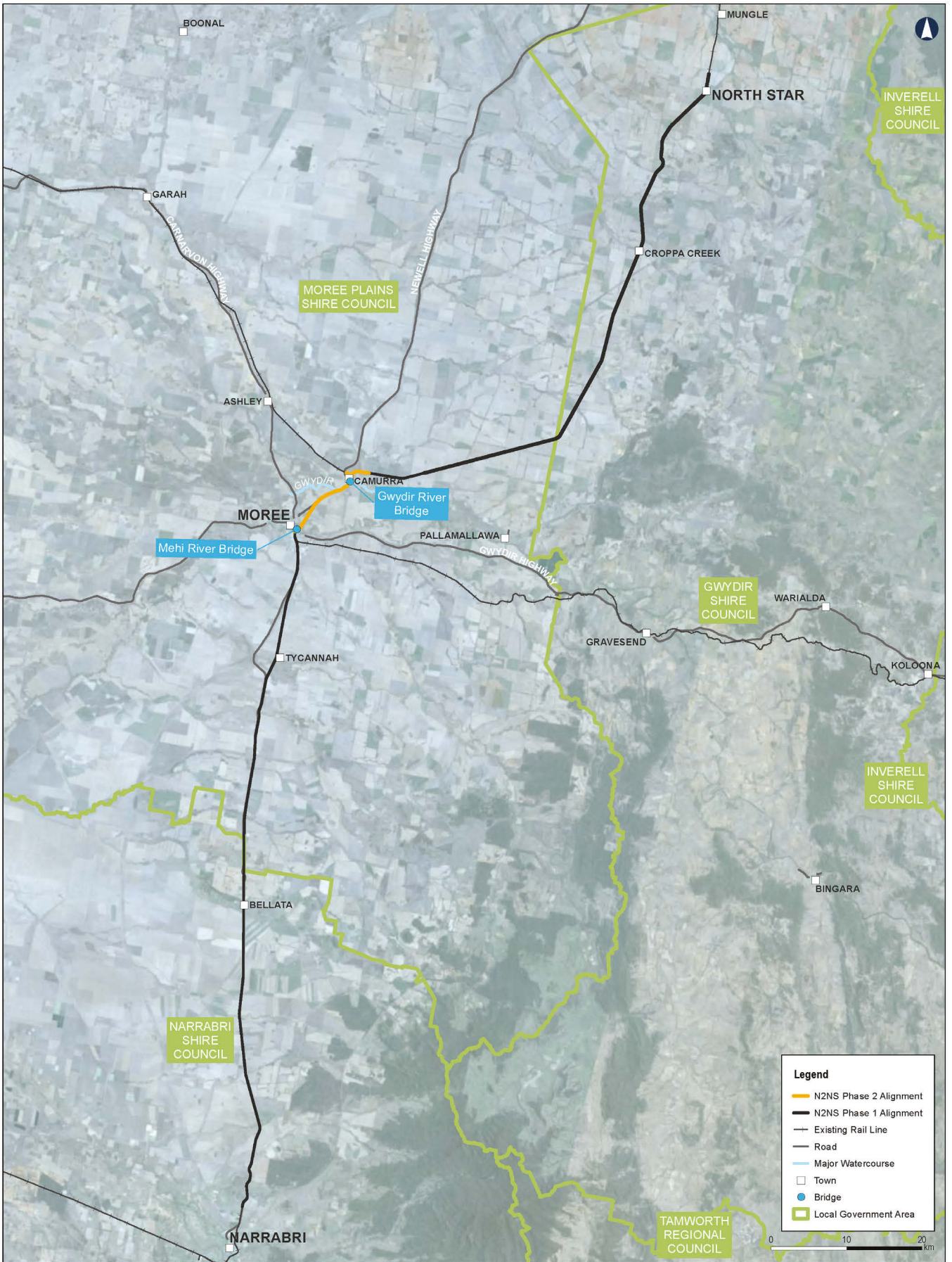


Figure 1-1 Location of the proposal

Data Sources: ARTC, IRDJV, LPI

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:450,000
 Paper size: A3
 Date: 9/22/2021
 Map 1 of 1

N2NS_OP2_EIS_F01_01_LocationOfPropo_044.mxd

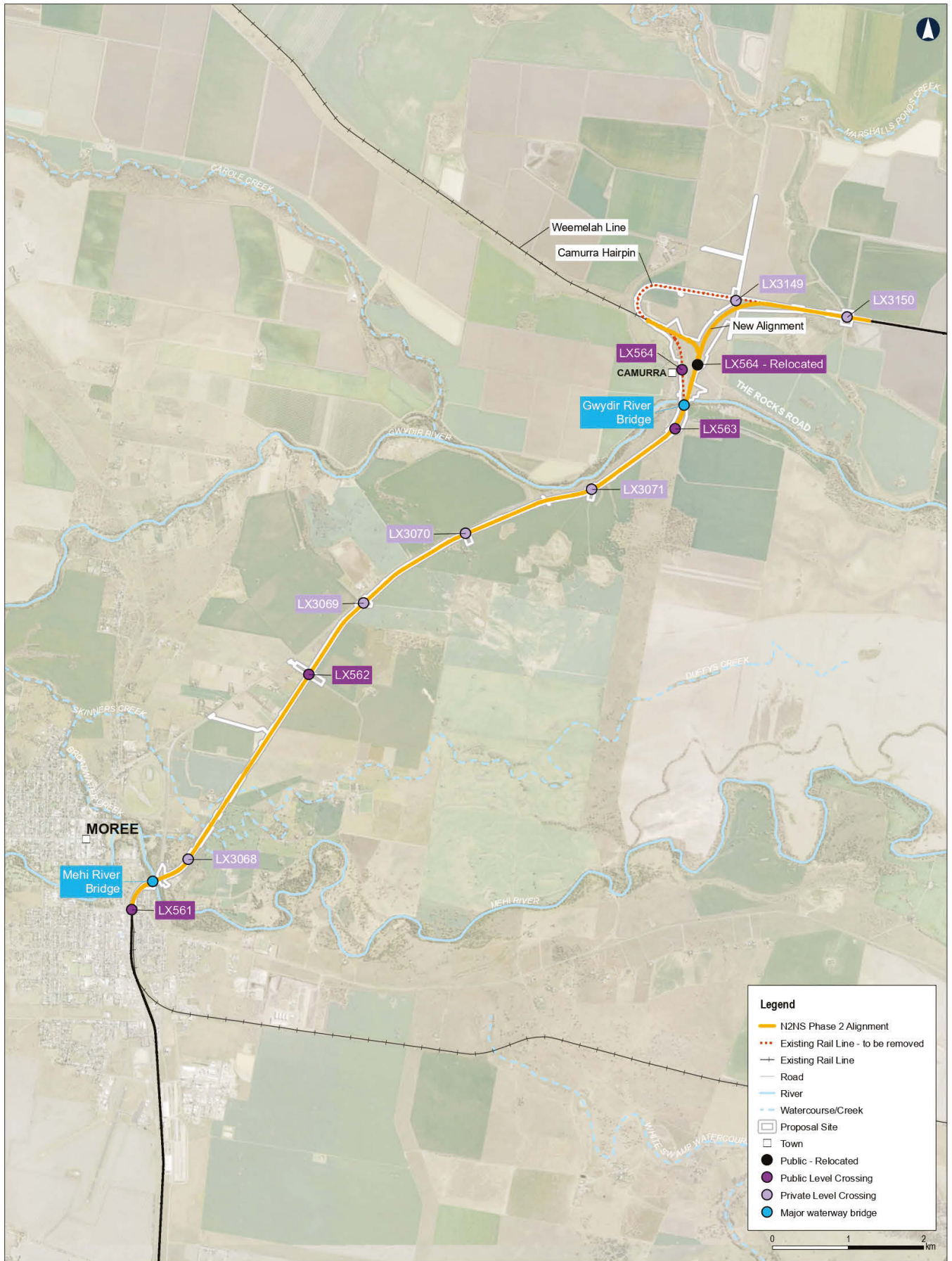


Figure 1-2 Proposal overview

Data Sources: ARTC, IRDJV, LPI

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:45,000
 Paper size: A3
 Date: 7/06/2022
 Map 1 of 1

N2NS_S02_E0_F01_02_P28000EN001_010.dwg

1.4 EIS purpose and structure

This EIS supports an application for approval of the proposal under Part 5, Division 5.2 of the EP&A Act. It addresses the environmental assessment requirements of the Secretary of the (then) Department of Planning, Industry and Environment (now the Department of Planning and Environment) (refer to Appendix A). The proposal is also a controlled action under the EPBC Act and requires approval from the Australian Government Minister for the Environment. The EPBC Act requirements are in Attachment A to the SEARs.

The structure and content of the N2NS Phase 2 EIS is outlined in Table 1-1.

TABLE 1-1 PURPOSE AND STRUCTURE OF THE EIS

Chapter	Description
Chapter 1	Introduction Provides a background to the proposal and an overview of the key features of the proposal. The chapter also outlines the overall structure and content of the EIS.
Chapter 2	General biophysical and cultural environment Provides a description of the general biophysical and socio-economic environment within which the proposal would be located, including the regional setting and a description of the proposal site.
Chapter 3	Statutory context Provides an overview of the statutory context for the proposal and the approval requirements.
Chapter 4	Community and stakeholder consultation Provides a summary of the consultation that occurred during the proposal development and environmental assessment process, and the consultation proposed during public exhibition, detailed design, and delivery.
Chapter 5	Strategic context and need Provides an overview of the strategic context and need for the proposal.
Chapter 6	Proposal development and alternatives Provides a summary of the alternatives to the proposal as a whole and the options considered during development of the concept design for the proposal.
Chapter 7	Proposal features and operation Provides a description of the proposal features and operation including the approach to avoiding or minimising impacts, design features and infrastructure proposed, operation, maintenance and other related information.
Chapter 8	Construction of the proposal Provides an indicative description of the likely construction process and activities.
Chapters 9 to 26	Describes the results of the assessment of key environmental issues identified by the SEARs, including information on the existing environment, potential construction and operation impacts, and the proposed approach to mitigation and management.
Chapter 27	Approach to environmental management and mitigation Provides a consolidated summary of the key potential impacts, a description of the proposed approach to environmental management, and a compilation of the mitigation measures.
Chapter 28	Justification and conclusion Conclusion and justification for the proposal.
	References Provides a list of references used to inform the EIS.
Appendices	
Appendix A	Secretary's Environmental Assessment Requirements and Summary of Agency Requirements
Appendix B	Statutory requirements
Appendix C	Environmental risk assessment
Appendix D	Community consultation report
Appendix E	Preliminary land requirements
Appendix F	CEMP outline
Appendix G	Rapid Assessment Framework checklist

Chapter	Description
Technical papers	Technical paper 1: Biodiversity development assessment report Technical paper 2: Post-wet aquatic ecology assessment Technical paper 3: Traffic impact assessment Technical paper 4: Hydrology and flooding impact assessment Technical paper 5A: Surface water impact assessment Technical paper 5B: Groundwater impact assessment Technical paper 6: Aboriginal cultural heritage assessment report Technical paper 7: Draft statement of heritage impact Technical paper 8: Social impact assessment Technical paper 9: Economic impact assessment Technical paper 10: Construction noise and vibration impact assessment Technical paper 11: Operational noise and vibration impact assessment

CHAPTER 02

General biophysical and cultural environment

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

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2. General biophysical and cultural environment

This chapter provides a description of the of the Narrabri to North Star Phase 2—Moree to Camurra North (N2NS Phase 2) Inland Rail (the proposal) site, including a summary of its general biophysical and cultural (including community, land use and socio-economic) environment.

2.1 Regional setting

The proposal is located within the local government area (LGA) of the Moree Plains Shire Council (MPSC) in the north-west of NSW. The Moree Plains LGA is 27,927 square kilometre (km²), which adjoins the NSW–Queensland border to the north, Gwydir LGA to the east, Narrabri LGA to the south, and Walgett LGA to the west.

The town of Moree is situated at the junction of the Gwydir and Newell Highways with connections to Sydney (608 kilometres (km) south-east) and Brisbane (473 km north-east) and is about 103 km north of Narrabri. It is located on the Mehi River with the Gwydir River to the north. Moree also benefits from its location above the Great Artesian Basin as a source of irrigation water. At the 2016 census, Moree Plains LGA had a population of 13,159 people (ABS, 2017) with a population in Moree town of about 9,345 (MPSC, 2021).

The primary land use in the LGA is rural, with the predominant local industries based around agriculture (mainly cotton and grains) and grazing (GHD, 2016). Moree is an important regional town providing a range of services to the surrounding agricultural areas and other nearby townships such as Ashley, Gurley, Biniguy and Pallamallawa.

Retail and commercial activity is predominantly located within a core area focused on the Moree Central Business District (CBD) and southern corridor along Frome Street. The Moree CBD exhibits a traditional 'main street' retail strip focused on Balo Street. The majority of industrial areas are located in two distinctive areas—a small estate in the north-west of the town containing low-scale light industrial activities, with some limited showroom and office activity, and a large industrial precinct in the south of the town focused on the airport and the Newell Highway and agricultural facilities along Tycannah Street.

Moree has a large number of parks and recreational amenities, with its most well-known attraction being the Moree Artesian Aquatic Centre located in Moree centre. The baths were established in 1895 during the search for a reliable source of irrigation water when a bore was sunk and the hot mineral water was discovered (VisitNSW, 2021).

The Midkin Nature Reserve is 13 km north-west of the proposal, the Gwydir Wetlands are located about 40 km north-west, and downstream of the proposal, and the Kirramingly Nature Reserve is located about 35 km south-west of the proposal.

2.1.1 N2NS corridor

N2NS Phase 2 is located wholly within the Moree Plains LGA. The N2NS Phase 2 corridor is considered to have a nominal width of 30 to 40 metres (m), providing a 15 m buffer on each side of the alignment centreline. Most of the works associated with the proposal would be undertaken within the existing corridors between Moree and Camurra. It is anticipated that the existing corridor is of sufficient width to accommodate the infrastructure currently proposed for the construction of the proposal as well as potential future expansion, including a possible future requirement for 3,600 m long trains. N2NS Phase 2 is located predominantly within brownfield areas (areas already developed) except for the greenfield diversion in the area of the Camurra hairpin. The existing hairpin curve occurs at the start of the Boggabilla Branch line, as it separates from the Weemelah line, which is a part of the NSW Country Regional Network (CRN).

Temporary corridor widening through temporary land acquisitions would be required for the construction of culvert banks, underbridges and level crossings.

2.2 Description of the proposal site

The proposal site consists of single-track rail line located predominantly within an existing rail corridor. The proposal site starts immediately north of the Moree Gwydir Highway level crossing at chainage (Ch) 666.000, and ends at Camurra north, Ch 681.000. Approximately 1.6 km of the rail line consists of new rail corridor through a 'greenfield' area. The proposal traverses the Mehi–Gwydir floodplain between the Mehi and Gwydir rivers and includes the bridges at both these locations.

The Mehi–Gwydir floodplain, located north of Moree, is a highly complex floodplain where flooding can have significant impacts on the local area, including extensive flooding events in the town and farming communities. The current rail alignment of N2NS Phase 2 between Moree and Camurra traverses directly through this floodplain. Due to the complex hydrology of the area and the outcomes of the original EIS for N2NS Phase 1, the initial N2NS Phase 2 design has been modified by ARTC to balance flood impacts while maintaining operational capacity.

2.2.1 Definition

The proposal site is defined as the area that would be directly impacted by the construction of the proposal, regardless of whether the impact is temporary or permanent, and includes the location of operational infrastructure. The N2NS Phase 2 proposal site is located predominantly within an existing rail corridor on public land owned by NSW Government (Transport for NSW (TfNSW)) except for a small section in the north associated with the new curve, which would replace the Camurra hairpin curve. The majority of works associated with the proposal would be undertaken within the existing corridor, as described in Chapter 7: Proposal features and operation. The proposal site also allows for the location of construction compounds and batch plants described in Chapter 8: Construction of the proposal.

2.2.2 Description

The existing rail corridor of N2NS Phase 2 starts at Ch 666.000, just north of the Gwydir Highway level crossing in Moree and crosses the Mehi River and Gwydirfield Road just north of the township of Moree. The alignment crosses Duffys Creek at approximate Ch 667.300, Skinners Creek at Ch 668.200 and Gwydirfield Road at Ch 669.930, before running adjacent to, and east of, the Newell Highway. A minor 10 m deviation to the east of the existing alignment would be required in this section to mitigate any potential short-stacking conflicts with the Newell Highway and provide some minor curve straightening. This deviation would remain within the existing rail corridor.

Continuing north-easterly, the corridor crosses three private roads and an unnamed drainage line before swinging north to cross the Gwydir River. At this point, the proposed alignment would leave the existing rail alignment to bypass the Camurra hairpin curve. North of the Gwydir River, a new rail spur would be required to facilitate the turnout and connection of the Weemelah rail line to the proposal. The alignment would deviate from the original alignment and traverse approximately 1.6 km of greenfield area to eventually re-join with the existing Camurra to Boggabilla rail line at Ch 678.270. Along this new section, it would cross the Camurra–Warialda Road (Back Pally Road) as a dual line, and a travelling stock route (TSR). Due to the proposed realignment, Back Pally Road level crossing would be relocated approximately 200 m east along the existing road. Two irrigation canals would also be crossed as a result of the new alignments through this northern section. Throughout the entire alignment of N2NS Phase 2, a total of nine level crossings would be upgraded or replaced.

2.3 General biophysical environment of the proposal site

A summary of the key biophysical characteristics of the study area is in the following sections.

2.3.1 Biodiversity

As outlined in Chapter 10: Biodiversity, the majority of the proposal site falls within the Brigalow Belt South Bioregion and Northern Outwash Sub-region; however, a portion of the proposal site at the Camurra end, falls within the Darling Riverine Plains Bioregion and Castlereagh–Barwon Sub-region. Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features, and flora and fauna communities.

The 'proposal site' is the area of land that is directly impacted by the construction of the proposal. This includes the existing rail footprint, new rail realignment, replacement bridges and associated construction areas (i.e. compounds, stockpiles). The development footprint is approximately 174.7 ha.

The proposal site was extensively surveyed by ecologists in December 2019 and February and March 2020. These surveys involved vegetation mapping, vegetation integrity plots (VIPs), targeted threatened flora and fauna surveys and aquatic ecology surveys. Surveys found that most of the vegetation within the study area that is outside the existing rail corridor, has been subject to historical clearing and agricultural land use; however, the proposal does cross and impact areas of native vegetation, including the following:

- ▶ Mehi and Gwydir Rivers and tributaries—riparian areas dominated by River Red Gum *Eucalyptus camaldulensis*
- ▶ TSR—contains areas of natural grassland, Cooba *Acacia salicina* and Weeping Myall *Acacia pendula* woodlands; however, generally dominated by naturalised Mimosa *Vachellia farnesiana* and exotic species such as African Boxthorn *Lycium ferocissimum* and Tiger Pear *Opuntia aurantiaca*
- ▶ road reserve—generally adjacent to the Newell Highway and other minor roads, includes a combination of native species and environmental weeds such as Johnson Grass *Sorghum halepense* and key emerging weed species in the region such as Coolatai Grass *Hyparrhenia hirta* and Sabi Grass *Urochloa mosambicensis*.

Six Plant Community Types (PCT) were identified within the development site, with a variety of open woodland and forest transitioning to grasslands with river red gum riparian forest adjacent to the waterways.

The proposal crosses two major waterways, the Gwydir River and Mehi River, and several tributaries of these rivers, including Duffys Creek, Skinners Creek and one unnamed waterway, which is a tributary of the Gwydir River. The Gwydir and Mehi Rivers, as well as Duffys and Skinners Creek, are listed as areas of high biodiversity value.

Both the Mehi and Gwydir rivers are seventh order rivers¹ and are identified as Class 1 fish habitat, containing important aquatic habitat for a number of riparian-dependent species and aquatic species. Mehi and Gwydir rivers support a diverse range of habitat types and native fish species, including threatened species, and are known to contain significant River Red Gum woodland communities. Further, numerous ephemeral tributaries, inclusive of Duffys Creek, Skinners Creek and many unnamed watercourses, occur within the proposal site, which are likely to support fish habitat values due to their intermittent and highly ephemeral nature. Wetlands of international importance (Ramsar wetlands) that occur nearby are Gwydir Wetlands, Gingham and lower Gwydir Wetlands approximately 40 km downstream of the proposal site.

Riparian areas, including the Mehi and Gwydir rivers, are generally in reasonable condition compared with the largely cleared and fragmented landscape in the surrounding area and therefore are fundamental to the movement of fauna in the region, including the smaller, more ephemeral tributaries like Duffys Creek. Additionally, the Camurra to Mia Mia TSR, which provides a link between the two river systems, is an important corridor. Although some sections contain only a sparse number of trees, the TSR is critical in allowing Koala (*Phascolarctos cinereus*) and other common and threatened fauna species to move throughout the landscape. Outside these areas, there are small pockets of remnant vegetation and grasslands within council land, private properties and road reserves that provide some habitat connectivity for more disturbance-tolerant and mobile species to travel across the landscape.

Further information and assessment of the likely impacts of the proposal to biodiversity is provided in Chapter 10: Biodiversity and Technical paper 1: Biodiversity development assessment report (BDAR).

2.3.2 Geology and soils

The proposal is located on generally flat land, with existing natural drainage lines of grades less than 0.5 per cent (IRDJV, 2019). The topography of the proposal site is dictated by its location relative to the Mehi and Gwydir Rivers. The proposal site lies between the Mehi River (on the southern side), and the Gwydir River (on the northern side), and associated floodplains. Land use in the Gwydir River catchment is dominated by agriculture. Livestock grazing and dryland cropping account for around 86 per cent of land use. Irrigation is concentrated around Moree, and the floodplains west of Moree, and accounts for 4 per cent of land use (Department of Primary Industries (DPI), 2018).

Elevations along the proposal site are typically between 209 m Australian Height Data (mAHD) to 213 mAHD. The presence of the elevated Great Dividing Range (GDR) to the east, and the lower-lying and typically flat riverine plain of the Great Australian Basin to the west, dictate the regional geology within the vicinity of the proposal site. The oldest bedrock in the area are within the foothills of the GDR, dominated by horizontally bedded Jurassic and Cretaceous quartz sandstone and shale, with limited conglomerates.

Vast colluvial and alluvial deposits have formed through prolonged erosion of highland areas of the GDR, with these deposits having been deposited westward into the Great Australian Basin. These sediments comprise stream deposit colluvial fans of coarse sands and gravels in the valley's upslope, becoming finer-grained alluvial sediments further down the valley. Evidence of larger stream courses of Quaternary age occur as long, sand-filled channels and clay plains with shallow depressions between ridges in which rainwater collects.

The NSW Department of Planning and Environment's (DPE) [eSPADE](#) website identifies the regional geology of the study area as Watercourse Road (Alluvial) landscape. This is a large floodplain associated with the Mehi River, Carole Creek and Gingham Watercourse. The majority of the landscape sits on Quaternary Alluvials of the Marra Creek formation, with small pockets of meander plains facies of the Bugwah formation scattered throughout.

Very deep (150–500 cm), very slowly permeable and very poorly drained self-mulching Grey and Dark Grey Vertosols (Grey Clays) dominate this landscape (approximately 80 per cent). Figure 20-1 in Chapter 20: Soils and contamination is a visual depiction of the soil landscape profile.

Construction and operation of the proposal requires vegetation removal and earthworks that would expose the ground surface, which could increase soil erosion through water runoff and wind. Heavy rainfall events may increase water runoff, further dispersing any loose soils and sediments from earthwork activities. This could impact the biodiversity in the area, by entering waterways and reducing the water quality for aquatic habitats, as well as changing the soil characteristics for the vegetation and habitat in nearby areas. Similarly, the disturbance of any potential contaminants in the soil during construction may put site workers at risk through direct contact or

1. Stream order is a number to indicate the level of branching in a river system.

inhalation when soil is dispersed into the air or enters receiving environments including waterways and surrounding ecosystems.

Impact to soils (outside the corridor or in greenfield areas) as a result of construction activities associated with the proposal is considered unlikely. The majority of excavated spoil would be reused onsite, reducing the volume of spoil stockpiled onsite or transported to an offsite facility. Hazardous materials that have the potential to contaminate soils and waterways would be stored and managed in a way to minimise the potential for spills. The potential for soil erosion and runoff impacts, as well as contamination impacts during construction and operation would be minimised through the implementation of mitigation measures.

Chapter 20: Soils and contamination includes further information and assessment of the impacts of the proposal to soil and geology at the proposal site.

2.3.3 Water quality, hydrology and groundwater

The proposal site is situated in the Gwydir River catchment, which covers an area of more than 26,600 km². It is separated from the Border Rivers catchment to the north by the Mastermans Range, and from the Namoi catchment to the south by the Nanadewar Range. It extends 670 km from the GDR to the Barwon River near Collarenebri (DPI, 2018). The proposal crosses the Mehi River and Gwydir River, Skinners Creek, Duffys Creek, and at least three unnamed creeks and irrigation channels. There are also a number of farm dams that intercept overland flow and are used as water supply for crop irrigation and stock throughout the area.

Due to the extensive agricultural land uses within the proposal area, water quality is anticipated to be generally poor, as a result of pesticides, herbicides, fertilisers and sedimentation of waterways. Water sampling undertaken at the proposal site in March 2020 (Golder Associates, 2020) reported generally poor water quality within the Gwydir River catchment due to:

- ▶ high turbidity levels across the catchment
- ▶ low pH, particularly in the Mehi River
- ▶ low dissolved oxygen levels across the catchment
- ▶ high levels of nitrogen and phosphorus.

This poor quality is likely to reflect existing soil conditions and agricultural land use practices within the proposal area. The water sampling identified that water quality objectives are not currently being met in the catchment.

Water quality sampling was also undertaken for general pollutants and toxicant concentrations, which were found to be low and did not exceed stock watering or human consumption guidelines.

Groundwater around Moree and to the north-west to North Star is generally sourced from the Lower Gwydir Alluvium. The Lower Gwydir Alluvium is broadly divided between two water bearing zones, being a shallow aquifer system up to 30 m deep, known as the Narrabri Formation, and a deep aquifer system, the Gunnedah Formation, which extends to a depth of approximately 90 m. The Great Artesian Basin underlies the Lower Gwydir Alluvium. Water quality within the Lower Gwydir Alluvium is of a high quality, supplying the town of Moree with potable water with only minor treatment. Numerous wells, dams, bores and irrigation channels were noted in the study area, particularly around Moree.

In general, the study area is characterised by relatively flat land, and the proposal site is located in an area that has been subject to significant floods. Six historic flood events of note have occurred on the Moree floodplain, including:

- ▶ February 1995
- ▶ July 1998
- ▶ January 2004
- ▶ November 2011
- ▶ February 2012
- ▶ March 2021.

The floodplain approaches 9 km in total width through the area for most flood events. During significant flood events, extensive areas of deep floodwaters occur, with depths exceeding 1 metre (m) over most of the floodplain. Under these conditions, the Newell Highway and several local roads become flooded and untrafficable, and generally remain so for up to three days. During major flood events, such as 1% annual exceedance probability (AEP) events, a significant area of the Moree township becomes inundated. The majority of residences within the floodplain are elevated on mounds, which prevents above-floor flooding.

Flood velocities throughout the floodplain are relatively low and do not exceed 1 m per second (m/s) over most of the floodplain in the large events. Flood durations are long, reflecting the regional scale nature of the flood behaviour in the area, with flooding persisting for more than 72 hours following major events.

Further information and assessment of impacts of the proposal to hydrology, flooding, water quality and groundwater is in Chapter 12: Hydrology and flooding impact assessment, Chapter 13: Surface water quality impact assessment and Chapter 14: Groundwater.

2.3.4 Air

The majority of the proposal site traverses sparsely settled rural land, meaning that air is generally of a higher quality than in densely developed, metropolitan areas such as Sydney or Brisbane. Agriculture is the primary industry in Moree and surrounds meaning that the main air pollutants in the region include emissions from farm machinery and dust generated from crop farming, particularly during harvest seasons.

In accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2016) quality assessment, background concentrations of air pollutants would ideally be obtained from ambient monitoring data collected at the proposal site; however, site-specific ambient data is rare and is typically obtained from monitoring sites as close as possible to the proposal site, where sources of pollution remain representative of the proposal site.

The NSW Government operates an air quality monitoring station approximately 94 km to the south of the proposal site, at the Narrabri Airport. The Narrabri station monitors concentrations of particulate matter (PM₁₀ and PM_{2.5}), wind speed and wind direction. Analysis of measured concentrations of particulate matter (dust) at Narrabri Airport for 2018 and 2019 provide an indication of particulate matter concentrations in the vicinity of the study area. It is evident that exceedances of PM₁₀ over a 24-hour averaging period are most frequent during summer months. Correlating this data with an understanding of local meteorology, it appears that while summer months experience increased rainfall, the increased temperatures and wind speeds result in increased ambient dust concentrations.

During construction of the proposal, dust is expected to be the most significant impact to air quality. During operation, train exhaust emissions are expected to be most significant. Mitigation and monitoring measures would be implemented to minimise both these impacts, and cumulative impacts associated with surrounding industry emissions.

Further information and assessment of impacts to local air quality is in Chapter 24: Air quality and greenhouse gas.

2.3.5 Noise and vibration

The existing noise environment surrounding the proposal is characteristic of a rural landscape, dominated by natural sounds and distant road traffic noise; generally, the area experiences only low background noise levels. The Newell Highway is the main noise source within the proposal study area. Noise monitoring for background noise levels was carried out in October 2020, for a greater understanding of the relative contributions from various noise sources at each monitoring location. Three monitoring locations were chosen, encompassing both the Moree township and greenfield and agricultural areas along the proposal alignment to provide representative background and ambient noise levels. The results showed that existing ambient noise levels were typical of a rural landscape with infrequent noise from traffic on the Newell Highway and a plane flyover. The highest levels were observed from road traffic.

The results from each monitoring location were used to create Noise Management Levels (NMLs), to be used to compare and assess predicted construction noise levels. Chapter 16 outlines potential exceedances of NMLs during construction, and associated mitigation and management measures for both the construction and operational phases of the proposal.

The most significant existing sources of vibration in the proposal area are generated by traffic on the Newell Highway and local road network, as well as occasional trains along the existing rail track. Vibration due to existing sources is well below the structural damage and human comfort criteria for all vibration sensitive receivers in the study area, and direct measurement of existing vibration is not considered necessary. Certain construction activities would likely require the use of vibration-intensive equipment that may affect the nearest sensitive receivers.

Further information and assessment of noise and vibration impacts on nearby sensitive receivers is provided in Chapter 16.

2.3.6 Existing transport

The existing traffic and transport environment surrounding the proposal site includes a network of road and rail infrastructure. The Newell Highway, Gwydir Highway, River Road and Gwydirfield Road are the major roads within the study area defined in Chapter 11. Local roads in the Moree township are typical of those in a rural town and traffic levels are generally low. The Newell Highway is the primary thoroughfare within the study area, running generally north–south and connecting the Goulburn Valley Highway near the NSW/Victoria border, and the Leichardt Highway near the Queensland/NSW border. Within the study area, the Newell Highway runs generally parallel to the rail line; however, the rail alignment does not cross the Newell Highway.

The study area is located within a generally flat landscape with relatively straight roads and gentle turns. Low traffic volumes are characteristic of the region. An assessment of traffic volumes was undertaken for the Newell Highway at its busiest recorded section. This assessment found that the Average Annual Daily Traffic (AADT) volume was 1,978 vehicles per day (two-way) in 2008. This increases to 2,697 vehicles per day (two-way) when an average annual growth rate of 2.6 per cent is applied through to 2020. The daily average quantity of heavy vehicles is 47 per cent, ranging from 28 per cent during the morning peak hour to 85 per cent between midnight and 2.00 am. This is due to the Newell Highway serving as a key freight route. Further analysis of traffic data, as well as road safety and crash data is in Chapter 11: Traffic and transport.

Moree is also serviced by the Weemelah (North West) rail line, which branches from the Main North Line at Werris Creek and runs north–west through the towns of Gunnedah and Narrabri to Moree. From Moree onwards, the line branches north–west to Weemelah at Camurra (approximately 10 km north-west of Moree). North Star is located on the Boggabilla line, which branches from the Weemelah line at Camurra to the north-east. This line is still used occasionally but has been closed to regular operations since 2013.

Further information and assessment of the likely impacts of the proposal on local traffic and transport is provided in Chapter 11: Traffic and transport.

2.3.7 Landscape and visual

The existing landscape of the proposal site is characterised as rural, with rural properties surrounding most of the proposal alignment. Outside the township of Moree, the land adjacent to the proposal site is mainly used for cropping and grazing purposes, consisting of substantially cleared agricultural land with scattered isolated patches of native vegetation in a gently undulating topography. The town of Moree represents the only area with an urbanised character. Zoning outside of Moree is predominantly Primary Production land, as outlined in Chapter 9: Land use and property and Chapter 19: Visual impact assessment. The key landscape character zones surrounding the proposal site include rural township (Moree), rural residential (outskirts of Moree) and agricultural (commercial agricultural land north of Gwydirfield road).

Surrounding built landscape features include scattered residences, farm buildings, sheds and agricultural structures, most of which are located more than 100 m from the proposal site. As a result, the number of private receptors that have visual access to the proposal is limited. The largest concentration of private residences that would register a visual impact during construction are located on the northern side of Moree, nearest to the reconstruction of the Mehi River Bridge.

For the majority of the proposal site, the existing rail track and associated rail infrastructure from the main built-form visual feature in the landscape; however, the low profile and horizontal, linear nature of the proposal means that the potential for visual impacts are limited to a distance relatively close to the proposal site.

Further information and assessment of the likely impacts of the proposal on landscape and visual aspects is in Chapter 19: Visual impact assessment.

2.4 General cultural environment of the proposal

A summary of the main cultural characteristics (including land use, heritage and socio-economic) of the proposal site is detailed in the following sections.

2.4.1 Land use and property

The proposal is mostly located within the existing rail corridor, with these areas subject to railway uses. The existing rail corridor is owned by the NSW Government and leased to ARTC (GHD, 2017). The area surrounding the proposal is dominated by agricultural industries, with significant cropping and livestock production. Most of the proposal area has been cleared of the original vegetation for agricultural activities. Scattered patches of remnant vegetation remain, mainly in the vicinity of watercourses and TSRs. The greenfield section of the proposed route alignment runs through Crown Land used as a TSR. Scattered paddock trees can be observed in various locations throughout the area.

The Moree Plains LGA is dominated by irrigated cropping and other broad-acre cropping (DPI, 2018). In Moree, the proposal is surrounded by a mix of land uses, including residential, industrial, open space and transport (roads). Residential and non-residential users (such as places of worship, education and other community

facilities) are concentrated in Moree and are located within 2 km either side of the rail corridor. Land ownership surrounding the proposal site includes private landowners, various State Government departments, and Crown land, including TSRs, reserves, waterways and public roads (GHD, 2017).

Further information and assessment of the likely impacts of the proposal on land use and property is in Chapter 9.

2.4.2 Heritage

2.4.2.1 Aboriginal heritage

The proposal site is mostly within the existing rail corridor that passes through large areas of land disturbed by existing agricultural practices, including dryland grazing and cropping; however, the proposal would also include the Camurra bypass, which would be outside the current rail corridor and replacement of the underbridges across the Mehi and Gwydir Rivers, which could harbour potential archaeological sites and archaeologically sensitive landforms

An Aboriginal Cultural Heritage Assessment Report (ACHAR) for the EIS has been undertaken and identified that areas such as the Mehi River and Gwydir River would have identified as highly significant to Aboriginal people and were important as a place for recreation and belonging. The area between these rivers was identified as significant for resource gathering as it contained substantial animal and plant resources; however, historical land use of the proposal site and surroundings, including the construction of the current rail line, potentially impacted any archaeological deposits that may have been present. Aboriginal people within the region had established informal settlements on the outskirts of Moree, including what was referred to as the 'Steel Bridge Camp', located within the proposal site at the crossing of the Mehi River; however, a test excavation undertaken during the recent ACHAR did not identify any Aboriginal artefacts.

The Duffys Creek site (10-3-0035), is also listed on the Aboriginal Heritage Information Management system (AHIMS) as an artefact scatter and area of potential archaeological deposit. During site survey for the ACHAR, between 50–100 artefacts were recorded at the surface; however, it was noted that, due to high velocity flooding and repeated ploughing, the remains are not considered to represent an *in situ* deposit.

In addition to the Steel Bridge Camp, a former Aboriginal fringe camp is located near the Mehi River bridge. Although not a listed archaeological site under the *Heritage Act 1977* (NSW), this area is considered to have archaeological potential. Other areas of significance include watercourses, in particular the Mehi and Gwydir rivers both for the supply of food and water and as an area to bath and recreate. The Gwydir River was identified as containing significance as a place of recreation and a place where Aboriginal families were able to feel a level of safety.

Further information and assessment of the likely impacts to Aboriginal heritage is provided in Chapter 15: Cultural heritage, and Technical Paper 6: Aboriginal cultural heritage assessment report.

2.4.2.2 Non-Aboriginal heritage

The potential non-Aboriginal heritage resources of the proposal site generally reflect the history of the surrounding region, and the existing N2NS rail alignment. The region in which the study area is located was first explored by Europeans around 1812. The first squatter in the Narrabri area established a station in 1834. The Moree to Camurra section of the Weemelah line and the Boggabilla line were opened in 1913 and 1932, respectively, as 'pioneer lines' (rail lines constructed to a lesser standard than main rail lines, providing access to mainly agricultural areas).

The non-Aboriginal heritage resources within the proposal site are typical of a rail line and include the:

- ▶ rail formation itself, with culverts and underbridges of varying construction materials and age
- ▶ evidence of the former stations and other rail-related structures and infrastructure
- ▶ grain rail-sidings and landmark grain silos.

The proposal abuts to the boundary of Moree Station; however, the station, including the island platform layout and refreshment room, would not be directly impacted by the proposal. The station would remain a functioning railway station, easily recognisable and understandable as such. As the station and line would remain operational, the upgrade of the existing rail line would not change the setting or character of this item.

Two locally listed heritage items are located within the proposal site—the Mehi River bridge and the Gwydir River bridge—which are listed on ARTC's section 170 heritage register. The Mehi River and Gwydir River bridges are considered to have local significance. The proposal would see the complete removal and replacement of the Mehi and Gwydir River bridges. The demolition and removal of these underbridges would detrimentally impact on local heritage significance.

Further information and assessment of likely impacts to non-Aboriginal heritage is provided in Chapter 15: Cultural heritage and Technical paper 7: Draft statement of heritage impact.

2.4.3 Socio-economic

The community surrounding the proposal site is concentrated in the town of Moree. A review of the 2016 census data (ABS, 2020) was undertaken to identify the community profile and economic environment of Moree, which indicated the Moree Plains LGA had a population of approximately 13,350 people with 49.9 per cent male, 50.1 per cent female and an approximately 21.6 per cent Aboriginal or Torres Strait Islander population.

Moree has large processing plants for cereal crops and cotton seed. Key developments around the town include the Moree Gateway and the Moree Solar Farm. The Moree Gateway is a logistics and transport hub located on 215 ha site about 3 km south of the town, adjacent to the Newell Highway and the Moree Airport. The Moree Solar Farm is located on a 350 ha site about 10 km south of the town and the southern end of the proposal site.

Further information and assessment of likely impacts of the proposal to the local socio-economic environment is provided in Chapter 17: Social impact assessment, Technical paper 8: Social impact assessment and Technical paper 9: Economic impact assessment.

2.5 Existing rail facilities and operations

2.5.1 Overview

The first steam railway between Sydney and Parramatta opened in 1855; however, the extension west was delayed as a result of the engineering issues presented by the Blue Mountains. Bathurst and Orange were finally reached by rail in the 1870s and the extension of the line to Molong served as the railhead for Parkes and the western districts until the 1890s.

The existing rail line consists of the Weemelah line between Moree and Camurra North, including the rail spur to Weemelah. The line is currently truncated to Weemelah, between Moree and Mungindi. Passenger trains still operate from Sydney to Moree and goods trains (mainly wheat) operate to Camurra. Trains can access North Star by request.

The existing 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.

2.5.2 Branches

From Moree, the Weemelah line travels north–west to Weemelah on the NSW–Queensland border. The line was closed between Weemelah and Mungindi in 1974 when rail services were withdrawn following flooding. The line to Inverell, east of Moree, branches from the Weemelah line at Moree. The Inverell line, which was completed in 1902, was progressively closed between 1987 and 1994. In 2017, a 2.8 km section of the Inverell line was reinstated under the NSW Government’s Fixing Country Rail program, between Moree and the Broadbent Grain receival facility to the east of Moree.

Moree to Garah was opened in 1913. It was built as one of the Pioneer Lines, which were built with lighter rails, lower quality sleepers and no ballast, as they were built to serve the seasonal freight traffic of agricultural industries.

Planning for the Boggabilla Branch commenced in 1902 but was only completed in 1932. The section from North Star to Boggabilla was closed in 1987. A summary of operating dates is presented in Table 2-1.

TABLE 2-1 RAILWAY OPERATING DATES

Date	Line	Extent
1897	Weemelah Line	Narrabri South Junction to Moree
1913	Weemelah Line	Moree to Camurra
1932	Boggabilla Branch	Camurra to North Star

2.5.3 Passenger services

The Northern Tablelands Xplorer, run by NSW TrainLink, travels between Sydney and Moree via Werris Creek and Narrabri. Immediately south of the proposal site, trains stop in Moree twice a day (to and from Sydney Central). The proposal site provides no passenger services.

Further information on the rail and road traffic assessment undertaken for the proposal is in Chapter 11: Traffic and transport.

CHAPTER 03

Statutory context

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

ARTC

INLAND
RAIL 
An Australian Government Initiative

3. Statutory context

This chapter provides a review of the legislation and environmental planning instruments relevant to the environmental assessment and approval of the of the Narrabri to North Star Phase 2—Moree to Camurra North (N2NS Phase 2) Inland Rail (the proposal). The permissibility and planning approval pathway is summarised, and other planning instruments and legislation relevant to the assessment and approval of the proposal are considered.

3.1 Overview of the planning approval pathway

The proposal is declared to be Critical State Significant Infrastructure (CSSI) and will be assessed under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). In summary:

- ▶ under State Environmental Planning Policy (Transport and Infrastructure) 2021 (previously the Infrastructure SEPP), the proposal is classified as ‘*development for the purpose of a railway or rail infrastructure on behalf of a public authority*’. ARTC is defined as a public authority through the effect of Clause 1 in, Schedule 1 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation); as such, the proposal may be carried out without development consent under the EP&A Act
- ▶ where development is permissible without consent, it can be declared to be State Significant Infrastructure (SSI) by a SEPP, usually State Environmental Planning Policy (Planning Systems) 2021 (PS SEPP)
- ▶ Section 5.12 of the EP&A Act provides for development to be declared SSI through a Ministerial Order or through a SEPP. The PS SEPP provides for the proposal to be declared SSI where ARTC is carrying out the proposal and the capital investment value is greater than \$50 million (Schedule 3, Clause 3 of the PS SEPP).

Accordingly, Schedule 3, Clause 3 applies, and the proposal is SSI. The sections below provide more detail on the EP&A Act and its operation in respect of the proposal.

3.2 Environmental Planning and Assessment Act 1979

The EP&A Act and EP&A Regulation establish a framework for the assessment and approval of development in NSW. This includes provision for considering potential environmental impacts of a development within the decision-making process. The EP&A Act and EP&A Regulation also provide for the making of environmental planning instruments, including state environmental planning policies (SEPPs) and local environmental plans (LEPs), which determine the permissibility and approval pathway for development proposals and form a part of the environmental assessment process.

3.2.1 Part 5 of the EP&A Act

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

Having regard to the requirements of section 5.5 of the EP&A Act, ARTC has formed the opinion that the proposal is likely to significantly affect the environment. Consequently, if the proposal had not been State Significant Development under Schedule 3 Clause 3 of the PS SEPP, it would be classified as State Significant Development by reason of Schedule 3, Clause 1 of the PS SEPP.

The proposal, therefore, becomes subject to the assessment and approval process in Division 5.2 of the EP&A Act and, consequently, the proposal would require an EIS for the proposal under Part 5 of the EP&A Act.

3.2.2 Division 5.2 of the EP&A Act

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

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

- a) ‘*infrastructure, or*
- b) ‘*other development that (but for this Part and within the meaning of Division 5.1) 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 Division 5.1*’.

As indicated in section 3.1 and 3.2.1, the proposal satisfies these requirements.

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

- (1) *The proponent may apply for the approval of the Minister under this Division to carry out State significant infrastructure;*
- (2) *The application is to:*
 - (a) *describe the infrastructure, and*
 - (b) *contain any other matter required by the Planning Secretary;*
- (3) *The application is to be lodged with the Planning Secretary.'*

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

0. submission of SSI application with the supporting document to the Secretary of the Department of Planning and Environment under section 5.15 of the EP&A Act, to seek the Secretary's Environmental Assessment Requirements (SEARs)
1. preparation and submission of an EIS under section 5.16(2) of the EP&A Act, addressing the requirements of the EP&A Act and EP&A Regulation and the matters outlined in the SEARs
2. public exhibition of the EIS for a minimum of 28 days
3. preparation of either a Response to Submissions Report (Submissions Report) (if no material changes to the proposal are proposed post-exhibition) or a Submissions and Preferred Infrastructure Report (SPIR) (if material changes to the proposal are proposed post-exhibition), and submission of the report to the Department of Planning and Environment
4. assessment of the application, the EIS and the Submissions Report/SPIR by the Department of Planning and Environment (DPE) and preparation of the Secretary's Environmental Assessment Report (section 5.18 of the EP&A Act)
5. determination of the application by the minister.

Clause 179 of the EP&A Regulation requires that an application for approval of the NSW Minister for Planning to carry out SSI must include:

- ▶ details of any approval that would be required for the carrying out of the SSI but are not required because of section 5.23 of the EP&A Act (refer to section 3.4.1)
- ▶ details of any authorisations that must be given under section 5.24 of the EP&A Act if the application is approved (refer to section 3.4.2)
- ▶ a statement as to the basis on which the proposed infrastructure is SSI, including, if relevant, the capital investment value of the proposed infrastructure.

Section 5.13 of the EP&A Act includes provisions to declare a project as critical SSI. In accordance with Section 5.13, *'state significant infrastructure may be declared critical state significant infrastructure, if it is the category that, in the opinion of the minister, is essential for the state for economic, environmental or social reasons'*.

N2NS Phase 2 has been declared SSI and SEARs were issued for Phase 2 on 14 October 2020. The N2NS proposal was declared a critical SSI project under the EP&A Act. This declaration applies to both Phase 1 and Phase 2.

The proposal will remain subject to the assessment provisions under Division 5.2 of the EP&A Act and require approval from the Minister for Planning.

3.2.3 Landowner's consent and notification requirements

Clause 181(5) of the EP&A Regulation identifies that consent of individual landowners would not be required to make the SSI application because the proposal is declared critical SSI and is:

- ▶ by a proponent that is a public authority
- ▶ for linear transport infrastructure.

The consent of individual landowners would not be required to make the application as the proposal is for linear transport infrastructure; however, in accordance with clause 181(6) of the EP&A Regulation, the proponent must:

- ▶ give written notice to the owner, within 14 days after the application or request has been made; or
- ▶ by advertisement published in a newspaper circulating in the area the infrastructure is to be located, within 14 days prior to the environmental impact statement being publicly exhibited.

Written notice was provided to landowners directly impacted by the proposal. Further, both landowners directly impacted by the construction and operation of the proposal, as well as residents of the Moree local area, have been provided with notice of the proposal by way of newspaper advertisements, e-news advertisements, community meetings and briefings, workshops, community information sessions, proposal website, and the distribution of information via mail outs, phone calls, emails and written correspondence. Community consultation is discussed in further detail in Chapter 4: Consultation.

3.2.4 Environmental Planning and Assessment Regulation 2021

Clause 190 of the EP&A Regulation set out requirements for the form and content of an EIS. These requirements are included in Appendix B: Statutory context.

3.2.5 Environmental Planning and Assessment (Major Projects) Regulation 2021

Changes under the Environmental Planning and Assessment Amendment (Major Projects) Regulation 2021 introduced the Rapid Assessment Framework as part of a comprehensive set of reforms implemented by the NSW Government to ensure State Significant Infrastructure (SSI) is supported by better quality assessment, better coordination and better engagement with the community. The Rapid Assessment Framework includes a series of guidelines, in particular the *State Significant Infrastructure Guidelines* (DPIE, 2021), to which proponents must consider under the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation 2021).

The Narrabri to North Star Phase 2 Environmental Impact Statement (EIS) was prepared prior to these reforms and the mandatory application of this guidance. However, under the superseded Environmental Planning & Assessment Regulation 2000 (EP&A Regulation), Schedule 2, Clause 2(c), the EIS for a State Significant Infrastructure (SSI) project must be prepared *with regard* to the State Significant Infrastructure Guidelines.

Appendix G demonstrates where the EIS fulfils the requirements of the Rapid Assessment Framework and in particular the requirements of State Significant Infrastructure Guidelines.

3.3 NSW Environmental Planning Instruments

3.3.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

The consolidation of NSW SEPPs on the 1st March 2022 combined the Infrastructure, Educational Establishments and Childcare Facilities, Major Infrastructure Corridors, and Three Ports SEPPs into the Transport and Infrastructure SEPP 2021. The SEPP consolidation does not change the legal effect of the existing SEPPs, with section 30A of the Interpretation Act 1987 (NSW) applying to the transferred provisions. The SEPP consolidation is administrative only. It has been undertaken in accordance with section 3.22 of the Environmental Planning and Assessment Act 1979 (NSW). The Transport and Infrastructure SEPP transfers most existing provisions from the four abovementioned SEPPs into chapters 2, 3, 4 and 5 of the Transport and Infrastructure SEPP respectively. Chapter 1 contains the preliminary information and commencement details.

Chapter 2 of the Transport and Infrastructure SEPP contains the provisions previously contained in the Infrastructure SEPP. This chapter aims to assist in the delivery of public infrastructure across the state through consistent planning and assessment regimes for public infrastructure. Clause 2.91 of the Transport and Infrastructure SEPP permits development on any land for *'the purpose of a railway or rail infrastructure'* to be carried out on behalf of a public authority without development consent.

As noted in section 3.1, ARTC is a 'public authority' under the EP&A Act for the purposes of these provisions of the Transport and Infrastructure SEPP. Accordingly, the proposal is permissible without consent.

Normally, the provisions of the Transport and Infrastructure SEPP prevail over other environmental planning instruments, unless the work is located on land reserved under the *National Parks and Wildlife Act 1974* (NSW) (NPW Act) or is regulated State Environmental Planning Policy (Coastal Management) 2018. As the proposal is not located on land reserved under the NPW Act, nor under the Resilience and Hazards SEPP (previously the Coastal Management SEPP), these conditions do not apply, and the proposal is permissible without consent. As such, the proposal is capable of being declared as SSI.

3.3.2 State Environmental Planning Policy (Planning Systems) 2021

The consolidation of NSW SEPPs combined the State and Regional Development, Aboriginal Land and Concurrences and Consents SEPPs into the Planning Systems SEPP (2021).

Chapter 2 of the Planning Systems SEPP (PS SEPP) contains the provisions previously contained in the State and Regional Development SEPP (SRD SEPP), including definitions of SSI and State Significant Development. In accordance with Clause 2.14 and 2.15 of the PS SEPP, the development is SSI if:

- ▶ the land on which the development is located is permissible without development consent, under Part 4 of the EP&A Act, by the operation of the SEPP (such as the Transport and Infrastructure SEPP)

- ▶ it meets the criteria provided in Schedule 3 to the PS SEPP.

In accordance with Clause 2.16 of the PS SEPP, the development is critical SSI if it:

- ▶ may be carried out without development consent under Part 4 of the EP&A Act
- ▶ is declared to be SSI for the purposes of the EP&A Act if it is not otherwise so declared
- ▶ is declared to be critical SSI for the purposes of the EP&A Act.

The proposal is declared to be SSI due to the following:

- ▶ as described in parts 3.1 and 3.3.1 above, the proposal is permissible without consent under Part 5 of the EP&A Act
- ▶ Schedule 3 Clause 3 of the PS SEPP identifies SSI as development for the purpose of rail infrastructure by, or on behalf of, the ARTC that has a capital investment value of more than \$50 million. As the capital investment value of the proposal is over \$50 million and the proposal meets the requirements of Clause 14, it is defined as SSI
- ▶ alternatively, if Schedule 3 Clause 3 did not apply, Schedule 3 Clause 1 of the PS SEPP would apply. Clause 1 identifies that infrastructure for which the proponent is the authority and, as described in part 3.2.1, ARTC (as both proponent and a public authority) is of the opinion that the proposal would require an EIS under Part 5 of the EP&A Act. This is because the proposal is permissible without consent under the Transport and Infrastructure SEPP.

3.3.3 Other Environmental Planning Instruments

Section 5.22(2) of the EP&A Act includes provisions that environmental planning instruments do not apply to, or in respect of, SSI, except where they apply to the declaration of infrastructure as SSI or critical SSI, or in other limited facultative circumstances identified in section 5.22(2).

3.4 Other NSW legislative requirements

3.4.1 Approvals not required

Section 5.23 of the EP&A Act includes provisions for approval and authorisation processes normally triggered by development in NSW, which are not required for an approved SSI project. Approvals not required for SSI include:

- ▶ a permit under section 201, 205 or 219 of the *Fisheries Management Act 1994* (NSW)
- ▶ approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977* (NSW)
- ▶ an Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974* (NSW)
- ▶ a bush-fire safety authority under section 100B of the *Rural Fires Act 1997* (NSW)
- ▶ 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* (NSW).

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 SSI.

The proposal is located on land designated under the Moree Plains Local Environmental Plan (LEP) 2012; however, the Moree Plains LEP does not apply, as the proposal is assessed under Division 5.2 of the EP&A Act.

3.4.2 Approvals to be applied consistently

The following approvals cannot be refused, if necessary, for the carrying out of approved SSI projects (in accordance with section 5.24 of the EP&A Act) and must be consistent with the SSI approval:

- ▶ an environment protection license under chapter 3 of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act)
- ▶ consent under section 138 of the *Roads Act 1993* (NSW) (Roads Act).

3.4.3 Consideration of requirements under other NSW Acts

Supplementary NSW environmental planning legislation that is directly relevant to the approval and assessment of the proposal is outlined below.

3.4.3.1 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (NSW) (BC Act) aims to conserve biodiversity at a bioregional and state scale. This includes listing a number of threatened species, populations and ecological communities.

The biodiversity management framework changed in NSW since the submission of the N2NS Phase 1 EIS in 2017. These changes include the commencement of the BC Act and the implementation of the new *Biodiversity Assessment Method Order 2020* (BAM) (Office of Environment & Heritage, 2020). In accordance with the BC Act, a Biodiversity Development Assessment Report (BDAR) has been prepared by an accredited person in accordance with the BAM.

Threatened species information from the original biodiversity assessment under the NSW Framework for Biodiversity Assessment (FBA), for the combined N2NS Phase 1 and Phase 2 sections in the 2017 EIS, will still be relevant to this EIS; however, the following new information is required as part of this EIS:

- ▶ new vegetation surveys under the BAM (using Vegetation Integrity Plot method)
- ▶ additional threatened species surveys to address BAM requirements and to capture new species listed under NSW or Commonwealth legislation since the submission of the original 2017 EIS.

Changes to the *Local Land Services Act 2013* (NSW) (LLS Act) resulted in land categorised as Category 1 (Exempt Land) under the LLS Act managed differently under the BC Act and the BAM. A Land Category Assessment (LCA) has been undertaken as part of this assessment.

Further consideration of the impact of this proposal on biodiversity is provided in Chapter 10: Biodiversity.

3.4.3.2 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (NSW) (FM Act) provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The FM act regulates certain activities that have the potential to impact aquatic habitats and identifies key threatening processes to fish. Permits under the FM Act are typically required for works that could block the passage of fish movement, the construction of structures in aquatic habitats, or dredging or reclamation works. A permit under section 201, 205 or 219 of the FM Act is not required for this project, because State significant infrastructure does not require these permits by reason of section 5.23 of the EP&A Act. The Act is still relevant to this proposal, in terms of the aquatic biodiversity assessment detailed in Chapter 10: Biodiversity.

3.4.3.3 Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (NSW) (CLM Act) outlines the circumstances in which notification of the Environment Protection Authority (EPA) is required in relation to the contamination of land.

Further consideration of the provisions and requirements of the CLM Act is provided in Chapter 20: Soils and contamination.

3.4.3.4 Protection of the Environment Operations Act 1997

The *Protection of the Environmental Operations Act 1997* (POEO Act) establishes, among other things, the procedures for issuing and managing Environment Protection Licences (EPLs). In accordance with Section 43, EPLs are required for scheduled development work and scheduled activities.

The definitions of scheduled activities provided in Schedule 1 include:

'33 Railway activities—railway infrastructure construction

1. This clause applies to railway activities—railway infrastructure construction, meaning:

- (a) the construction of railway infrastructure (including the widening or rerouting of existing railway infrastructure) and any related tunnels, earthworks and cuttings,*
- (b) any extraction of materials necessary for that construction,*
- (c) any on site processing (including crushing, grinding or separating) of any extracted materials or other materials used in that construction.*

33A Railway activities—railway infrastructure operations

- (1) This clause applies to railway activities—railway infrastructure operations, meaning the operation or the on-site repair, maintenance or replacement of existing railway infrastructure.*
- (3) The activity to which this clause applies is declared to be a scheduled activity if it involves a continuous or connected length of track greater than 30 kilometres that is operated by the same person.*

The proposal meets the definitions identified in Schedule 1 as railway activities—railway infrastructure construction and railway infrastructure operations 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 (licence number EPL3142). This licence would either be amended to include the operation of the proposal or a new licence would be obtained. Licensing requirements for the proposal would be considered in consultation with the Environment Protection Authority (EPA).

3.4.3.5 Roads Act 1993

Under Section 138, Part 9, Division 3 of the *Roads Act 1993* (NSW) (Roads Act), approval from the relevant road's authority is required to impact, or carry out work on or over, a public road. Clause 5(1) of Schedule 2 of the Roads Act exempts public authorities from this requirement, except in relation to works on or over classified and Crown roads. However, ARTC is not a public authority for the purposes of this exemption, and so it will require a section 138 consent.

The proposal would involve works close to and over the Newell Highway, which is a state-owned road. Approval would be sought under section 138 from Transport for NSW (TfNSW) for these works. As noted in section 3.4.2, approval under section 138 of the Roads Act cannot be refused if it is necessary to carry out a SSI project and must be consistent with the SSI approval.

Further consideration of the provisions and requirements of the Road Act is provided in Chapter 11: Traffic and transport.

3.4.3.6 Water Management Act 2000 and Water Act 1912

The *Water Management Act 2000* (NSW) (WMA) and *Water Act 1912* (NSW) (Water Act) control the extraction of water, the use of water, the construction of water storage and transport works such as dams and weirs and the carrying out of activities in or near water sources in NSW. The provisions of the WMA are being progressively implemented to replace the Water Act. Since 1 July 2004 the new licensing and approvals system has been in effect in those areas of NSW covered by operational water sharing plans.

Temporary dewatering and construction activities that interfere with aquifers are generally identified as aquifer interference activities in accordance with the Water Management Act and the *NSW Aquifer Interference Policy* (DPI, 2012); however, the aquifer interference approval provisions of the Water Management Act have not commenced, and licensing of these activities is often carried out under either Part 5 of the Water Act or other approval provisions in the Water Management Act.

A licence under Part 5 of the Water Act will generally be required where there is no water sharing plan and, in some cases, where there is a water sharing plan. The WMA will generally apply where there is a water sharing plan. While the Water Act has some operation even where water sharing plans are in place (e.g. where provisions requiring water supply work approvals have not been 'switched on'), most areas in NSW are subject to the WMA.

Excavation would be undertaken as part of the proposal. Although groundwater may be intercepted, it is unlikely that any dewatering would exceed 3 megalitres (ML) of groundwater per year, meaning that licences or approvals under the water regulatory regimes may not be required. Extraction of groundwater is proposed as one of several potential water sources during construction (described in Chapter 8: Construction of the proposal). Relevant licences and approvals would be sought if required. Water management work approvals under sections 89, 90 and 91 of the WMA are not required for SSI projects.

3.4.3.7 Crown Land Management Act 2016

The *Crown Land Management Act 2016* (NSW) (Crown Land Act) provides an overview of how Crown land should be managed. In relation to actions affecting Crown land:

- ▶ all actions are to be consistent with the 'principles of Crown land management'
- ▶ an assessment must be carried out prior to any dealings in Crown land (such as a lease)
- ▶ specific use of Crown land generally needs to be authorised by a lease, licence or other permit.

The principles of Crown land management are that, as appropriate:

- ▶ environmental protection principles be observed
- ▶ natural resources and the land be conserved, wherever possible
- ▶ public use and enjoyment, and multiple use be encouraged
- ▶ the land and its resources be sustained in perpetuity
- ▶ the land be occupied, sold, or otherwise dealt with consistent with these principles.

An authorisation under the Crown Land Act to allow occupation of Crown land must be obtained. Chapter 9: Land use and property considers the potential impacts of the proposal to land use, including Crown land.

3.4.3.8 Transport Administration Act 1988

The *Transport Administration Act 1988* (NSW) (Transport Administration Act) provides for the administration and management of transport infrastructure and transport agencies in NSW. Under section 99B of the Transport Administration Act, a rail infrastructure owner may close any level crossing, bridge or other structure, provided that, prior to closing the crossing, it notifies TfNSW and the local council, and receives ministerial approval.

Transport for NSW reviews all applications for level crossing closures before they are submitted to the minister to ensure that the relevant issues have been considered, and adequate consultation has been undertaken.

The proposal includes upgrading, relocating or consolidating nine level crossings and replacing eight under-bridges to meet structural load requirements. Further details regarding changes to level crossings and associated infrastructure are considered within Chapter 7: Proposal features and operation.

3.4.3.9 Waste Avoidance and Resource Recovery Act 2001

The *Waste Avoidance and Resource Recovery Act 2001* (NSW) (WARR Act) aims to ensure that waste management options are considered against the following waste management hierarchy:

- ▶ avoidance of unnecessary resource consumption
- ▶ resource recovery (including re-use, reprocessing, recycling and energy recovery)
- ▶ disposal.

ARTC has identified waste commitments within the *Inland Rail Sustainability Strategy* (ARTC,2020), which are to be used as guidance within the design, construction and operational stages of the proposal. The waste strategy aims to minimise waste by managing potential waste in accordance with relevant legislative and policy requirements; designing, constructing and operating the proposal so that materials are managed according to the waste management hierarchy; and implementing the waste management and mitigation measures.

Further consideration of the WARR Act and the waste strategy for the proposal is provided in Chapter 21: Waste.

3.5 Commonwealth requirements

3.5.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, proposed 'actions' that have the potential to significantly impact on matters of national environmental significance (MNES) or the environment on Commonwealth land, or that are being carried out by an Australian Government agency, must be referred to the Australian Government's Minister for the Environment for assessment. If the minister determines that a referred project is likely to have a significant impact on any of the matters described, then the minister will determine that the proposal is a 'controlled action' under the EPBC Act for each of those matters where the minister has determined a likely significant impact. The proposal will be assessed by the Australian Government under the Bilateral Assessment process and, accordingly, approval from the minister would be required. The Bilateral Assessment Process allows the Australian Government Minister for the Environment to rely on NSW environmental impact assessment processes to assess actions under the EPBC Act. The Australian Government considers the impacts of the proposal based on the NSW Minister's Assessment report covering each MNES for which the proposal has been declared a 'controlled action'.

Due to the potential for impacts on protected matters, the whole of the N2NS project was referred to the (then) Australian Government's Minister for the Environment in June 2016 (EPBC Referral No. 2016/7729 dated June 2016). The former Australian Department of Environment and Energy (DoEE) determined the N2NS project to be a controlled action under the EPBC Act and was consequently involved in the assessment and approval process. However, the referred proposal was then varied to relate only to Phase 1 of N2NS. N2NS Phase 1 was approved by the Australian Government Minister for the Environment under the EPBC Act on 1 October 2020.

Similarly, the N2NS Phase 2 proposal was referred to the Australian Government Minister for the Environment in June 2020 (EPBC Referral No. 2020/8689 dated June 2020). The EIS for this phase will be assessed by both federal and state assessment agencies.

Further information on potential biodiversity impacts, including the assessment of the potential impacts on EPBC Act listed threatened species and communities, is provided in Chapter 10: Biodiversity.

3.5.2 Native Title Act 1993

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

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

The National Native Title Tribunal has a number of functions under the Act, including maintaining the Register of Native Title Claims, the National Native Title Register and the Register of Indigenous Land Use Agreements, and mediating native title claims. Native title claims, registers and Indigenous Land Use Agreements are administered under the Act. A search of the National Native Title Vision database was completed on 20 July 2020. One Native Title claim (Gomeri People NC2011/006) is registered across the proposal site.

3.6 Summary of approval and notification requirements

In summary:

- ▶ the proposal is permissible without consent through the effect of the Transport and Infrastructure SEPP. The proposal is SSI and it requires approval from the Minister for Planning under Division 5.2 of the EP&A Act
- ▶ an environment protection licence is required under the POEO Act for the construction of the proposal. In relation to the operation component of the new section of track, either a modification to the existing environment protection licence or a new licence would be required due to condition A1.2 of the existing EPL
- ▶ notice of the application for planning approval must be given in accordance with clause 181(6) of the EP&A Regulation
- ▶ ministerial approval would be sought to close level crossings, bridges or other structures in accordance with section 99B of Transport Administration Act. Prior to closing the crossing, TfNSW and the local council must be notified
- ▶ a licence would be sought under the relevant water regulatory regime if required
- ▶ a permit would be sought under the Roads Act
- ▶ the proposal has been referred to the (then) Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the EPBC Act for consideration as to whether the proposal is deemed to be a controlled action under the EPBC Act due to significant Matters of National Environmental Significance (MNES). The proposal was declared a controlled action. Consequently, the proposal will require approval under the EPBC Act from the Australian Government Minister for the Environment.

3.7 Summary of the assessment process

3.7.1 Environmental assessment requirements

Under section 5.16(1) of EP&A Act, *'When an application is made for the Minister's approval for State significant infrastructure, the Secretary is to prepare environmental assessment requirements in respect of the infrastructure'*. These identify the general requirements for the N2NS Phase 2 EIS, and the key issues to be assessed. The SEARs for the proposal were issued on 14 October 2020 (application number SSI-10054).

The requirements outlined in the SEARs, together with where they are addressed by this EIS, are provided in Appendix A.

3.7.2 Public exhibition and submissions

Under section 5.17 of the EP&A Act, the EIS is required to be placed on public exhibition. During the exhibition period, written submissions would be invited from relevant agencies, stakeholders and members of the public for consideration by DPE in its assessment of the proposal.

DPE will provide ARTC with a copy of the submissions which ARTC would respond to. ARTC may modify the proposal if required and practicable. If the proposal is modified in response to the issues raised, a submissions and preferred infrastructure report (SPIR) would be prepared to describe the scope of the revised proposal; otherwise, a submissions report would be prepared. The department would make the required report publicly available.

Further information on the proposed approach to consultation during the exhibition period is provided in Chapter 4: Consultation.

3.7.3 Assessment and determination

Following the exhibition period, the DPE would, on behalf of the Minister for Planning, review the EIS and the SPIR. The DPE would usually prepare an assessment report within 90 days from the end of the EIS exhibition, which would be submitted to the Minister for Planning, for determination. The minister may refuse the proposal or approve it with any modifications and conditions considered appropriate. The minister's approval and the assessment report would be published on DPE's Major Projects website following determination. Assessment and approval under the EPBC Act from the Australian Government Minister for the Environment would be advised separately.

CHAPTER 04

Consultation

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

ARTC

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4. Consultation

This chapter outlines the objectives, strategies and consultation approach for the proposal during the design process and in preparation of this EIS for the Narrabri to North Star Phase 2—Moree to Camurra North (N2NS Phase 2) Inland Rail (the proposal). It includes the tools and activities used to complete the consultation, outcomes of the consultation, and ongoing consultation activities through the construction and operation phases of the proposal.

4.1 Consultation objectives and strategy

4.1.1 Consultation requirements

Table 4-1 shows the Secretary’s Environmental Assessment Requirements (SEARs) relevant to consultation and outlines the relevant sections in this chapter where the requirements are addressed.

TABLE 4-1 CONSULTATION SEARS REQUIREMENTS

Desired performance outcome	Requirement	Where addressed
4 Consultation The project is developed with meaningful and effective engagement during project design and delivery	1 The project must be informed by consultation, including with relevant local, State and Commonwealth government agencies, infrastructure and service providers, special interest groups, local Aboriginal community groups, affected landowners, businesses and the community. The consultation process must be undertaken in accordance with the current guidelines.	Section 4.1
	2 The Proponent must document the consultation process and demonstrate how the project has responded to the inputs received.	Sections 4.2 and 4.3
	3 The Proponent must describe the timing and type of community consultation proposed during the design and delivery of the project, the mechanisms for community feedback, the mechanisms for keeping the community informed, and procedures for complaints handling and resolution.	Sections 4.2, 4.3 and 4.4

4.1.2 Overall objectives

Australian Rail Track Corporation (ARTC) developed a 10-year program to deliver Inland Rail, under the guidance of the Australian Government’s Inland Rail Implementation Group. ARTC’s values commit the organisation to active engagement with stakeholders and the community. ARTC’s approach to communication and engagement is to:

- ▶ ensure engagement activities meet the needs of the community and stakeholders
- ▶ ensure proposal team members, stakeholders and the community understand their roles and responsibilities to deliver the Inland Rail Program
- ▶ support the overall program objectives through active engagement.

The ARTC Inland Rail Communications and Engagement Strategy (ARTC, 2015a) provides the overarching communications and engagement framework for the Inland Rail program. The consultation process was also guided by the Community and Stakeholder Engagement component of the *Draft Environmental Impact Assessment Guidance Series* (Planning and Environment, 2017a) and the Social impact assessment guideline for State significant mining, petroleum production and extractive industry development (Planning and Environment, 2017b).

Effective communication and stakeholder engagement are fundamental to reducing risk, optimising route alignment, minimising social and environmental impacts, securing statutory approvals, and gaining and maintaining the social licence to operate.

The communication and engagement objectives of the proposal and detailed design phase are to:

- ▶ ensure external stakeholders are clearly identified, and their specific needs are understood and managed
- ▶ ensure all stakeholders understand and are aware of the proposal; and work to increase acceptance of Inland Rail in the region
- ▶ ensure the social licence to operate (reputation and trust) is built and maintained through the engagement of external stakeholders
- ▶ ensure that engagement and communication activities are transparent, equitable and accessible, with adequate opportunities for stakeholders to comment or provide input
- ▶ deliver engagement targeted at mitigating identified stakeholder risks, so that the proposal can be delivered on budget and schedule
- ▶ ensure that relationships are built with stakeholders to ensure effective dialogue with the Inland Rail team
- ▶ ensure that all stakeholders, including relevant Aboriginal parties, are aware of the statutory consultation process, timeframes and opportunities to provide feedback
- ▶ ensure that all stakeholders are aware of the Inland Rail Program and the early field studies, environmental approvals and design development process
- ▶ involve the community in negotiable decision points to build trust and buy-in with Inland Rail about the design
- ▶ ensure that feedback from road authorities is incorporated into the road-rail interface design and approvals process
- ▶ ensure affected landowners are aware of opportunities to contact Inland Rail directly with concerns, and trust Inland Rail to assist them
- ▶ pursue stakeholder and community cooperation, understanding and acceptance of the design through meaningful interactions and appropriate engagement.

4.2 Consultation approach

Stakeholder consultation and community engagement has been an important part of the proposal development to date. Consultation activities carried out for the proposal are described in this section.

A targeted consultation approach ensured consultation feedback was obtained in a timely manner to inform the EIS. Noting that hydrology had been identified as a key concern in earlier consultation, ARTC sought feedback from a wider group of stakeholders, including any landowners and community members potentially impacted by changes in hydrology. A key objective of the first round of consultation was to ensure landowners and community were aware of the removal of the proposal from the wider N2NS project and the differences in both project timelines and focus. This first round of consultation also provided general information about a range of factors associated with the proposal, including but not limited to visual impact, level crossings and biodiversity. This initial round of consultation identified that there were three primary issues: hydrology, noise and the potential for land acquisition from a small number of stakeholders. This informed the second and third rounds of consultation.

4.2.1 Stakeholder identification

A stakeholder is defined as any individual, group of individuals, organisation or political entity with an interest in the outcomes of a decision. They may be, or perceive that they may be, directly or indirectly affected by the outcome of a decision (IAP2, 2018). Using a desktop search and field visits, ARTC identified stakeholders directly impacted by, and adjacent to, the existing rail corridor as well as stakeholder groups in the wider community likely to have an interest in the construction and operation of the proposal.

Key stakeholders for the proposal include:

- ▶ UGL Regional Linx (the Rail Infrastructure Manager/Operator and Maintainer of the Country Regional Network)
- ▶ elected members of the New South Wales and Australian parliaments
- ▶ Moree Plains Shire Council (MPSC)
- ▶ state government and Australian Government agencies
- ▶ landowners and residents with the potential to be directly or indirectly impacted by the proposal
- ▶ community, industry and environment groups
- ▶ Traditional Owners and local Aboriginal community groups
- ▶ emergency services

- ▶ utility providers
- ▶ representatives of neighbouring and related projects.

Throughout consultation, the proposal team discussed all key proposal elements with these stakeholders, including:

- ▶ proposal scope, design and features
- ▶ construction and operation of the proposal
- ▶ route selection
- ▶ flooding
- ▶ traffic and transport
- ▶ noise and vibration
- ▶ air quality
- ▶ hazards and risks
- ▶ visual amenity
- ▶ biodiversity
- ▶ heritage
- ▶ waste management
- ▶ biosecurity
- ▶ social and economic impacts
- ▶ public safety
- ▶ consultation.

4.2.2 Community and stakeholder contact and information tools

Various communication channels used to support different phases of stakeholder and community engagement. These channels have been, and would continue to be, instrumental to ensure information and updates about the proposal are disseminated regularly. Feedback from the community and stakeholders would be received, recorded in Consultation Manager database and escalated internally to assist with the development of the proposal.

Table 4-2 outlines the key contact points available during the preparation of the EIS.

TABLE 4-2 CONTACT POINTS AVAILABLE DURING THE PREPARATION OF THE EIS

Information point	Details
Program information line (toll free)	▶ 1800 732 761
Program email address	▶ inlandrailenquiries@artc.com.au ▶ inlandrailnsw@artc.com.au
Website	▶ inlandrail.com.au
Postal address	▶ GPO Box 14 Sydney NSW 2000
Social media	▶ Inland Rail on Facebook, Instagram, LinkedIn, Twitter and YouTube

4.2.3 General activities

Before and during the development of the proposal and EIS, ARTC engaged with stakeholders, landowners, businesses and the community. To ensure stakeholders in the proposal area were kept informed, a number of communications tools were used as outlined in Table 4-3.

TABLE 4-3 CONSULTATION TOOLS

Tool	Purpose	Timing
Toll-free community information line	<ul style="list-style-type: none"> ▶ Inland Rail has a toll-free community information line (1800 732 761) for any enquiries about the proposal. ▶ A team of community and engagement advisors take these calls and direct them to the appropriate engagement advisor for response. 	Established January 2015 and continues to be managed
Program email	<ul style="list-style-type: none"> ▶ Online communication channel where stakeholders can ask questions, share their views, issues and concerns, provide feedback and request additional information. 	Established 2014 and continues to be managed
Inland Rail website	<ul style="list-style-type: none"> ▶ Raises awareness and understanding of the proposal. ▶ Provides information and promotion through which stakeholders can ask questions, share their views, issues and concerns and request additional information. ▶ The website includes proposal factsheets and newsletters, presentations from community events, proposed alignment maps and contact details for the stakeholder engagement team. The website is updated as required to reflect the stages of the proposal. 	Established 2014 and updated regularly
Social PinPoint	<ul style="list-style-type: none"> ▶ Promotes the proposed alignment. ▶ Provides information about key locations along the alignment. ▶ Is an online communication channel where stakeholders can provide feedback and ask questions ▶ Includes links to interactive visualisations focusing on design features such as level crossings and culverts. 	Established in November 2020 and is ongoing
Visualisations	<ul style="list-style-type: none"> ▶ An animated fly-through video of the area allowing the community to visualise the alignment from start to finish. ▶ Updated in 2022 to include culvert locations and level crossings. 	Established in November 2020 and is ongoing
Printed information—distributed to people on a mailing list and at communication sessions	<ul style="list-style-type: none"> ▶ Raises awareness and understanding of the proposal. ▶ Provides information and details about specific projects as well as features and activities. ▶ Provides information on guidelines and procedures. 	Commenced in 2016 for N2NS project Commenced in August for the proposal and is ongoing
Stakeholder electronic newsletter	<ul style="list-style-type: none"> ▶ Electronic newsletters have been sent to stakeholders to provide program updates, invite them to attend community drop-in sessions and advise them of community information sessions. ▶ Individuals can sign up for electronic news program updates online through the ARTC website, at public information displays, or stakeholder engagement advisors can sign them up following a one-on-one meeting. ▶ Separate Phase 2 newsletter to be distributed from March 2022. 	Established in 2019 for N2NS project and is ongoing
Community priority survey	<ul style="list-style-type: none"> ▶ Survey undertaken to understand community priorities for the Social Impact Assessment and future consultation. ▶ Made available through e-newsletters and stakeholder communications. 	September–November 2020
EIS exhibition survey	<ul style="list-style-type: none"> ▶ Survey to understand how people wished to receive information about the EIS while on public display 	June–July 2022
Community information sessions and staffed pop-ups	<ul style="list-style-type: none"> ▶ Provides information on the proposal to the local community. ▶ Seeks local input to inform the design process and EIS. 	Commenced in 2016 for N2NS project Commenced in September 2020 for the proposal Refer to Appendix D for more information
Workshops	<ul style="list-style-type: none"> ▶ Discuss the proposal and address specific questions and concerns in person. 	Commenced in 2016 for N2NS project

Tool	Purpose	Timing
	<ul style="list-style-type: none"> ▶ Provide an opportunity for stakeholder input to inform the design process and EIS. ▶ Obtain targeted feedback from stakeholders to develop the EIS. 	
Landowner face-to-face meetings	<ul style="list-style-type: none"> ▶ Raise awareness of the proposal and the potential impacts on landowners. ▶ Provide an opportunity for landowners to ask questions and have input into the design and EIS. 	Commenced in 2016 for N2NS project Commenced in August 2020 for the proposal
Stakeholder meetings and briefings	<ul style="list-style-type: none"> ▶ Formal and informal meetings providing the opportunity to address specific questions and issues in person. May be initiated by stakeholders or the proposal team. ▶ Provide an opportunity for stakeholder input to inform the design process and development of the EIS. ▶ Submissions from the local councils and businesses have been invited to provide an opportunity for local knowledge and views to be shared with the proposal team. ▶ Over 150 meetings have occurred in the period between August 2020 and March 2022. 	Commenced in 2016 for N2NS project Commenced in August 2020 for the proposal
Inland Rail social media channels ▶ LinkedIn ▶ Facebook ▶ Instagram	<ul style="list-style-type: none"> ▶ Online communication provides information about the Inland Rail program. ▶ Online communication channels where stakeholders can ask questions, share their views, issues and concerns, provide feedback and request additional information. 	Established in 2019 and ongoing
Door knocks	<ul style="list-style-type: none"> ▶ Provide proposal update to stakeholders in Morton and Oak Street who don't have registered contact details on Inland Rail database. ▶ Provide advice of hydrology impacts to Yarraman community. ▶ Discuss 7 day working week with potentially impacted stakeholders. 	January 2021 October 2021
Program database	<ul style="list-style-type: none"> ▶ Records all correspondence relating to the proposal, including feedback, concerns and commitments. 	Established in 2014 and ongoing
Letters and emails to identified stakeholders	<ul style="list-style-type: none"> ▶ Ensure key elements of proposal progress are communicated. 	At key points in the N2NS including advice for splitting Phase 1 and Phase 2 and the EIS development Refer to Appendix D for more information
ARTC Community Investment / Sponsorship	<ul style="list-style-type: none"> ▶ Opportunity for direct or in-kind community support. 	Four times per year
E-blast emails / emails	<ul style="list-style-type: none"> ▶ Promote engagement channels and opportunities to learn more about the proposal. ▶ Promote when community feedback and inputs are required. 	As required
Submissions	<ul style="list-style-type: none"> ▶ Submissions from local councils and businesses have been invited to provide an opportunity for local knowledge and views to be shared with the proposal team. 	Ongoing
Briefing papers	<ul style="list-style-type: none"> ▶ Provided to state and federal government agencies to outline key issues and strategies. 	Ongoing
Local media	<ul style="list-style-type: none"> ▶ Raise awareness and understanding. ▶ Provide information. 	Ongoing
Consultation Manager	<ul style="list-style-type: none"> ▶ Records all correspondence relating to the proposal, including feedback, concerns and commitments. 	Established in 2014 and ongoing

4.2.4 Consultation background

4.2.4.1 Consultation prior to N2NS Phase 2

Stakeholder and community engagement for Inland Rail commenced in 2010 and has evolved in response to changing proposal conditions, and stakeholder and community needs. In early 2015, ARTC developed the Inland Rail Strategic Stakeholder and Engagement Plan (ARTC, 2015a). The aim of the plan was to inform early engagement with key local councils, including MPSC, before commencing formal consultation and fieldwork.

ARTC's approach to engagement during this early phase was to:

- ▶ provide an update to key stakeholders
- ▶ revisit issues raised by councils and other local stakeholders during early consultations
- ▶ discuss any issues identified during technical studies in the priority construction areas
- ▶ understand the councils' views of Inland Rail within their respective regional plans
- ▶ seek input regarding key local stakeholder groups (local business and community leaders) to be engaged through future consultation
- ▶ identify new opportunities and issues associated with delivery of Inland Rail at a local level.

This approach was well received by the local councils, who were actively seeking information and encouraging early engagement. Later in 2015, ARTC developed the Communication and Engagement Plan Narrabri to North Star (ARTC, 2015b) to guide engagement with the local community.

As defined by the plan, consultation has been, and will continue to be undertaken, over five phases, including:

- ▶ development of the business case
- ▶ planning, design and approvals (including preparation of the EIS)
- ▶ construction
- ▶ commissioning and handover
- ▶ operation.

The communication and engagement activities are tailored in the plan for each phase, and generally include:

- ▶ meetings and briefings
- ▶ workshops
- ▶ community information sessions
- ▶ phone, email and written correspondence
- ▶ proposal website
- ▶ distribution of information, including mail outs.

Table 4-4 is a summary of the significant consultation activities that have taken place for N2NS, including prior to the proposal being extracted from the wider N2NS project. Throughout this period, regular meetings occurred with Narrabri Shire Council, MPSC, Gwydir Shire Council (GSC), Local Aboriginal Land Councils (LALCs), government representatives, Transport for NSW (TfNSW) and other critical stakeholders. Email updates were sent to stakeholders throughout this period as needed and regular e-newsletters commenced in August 2019. ARTC also attended a range of community events including Ag-Quip and local agricultural shows. A full list of all consultation and community engagement activities undertaken is in Attachment M of Appendix D: Community consultation report.

TABLE 4-4 CONSULTATION HIGHLIGHTS PRECEDING N2NS PHASE 2 EIS

Year	Summary of activities
2015	<ul style="list-style-type: none"> ▶ Moree farmers meeting in collaboration with MPSC and NSW Farmers Federation—workshop attended by 26 stakeholders. ▶ Moree Local Aboriginal Land Council—meeting with CEO and Deputy CEO. ▶ Correspondence to Cultural Knowledge holders.
2016	<ul style="list-style-type: none"> ▶ Initial face-to-face meetings with over 90 landowners to capture contact details and achieve 110 signed land access agreements. ▶ Meeting with Western Zone Aboriginal Land Council Director. ▶ Workshop—Moree Registered Aboriginal Parties. ▶ Drop-in session Moree—approximately 10 attendees. ▶ Impacted landowners within 1 km of the alignment—mail out providing an overview of the proposal and proposed activities sent to over 390 landowners. ▶ Introductory meeting with Moree Local Emergency Management Committee. ▶ Face-to-face meetings to support cultural heritage and geo-tech field studies with 45 landowners. ▶ Water-flow and flood modelling consultation—face-to-face meetings with approximately 30 landowners. ▶ Emergency Services Moree region—workshop to discuss severance and accessibility and pedestrian safety with representatives from police and ambulance services in attendance. ▶ Stakeholder update—e-news update to councils and MPs. ▶ Face-to-face meetings with 31 landowners with private level crossings. ▶ Inland Rail website launched.
2017	<ul style="list-style-type: none"> ▶ Carried out engagement activities for the EIS public exhibition, including seven drop-in sessions across Narrabri, Moree, Croppa Creek and North Star with a total of 147 people attending the sessions. ▶ Moree Local Aboriginal Land Council and elders Workshop with 7 attendees. ▶ Face to face meetings with 2 landowners regarding potential quarry sites and geotechnical activities. ▶ Engagement with four private landowners to request access for LiDAR surveyors. ▶ Advertising in Moree and Narrabri newspapers advising the community of LiDAR survey activities. ▶ Written notification provided to 74 landowners advising of LiDAR survey activities. ▶ Direct contact with relevant government agencies and key stakeholders to encourage attendance at the EIS community information sessions. ▶ Letters and face to face meetings with 110 landowners to renew property access agreements. ▶ Development of a podcast about the EIS process with short interviews of the Project Manager and Environment Manager. ▶ Updated residents within 500 m of the proposal area through direct mail-out, and the wider community through face-to-face meetings, letters and fact sheets.
2018	<ul style="list-style-type: none"> ▶ Letter/email sent to various stakeholders providing information on N2NS Activities Supporting Inland Rail: N2NS Detailed Design. ▶ Email to 152 stakeholders including councils and MPs that consultation is commencing on detailed design. ▶ Consulted with approximately 120 stakeholders and landowners to support detailed design for Phase 1 and 2 Narrabri to North Star. ▶ Carried out consultation on 84 public and private level crossing designs. ▶ Six meetings with MPSC staff to discuss matters related to the EIS. ▶ Meeting with Moree LALC to discuss matters related to the EIS. ▶ Meeting with Moree Chamber of Commerce to provide update. ▶ Survey available at Moree Show asking community members about communication preference and their experience with Inland Rail thus far—approximately 64 responses. ▶ Briefing with regional NSW Farmers representative and later briefings to three local branches. ▶ Media event with Moree Mayor Katrina Humphries and Member for Parkes the Hon. Mark Coulton MP capturing a drill rig in action for investigations. ▶ Ecology and geology investigations and associated communication activities undertaken on approximately 12 properties. ▶ Meeting with Transport for NSW regarding Jones Avenue.

Year	Summary of activities
2019	<ul style="list-style-type: none"> ▶ Communications to renew Land Access Agreements with N2NS Stakeholders. ▶ Ecology investigations for borrow pits undertaken with relevant N2NS Stakeholders. ▶ Meetings with North-West Local Land Services. ▶ Attendance at Gunnedah Ag-Quip to engage with the broader community. ▶ Attendance at Moree Show—interacted with approximately 80 persons. ▶ Round Table meeting held with Moree Plains Shire Council; Federal Government representative (Mark Coulton); Department of Infrastructure, Transport, Regional Development and Communications; and industry and landowners to discuss N2NS Phase 1 and 2. ▶ Briefing provided to the Hon. Adam Marshall MP on an N2NS Phase 1 and Phase 2 update. ▶ Launched the Inland Rail Sponsorship and Donations Program. ▶ Inland Rail Leadership Team meeting with Narrabri Shire Council and MPSC. Proposal update and introduction to Inland Rail leadership team. ▶ Conducted two information sessions on flooding and noise in Moree—approximately 30 community members attended. ▶ Letter to 44 identified stakeholders in N2NS Phase 2 proposal area re Phase 1 and 2 split and upcoming investigations. ▶ Meetings with seven directly affected landowners. ▶ Supervised investigations on six properties in Phase 2 proposal area to inform the State Significant Infrastructure (SSI) Application and Scoping Report. ▶ Supplier briefings noting Phase 1 and Phase 2 split. ▶ Regular advertisements in NSW Farmers magazine regarding Inland Rail progress. ▶ Five meetings with Moree Plains Shire Council, which included a discussion of N2NS Phase 2 matters. ▶ Meeting with Local Land Services to discuss Travelling Stock Reserves across N2NS Phase 1 and Phase 2. ▶ Update provided to TfNSW on N2NS Phase 1 and 2. ▶ Attempted phone calls to all identified N2NS Phase 2 stakeholders to advise of Phase 1/Phase 2 split. Follow up emails also sent.
2020	<ul style="list-style-type: none"> ▶ Investigations in Phase 2 proposal area to inform SSI Application and Scoping Report. ▶ Meet the Proponent sessions for N2NS Phase 1 in Moree—presentation noting Phase 1/Phase 2 split.

4.3 Consultation relevant to the EIS

4.3.1 EIS consultation approach

While N2NS Phase 2 communications and engagement are ongoing (through the general activities and communication channels detailed in this section) consultation for development of the EIS was focused around the following intensive periods of consultation.

4.3.1.1 Hydrology model and proposal overview: August to September 2020

In August and September of 2020, the Community Engagement Team met with approximately 40 landowners, as well as a range of other stakeholders including the MPSC, TfNSW, the Moree Local Aboriginal Land Council and the Gwydir Valley Irrigators Association to introduce the Phase 2 EIS process.

The key intention was to seek feedback from the community about whether the hydrology model to be used as the basis of the preliminary design was consistent with their personal experience. Key materials presented as part of consultation included historic flood imagery and flood modelling showing existing water flow and interaction with the rail line.

The team also introduced the range of topics that would be covered in the development of this EIS and sought early views on topics of interest. This was also supplemented by a community survey that was distributed to the Phase 1/Phase 2 newsletter distribution list.

As well as individual meetings, an online and a drop-in information session were hosted. A community information session was also held for the Yarraman Community after a full assessment of potential hydrology impacts to that area.

The objectives of these sessions were to:

- ▶ provide a proposal update to the wider community who are further from the proposal area and therefore had not participated in a one-on-one meeting with the proposal team
- ▶ provide the wider community an opportunity to interact with the wider proposal team specialists, including hydrology, noise and environmental
- ▶ provide an opportunity to ask questions and give feedback to the proposal team.

Summary of issues raised

Landowners consulted were generally supportive of the N2NS Phase 2 proposal and appreciated the opportunity to review the hydrology modelling. During consultation sessions, it was apparent from mapping and flood modelling that most landowners in the proposal area would be protected by measures such as mounds and levees. All landowners did, however, reiterate the importance of ensuring sufficient culverts were part of the preliminary design.

It was clear through this initial round of consultation that hydrology and noise were the key areas of interest and this informed the following rounds of consultation.

Other points of interest included fencing, potential temporary occupation, air pollution and traffic disruption. Initial views were sought on the replacement of the bridges; however, the majority of landowners and local residents were unconcerned by their removal and replacement. Some did, however, express the desire for there to be some form of memorial for the bridges.

4.3.1.2 Understanding impacts, feedback on design: November to December 2020

The primary objective of these meetings was to present and seek feedback on proposed design, including rail alignment, level crossing design and trafficking requirements, culvert size and placement and flood impact. Key materials presented as part of consultation included flood modelling showing the proposed rail design to minimise both the possibility of water overtopping the rail line and effect of changed flood conditions on properties and infrastructure.

It was also important that the team understood how any potential increase in hydrology impacts would affect properties and residences. The team ensured they gained a good understanding of where recent flood events had impacted and how far the waters were from entering houses.

During this period the team also informed the community about construction impacts relevant to them and sought their feedback on how this might impact their operations.

The team also provided information on the proposal approval process as well as highlighting how to provide a submission.

In December, a further online session as well as a drop-in information session were provided to give the wider community the opportunity to review the preliminary design and raise any other concerns.

Summary of issues raised

During this round of consultation, discussion focused on preliminary design and anticipated hydrological impacts for proposal stakeholders. The community provided feedback on how close previous flood events had been to entering their properties and considered information about impacts the proposal may have on flood levels.

Landowners were generally supportive of the preliminary design and provided positive feedback in relation to the large number of culverts. The hydrologist presented flood model mapping showing anticipated impacts and, with limited exceptions, landowners were generally comfortable with the level of change. Landowners were made aware that areas such as the Camurra hairpin would continue to be subject to refinement during detailed design.

Landowners indicated acceptance of construction noise and impacts, noting that most simply wanted the construction period to be completed as soon as possible. The majority of residents residing in proximity to the alignment expressed concern regarding operational noise and the number of trains predicted to be in use. This was the focus of the next round of consultation.

4.3.1.3 Noise and what it means: February 2021

The Community Engagement Team met with a smaller number of stakeholders in February 2021, including those closest to the rail alignment. The key objective was to identify landowners who would be eligible for noise mitigation treatment (based on completed noise modelling) and those who would be noise affected but may not be eligible for treatment. Key materials presented as part of consultation included construction and operational noise modelling, and visualisations of proposed mitigation measures (noise wall). Discussion included a detailed explanation of rail noise impacts, the amenity protection triggers in the NSW Rail Infrastructure Noise Guideline and available mitigation measures that would be explored during detailed design.

The team also sought to explain noise impacts during construction, including potential work hours. It was also deemed important to understand the particular needs of any shift-workers so this could be factored in during construction planning, if possible.

Summary of issues raised

In this round of consultation, there was a high level of concern identified around operational noise impacts, particularly because currently the rail line, while operational, has very limited use. There was a strong perception that a greater number of residences would have been potentially eligible for noise mitigation measures. ARTC clarified that noise mitigation would likely not be required for those north of the Mehi River, but those south of the Mehi River crossing would require noise mitigation and a noise wall may be considered during detailed design. Views in the community on a noise wall differed depending on location—with those closest to the rail line opposing it and those further away being generally more supportive. ARTC acknowledged these concerns and intends to consult extensively with the community during detailed design.

4.3.1.4 Construction hours: October to November 2021

The Community Engagement team door knocked a number of stakeholders, including landowners and tenants in Morton, Oak, Gosport and McElhone Streets, to seek feedback on the proposal of a seven-day construction working roster. These landowners and tenants are predicted to receive in excess of 55 dB construction noise from works carried out from 6 am–6 pm, Monday to Sunday.

The key objective of the door knock was to inform residents of the proposed working hours and to identify whether residents would support the proposal. The Community Engagement Team used a survey to identify any potential impacts and collect feedback from landowners and tenants.

An email containing the survey was sent to a wider group of stakeholders along the Phase 2 the alignment, to advise them of the proposed 7-day working roster. Follow-up phone calls were made to stakeholders who had not submitted a survey response to ensure a wide snapshot of feedback was received. An additional 46 stakeholders submitted feedback through this process.

Summary of issues raised

Views on the proposal differed, with most objections received from nearby impacted residents. Concern was also expressed by local businesses regarding potential worker fatigue as a result of the 7-day working roster. From this engagement, 55 stakeholders supported the working hours proposal, and 6 did not.

4.3.1.5 Social Impact: October to November 2021

The primary objective of this consultation was to better understand how the proposal would impact Moree and the surrounds. The Community Engagement and Social Performance teams met with a number of agencies who were overwhelmingly positive about the proposal, acknowledging that Inland Rail has been present in the community for some time, and some positive and negative impacts have already been experienced.

Summary of issues raised

While feedback was positive, most stakeholders were concerned about the impact on the housing market and housing availability. The agencies noted positive experiences from the Phase 1 project and the economic boost it has provided locally. They also noted that people from disadvantaged backgrounds may not be able to take advantage of the opportunities, and the Community Engagement Team committed to examining how to address this disadvantage for the Phase 2 proposal.

Moree Plains Shire Council is examining the issue of housing and has prepared a Moree Plains Local Housing Strategy, which will be subject to market forces and it notes the high demand for housing construction personnel.

4.3.1.6 Velocity impacts on soil: November to December 2021

The Project Team met with 6 directly affected landowners along the alignment to present the modelled velocity impacts on soil and to seek feedback on potential mitigation measures. Further refinement of these potential mitigation measures would be undertaken during the detailed design phase of the proposal to align with regulatory requirements set by the DPE.

Soil sampling and characterisation was conducted at 10 locations along the alignment to refine ARTC's understanding of the potential velocity impacts. The soil sampling and characterisation identified largely homogeneous results at each of the sample sites, except in two locations where the landowner had constructed a pad or hard stand area.

As well as the soil sampling and characterisation results and potential mitigation measures, the Project Team also explained the Quantitative Design Limits (QDLs). These limits are important because they define the maximum permissible change to flood parameters such as velocity, duration and flood level resulting from the implementation of the CSSI. Landowners were advised that if velocity QDLs were breached, further discussions would occur between ARTC and landowners, and 'at property' mitigation measures would be negotiated. It was explained that ARTC is not proposing to redesign the reference design to mitigate the potential QDL exceedances; however, ARTC is seeking feedback on the acceptability of the impacts and suggestions of potential 'at property' mitigations.

Summary of issues raised

The majority of landowners were comfortable with the level of change predicted and agreed the impacts could be addressed during the detailed design phase via further consultation to seek an acceptable outcome.

One landowner expressed concern at both the modelled velocity and afflux impacts presented. The landowner's key concerns related to the extent of modelled impacts given their intention, at the time of purchase, was to resell the block for a future house build. The landholder identified that, in their view, the modelled hydrology changes may negatively affect the saleability of the block. This landowner was agreeable to working through these issues in the detailed design phase when the final impacts are identified.

ARTC would seek to finalise the design, develop 'at property' mitigations and consult with affected landowners during detailed design.

4.3.1.7 Temporary and permanent occupation for construction and operational purposes

During April, May and June of 2022, the community engagement team met with landowners who were identified as impacted by temporary occupation. Landowners were advised of the proposed occupation area and the steps that would be taken to lease or license the area for construction. Landowners spoken to were comfortable with the areas identified and the process.

Conversations also occurred with landowners impacted by permanent acquisition as a follow up to conversations that had occurred in 2020.

Summary of issues raised

Landowners were generally comfortable with the temporary occupation process, while those affected by permanent occupation remain keen to ensure appropriate and adequate compensation via due process.

4.3.1.8 Interim period

The objectives of engagement activities conducted in the periods between each round of consultation were to:

- ▶ finalise meeting outcomes by sending minutes and providing opportunity to comment
- ▶ provide further opportunity to provide feedback by sending link to survey to all meeting participants
- ▶ continue conversations with stakeholders about issues that arose in the previous consultation to enable better outcomes for stakeholders in further consultation.

4.3.2 Overview of consultation activities

In response to community gathering restrictions due to the COVID-19 pandemic, ARTC undertook a flexible approach to consultation. Regionally based staff personally attended consultation events and landowner meetings, supported by other team members attending and presenting online. This enabled a greater presence of experts than may have ordinarily been possible. Figure 4-1 provides an overview of the landowners who have been consulted during the EIS preparation.

The meetings with landowners involved a hydrologist, regionally based engagement officers, the Senior Environmental Adviser and an engineering specialist where relevant or requested. Community information sessions during this period involved two virtual sessions and three face-to-face sessions.

The online approach to consultation enabled more flexibility for stakeholders to participate, especially considering the regional proposal area. By hosting a community information session online, ARTC assisted stakeholders to participate in their homes and have access to all members of the project team to ask questions or raise concerns.

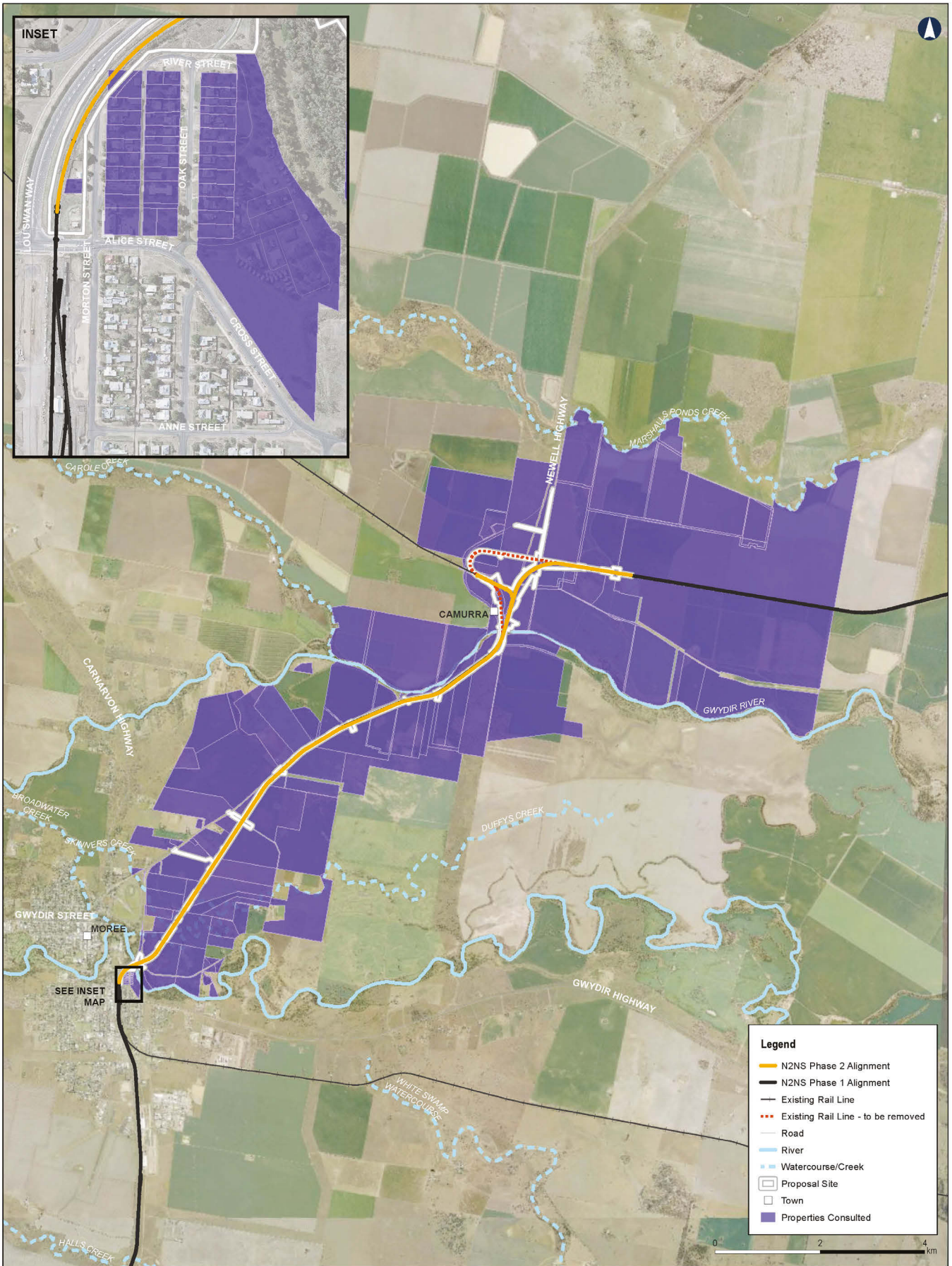


Figure 4-1 Landowner consultation

Data Sources: ARTC, IRDJV, LPI

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 1 of 1

N2NS_SF2_EIS_F04_01_PropertiesConsulted_r2x2.mxd

A summary of key engagement activities that ARTC has carried out on Phase 1 and Phase 2 of the proposal is provided in Table 4-5. A full outline of community engagement and stakeholder consultation activities is provided in Appendix D.

TABLE 4-5 SUMMARY OF CONSULTATION ACTIVITIES DURING THE DEVELOPMENT OF THE EIS

Month	Activities
August 2020	<ul style="list-style-type: none"> ▶ Letter sent to 31 proposal stakeholders explaining the separation of N2NS Phase 1 from Phase 2 and advising upcoming consultation activities. ▶ Briefing with Transport for NSW (TfNSW) and Department of Planning, Industry and Environment (DPIE). ▶ Meeting with Gwydir Valley Irrigators Association. ▶ 19 meetings with landowners who are directly or indirectly impacted by the project.
September 2020	<ul style="list-style-type: none"> ▶ Meeting with North West Local Land Services to further discuss proposed acquisition in Camurra North Travelling Stock Reserve (TSR). ▶ 2 meetings with Moree Plains Shire Council staff to provide introduction to EIS process and discuss hydrology modelling. <ul style="list-style-type: none"> ▶ One meeting included consultants contracted by MPSC to examine floodplain risk management strategies. ▶ Presentation to MPSC councillors—proposal overview. ▶ 23 meetings with landowners who are directly or indirectly impacted by the proposal. ▶ Advertisements in Moree Champion Post promoting Community Information Sessions. ▶ Sponsored posts on Facebook promoting Community Information Sessions. ▶ Letter-box drop with flyer for Morton Street and Oak St area to promote Community Information Sessions being held to inform that community of particular issues of interest to them, including construction and operational noise and hydrology modelling. ▶ Face-to-face community drop-in session for Morton Street and Oak St area—seeking to provide proposal updates and gather contact details. ▶ Online community information session for the wider Moree community (approx. 40 attendees)—provided proposal overview with a focus on hydrology modelling. ▶ Community Priority Survey hosted on N2NS website—survey sought feedback on issues of interest—low return rate. ▶ Minutes sent to Landowners and Stakeholders with link to survey.
October 2020	<ul style="list-style-type: none"> ▶ E-news sent to registered addresses. ▶ Meeting with MPSC. ▶ Three meetings with landowners who are directly or indirectly impacted by the proposal.
November 2020	<ul style="list-style-type: none"> ▶ Letter sent to Morton St and Oak St residents outlining potential construction impacts and seeking their views on noise mitigation measures. ▶ Two meetings with landowners who are directly or indirectly impacted by the proposal. ▶ One meeting with Yarraman community representative on how best to approach Yarraman Community in relation to minor changes in flood behaviour. ▶ Meeting with North West Local Land Services. ▶ Meeting with Moree Police Service. ▶ Meeting with Rural Fire Service. ▶ Presentation to Moree Plains Shire Council Floodplain Management Group.
December 2020	<ul style="list-style-type: none"> ▶ Meeting with Gwydir Valley Irrigators Association. ▶ Meeting with SES—Southern and Western Zone. ▶ Presentation to Local Emergency Management Committee. ▶ 41 meetings with landowners who are directly or indirectly impacted by the proposal. ▶ Face-to-face community drop-in session for the Moree community. ▶ Online community information session for wider Moree community (14 attendees). ▶ Minutes sent to Landowners identifying where further action required.
January 2021	<ul style="list-style-type: none"> ▶ Door-knock Morton St and Oak St area to gain contact details and inform of potential construction and operational noise with principal aim of consulting on noise mitigation measures.

Month	Activities
February 2021	<ul style="list-style-type: none"> ▶ E-news sent to registered addresses, included link to SEARs. ▶ Meeting with MPSC, discussion included: construction and operational noise, historic bridges, and hydrology impacts. ▶ Meeting with Moree Local Aboriginal Land Council to discuss proposed acquisition in Camurra North TSR and their claims on it, overpass issues and noise wall implications. ▶ 24 meetings with landowners who are directly or indirectly impacted by the proposal. ▶ Door-knock and letterbox drop in Yarraman (Yarraman is approximately ten minutes' drive from Moree) to promote community drop-in—flyer indicated slight changes in hydrology impact due to preliminary design (approximately 80 flyers dropped). ▶ Face-to-face community drop-in session for Yarraman community regarding flooding (six attendees), information well-received by those present.
March 2021	<ul style="list-style-type: none"> ▶ Presentation to the Floodplain Risk Management Committee on updated hydrology models. ▶ Meeting with North-West Local Land Services in Tamworth to discuss TSRs. ▶ Meetings with stakeholders to provide updates on hydrology impacts.
April 2021	<ul style="list-style-type: none"> ▶ Attendance at Moree Show. ▶ Attendance at council-hosted business information session with the Moree community to provide information on N2NS Phase 1 and Phase 2. ▶ Meeting with Heritage NSW to discuss bridges in the proposal area. ▶ Two presentations to Moree community groups.
May 2021	<ul style="list-style-type: none"> ▶ Attendance at Lions Club meeting to provide information on N2NS Phase 1 and Phase 2. ▶ Cultural tour with Moree Local Aboriginal Land Council. ▶ Attendance at Probus meeting to provide information on N2NS Phase 1 and Phase 2. ▶ Tour of TSRs with North West Local Land Services to understand stock movements. ▶ Meeting with Moree Local Aboriginal Land Council to provide an update on hydrology impacts. ▶ Four meetings with landowners to renew land access agreements and provide a proposal update.
June 2021	<ul style="list-style-type: none"> ▶ One meeting with landowner to advise of surveying audit. ▶ One meeting with landowner to advise of hydrology impacts.
July 2021	<ul style="list-style-type: none"> ▶ Regular meeting with TfNSW. ▶ Three landowner meetings to renew land access agreements and provide proposal update.
August 2021	<ul style="list-style-type: none"> ▶ Regular meeting with TfNSW to discuss staffing, EIS display time, short-stacking and interaction with designs.
September 2021	<ul style="list-style-type: none"> ▶ Correspondence with one impacted landowner regarding flood mitigations. ▶ Correspondence with one impacted landowner in regarding hydrology impacts and offering a one-on-one meeting with the Environmental Advisor. ▶ Discussion with impacted landowners regarding land acquisition.
October 2021	<ul style="list-style-type: none"> ▶ Door knocked impacted Phase 2 Moree residents regarding the proposal of a seven day working roster on P2/SP2, letterboxed dropped residents with survey, emailed survey to stakeholder list, over 40 follow up phone calls. ▶ Presentation to Moree Plains Shire Councillors, specifically those sitting on Strategic Works Committee. ▶ Meeting with Indigenous Group to discuss native grasses program. ▶ Meeting with Landcare to discuss biodiversity offsets. ▶ TfNSW discussion around Newell Highway upgrade and cumulative effects. ▶ Meeting with MPSC Strategic Works Council Meeting proposal update.
November 2021	<ul style="list-style-type: none"> ▶ Follow-up meeting with TfNSW to discuss cumulative effects on Newell Highway. ▶ Presentation to Moree Plains Shire Council about social impacts. ▶ Mehi River Bridge area: community consultation. ▶ Follow-up meeting with TfNSW to discuss Newell Highway Upgrade. ▶ Meeting with TAFE NSW—Moree to discuss native grasses, grains and the Mehi River area. ▶ Meeting with four community and Indigenous groups to provide Phase 2 update and discuss social impacts. ▶ Meeting with one landowner to discuss access during construction. ▶ Soil investigations.
December 2021	<ul style="list-style-type: none"> ▶ Meeting with six landowners to discuss hydrology and soil sampling. ▶ Social performance briefing for Moree housing organization.
January 2022	<ul style="list-style-type: none"> ▶ Meeting with 4 landowners to discuss property acquisitions. ▶ EIS briefing for DPE.

Month	Activities
February 2022	<ul style="list-style-type: none"> ▶ Contact with landowner to discuss level crossing requirements. ▶ Post drought biodiversity surveys. ▶ Surveying investigations. ▶ Letterbox drop and face-to-face contact to promote community drop-in session at the Moree Sports Health Arts and Education Academy. ▶ Letterbox drop and face-to-face to discuss changes in hydrology impact in Yarraman and Moree. ▶ Meeting with MPSC to discuss social impact and Indigenous engagement. ▶ Meeting with landowner to discuss noise impact. ▶ Meeting with stakeholder to discuss Indigenous engagement. ▶ Email sent to DPE Water requesting contact details.
March 2022	<ul style="list-style-type: none"> ▶ Meeting with TfNSW to discuss CRN network. ▶ Engagement Event held at the Moree Sports Health Arts and Education Academy on 9 March to provide proposal update. ▶ Meeting with 2 landowners to discuss noise impacts and construction impacts on agriculture infrastructure. ▶ Meeting with TfNSW, MPSC and Crown Lands to discuss road alignment near Camurra Bend. ▶ Regular catch up with MPSC – confirmed no regular use of Mehi and Gwydir Rivers. ▶ Meeting with Moree Business Chamber to advise of upcoming EIS process and provide update. ▶ Meeting with MPSC to discuss alignment design questions, reiterate expected QDLs and confirm consistency with Gwydir Floodplain Management Plan. ▶ Development of newsletter specifically for the Narrabri to North Star Phase 2 proposal. ▶ Further meeting with TfNSW to discuss CRN network.
April 2022	<ul style="list-style-type: none"> ▶ Presented at Moree TAFE hosted event – Industry focus ▶ Meeting with TfNSW to discuss matters of joint interest ▶ Meetings with 11 landowners to discuss temporary occupation process for construction purposes
May 2022	<ul style="list-style-type: none"> ▶ Meetings with 9 landowners to discuss temporary and permanent occupation process ▶ Meeting with North West Local Land Services to discuss temporary occupation process ▶ Regular meeting with Department of Infrastructure ▶ Phase 2 specific newsletter issued
June 2022	<ul style="list-style-type: none"> ▶ Face-to-face meeting with TfNSW to discuss hydrology impacts ▶ On-site meeting with stakeholders to discuss impacts to irrigation pump ▶ Regular catch-up with MPSC ▶ Presentation to Moree Probus Club ▶ Meeting with 1 landowner to discuss temporary occupation and design issues ▶ Meeting with Local Land Services to further discuss construction impacts as well as Level Crossings ▶ Meeting with Moree and District Police Services—proposal update ▶ Phase 2 specific newsletter issued included survey asking readers how they would like to receive information on the EIS

4.3.3 Results of consultation relevant to the EIS

A number of interests and issues were raised by stakeholders and community members during the preparation of the EIS in meetings, briefings, information sessions, and via email and phone. Hydrology was the key concern raised across consultation events, reflecting the complexity of the proposal area and justifying the removal of this section from the N2NS alignment.

Table 4-6 identifies issues raised during community and stakeholder consultation and where they are addressed in the EIS. A full copy of government agency stakeholder letters is provided in Appendix A of the EIS.

TABLE 4-6 ISSUES RAISED DURING EIS CONSULTATION

Topic category	Issues raised for consideration	EIS reference
Land use/properties	<ul style="list-style-type: none"> ▶ Process and timing of property acquisition and temporary land leases. ▶ Concerns about property devaluation. ▶ Impact of proposal on future property plans (subdivisions, selling property). ▶ Fencing of rail corridor needs to reflect land use (crop, livestock). ▶ Impact on irrigation channels and operations during construction. 	Chapter 9: Land use and property

Topic category	Issues raised for consideration	EIS reference
Traffic/access	<ul style="list-style-type: none"> ▶ Safety at level crossings. ▶ Wait times at level crossings. ▶ Ensuring emergency access clearance is maintained. ▶ Design allowance for farming machinery and trucks at level crossings. ▶ Improved road safety by freight moving on rail once operational. ▶ Detour routes and lengths during construction. ▶ Impacts on heavy vehicle movements during construction, particularly during harvesting and planting times. ▶ Impacts of construction and operation on travelling stock routes. ▶ Interaction with the Newell Highway. ▶ Safety concerns regarding road width and sight lines at Gwydirfield Road (underbridge). ▶ Maintaining access to irrigation channels within rail corridor. ▶ Maintain access to rail corridor for weed management. ▶ Maintaining access across the rail line for Aboriginal communities. 	Chapter 11: Traffic and transport
Hydrology	<ul style="list-style-type: none"> ▶ Concern around interfaces with highway upgrades and floodplain management programs. ▶ Culvert location and heights. ▶ Changes to flow duration, depth and velocity. ▶ Impacts of flooding related to levee bank heights in the area. ▶ Maintaining water flow through rail line. 	Chapter 12: Hydrology and flooding impact assessment
Noise and vibration	<ul style="list-style-type: none"> ▶ Impact of noise and vibration during operation. ▶ Concern about vibration impacts to property during piling as part of bridge construction. ▶ Noise mitigation measures available to nearby landowners. ▶ Nature of noise carrying along the Mehi River and across from the rail line. ▶ Concern about operational noise modelling results and lack of mitigation measures required according to the Rail Infrastructure Noise Guideline (RING) (EPA, 2017). ▶ Concern about graffiti/crime associated with the noise wall mitigation option. ▶ Concern about sleep disturbance for shift workers during construction. 	Chapter 16: Noise and vibration
Social and economic impacts	<ul style="list-style-type: none"> ▶ Opportunities for local jobs and bringing people to the area. ▶ Increased connectivity for farmers and new industries. ▶ Better pricing of grains to more competitive and broader markets. ▶ Opportunities for community partnerships, grants and sponsorship. 	Chapter 17: Social impact assessment Chapter 18: Economics
Visual amenity	<ul style="list-style-type: none"> ▶ Impacts of operation on visual amenity. 	Chapter 19: Visual impact assessment
Air quality	<ul style="list-style-type: none"> ▶ Concern about air quality and negative health impacts associated with increased use of rail line. 	Chapter 24: Air quality and greenhouse gas

4.3.4 Response to consultation feedback

Consultation as part of EIS development proactively seeks feedback from stakeholders, impacted landowners and the wider community to ensure project acceptance throughout the proposal area. As this proposal is currently in the Reference Design stage, this feedback has been captured to further explore in the detailed design phase, which will take place after this EIS has been approved. Table 4-7 provides examples where consultation feedback has been incorporated into the design and approvals process.

TABLE 4-7 FEEDBACK INCORPORATED INTO DESIGN

Feedback	Response	Next steps
Landowner requested construction access route to go north of property, removing the need for construction vehicles to drive past his house to the south of property (creating noise, dust and safety concerns).	<ul style="list-style-type: none"> ▶ Modified the construction impact zone (CIZ) to have construction access road go north of property. 	<ul style="list-style-type: none"> ▶ Include modified CIZ as part of this EIS.

Feedback	Response	Next steps
Landowners trees at front of property were originally captured in the EIS CIZ.	<ul style="list-style-type: none"> ▶ Modified CIZ to reduce proposal footprint. ▶ CIZ increased on the north side of road to minimise effect on residential properties. ▶ Reducing impact to trees maintains visual screen between the house and rail line/level crossing and addresses any visual amenity concerns. 	<ul style="list-style-type: none"> ▶ Include modified CIZ as part of this EIS.
During consultation, landowners offered locations for borrow pits to use during construction. Borrow pits were previously considered as part of the early investigations in the EIS.	<ul style="list-style-type: none"> ▶ As there are a number of existing borrow sites already established in the area, Inland Rail determined that it would not be required to set up more borrow sites and instead would be better to procure material on a commercial basis. ▶ Therefore, Inland Rail will not be developing borrow sites and instead buying the material from existing commercial and licensed sources. 	<ul style="list-style-type: none"> ▶ Informed landowners of this approach.
The proposal design is close to a 3 m deep well and pumping station into the Gwydir River, feeding an irrigation channel travelling north. Request to explore options to relocate pumping station.	<ul style="list-style-type: none"> ▶ Extended CIZ to include this property for further consultation regarding potential relocation of the pumping station. 	<ul style="list-style-type: none"> ▶ Include extended CIZ as part of this EIS. ▶ Seek to move pump early to provide landowner with certainty around his ability to plan irrigation operations ▶ Further conversations required with landowner and construction contractor during detailed design.
Landowner noted preference for small culvert to be removed to water flows into paddocks instead of shed.	<ul style="list-style-type: none"> ▶ Preference noted and will be explored further in detailed design. 	<ul style="list-style-type: none"> ▶ Further consideration during detailed design.
During consultation, landowners explained safety issues at the underbridge on Gwydirfield Road, noting road width and sight lines. Requested bridge piers be placed further apart to allow for future road widening.	<ul style="list-style-type: none"> ▶ Noted any future road widening projects are the responsibility of council, not Inland Rail. ▶ Advised, however, that if further assessments of design provide allowance for bridge piers to be placed further apart, Inland Rail would allow this to occur. 	<ul style="list-style-type: none"> ▶ Further consideration during detailed design.
Consultation provided mixed responses of support for a noise wall along Morton Street as a mitigation measure for operational noise.	<ul style="list-style-type: none"> ▶ Consultation found mixed responses in community sentiment to a noise wall along Morton Street. ▶ Consultation will be undertaken in determining final mitigation treatment. 	<ul style="list-style-type: none"> ▶ A noise wall is one proposed mitigation measure which would be considered in determining the best noise mitigation approach for the Morton Street area based on what is most reasonable and feasible (community feedback, cost, safety and maintenance). ▶ Arrange early consultation to provide certainty to this community.
Landowners noted support for the removal of the Mehi Bridge. There were, however, requests for a memorial.	<ul style="list-style-type: none"> ▶ Preference noted and will be explored further in detailed design and relevant heritage discussions. ▶ Heritage assessment has included a requirement to undertake heritage interpretation for any bridge demolition 	<ul style="list-style-type: none"> ▶ Further consideration during detailed design and heritage discussions. ▶ Convene community meeting to record suggestions and requests into the heritage interpretation.
Landowner raised issue with telecommunications reception along the alignment and requested localised signal upgrades to address increased demand on the network.	<ul style="list-style-type: none"> ▶ Working group established to address issue. 	<ul style="list-style-type: none"> ▶ Working group would be advised of particular telecommunications reception issues within the Phase 2 proposal area. ▶ Conversation about telecommunications is ongoing at a project level.
Landowners provided feedback on the need to balance flood flows and ensure culverts were situated in suitable locations to	<ul style="list-style-type: none"> ▶ Flood model used to identify most suitable locations for culverts to minimise flood impacts to residential properties. 	<ul style="list-style-type: none"> ▶ Flood model would be continuously referred to during detailed design to ensure culverts remain in most effective locations.

Feedback	Response	Next steps
minimise flooding impacts to residential properties.	<ul style="list-style-type: none"> ▶ Flood modelling finessed throughout the EIS process to test scenarios. ▶ Presented options to relevant landowners to seek feedback, noted the work will continue. 	
Consultation with LLS highlighted importance of maintaining stock movements through dedicated TSRs.	<ul style="list-style-type: none"> ▶ ARTC requested tour of stock reserve to understand stock movements more fully. ▶ ARTC would continue to liaise with LLS throughout construction to monitor the use of TSRs that would be impacted by construction. ▶ EIS notes LLS preference for access under bridges to be maintained. 	<ul style="list-style-type: none"> ▶ Consultation would continue in the detailed design phase and would focus on ensuring access is maintained from east to west of the rail line. ▶ Access under bridges to be developed during detailed design to ensure these are maintained.
Consultation with the community highlighted the need to complete construction in a timely manner.	<ul style="list-style-type: none"> ▶ Consultation with the community to seek feedback on a 7-day working week. ▶ Seeking approval through the EIS process for a 7-day working roster during construction. 	Consultation would continue in the detailed design phase and throughout construction to ensure engagement with impacted landowners is appropriately managed.
Consultation with Council led to a request for emergency access under the southern side of the Mehi Rail Bridge.	▶ Project team assessed design compliance with required vehicle clearance.	Project team have provided advice to Council that the rail bridge design will be amended to accommodate emergency vehicles.
Consultation with TfNSW required further information on flood events to inform TfNSW planning.	▶ Project team sought additional modelling from hydrologist.	Project team presented 20% AEP event modelling to TfNSW.
Consultation with TfNSW identified concern of QDL exceedances to infrastructure.	▶ Project team commissioned detailed study on QDL exceedances to TfNSW infrastructure.	Paper will be presented to TfNSW for discussion at regular meetings.
Consultation with TfNSW led to discussion regarding future use of Newell Highway and possible upgrade to B-triple.	▶ Project team commissioned study of level crossings in area and capacity to handle B-triple vehicles.	Paper will be presented to TfNSW for discussion at regular meetings.

4.4 Ongoing stakeholder engagement

4.4.1 Consultation during exhibition of the EIS

This EIS will be placed on public exhibition by DPE for a minimum of 28 calendar days. During this period, stakeholders and the community will be able to review the EIS and are invited to make submissions. Given the current fluid nature of COVID-19 restrictions and the emergency measures required, the tools listed will be considered a minimum for public exhibition. ARTC will continue to liaise with DPE to identify further opportunities that align with the restrictions in place given the state of the pandemic at the time.

Consultation tools used during this exhibition period will include:

- ▶ advertisements in the local media and geo-targeted social media campaign providing information about the proposal and where the EIS will be displayed
- ▶ written notice to impacted landowners
- ▶ newsletters issued to the community (via council newsletters, e-newsletters and others)
- ▶ briefings to key stakeholders, including MPSC and the Moree LALC
- ▶ social pinpoint
- ▶ visualisation tools
- ▶ community information sessions, including at the SHAE Academy.

The EIS will be made available for viewing on the DPE and Inland Rail websites. The public will be able to review the EIS and send submissions to DPE for consideration.

Community information sessions and briefings will be held during the public exhibition period to enable community members and representatives to ask questions.

4.4.2 Submissions report

At the completion of the public exhibition period, DPE will provide ARTC with a copy of all public and government submissions. ARTC will develop responses to submissions received and issues raised (in accordance with the Environmental Planning and Assessment Regulation 2021). ARTC will also continue to liaise directly with key stakeholders about the proposal progress. If changes to the proposal need to be made, a submissions and preferred infrastructure report (SPIR) would be prepared.

While all submissions received will be made available for viewing on the DPE website, the privacy of submitters will be protected by removing names from submissions.

Once the submissions report has been published, ARTC's Inland Rail website will be updated. Stakeholders and landowners will be informed via email and a media release will inform the community that the submissions report is available.

4.4.3 Consultation and communication during design and delivery of the proposal

Consultation and communication with the community and key stakeholders would be ongoing in the lead up to, and during, construction. The consultation activities would ensure that:

- ▶ the community and stakeholders have a high level of awareness of all processes and advanced notice of activities associated with the proposal
- ▶ accurate and accessible information is made available
- ▶ a timely response is given to issues and concerns raised by the community
- ▶ feedback from the community is encouraged
- ▶ opportunities for input are provided.

Once details of the construction program and likely work hours are known, further consultation may take place to reach agreements with residents and the community to extend work hours.

Targeted consultation methods, such as letters, notifications, signage and face-to-face communications would continue. The Inland Rail website and social media platforms would also include updates on the progress of the proposal.

The following communication tools and activities used during the construction phase would include:

- ▶ development of a Communications Management Plan detailing the complaints handling process
- ▶ proposal email address
- ▶ 1800 phone number
- ▶ updates to the Inland Rail website
- ▶ targeted consultation and notifications such as letters, notifications and face-to-face communication
- ▶ construction signage.

4.5 Complaints management

During construction

- ▶ Contractors engaged to construct the proposal would be required to implement an enquiries and complaints management system and procedure during construction of the proposal. This procedure would be defined within the Construction Environmental Management Plan, which the contractor would be required to prepare and have approved by ARTC prior to construction commencing.
- ▶ The complaints management system and procedures would include the following (at a minimum):
 - ▶ contact details for a 24-hour, 7 days a week response line for complaints and enquiries
 - ▶ a postal and email address for ongoing stakeholder contact throughout the proposal
 - ▶ publication of contact details in local newspapers and on the proposal website
 - ▶ provision of accurate public information signs while work is in progress
 - ▶ management of complaints in accordance with ARTC's complaints management procedure and the conditions of approval for the proposal, including:
 - steps to receive, manage and take appropriate action in relation to community enquiries and complaints

- verbal and written responses, describing what action will be taken, provided to the complainant within agreed time limits
- a complaints register to record all enquiries, complaints and contact with community members and stakeholders
- a system for managing unresolved complaints
- reporting requirements in accordance with the conditions of approval.

During operation

- ▶ The NSW EPA requires ARTC to hold a complaints database, email address and phone number to receive and manage environmental complaints in NSW as an obligation of ARTC's Environment Protection Licence.
- ▶ Operational enquires and complaints will be managed in accordance with the existing ARTC Enquires and Complaints Procedure and in accordance with ARTC's EPL and other approvals. Operational complaints and enquires would consider the conditions of approval where relevant.

CHAPTER 05

Need for the Inland Rail Program and the strategic context of the proposal

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

ARTC

INLAND
RAIL 
An Australian Government Initiative

5. Need for the Inland Rail Program and the strategic context of the proposal

This chapter describes the strategic planning context and the opportunities and challenges that have influenced the need for, and development of, Inland Rail, and the Narrabri to North Star Phase 2—Moree to Camurra North (N2NS Phase 2) Inland Rail (the proposal) as part of the wider Inland Rail program.

5.1 The existing situation

There is no direct continuous inland rail link between Melbourne and Brisbane, with interstate rail freight travelling between Melbourne and Sydney via Albury, and then between Sydney and Brisbane, generally along the coast. About 70 per cent of the freight between Melbourne and Brisbane is carried by road, principally the Newell Highway in NSW, and connecting highways in Victoria and Queensland (Transport for NSW (TfNSW), 2015).

The proposal to extend the Australian rail network to provide an inland railway between Melbourne and Brisbane has been around for at least 100 years (ARTC, 2015b). In the last decade, the concept of an inland railway between Melbourne and Brisbane has been subject to significant analysis for the following reasons (ARTC, 2010):

- ▶ the existing north–south coastal railway would reach capacity in the medium term, and additional capacity would be required to service future demands for interstate and regional rail freight
- ▶ the efficiency and service quality associated with the existing coastal route is currently impacting on freight productivity and transport costs
- ▶ road freight transport has a competitive advantage over rail, making it difficult for rail to increase its market share
- ▶ road freight is associated with the potential for safety, congestion and environmental costs as a result of the movement of heavy vehicles on roads
- ▶ rail paths on the coastal route through Sydney are shared between passenger and freight trains, impacting on the reliability of rail freight, and constraining opportunities for the expansion of passenger services.

Two major studies have been undertaken in relation to the development of an inland rail route between Melbourne and Brisbane. The first study, the *North–South Rail Corridor Study* (Ernst and Young, 2006) considered potential corridors for the rail line. As an outcome of the study the ‘far-western sub-corridor’, via Parkes, Moree and Toowoomba, was identified as the preferred corridor for a Melbourne–Brisbane inland railway.

In 2008, the then Minister for Infrastructure, Transport, Regional Development and Local Government announced a study to determine the optimum alignment, as well as the economic benefits and likely commercial success, of a new standard-gauge inland railway between Melbourne and Brisbane. This study, the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010) developed the current Inland Rail alignment (as shown in Figure 5-1). The conclusions of the *Melbourne–Brisbane Inland Rail Alignment Study* include:

- ▶ there is demand for an inland rail line
- ▶ the route for an inland rail line would be more than 100 kilometres (km) shorter than the existing coastal route
- ▶ the preferred alignment could achieve an average Melbourne to Brisbane transit time (terminal to terminal) of less than 24 hours, compared to a transit time on the existing coastal route of about 27 hours and 30 minutes
- ▶ the inland rail line would free up rail and road capacity through Sydney
- ▶ the inland rail line would achieve a positive economic net present value between 2030 and 2035 if demand volumes grow more strongly than forecast, viability could be reached sooner.



Figure 5-1 Inland Rail alignment

Data Sources: ARTC

Paper size: A3
Date: 7/15/2021
Map 1

NSRS_SPT_BIS_EIS_01_MelbtoBrisMap_2x1.mxd

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

In 2015, ARTC produced a strategic *Inland Rail Programme Business Case* (ARTC, 2015a) to demonstrate the viability, benefits, costs and risks associated with Inland Rail to the Australian Government for endorsement, and for further approval to proceed with the delivery of the Inland Rail Program. An addendum to the business case was undertaken in March 2016 (ARTC, 2016) focusing on more expansive calculation of induced freight benefits and wider economic benefits.

In conjunction with the *Programme Business Case*, in 2015 the Inland Rail Implementation Group (ARTC, 2015b) recommended some variations to the corridor from those recommended in the 2010 Inland Rail Alignment Study (ARTC, 2010). The report supported the development of Inland Rail and recommended that the Australian Government commit further funding in the 2016–17 Budget for Inland Rail. The Australian Government then committed \$9.3 billion, in several commitments over a period of three years, for ARTC to develop and build Inland Rail.

In March 2020, Ernst and Young were engaged by the Department of Infrastructure, Transport, Regional Development and Communications to identify the sustained economic uplift flowing to the regions as a result of the operation of Inland Rail. The study (Ernst and Young, 2020) was intended to identify the potential investment opportunities associated with Inland Rail—namely investment opportunities for transport logistics operation, intermodal terminals, warehousing, and food processing facilities. Key dates and deliverables for N2NS Phase 2 to date include:

- ▶ 2006—North–south rail study completed
- ▶ 2010—Inland Rail alignment study completed
- ▶ 2013—Australian Government's \$300 million commitment for the business case and planning announced
- ▶ 2015—Inland Rail business case completed
- ▶ 2016—Australian Government's \$594 million commitment for development and land acquisition announced
- ▶ 2017—Australian Government's \$8.4 billion commitment for ARTC to deliver Inland Rail announced
- ▶ 2019—CSIRO Supply Chain Mapping Pilot completed
- ▶ 2019—Australian Government's \$64 million commitment to improve Inland Rail connectivity announced
- ▶ 2020—Inland Rail Regional Opportunities Report (Ernst and Young)
- ▶ 2020—Australian Government announced an equity investment of \$5.5 billion to ARTC to support the delivery of Inland Rail.

5.2 The opportunity and challenges

A summary of the opportunities and challenges relevant to the development of, and need for, Inland Rail (including the current proposal) is provided below. A detailed analysis of the issues and proposal drivers is provided in the Program Business Case (ARTC, 2015) and addendum (ARTC, 2016), in the *Inland Rail Implementation Group Report* (Inland Rail Implementation Group, 2015) and in the *Inland Rail Regional Opportunities Report* (Ernst and Young, 2020).

5.2.1 Growth in freight demand

In 2011, the domestic rail freight task totalled 261.4 billion tonne kilometres, accounting for approximately 46 per cent of total domestic freight. This represents an increase of 91 per cent since 2000–01 (Infrastructure Australia, 2015).

The *Australian Infrastructure Audit* (Infrastructure Australia, 2015) notes that:

- ▶ the national land freight task is expected to grow by 80 per cent between 2011 and 2031
- ▶ demand for freight rail infrastructure is projected to grow; in particular, for resource bulk commodity haulage in Western Australia, Queensland and NSW
- ▶ freight rail would 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.

Australia's east coast comprises 18 million residents (79 per cent of the country's population) and export trade through east coast ports is estimated to contribute about \$260 billion annually. With the population estimated to grow by 36.8 million by 2047, increasing pressure would be placed on freight infrastructure and services (ARTC, 2015a). The total freight demand is expected to increase from 6.7 million tonnes in 2015 to 10.5 million tonnes in 2030 and 17.9 million tonnes in 2050 (ARTC, 2015a).

Demand for freight transport in the Melbourne to Brisbane corridor is expected to grow substantially over coming decades, from approximately 4.9 million tonnes in 2016 to around 13 million tonnes, or 1.1 million containers, by 2050 (Infrastructure Australia, 2018).

Without the increased use of rail, the growth in freight demand is likely to result in increasing pressure on the road network and associated issues, increased freight costs and a loss of economic opportunity.

5.2.2 Existing freight capacity and infrastructure issues

As the demand for regional and interstate freight transport grows, the existing rail and road infrastructure in the north–south corridor along the Australian east coast will be placed under progressively increasing pressure. Increased pressure is anticipated; particularly on freight capacities between capital cities, and from regional towns to urban freight destinations and export ports.

The current rail connection between Melbourne and Brisbane, via the Sydney metropolitan network, cannot offer the transit times and reliability required by industry. This is largely a function of poor rail alignments and capacity constraints, particularly on the section between Sydney and Brisbane due to delays on freight transiting the Sydney metropolitan area (Infrastructure Australia, 2018). Travel time reliability is poor, as a result of the priority given to passenger services, freight transit curfews in the Sydney metropolitan area, and substandard rail alignments elsewhere. Limited capacity during morning and afternoon passenger peaks restricts freight movements at these times (TfNSW, 2013).

The current road connection between Melbourne and Brisbane via inland NSW offers faster transit times than rail via Sydney (Infrastructure Australia, 2018). However, many of the roads are two-lane single carriageway with limited passing lanes. Without additional capacity, transit times on this corridor would increase as freight volumes rise. Infrastructure Australia (2016) notes that the demand for urban transport infrastructure is projected to increase significantly. Without action, the cost of congestion on urban roads to the wider community could rise to more than \$50 billion each year by 2031. Demand for many key urban road and rail corridors is projected to significantly exceed current capacity by 2031.

The *Inquiry into National Freight and Supply Chain Priorities* (Department of Infrastructure, Transport, Regional Development and Communications, 2018) identifies a number of existing challenges facing road and rail freight, including:

- ▶ road transport would experience further congestion due to the increasing numbers of passenger vehicles, and the priority given to passenger vehicles over freight vehicles in urban transport, resulting in associated higher costs over the next 20 years
- ▶ the encroachment of urban development on freight routes and precincts as cities grow in size and density leads to an increased potential for amenity, environmental and interface issues.

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

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

The issues associated with the existing regional rail systems also include the fact that much of the infrastructure is old and has maintenance and renewal issues. Poor maintenance of rail lines leads to more freight being transported by road, imposing additional maintenance burdens on the affected councils (Infrastructure Australia, 2015).

5.2.3 Assessment of demands for Inland Rail

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 (i.e. the amount of freight transport) has quadrupled, with major increases evident in road and rail transport. Forecasts indicate that the total freight task would continue to grow and is estimated to nearly double by 2030 based on 2010 levels (Standing Council on Transport and Infrastructure, 2013).

The *Programme Business Case* (ARTC, 2015) provides a detailed description of the potential demand for Inland Rail. The demand projections have been used to:

- ▶ estimate the potential revenue of Inland Rail
- ▶ assess the economic benefits arising from mode shift from road and the coastal route to Inland Rail
- ▶ determine the appropriate capacity of Inland Rail
- ▶ determine appropriate service frequency and the impact of this on capacity utilisation, railway and train operating costs.

The main categories of freight that are expected to comprise the market for Inland Rail are non-bulk manufactured products, including bulk steel, paper, coal and grain. The demand analysis (ARTC, 2015) indicates that:

- ▶ Inland Rail is expected to increase rail's share of the Melbourne to Brisbane freight market from the current 26 per cent to 62 per cent by 2049–2050. Similarly, it is estimated that Inland Rail would increase rail freight's share of the Adelaide to Brisbane market by 28 per cent and Brisbane to Perth's share by 7 per cent
- ▶ better connections to the Port of Brisbane would result in an estimated 2 million tonnes of freight shifting from road to rail by 2049–2050—particularly grain and cotton from New England north-west, as well as grain on both rail and road from the Darling Downs to the Port of Brisbane
- ▶ in NSW, a significant tonnage of grain (about 7.5 million tonnes) would also use Inland Rail on its way to NSW ports
- ▶ Inland Rail would induce an increase in freight from the current 8 million tonnes to 19.5 million tonnes.

5.3 Need for Inland Rail

The need for Inland Rail is driven by the issues and demands outlined, exacerbated by factors such as population growth, environmental (greenhouse gas) considerations, the economic and safety costs associated with road congestion, and the emerging recognition of the need to build efficient supply chains to ensure a productive and competitive Australian economy. As noted in the *National Land Freight Strategy* (Standing Council on Transport and Infrastructure, 2013), '*The efficient movement of land freight is crucial for Australia's productivity and competitiveness and affects the lives of every Australian*'. As such, the transition of freight from road to rail is an increasingly important issue, due to road congestion significantly affecting the country's economic productivity as well as impacting the quality of life for Australians. The existing rail mode share of freight between Melbourne and Brisbane (averaging the two directions) varies between approximately 22 to 27 per cent for non-bulk freight, to 60 to 90 per cent for commodities transported in bulk (ARTC, 2010).

The cost of road congestion is projected to grow by \$20 billion in the next decade, and to between \$30 billion a year and \$50 billion a year (Infrastructure Australia, 2016). The *National Land Freight Strategy Update* (Infrastructure Australia, 2013) notes that the infrastructure supporting the movement of land freight, such as road, rail and ports, must be sufficient for the significant projected growth in demand for freight transport (described in section 5.2.1). Additional investment in rail infrastructure (e.g. Inland Rail) is therefore necessary to avoid the repercussions associated with increased traffic congestion at a regional, state and national level.

Rail is generally the most productive and efficient mode for freight travelling from regional areas to export ports and urban destinations. Rail has traditionally dominated the freight market for mining and agricultural commodities, particularly iron ore, coal, grains, rice, cotton, and sugar for processing or export (ARTC, 2015). As noted by the Minister for Infrastructure and Regional Development (2013), '*an efficient rail freight network is the key to effective supply chains, national productivity and competitiveness*'.

Inland Rail is needed to improve the efficiency of freight moving between Melbourne and Brisbane. Inland Rail would bypass the Sydney metropolitan area, substantially reducing the overall journey time to less than 24 hours and increasing the reliability of services between Melbourne and Brisbane (Infrastructure Australia, 2016). This is expected to increase the competitiveness of rail transport relative to road transport (ARTC, 2015).

As noted by the *Australian Infrastructure Audit* (Infrastructure Australia, 2015), '*Rail offers an alternative to road transport and societal benefits in terms of lower emissions, reduced road congestion and increased safety per tonne kilometre, particularly over longer distances or when carrying heavy goods*'. Infrastructure Australia has also considered that Inland Rail is likely to have long-term benefits both to potential users and the broader economy.

In summary, Inland Rail is needed to:

- ▶ respond to the growth in demand for freight transport (as described in section 5.2.1)
- ▶ address existing freight capacity and infrastructure issues (described in section 5.2.2)

- ▶ meet the demand for transport of non-bulk manufactured products (described in section 5.2.3)
- ▶ improve sustainability, as moving freight by rail is found to be four times more fuel efficient than moving freight by road.

5.4 Need for the proposal

N2NS Phase 2 is integral to the Inland Rail between Melbourne and Brisbane, and forms one of the 13 projects required to deliver the program of works. N2NS Phase 2 has been designed to improve flood immunity and re-align the track to maximise train-speed efficiency. The current bridges do not have the structural integrity and the track is not capable of carrying the larger/heavier axle loads. Existing curves and the alignment of the current track do not allow for greater train speeds and, therefore, would not be able to provide the efficiencies needed for the new trains.

These changes have been implemented to provide for a faster and more efficient connection—one that is less prone to delays from flooding in the local area. This is critical to the Inland Rail program achieving an average Melbourne to Brisbane transit time (terminal to terminal) of less than 24 hours.

The proposal provides for the following major benefits:

- ▶ it reduces the risk of disruption/closure of the rail line due to flooding; particularly through the Gwydir floodplain
- ▶ it avoids the need for trains to slow down, by constructing a new section of track to eliminate the need to use the Camurra hairpin curve
- ▶ it provides jobs during construction and operation to the town of Moree and surrounds
- ▶ it upgrades two bridges, which would allow heavier loads and enable trains to travel at increased speeds
- ▶ it provides a safer rail line with the addition of a fence.

The proposal is a ‘missing link’ of the Inland Rail route between Melbourne and Brisbane; therefore, Inland Rail cannot proceed if the proposal does not proceed, which means the benefits of Inland Rail would not be realised if the proposal does not proceed.

5.5 National, state and regional planning policies and strategies

The strategic context of the proposal is influenced by the outcomes of several strategic plans for transport, development and freight that have been prepared at the national, state, and regional levels. Key national and state strategies, policies and plans have also informed and influenced the vision, objectives and development of the proposal.

The proposal, as part of Inland Rail, is consistent with the relevant strategies identified in Table 5-1. Table 5-1 provides an overview of relevant strategic plans and their relationship to the proposal.

TABLE 5-1 CONSISTENCY WITH NATIONAL PLANNING POLICIES AND STRATEGIES

Policy	Description
NATIONAL	
Australian Infrastructure Plan	Infrastructure Australia’s <i>Australian Infrastructure Plan: The Infrastructure Priority List</i> (the Priority List), (Infrastructure Australia, 2020), sets out a number of projects and initiatives identified as priority infrastructure investments that Australia needs over the next 15 years. The Priority List identifies Inland Rail as a ‘Priority Project’. Priority Projects are potential infrastructure solutions that address a nationally significant problem or opportunity and have been positively assessed by the Infrastructure Australia Board.
State of Australia’s Cities 2014–2015	The State of Australian Cities reports bring together current research and data to present a comprehensive picture of how Australia’s cities are evolving, to strengthen the knowledge base used to develop policy. The 2014–2015 report (Department of Infrastructure, Transport, Regional Development and Communications, 2015b) observed that there is more demand for transport in Australia, including freight, than ever before. Inland Rail provides a response to some of the issues raised in this report, as it aims to: <ul style="list-style-type: none"> ▶ provide a step-change improvement in rail service quality in the Melbourne to Brisbane corridor to deliver a freight rail service on the east coast that is competitive with road ▶ improve road safety, ease congestion and reduce environmental impacts by moving freight from road to rail ▶ bypass bottlenecks on the congested metropolitan rail networks on the east coast, and free up train paths for other services on the coastal route.

Policy	Description
Urban Transport Strategy	<p>The <i>Urban Transport Strategy</i> (Infrastructure Australia, 2013), <i>National Land Freight Strategy</i> (Standing Council on Transport and Infrastructure, 2013), and the <i>National Ports Strategy</i> (Infrastructure Australia, 2011) form the key components of strategic planning for transport in Australia.</p> <p>Inland Rail is consistent with this strategy, as it aims to:</p> <ul style="list-style-type: none"> ▶ improve road safety, ease congestion and reduce environmental impacts by moving freight from road to rail ▶ bypass bottlenecks on congested metropolitan rail networks on the east coast, and free up train paths for other services on the coastal route.
National Land Freight Strategy	<p>The <i>National Land Freight Strategy</i> (Standing Council on Transport and Infrastructure, 2013) is a partnership between the Australian Government and state, territory and local governments and industry to drive efficient and sustainable freight logistics, balancing the needs of a growing Australian economy, with the quality of life aspirations of the Australian people.</p> <p>Inland Rail is included on the map of key freight routes developed by the strategy, based on the route provided in the <i>National Land Freight Strategy Update</i> (Infrastructure Australia, 2012). The map shows a single new national network to reflect the emphasis on potential future freight flows, freight (vehicle) connectivity, ports, and settlements.</p> <p>Once delivered, Inland Rail (and the proposal) will help to realise the core objectives of the strategy: an increase in the efficiency of freight movements across infrastructure networks by providing modal alternatives and relieving the capacity constraints experienced by the existing freight supply chain. Inland Rail will achieve this by acting as a catalyst for moving freight from road to rail, by delivering a greater supply of faster, more reliable freight paths offering significantly lower operating costs than either road transport or existing rail via the coastal route (ARTC, 2020). Inland Rail will also encourage and facilitate the shift of more freight from road to rail. This modal shift will help to significantly reduce the economic cost to Australia from road congestion, forecast to be as much as \$37 billion a year by 2030 (ARTC, 2020).</p>
National Ports Strategy	<p>The Council of Australian Governments (COAG) endorsed the <i>National Ports Strategy</i> (Infrastructure Australia, 2011) in July 2012 as part of a collaborative approach to the future development and planning of Australia's port and freight infrastructure. Inland Rail would connect key production areas in Queensland, NSW and Victoria with export ports in Brisbane and Melbourne.</p>
STATE	
Building Momentum: State Infrastructure Strategy 2018–2038:	<p><i>Building Momentum: State Infrastructure Strategy 2018–2038</i>: (Infrastructure NSW, 2018) is a 20-year strategy, which identifies and prioritises the delivery of critical public infrastructure to drive productivity and economic growth. The strategy switches the focus from preceding years of developing an infrastructure proposal pipeline to achieving sustainable growth in NSW.</p> <p>The strategy acknowledges that Inland Rail would benefit the states' primary industries by optimising the movement of freight in regional NSW to ports and gateways in NSW, Queensland and Victoria.</p>
Future Transport Strategy 2056	<p>The <i>Future Transport Strategy 2056</i> (TfNSW, 2018b) is an update to the <i>NSW Long-Term Transport Master Plan</i> (TfNSW, 2012b), which guides NSW service and infrastructure investments. Inland Rail is identified in the <i>Future Transport Strategy 2056</i> as a committed initiative for the next 0–10 years. The strategy identifies Inland Rail as an opportunity to provide for improved movements of freight to ports and provide relief for the coastal road and rail networks.</p>
NSW Freight and Ports Plan	<p>The <i>NSW Freight and Ports Plan 2018–2023</i> (TfNSW, 2018a) is a call to action for government and industry to work together to make our freight system more efficient, more accessible, safer and more sustainable for the benefit of producers, operators, customers and communities across NSW. One of the goals of the plan is to improve rail freight access and flows, with a key action to support the delivery of Inland Rail to ensure the proposal optimises the movement of freight in regional NSW, and to ports and gateways.</p>
NSW Road Safety Strategy 2012–2021	<p>The <i>NSW Road Safety Strategy 2012–2021</i> (TfNSW, 2012a) sets the direction for road safety in NSW for the next 10 years. The strategy notes that heavy trucks are often involved in serious road accidents in NSW. While they represent only 2.2 per cent of registered motor vehicles and 7 per cent of all motor vehicle travel, heavy trucks were involved in 17 per cent of fatalities on NSW roads. Nearly 30 per cent of fatal heavy vehicle crashes involved heavy vehicles from interstate.</p> <p>The proposal contributes to the strategy as it aims to improve road safety by moving freight from road to rail.</p>

Policy	Description
REGIONAL	
New England North-West Regional Transport Plan 2013	The NSW Government released the <i>New England North West Regional Transport Plan</i> (TfNSW, 2013) to provide a blueprint for the future of transport infrastructure in the region, as well as a strategic direction for the delivery of major projects over the next 20 years. The plan addresses the challenges associated with providing convenient, reliable and safe travel in regional areas via bus, rail and taxi. The plan also committed to investigate opportunities for an Inland Rail freight line, in order to improve the efficiency and reliability of rail freight between Melbourne and Brisbane.
Economic Development Strategy for Regional NSW	The <i>Economic Development Strategy for Regional NSW</i> (Department of Trade and Investment, Regional Infrastructure and Services, 2015), provides the framework for driving economic growth in regional NSW. Inland Rail is relevant to the following goals included in the strategy: <ul style="list-style-type: none"> ▶ drive regional employment and regional business growth ▶ invest in economic infrastructure and connectivity.

5.6 Key benefits

5.6.1 Inland Rail

Inland Rail will be pivotal in shaping and sustaining long-term economic growth and prosperity in the regions along the corridor. Inland Rail is predicted to deliver economic growth through two response pathways: supply chain efficiencies and value chain growth.

5.6.1.1 Supply chain efficiencies

Freight operators are projected to use Inland Rail over alternative forms of transport to realise the benefits identified in the *Programme Business Case* (ARTC, 2015a) and the CSIRO *Inland Rail Supply Chain Mapping Pilot Project* (Higgins et al., 2019) including:

- ▶ **Reduced transport costs:** Inland Rail can reduce the cost of freight transport and deliver savings to businesses and consumers in getting goods to and from markets. The CSIRO *Inland Rail Supply Chain Mapping Pilot Project* (Higgins et al., 2019) estimated an average saving of \$76 per tonne when shifting from other freight options (for horticulture and post processed foods), as per CSIRO supply chain mapping, Parks to Narromine Pilot March 2019.
- ▶ **Greater access to suppliers, customers and markets:** Inland Rail will provide direct or indirect connections to five ports and provide businesses with viable alternative options for both importing and exporting goods. This will support freight flows of imports and exports in both a north–south and south–north direction as freight operators have a genuine choice over port access and can select ports based on transport efficiency (ARTC, 2015a).
- ▶ **Increased reliability:** Inland Rail will provide a reliable transport option and a less than 24-hour transit time between Melbourne and Brisbane terminals with 98 per cent reliability (ARTC, 2015a).

5.6.1.2 Value chain growth

The value chain refers to the processes or activities a business or industry performs to add value to a good or service. Inland Rail has a very important role in enhancing the attractiveness of the Inland Rail corridor as a location for investment in value-added operations. Three key benefits of value chain opportunities have been identified:

- ▶ **Direct value-added opportunities:** These include investments in value-added opportunities that have a direct interface with Inland Rail, such as intermodal terminals and logistics, packaging, sorting, consolidating and warehousing. Direct value-added opportunities stem from the reorganisation of supply chains and businesses strategically positioning their operations to take advantage of resulting supply chain efficiencies.
- ▶ **Indirect value-added opportunities:** These are investments in value-added opportunities, such as food processing or advanced manufacturing, that do not directly interface with Inland Rail but benefit from proximity to operations that do directly interface with Inland Rail, e.g. a flour mill in proximity to warehousing, storage and logistics support enables efficient access to upstream inputs and downstream transportation.
- ▶ **Hub formations:** These are a group of investments in value-added opportunities with similar or related businesses situated within a geographic area that share common markets, inputs, technologies and/or workers. Grouping of operations at central nodes along the Inland Rail corridor may encourage complementary manufacturers to establish in adjacent locations. Complementary manufacturers may not necessarily receive

a direct benefit from Inland Rail, rather they can take advantage of strategically locating near logistic operators, distributors and manufacturing businesses who produce inputs or purchase outputs.

5.6.1.3 Other key benefits

- ▶ **Long-term cost ratio:** the cost to build Inland Rail was revised in 2020 to be an estimated \$15 billion over 10 years; however, the long-term benefit to Australia is an economic benefit–cost ratio of 2.62.
- ▶ **Boost the Australian economy:** Inland Rail is expected to boost Australia’s GDP about \$16 billion over the next 50 years.
- ▶ **Create jobs:** Inland Rail is expected to create up to 16,000 new jobs at the peak of construction, with an additional 700 long-term jobs once operational.
- ▶ **Improve connections within the national freight network:** Inland Rail would enhance the National Land Transport Network by creating a rail linkage between Parkes in New South Wales and Brisbane, providing a connection between Queensland and the southern and western states.
- ▶ **Provide better access to and from our regional markets:** Inland Rail would make it easier to connect our farms, mines, cities and ports to domestic and international markets. Two million tonnes of agricultural freight would switch from road to rail, with a total of 8.9 million tonnes of agricultural freight more efficiently diverted to Inland Rail.
- ▶ **Reduce costs:** the CSIRO *Inland Rail Supply Chain Mapping Pilot Project* (Higgins, et al., 2019) estimated an average saving of \$76 per tonne when shifting from other freight options (for horticulture and post processed foods), as per CSIRO Supply Chain Mapping, Parks to Narromine Pilot.
- ▶ **Offer better transit time and reliability:** Inland Rail would offer less than 24-hour transit time between Melbourne and Brisbane terminals and 98 per cent reliability matching current road levels.
- ▶ **Increase the capacity of the transport network:** Inland Rail would increase capacity for freight and passenger services by reducing congestion along the busy coastal route and allow for growth in passenger services. It would particularly free up capacity on Sydney’s rail network for more passenger and freight services.
- ▶ **Reduce distances travelled:** the rail distance between Melbourne and Brisbane would be reduced by 200 km.
- ▶ **Improve road safety:** up to 15 serious crashes, involving fatalities and serious injuries, are estimated would be avoided every year.
- ▶ **Improve sustainability:** carbon emissions would be reduced by 750,000 tonnes per year as a result of transferring freight from road to rail, as moving freight by rail is four times more fuel efficient than moving it by road.
- ▶ **Improve amenity for the community:** truck volumes would be reduced in more than 20 regional towns. Road congestion on some of Australia’s busiest highways would be reduced, including the Ipswich Motorway, and the Hume, Newell and Warrego Highways.
- ▶ **Provide an alternative north-south freight link:** Inland Rail would provide a second link between Queensland and the southern states, making Australia’s national freight rail network less vulnerable to disruptions, e.g. from extreme weather events.
- ▶ **Promote complementary supply chain investments:** Inland Rail would be a catalyst for complementary private sector investments, such as fleet upgrades, new metropolitan and regional terminals and integrated freight precincts.

5.6.2 The proposal

The proposal would directly support the benefits outlined in section 5.6.1 for the proposal itself and for Inland Rail more broadly.

The proposal is a critical link to the overall Inland Rail connection between Melbourne and Brisbane. The key benefits of the proposal include:

- ▶ significantly reducing the risk of disruption/closure to the rail line due to flooding, particularly through the Gwydir floodplain
- ▶ avoids the need for trains to slow down by removing the Camurra hairpin
- ▶ providing jobs during construction and operation to the town of Moree and surrounds
- ▶ it upgrades two bridges, which would allow heavier loads and enable trains to travel at increased speeds
- ▶ it provides a safer rail line with the addition of a fence.

CHAPTER 06

Inland Rail Program development, alternatives and the proposal

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

ARTC

INLAND
RAIL 
An Australian Government Initiative

6. Inland Rail Program development, alternatives and the proposal

This chapter is a summary of the alternatives that have been considered as part of the development of Inland Rail overall. These included the strategic alternatives to Inland Rail as a whole (including road upgrades, upgrading the east coast railway, and greater use of maritime and air freight), and alternative route locations. The chapter also includes a summary of the main options that were considered during the concept design process for the Narrabri to North Star Phase 2—Moree to Camurra North (N2NS Phase 2) Inland Rail (the proposal). Information on how the options were developed and assessed is included.

Table 6-1 provides the Secretary's Environmental Assessment Requirements (SEARs) relevant to development and alternatives of the proposal and outlines the relevant sections where the requirements are addressed.

TABLE 6-1 PROPOSAL DEVELOPMENT AND ALTERNATIVES SEARS REQUIREMENTS

Desired performance outcome	Requirement	Where addressed
2 Environmental Impact Statement The project is described in sufficient detail to enable clear understanding that the project has been developed through an iterative process of impact identification and assessment and project refinement to avoid, minimise offset impacts so that the project, on balance, has the least adverse environmental, social and economic impact, including its cumulative impacts.	1 The EIS must include, but not necessarily be limited to, the following:	
	a A summary of the strategic need for the project with regard to its critical State significance and relevant State Government policy	Chapter 5
	b An analysis of alternatives to the project	Section 6.1
	c A description of options within the project	Section 6.4
	d a description of how alternatives to and options within the project were analysed to inform the selection of the preferred alternative/option. The description must contain sufficient detail to enable an understanding of why the preferred alternative to and options(s) within the project were selected	Section 6.4
	k a demonstration of how the project design has been developed to avoid or minimise likely adverse impacts	Section 6.5

6.1 Alternatives to Inland Rail

6.1.1 Strategic alternatives—alternative freight transport solutions

Alternative freight transport solutions with the potential to address Australia's current and future freight challenges were considered as part of a strategic options assessment set out in the *Inland Rail Programme Business Case* (ARTC, 2015a and addendum 2016), and examined in the *Inland Rail Implementation Group Report* (ARTC, 2015b).

6.1.1.1 Strategic options assessment

Three options were assessed by the *Inland Rail Programme Business Case* (ARTC, 2015a):

- ▶ progressive road upgrades
- ▶ upgrading the existing east coast railway
- ▶ an inland railway.

These options were subjected to a rigorous assessment consistent with Infrastructure Australia's *Reform and Investment Framework* guidelines (2013). The options were assessed against seven equally weighted criteria:

- ▶ capacity to serve east coast future inter-capital regional/bulk freight market needs
- ▶ foster economic growth through improved freight productivity and service quality (including improved reliability and resilience)
- ▶ optimise environmental outcomes
- ▶ alleviate urban constraints

- ▶ enable regional development
- ▶ ease of implementation
- ▶ cost-effectiveness.

Overall, constructing an inland railway ranked highest, with an average high likelihood of improving outcomes across all criteria. Progressive road upgrades and upgrading the existing east coast railway both had an average medium overall ranking across all criteria. In relation to individual criteria, progressive road upgrades outranked an inland railway only in relation to ease of implementation and ranked equally with an inland railway in relation to enabling regional development outcomes. An inland railway was found to be the best option across all other criteria.

6.1.1.2 Review of alternatives

The following alternatives were reviewed by the Inland Rail Implementation Group:

- ▶ maritime freight
- ▶ air freight
- ▶ road freight
- ▶ rail solutions.

The results of the review of alternatives undertaken by the Inland Rail Implementation Group are summarised in the following sections.

Maritime shipping

Maritime freight was examined as a potential alternative to Inland Rail based on two types of services:

- ▶ a dedicated service between Melbourne and Brisbane (coastal shipping)
- ▶ using spare capacity on vessels calling at Melbourne and Brisbane as part of an international voyage.

The *Inland Rail Implementation Group Report* (ARTC, 2015b) concluded that:

- ▶ shipping is unlikely to be a strong alternative to Inland Rail, as it does not provide the level of service (transit time and service availability) required by most of the Melbourne to Brisbane interstate market
- ▶ shipping still has a role to play, especially due to its strengths in transporting high-volume and long-distance cargo around the coast. Shipping must be used in conjunction with other modes, such as an inland railway, to meet Australia's future transport needs.

Air freight

Domestic air freight accounts for less than 0.01 per cent of total domestic freight movements in Australia by weight. The majority of these movements are comprised of newspapers and parcels between major cities, on either dedicated freight flights or on existing passenger flights. Air freight is highly specialised due to the inherent constraints on aircraft size and the nature of the goods that can be carried. The report concluded that:

- ▶ air freight has a limited role in the transport of bulky or heavy goods on the Melbourne to Brisbane corridor, but will continue to play a crucial role for small, high-value and time-dependent goods
- ▶ air freight is not a viable alternative for addressing Australia's freight requirements on the Melbourne to Brisbane corridor into the future.

Road freight

The role of road transport was considered as a potential alternative to Inland Rail. While rail carries a larger volume of freight overall, road transport is the main mode of transport for most commodities produced or consumed in Australia.

Along the north–south corridor, the main routes for road freight are on the Hume Highway (between Sydney and Melbourne), the Pacific Highway (for coastal transport between Sydney and Brisbane) and the Newell Highway (between Melbourne and Brisbane).

The identified issues and considerations relevant to road freight on these corridors include:

- ▶ the north–south road corridor will face significant local and regional capacity constraints for road freight in the medium to longer term
- ▶ the mix of local traffic, private vehicles, and freight vehicles on road transport corridors reduces reliability as a result of the different average travel speeds between cars and heavy vehicles and increases accident rates

- ▶ conflicts between local traffic, private vehicles and freight vehicles on these corridors will increase in line with significant forecast growth in population, employment, and demands for freight transport
- ▶ compared with rail, road freight results in additional environmental costs, including from air pollution, greenhouse gas emissions, and water pollution
- ▶ the cost to freight operators of congestion in urban areas as a result of reduced travel speeds and reliability for freight transport is estimated to be around \$60 million per year for Melbourne to Brisbane inter-capital freight alone
- ▶ the Australian Government and state governments are investing in road infrastructure along the north–south corridor; however, this investment will be insufficient to remove all the existing and predicted future issues along the full length of the corridor, leaving trucking productivity exposed to the cumulative effects of the remaining deficiencies.

The report concluded that:

- ▶ while road transport will continue to contribute to Australia’s freight task, unless substantial additional investment is made, it will be unlikely to meet the longer term needs for Australia’s freight task alone
- ▶ should the Australian Government decide not to proceed with a rail solution, further investigation of road transport is required to determine its capacity to manage the future north–south freight task.

Rail solutions

The two main rail solutions considered were enhancing the existing east coast railway and constructing a new inland railway.

The report noted that there are a number of capacity, reliability, and performance issues associated with the existing east coast railway, mainly relating to constraints associated with moving freight trains through the Sydney metropolitan rail network.

As a sub-option of enhancing the existing east coast railway, the report noted that the proposed new Outer Sydney Orbital corridor would provide opportunities for a rail route that could ease freight congestion on Sydney freight networks; however, the main role of this corridor would be to address freight capacity constraints on other routes, such as those for intrastate and export freight. In addition, this option would not provide significant transit time savings for Melbourne to Brisbane freight, as the missing link between north–west NSW and southern Queensland would still be required, or the existing coastal line would need to be upgraded. The report concluded that use of the Outer Sydney Orbital corridor would complement, but not replace, Inland Rail.

The report concluded that:

- ▶ for Melbourne to Brisbane freight, the existing east coast railway would not be competitive with road in terms of cost or time, even with significant further investment, and it is not a viable alternative to Inland Rail
- ▶ Inland Rail would meet Australia’s future freight challenge and bring significant and positive national benefits by boosting national productivity and economic growth, while promoting better safety and environmental outcomes.

6.1.1.3 Summary of findings

Overall, in relation to the various alternatives to Inland Rail, the Inland Rail Implementation Group (ARTC, 2015b) concluded that:

- ▶ while shipping and air will continue to play a role in the interstate freight market, they are not viable alternatives to rail
- ▶ without Inland Rail, road is the only mode capable of addressing most of the future freight task, with associated direct and indirect costs.

6.2 The ‘do nothing’ alternative

Not developing Inland Rail would result in continued growth in the use of road for freight transport between Melbourne and Brisbane, particularly along the Newell Highway. The issues associated with using road transport alone to address Australia’s freight needs into the future, as identified in section 6.1.1. In addition, road transport would be unlikely to meet the longer term needs for Australia’s freight task alone unless substantial additional investment is made (ARTC, 2015b).

6.3 Alternative route options for Inland Rail

Alternative routes for Inland Rail have been considered by the following studies:

- ▶ North–South Rail Corridor Study (Ernst and Young, 2006)
- ▶ Melbourne–Brisbane Inland Rail Alignment Study (ARTC, 2010)
- ▶ Inland Rail Melbourne to Brisbane Inland Rail Route History 2006–2019 (ARTC, 2020).

The results of the studies are summarised below.

6.3.1 North–South Rail Corridor Study

The *North–South Rail Corridor Study* (Ernst and Young, 2006) considered potential corridors for the rail line to determine which route would deliver the best economic and financial outcome.

6.3.1.1 Options identified

Potential options were identified within a ‘north–south rail corridor’, defined by the standard-gauge rail line along the NSW coast, and a broad arc west of Shepparton, Jerilderie, Coonamble, Burren Junction, Goondiwindi and Toowoomba. Within this corridor, four sub-corridors were identified for comparative analysis, each of which could be combined with alternative routes between Melbourne and Junee, via Shepparton or via Albury. The four sub-corridors comprised:

- ▶ **Far-western sub-corridor**—linking Junee to Brisbane via Parkes, Dubbo and/or Narromine, Coonamble, Burren Junction, Narrabri and/or Moree, North Star, Goondiwindi, Warwick and/or Toowoomba.
- ▶ **Central inland sub-corridor**—linking Junee to Brisbane via any inland route that includes the Werris Creek to Armidale to Tenterfield rail links.
- ▶ **Coastal sub-corridor**—following the existing coastal route between Junee and Brisbane (via Goulburn), through Sydney.
- ▶ **Hybrid sub-corridor**—combining elements of an inland and coastal route, linking Junee to Brisbane via Muswellbrook and Maitland.

Within each of these sub-corridors, the feasibility of 136 possible route options was investigated. These options involved different amounts of new track and/or upgrading existing sections of track.

6.3.1.2 Analysis of options

The route options were compared using an optimisation model specifically developed for the study, based on the following criteria:

- ▶ operating efficiency
- ▶ infrastructure requirements
- ▶ market demand
- ▶ environmental constraints
- ▶ financial and economic viability.

The study identified potential demand, financial issues, environmental issues and infrastructure costs relevant to the four sub-corridors. The analysis undertaken for the study concluded that the far-western sub-corridor was superior to the other alternatives and formed the basis for the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010).

6.3.2 Melbourne–Brisbane Inland Rail Alignment Study

The purpose of the *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010) was to determine the optimum alignment as well as the economic benefits and likely commercial success of a new standard-gauge inland railway between Melbourne and Brisbane. The terms of reference for the study required it to develop a detailed route alignment, generally following the far western sub-corridor identified by the *North–South Rail Corridor Study* (Ernst and Young, 2006).

6.3.2.1 Options identified

The *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010) short-listed and analysed a number of route options. The stages of route analysis involved:

- ▶ identification of the route—evaluation of the route options and preliminary analysis for the three main areas: Melbourne to Parkes; Parkes to Moree; and Moree to Brisbane
- ▶ analysis of the route—the route was analysed in terms of capital cost, environmental impacts and journey time, as well as its preliminary economic and financial viability
- ▶ development of the preferred alignment—the alignment was developed considering environmental and engineering factors.

The study noted that with the combination of numerous route options and sections, there were over 50,000 possible options for the route between Melbourne and Brisbane. As it was not feasible to analyse each option, two key criteria (capital cost and journey time) were used to establish a shortlist of route options in each of the three main areas.

The shortlist included:

- ▶ Melbourne to Parkes—two main options:
 - ▶ via Albury, using existing track from Melbourne to Parkes (with a possible new direct line from Junee or Illabo to Stockinbingal, bypassing Cootamundra)
 - ▶ via Shepparton, using the existing broad-gauge Mangalore–Tocumwal line via Shepparton, the disused standard-gauge line to Narrandera, and a new direct connection through to near Caragabal, before re-joining the existing line to Parkes.
- ▶ Parkes to Moree—four main options:
 - ▶ Parkes to Moree via Werris Creek, using existing track (with a new section of track at Binnaway and Werris Creek to avoid reversals)
 - ▶ Parkes to Moree via Binnaway and Narrabri, using existing track to Binnaway, and then a new section connecting to the existing track near Emerald Hill or Baan Baa
 - ▶ Parkes to Moree via Curban, Gwabegar and Narrabri, using existing track to Narromine, predominately new track between Narromine and Narrabri, and existing track from Narrabri to Moree
 - ▶ Parkes to Moree via Burren Junction, using existing track to Narromine, and predominately new track via Coonamble and Burren Junction to Moree.
- ▶ Moree to Brisbane—two main options:
 - ▶ the Warwick route—a new ‘greenfield’ route via Warwick to the existing standard gauge Sydney–Brisbane line
 - ▶ the Toowoomba route—a new corridor direct from Inglewood to Millmerran and Oakey, near Toowoomba, and then a new alignment down the Toowoomba Range, and use of the proposed Southern Freight Rail Corridor from Rosewood to Kagaru.

6.3.2.2 Analysis of options

The shortlist of route options was subjected to more detailed technical, financial and economic assessment. The option involving use of existing track towards Werris Creek was chosen to represent the option with the lowest capital expenditure meeting the performance specification. This option had a length of about 1,880 kilometres (km). The option involving the more direct route between Narromine and Narrabri had the fastest transit time for a reasonable capital expenditure. This option, which had a length of about 1,731 km, became the focus for more detailed route, demand, economic and financial analysis.

Refining the proposed alignment involved an iterative process, with evaluation of the following:

- ▶ environmental and land issues
- ▶ railway operations considerations
- ▶ engineering assessments
- ▶ capital cost estimates.

The final preferred Inland Rail alignment, between South Dynon in Melbourne and Acacia Ridge in Brisbane, incorporated:

- ▶ Melbourne to Parkes—670 km of existing track and 37 km of new track on a greenfield alignment from Illabo to Stockinbingal, bypassing Cootamundra and the Bethungra spiral (further discussed in section 6.4)
- ▶ Parkes to North Star—307 km of upgraded track, and 291 km of new track on a greenfield alignment from Narromine to Narrabri
- ▶ North Star to Acacia Ridge—271 km of new track on a greenfield alignment, 119 km of existing track upgraded from narrow gauge to dual gauge, and 36 km of the existing coastal route.

6.3.3 Melbourne to Brisbane Inland Rail Route History 2006–2019

Initially, a predominantly greenfield route to the east of the existing alignment was explored. This option bypassed Moree to address connectivity and severance issues on the existing alignment through the Moree urban area. Route assessments identified that while the bypass would function similarly to the line through Moree on non-cost criteria, the cost assessment indicated that the bypass option would have a major additional capital cost of approximately \$70 million.

The grade and minimal curvature of the existing alignment was deemed suitable for use by Inland Rail, and no additional alternative options were identified. The track will be upgraded to comply with Inland Rail mainline standards.

Further analysis of the Narrabri to North Star section identified an area where a deviation from the existing corridor would help improve the overall Inland Rail Service Offering. This area includes a short length of greenfield construction at Camurra, to bypass the tight curve at the Camurra hairpin. The remainder of the upgraded track for N2NS Phase 2 remains within the existing rail corridor between Moree and Camurra north.

6.4 Initial project development for N2NS

Inland Rail has undergone a progressive route development and selection process since 2006—each stage refining the focus on what is required to deliver the Inland Rail program. The *Melbourne to Brisbane Inland Rail Alignment Study* (ARTC, 2010) effectively established the Inland Rail route that has undergone some relatively minor changes in the years since.

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

In conjunction with the *Inland Rail Programme Business Case* (ARTC, 2015a), the Inland Rail Implementation Group (ARTC, 2015b) recommended some variations to the corridor from those previously recommended in the *Inland Rail Alignment Study* (ARTC, 2010). That report supported the development of Inland Rail and recommended that the Australian Government commit further funding in the 2016–17 Budget for the Inland Rail program. The Australian Government has committed \$15.4 billion to deliver Inland Rail.

From a route selection and rail corridor determination perspective, Inland Rail sections essentially fall into brownfield and greenfield categories. N2NS is predominately a brownfield project, using sections of ARTC's existing leased network.

While these sections are brownfield, they nonetheless require significant upgrades and, consequently, capital investment, to achieve the higher performance specifications of Inland Rail.

6.4.1 Initial route selection

The route selection process began in earnest with the 2006 *North–South Rail Corridor Study* (Ernst and Young, 2006), which identified a broad corridor for a future Melbourne–Brisbane railway. The study examined four broad alternatives between Melbourne and Brisbane, ranging from a far western sub-corridor via western New South Wales through to a coastal sub-corridor via Sydney and the North Coast. The main finding of the study was that a far western sub-corridor (via Albury and Parkes) would have the lowest capital cost, fastest transit time and the best economic cost-benefit performance.

The far western sub-corridor identified in the *North–South Rail Corridor Study* (Ernst and Young, 2006) formed the starting point for the *Inland Rail Alignment Study* (ARTC, 2010) completed in 2010. The 2010 *Inland Rail Alignment Study* analysed a large number of alternatives within the Far Western Sub-Corridor. It identified a detailed alignment that sought to minimise construction and operational costs and maximise the economic benefit; in particular, freight user benefits flowing from operating cost savings, time savings and improved reliability. This drove identification of key greenfield sections such as Narromine to Narrabri.

The *Inland Rail Alignment Study* (ARTC, 2010) considered two key route options from Melbourne to Parkes via Albury, using existing track from Melbourne to Parkes with a possible new direct line from Junee or Illabo to Stockinbingal, bypassing Cootamundra and via Shepparton, following the existing broad-gauge Mangalore–Tocumwal line via Shepparton, the disused standard-gauge line to Narrandera and a new direct connection through to near Caragabal where it re-joins the existing line to Parkes. The options were differentiated based on capital cost and journey time. The options with the lowest capital cost per minute saved were considered the most cost-effective options. Analysis showed many of the options to be less favourable because of:

- ▶ negative environmental impacts and land use constraints
- ▶ significant capital expenditure
- ▶ the upgrading of track did not give significant journey time improvement (due to curves and grades still constraining the speed of the train)
- ▶ options to remove speed constraints were costly for little time saving.

The study found that the far western sub-corridor (via Albury and Parkes) had the lowest capital cost, fastest transit time and best economic cost benefit, considering capital and operating costs, access revenue and external factors (environmental, congestion benefits, etc.).

For N2NS it was identified that the existing railway contains a rail corridor that is largely suitable for Inland Rail and, during route development, no alternative options were identified. N2NS alignment based on grade and minimal curvature is suitable for Inland Rail. The track is currently a combination of secondary and branch line standard, requiring upgrading to full Inland Rail mainline standards.

The 2006 *North–South Rail Corridor Study*, *Inland Rail Alignment Study* (ARTC, 2010) and the Inland Rail Implementation Group report (ARTC, 2015b) were high-level studies with consultation focused on Australian Government, state and local governments, and industry stakeholders. As the project progressed and more technical studies were completed, the level of information available and community engagement possible increased. In the early life of the Inland Rail proposal, the information available often did not, nor could it, meet the expectations of landowners and the community. Extensive landowner, community and stakeholder consultation for Inland Rail commenced in early 2016 as a preferred alignment started to become clearer following the Inland Rail Implementation Group report (ARTC, 2015b). N2NS being brownfield sections, the focus was on explaining proposed works and timelines and gaining landowner and community feedback on impacts and designs.

The N2NS Phase 2 consists of predominantly existing rail corridor from Moree north to beyond the Camurra Bypass, including the Mehi and Gwydir river crossings. Phase 2 incorporates enhancement of existing track, replacement of two bridges and construction of approximately 1.6 km of realigned rail corridor.

An overview of the development of the proposal is included in Figure 6-1 with further detail on the options assessment provided in the sections.



FIGURE 6-1 STAGES AND DEVELOPMENT OF THE PROPOSAL

6.4.2 2015 alignment refinement

In 2015, ARTC undertook further alignment refinement based on the preferred alignment selected as part of the *Inland Rail Alignment Study* (ARTC, 2010). The refinement process reviewed the 2010 alignment for any high-risk areas, such as significant engineering and environmental risks, and sought to avoid or minimise impacts on these. As part of this review, four alternative alignment options in addition to the 2010 preferred alignment were identified roughly following the original 2010 alignment. These options were developed and compared as alignment improvements in comparison to the 2010 alignment, to identify any opportunities to further refine the alignment and avoid environmental impacts. This comparison showed that there were benefits in shifting away from the 2010 alignment; however, with no field investigations and limited community and stakeholder consultation undertaken, further design development and optioneering was required.

6.4.3 2016–2017 alignment refinement

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

In conjunction with the *Inland Rail Programme Business Case* (ARTC, 2015a), the Inland Rail Implementation Group report (ARTC, 2015b) recommended some variations to the corridor from that previously recommended in the *Inland Rail Alignment Study* (ARTC, 2010). That report supported the development of Inland Rail and recommended that the Australian Government commit further funding in the 2016–17 Budget for the Inland Rail program.

In 2016 and 2017, ARTC completed the EIS studies for the N2NS section of Inland Rail. Part of those studies included extensive community consultation, which included information sessions, meetings with councils and other key stakeholders, mail outs and landowner meetings.

6.4.4 2018–2019 preferred alignment

The consultation informed the development of options that formed the basis of the design case for the EIS. For the N2NS Phase 2 section, within the EIS five options were considered for the Moree section and areas to the immediate north of Moree. The options considered are presented in Table 6-2.

TABLE 6-2 BYPASS OPTIONS FOR MOREE

Option	Brief Description
Option 1	A 20.7 km alignment of new track following a direct route across the floodplain, bypassing approximately 26 km of the existing alignment, including the existing Camurra hairpin curve.
Option 2	A 17 km alignment of new track, including the Camurra bypass. It provides a relatively direct route across the floodplain crossing the Mehi and Gwydir rivers at its narrowest point, and bypasses approximately 18 km of the existing alignment.
Option 3	A 14.6 km alignment of new track, including the Camurra bypass. It provides a direct route across the floodplain and bypasses approximately 15 km of the existing alignment.
Option 4	A derivative of option 3, it is 13.7 km alignment of new track, including the Camurra bypass. It follows a similar alignment to option 3, but provides a less direct alignment, to minimise property severance.
Option 5	A 12.4 km alignment of new track, including the Camurra bypass. Of all proposed alignments, it is the shortest in length and the closest to the Moree township.

Source: (GHD, 2017)

During the options analysis, the options were further split into two general themes: connectivity for Moree compared with a bypass of Moree:

- ▶ **Moree connectivity options**—three options were assessed to develop an alternative connectivity solution associated with the upgrade of the existing rail corridor. The options considered level crossing upgrades, footbridges, improved access for emergency vehicles, a detour of the Gwydir Highway to the south of the town, a Gwydir Highway bypass and overbridges in the town. A road bridge over the rail line at Jones Avenue was seen as the best of three options for such a bridge (GHD, 2017).
- ▶ **Moree bypass options**—five possible bypass alignments were considered (GHD, 2017). At the time of the submission of the EIS, Option 5 was considered the preferred alignment as it was the shortest of all proposed alignments and closest to Moree township.

Additionally, options were considered in the selection of a route at the Camurra hairpin, with the following objectives:

- ▶ improvement of the alignment to achieve desired design speeds
- ▶ minimisation of environmental impacts
- ▶ minimisation of property impacts
- ▶ minimisation of infrastructure impacts.

Four options for the Camurra hairpin were assessed:

- ▶ retention of the existing route, using the current bridge position and hairpin
- ▶ retention of the current bridge with a turn radius of 800 m through the travelling stock route (TSR)
- ▶ a revised alignment linked with the Moree bypass options
- ▶ a revised alignment and new bridge east of the current bridge.

Figure 6-2 shows the location of the five Moree bypass options and the four options for Camurra hairpin, relative to the final alignment chosen.

6.4.5 Multi-criteria analysis

The conclusion of the multi-criteria assessment (MCA) of the options in the EIS identified that the Moree connectivity option was the preferred solution based on technical viability, safety considerations, operational approach, constructability and schedule, environmental impacts, community and property impacts, approvals and stakeholder engagement, and construction costs.

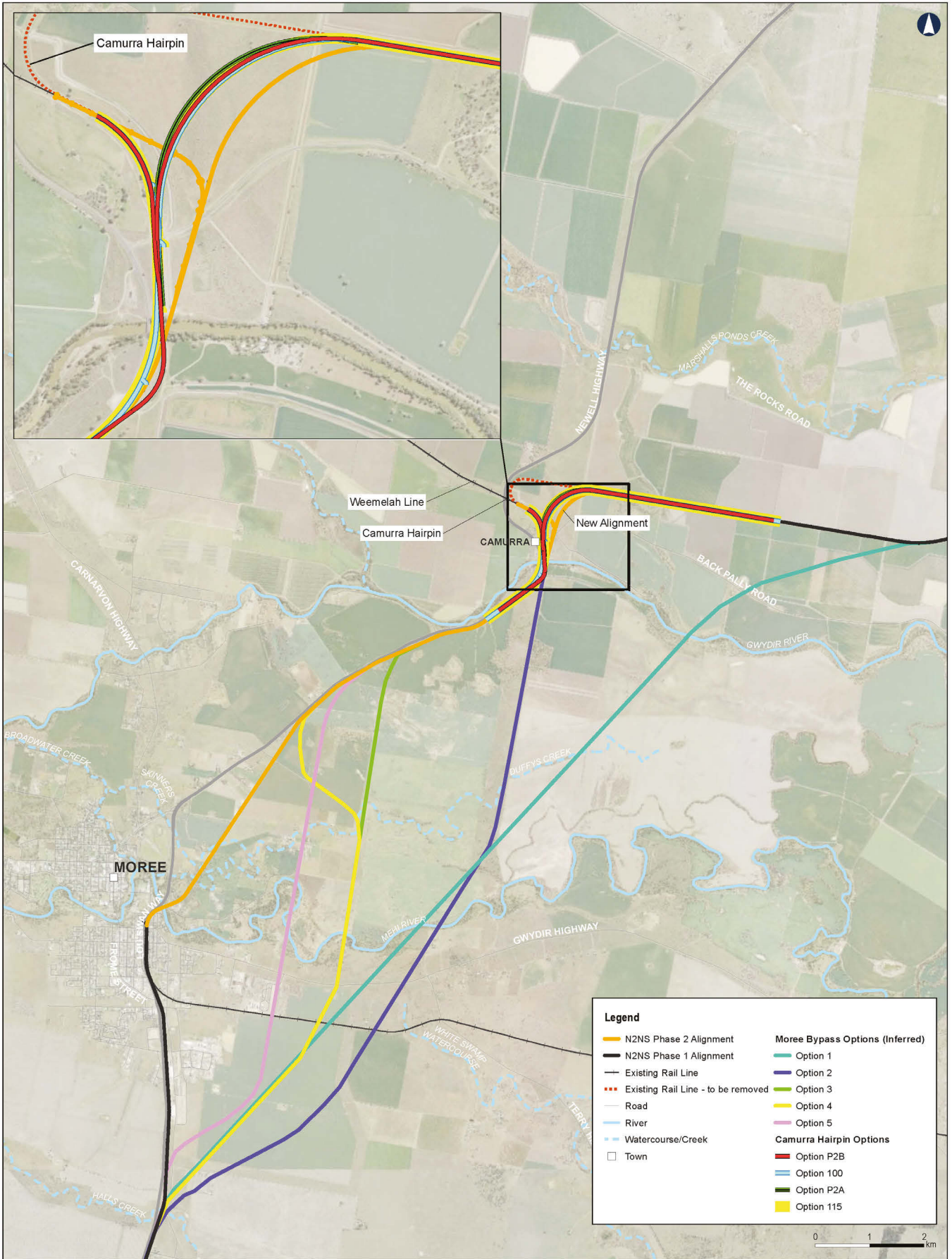


Figure 6-2 Moree Bypass and Camurra Hairpin options

Data Sources: ARTC, IRDJV, LPI

Coordinate System: GDA 1994, MGA Zone 55
 Scale: 1:15,573
 Paper size: A3
 Date: 9/23/2021
 Map 1 of 1

N2NS_SP2_EIS_F06_02_MoreeBypassOptions_2021.mxd

6.5 Development of the proposal

6.5.1 Overview

The track alignment proposed during the assessment of the 2017 N2NS EIS between Narrabri to North Star (GHD, 2017), would have likely resulted in significant flooding of the surrounding area and sensitive receivers despite attempting to meet ARTC's flood immunity requirements for the rail line. The Moree to Camurra North section of the alignment was therefore removed from the overall N2NS EIS to be assessed separately to more appropriately address design challenges associated with crossing the flood plain between Moree and Camurra North. This section is the subject of this N2NS Phase 2 Moree to Camurra North EIS and is to be assessed separately from the original N2NS proposal—now renamed N2NS Phase 1, which was approved in 2020.

N2NS Phase 2 was developed to address unresolved challenges experienced during the Phase 1 EIS. Resolutions to the identified challenges have largely focused on:

- ▶ developing a design across the floodplain that balances upstream and downstream flood impacts while achieving ARTC's operational flood immunity requirements for the rail line
- ▶ undertaking additional consultation with affected parties to determine flood objectives and to achieve broad acceptance of potential residual impacts
- ▶ assessing environmental impacts as a result of the proposed design (vertical and horizontal alignment) and to determine any residual impacts that may result post mitigation
- ▶ assessing social and economic impacts of the proposed design.

The revised Moree to Camurra North design also requires minor realignment of the track to maximise train speed and efficiency while providing safe level crossings for public and private land users.

6.5.2 Approach to avoiding or minimising impacts

The approach to design development has included a focus on avoiding and/or minimising the potential for impacts during all key phases of the proposal. A design was completed based on detailed imagery, updated cadastral (land ownership) data, site investigations, ecology, geotechnical investigations, and hydrological assessments.

The proposal, as described in this EIS, is based on the outcomes of the current design described in Chapter 7: Proposal features and operation. The design approach aims to remove or minimise various types of impacts influenced by the proposed section of rail upgrade between Moree and Camurra North.

The Mehi–Gwydir floodplain forms a large proportion of N2NS Phase 2 between Moree and Camurra North. This focused area is particularly sensitive to flood events, which could see extensive impacts to the rail corridor, road flooding (including the Newell Highway) and property. Mitigating these potential flooding impacts and is critical to the overall objective of the design. Flood modelling of the existing and proposed conditions, together with community consultation feedback, was used to identify sensitive areas and to minimise changes to the flood regime and manage flood impact through design improvements. The proposed rail alignment design has been developed in response to the flood modelling, which has been a key input to achieve the required ARTC flood immunities for the rail line and minimise changes to the floodplain. The design will provide for efficient construction methodologies and reduce impacts to the drainage and to utility adjustments. Additionally, the design will improve train operations by providing larger radius curves along the existing alignment.

The proposed rail alignment would remove existing short-stacking issues between the existing track and the Newell Highway by realigning a portion of the track 10 m to the east and south east, away from the Newell Highway. Short stacking occurs when a long vehicle, such as a semi-trailer, does not have enough space to completely clear the level crossing and stops while part of the vehicle is still within the level crossing. The current design would accommodate both the existing Newell Highway alignment and the future planned realignment of the Newell Highway with regards to achieving compliance for short stacking and vertical tie-ins at the proposed level crossings.

Unless a level crossing closure has been agreed with the landowner, all existing level crossings within this section of rail will remain operational where the proposed alignment intersects the corresponding local road or private access road. Private level crossings adjacent to the Newell Highway have been improved and reshaped to have less grade, allowing larger vehicles to safely traverse the level crossing from a stopped position. No private level crossings will be closed without discussion and agreement with landowners. Public crossings have been redesigned as signalled level crossings, providing improved road user safety. Accordingly, all level crossings where closure is not being progressed will be upgraded to comply with the relevant Australian and ARTC standards.

6.5.3 Options for key features of the proposal

6.5.3.1 Camurra hairpin decommissioning

Options to retain or remove the Camurra hairpin were considered. It was determined that design realignment of the track between chainages (Ch) 675.800 and 678.200 would result in the existing Camurra hairpin no longer being required as part of the rail infrastructure. By removing the hairpin formation, it would allow the land to be freed up and it could then be used for other purposes, such as returning it to agricultural land or rehabilitation.

At present, the formation works of the Camurra hairpin serve as a flood mitigation measure, protecting the Newell Highway from effects of flooding. The proposal design has provided a large number of additional culverts compared with the existing rail line to allow for the removal of the Camurra hairpin. A flood balance would be achieved so that removal of the Camurra hairpin would not result in increased flood risks to the Newell Highway and surrounding rural land. Detailed flood management outcomes may require the retention of parts of the existing rail embankment as part of the flood balance outcomes. Removal of the hairpin would result in more structural material being available for the construction of the new formation, resulting in reduced requirements to import structural material. Additionally, the removal of the Camurra hairpin would also reduce long-term maintenance obligations for ARTC for infrastructure that is not beneficial to rail operations.

6.5.3.2 Country Rail Network connection line turnout

Due to the highly sensitive flooding constraints in the northern section of rail near Back Pally Road, the positioning of the rail culverts is constrained. This constraint, as well as curve radius, directly impacts where the turnout for the CRN connection line can be installed. Options to move the turnout north of the proposed culvert were found to have adverse impacts, by excessively decreasing the curve radius to tie into the existing Weemelah line. The turnout position for the CRN connection line was therefore shifted further south immediately north of the Gwydir River underbridge (approximately 400 m south of Back Pally Road) to allow maximum train storage length between the turnout and level crossing at Back Pally Road. The turnout has been situated in the safest location possible, while still allowing the activated signals at Back Pally Road to be activated in a safe manner for vehicles at the level crossing.

6.5.3.3 Level crossings

In line with the Transport for NSW (TfNSW), *Level Crossing Closures Policy* (TfNSW, n.d.), options were also considered to reduce the overall number of level crossings, to provide safer crossings of the rail line across the network. To minimise the number of level crossings, an assessment of each crossing was undertaken to identify crossings suitable for potential closure/consolidation. Suitability for closure was dependent on a number of factors including:

- ▶ traffic volumes being (relatively) low
- ▶ proximity of crossings to one another
- ▶ where alternative legal access is available or reasonably achievable for landowner
- ▶ safety of the crossing in terms of sight lines
- ▶ ensuring stationary vehicles waiting at level crossings did not queue across major highways or other busy intersections
- ▶ ensuring sufficient length to allow trains to park (to wait for the line to be available) and not be across any vehicle access or roads
- ▶ whether the level crossing is redundant.

Consultation with landowners regarding the closure of level crossings is ongoing and initial agreements have been reached. Agreements have been sought on the following:

- ▶ other access routes are provided to enable a reduction to the required land acquisition extents
- ▶ future maintenance to the level crossing cannot be maintained
- ▶ new locations are required, to allow for potential optimisation to the rail alignment where short-stacking risks were previously present.

Currently one level crossing at Ch 667.000 would be closed after completion of this stakeholder consultation, where it has been agreed to be closed. Agreements would be reached during ongoing consultation with landowners, which may result in changes to private level crossings and closures.

6.5.3.4 Mehi and Gwydir river bridges

The proposal design has also considered options for the Mehi and Gwydir river bridges.

The Mehi River bridge is an 11-span bridge, constructed in approximately 1913 after the existing line terminated in Moree in 1897. The Mehi River bridge comprises a single truss span and two through girder spans over the main channel of the river, with timber girder approach spans. The Gwydir River bridge is an eight-span bridge, also constructed in approximately 1913, comprising two truss spans over the river channel, with timber girder approach spans. Both bridges are listed on the State Heritage Inventory (SHI), and the ARTC's section 170 Heritage Register. The Mehi River and Gwydir River bridges are considered to have local significance due to their early twentieth century construction and visual form in the landscape (refer to Chapter 15: Cultural heritage for further details).

Gwydir River bridge options

The Gwydir River bridge is positioned in an area where a new section of track is being constructed. As such, a new or additional bridge would be constructed to the east of the current bridge, providing for the possibility of part retention of the Gwydir River bridge. Should the existing bridge remain in place, it may provide additional obstructions within the waterway and would require ongoing maintenance.

Mehi River bridge options

During the design phase, options were explored to avoid impacting the Mehi River bridge by diverting the alignment to the north or south of the current alignment.

Northern alignment

If the proposal was moved to the north, the rail line would move closer to the Newell Highway, which would have the following impacts:

- ▶ reduced clearance to 14.5 m from the road shoulder to rail centreline at Ch 666.300, which would result in the following:
 - ▶ additional acquisition for the rail corridor and land from the road corridor
 - ▶ limiting the potential upgrade to Newell Highway
 - ▶ potential safety issues, with the proximity of the rail formation and infrastructure being closer to the Newell Highway
- ▶ land acquisition would also be required to property at Ch 666.700.

Southern alignment

If the proposal was moved south, the following would be impacted:

- ▶ likely additional noise impacts on multiple residential properties at Ch 666.200
- ▶ acquisition of additional land
- ▶ possible change in bridge design due to horizontal curve moving south at Ch 666.750
- ▶ possible impact to Alice Street level crossing due to horizontal geometry change.

Options to divert the alignment either north or south were considered to not be feasible. The decision was made to retain the Mehi River crossing on the existing alignment due to it being the safest and most efficient option for the design.

Options to retain the Mehi River bridge

Options to retain all or parts of the existing Mehi River bridge were investigated further during the design phase. Options were explored for full retention of the Mehi River bridge or partial retention of the piers only. Full retention of the bridge would result in non-compliances for clearances, residual life and loading of the bridge and design life. Retaining the piers only would also result in non-compliances for the residual life and loading of the bridge, as well as the design life of the bridge and the concrete truss span would be lower and, therefore, would not provide enough freeboard to clear a 1% AEP flooding level due to the level of the new deck. Table 6-3 provides a comparison of the options and whether they are compliant with ARTC requirements for bridges.

TABLE 6-3 DESIGN COMPLIANCE REQUIREMENTS FOR MEHI RIVER BRIDGE

Design Basis	Mehi River bridge—full retention	Mehi River bridge—retention of piers only
Rail alignment	Compliant—existing structure on the proposed rail alignment.	Compliant—existing structure on the proposed rail alignment.
Clearances	Non-compliant—insufficient lateral and vertical clearance within the truss and half through girders to accommodate F-shape clearance envelope.	Compliant, but with extensive modification to pier tops to accept new superstructure. Concept design required for a new long-span girder superstructure spanning between retained piers.
Estimated residual life & loading rating	Non-compliant—insufficient information available to determine load rating.	Non-compliant—insufficient information available to determine load rating
Design life after strengthening 100 years	Non-compliant—structure life already exceeded. Fatigue life of steelwork unknown but assumed exceeded.	Non-compliant—structure life already exceeded
Clearance + freeboard allowance to 1% AEP flooding	Compliant	Non-compliant—the soffit of new long-span girder would encroach below the 1% AEP level

Due to the location of the Mehi River bridge within the existing alignment, it is not feasible to retain any components of the bridge, in order to comply with ARTC design and structural requirements. The design has currently been undertaken on the assumption that the Mehi River bridge would be demolished, including the main truss spans, and be replaced with a new bridge carrying the upgraded Inland Rail alignment over the river.

6.6 Refinement of the proposal

The proposal is based on the outcomes of the current design described in Chapter 7: Proposal features and operation. Detailed design would take into account the outcomes of the current design phase; the findings of this EIS, including the mitigation measures detailed in Chapters 9 to 26 (and summarised in Chapter 27: Approach to environmental management and mitigation); and any conditions of approval (if the proposal is approved).

The design has been updated throughout the EIS phase and will continue to evolve over future phases as a result of engineering, traffic, economic, social and environmental considerations. The option selection and design process has also taken into account issues raised during consultation with the community and relevant stakeholders (refer to Chapter 4: Consultation) and the findings of preliminary environmental investigations. The EIS is based on the current design for the proposal. Given the current level of design development, there remain some uncertainties relating to technical requirements, how the proposal would be constructed and how it would operate as part of Inland Rail overall. These details would be resolved as the design of the proposal progresses. A summary of the main uncertainties around the design, construction and/or operational methodologies of the proposal, and how these will be resolved, is provided in Chapter 28: Conclusion.

CHAPTER 07

Proposal features and operation

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

ARTC

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7. Proposal features and operation

This chapter provides a description of the Narrabri to North Star Phase 2—Moree to Camurra North (N2NS Phase 2) Inland Rail (the proposal) features and operation for the purposes of the EIS. It includes a description of the infrastructure proposed land acquisition likely to be required and how the proposal would operate.

Table 7-1 shows the Secretary’s Environmental Assessment Requirements (SEARs) relevant to proposal features and operation and outlines the relevant sections in this chapter where the requirements are addressed.

TABLE 7-1 SEARS RELEVANT TO THE PROPOSAL FEATURES AND OPERATION

Desired performance outcome	Requirement	Where addressed
2 Environmental Impact Statement The project is described in sufficient detail to enable clear understanding that the project has been developed through an iterative process of impact identification and assessment and project refinement to avoid, minimise or offset impacts so that the project, on balance, has the least adverse environmental, social and economic impact, including its cumulative impacts.	1 The EIS must include, but not necessarily be limited to, the following:	Section 7.2
	b A description of the project, including key components and activities (including ancillary components and activities) required to construct and operate it including:	
	– project overview	Section 7.1
	– site and route locations (including use of plans)	Section 7.1
	– scope of works to construct the project, including key activities, description of methodologies, working hours, indicative plant and equipment to be used	Section 7.2
	– timing of key construction activities	Chapter 8
	– acquisition of privately owned, council and Crown land, and	Section 7.4
– connections to Inland Rail—Narrabri to North Star Phase 1.	Section 7.2	

7.1 Overview

The location of key features of the proposal have been described based on their chainage (Ch), which is the distance measured along the proposal starting at Ch 666.000 in Moree and ending at Ch 681.000 in Camurra North.

7.1.1 The proposal

The proposal involves an upgrade of approximately 13.7 kilometres (km) of existing rail corridor between Moree and Camurra North, in addition to the construction of about 1.6 km of realigned rail corridor within a greenfield area.

Key features of the proposal are:

- ▶ enhancement of about 13.7 km of existing track through minor adjustments to the vertical and horizontal alignment, and the construction of about 1.6 km of new rail corridor, including rail embankments
- ▶ demolition and reconstruction of eight underbridges at Mehi River, Gwydir River, Skinners Creek, Duffys Creek and at four other un-named water courses
- ▶ installation of approximately 1,100 new flood relief box culverts along the formation
- ▶ three new signalised level crossings at Gwydirfield Road, the Rocks Road and Back Pally Road replacing the existing level crossings
- ▶ realignment and changes to six private level crossings (including closure of one private level crossing)
- ▶ new turnout between the Gwydir River and Back Pally Road, immediately north of the new Gwydir underbridge, to provide a connection to the Inland Rail/North Star line to the east and the Weemelah line to the west
- ▶ decommissioning and removal of the Camurra hairpin and the associated formation, through the construction of the greenfield Camurra bypass, providing connections to the existing rail lines to the east and the Weemelah line to the west
- ▶ reconstruction of a new rail spur for the Weemelah line.

Associated works would include installation of signalling systems, signage, fencing, drainage, the relocation of services and utilities where necessary and the formation of rail maintenance access roads (RMARs) within the rail corridor adjacent to the line. The construction and operation of the proposal would also require the following ancillary facilities:

- ▶ construction access and haul roads linking to the surrounding public road network
- ▶ construction storage and laydown areas
- ▶ associated earthworks for the construction of pads for piling rigs and cranes at underbridge locations.

Additional ancillary facilities could also include mobile batch plant, accommodation for construction workers and construction water supply and storage.

The proposal would require temporary occupation and permanent acquisition of land along the alignment. A total of 27 lots would be impacted by permanent land acquisition, including approximately 4 hectares (ha) of private land within 12 lots and 9 ha of Crown land within 15 lots.

Once operational, the proposal would form part of the rail network managed and maintained by ARTC, with trains operated by a variety of operators. Inland Rail, in its entirety, would be operational once all 13 sections are complete. Prior to the completion of the entire Inland Rail program, N2NS Phase 2 would form part of the existing network serving grain operations on currently active rail lines to North Star and Weemelah. Therefore, use of the proposal section could occur prior to operation of Inland Rail. This activity would recommence following the completion of construction of the proposal and N2NS Phase 1.

Maximum train speeds would range from 80 to 115 km per hour (km/h), except through Moree, where the maximum train speed would be 60 km/h due to track geometry and safety.

Based on current demand forecasting, N2NS Phase 2 is expected to have an average of about 11 trains per day travelling between Camurra and Moree in 2027. This would increase to about 20 trains per day in 2040.

The proposal features and operations are described further in sections 7.2 and 7.3 and shown in Figure 7-1.

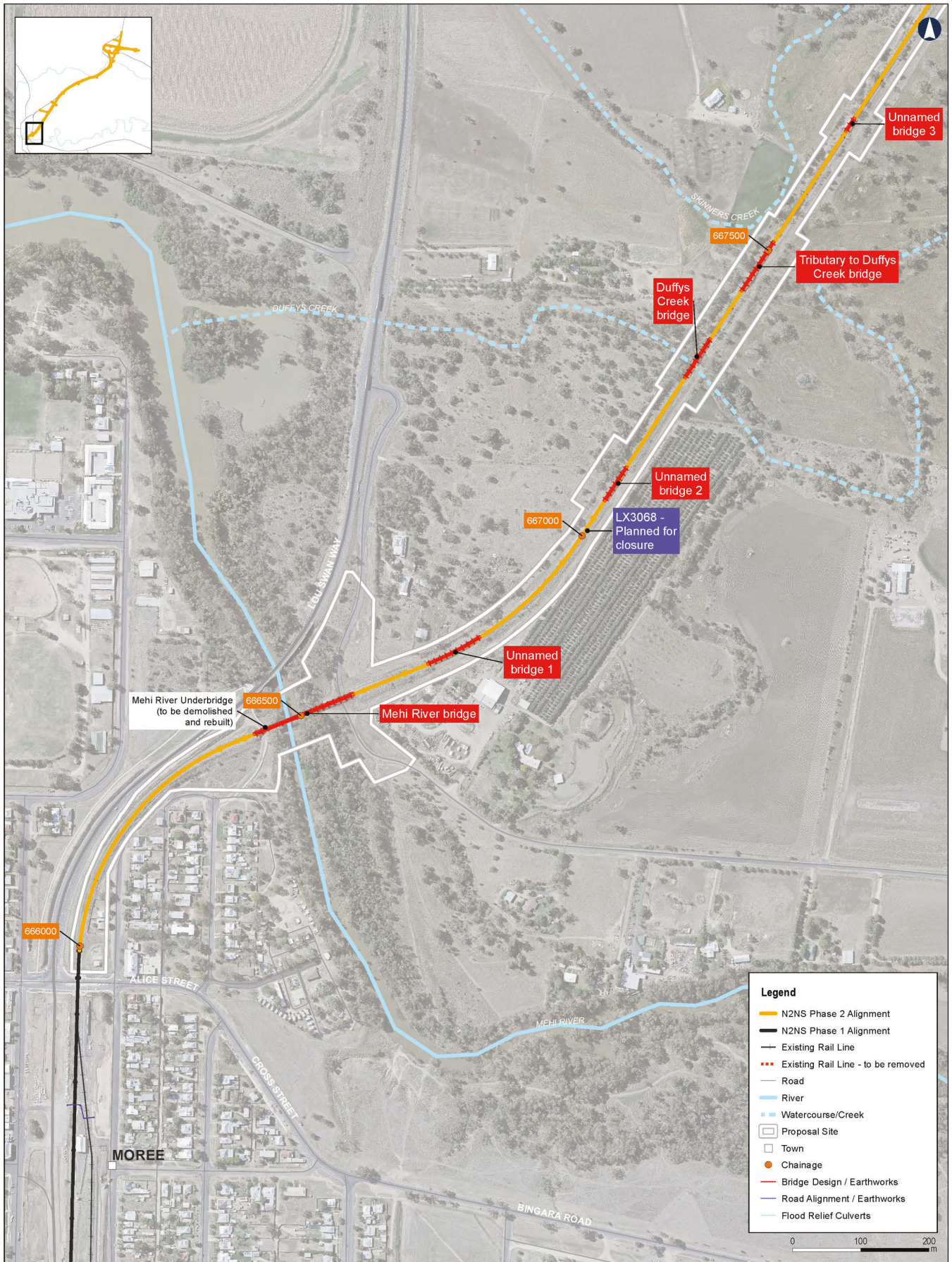




Figure 7-1 Key features of the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 2 of 8

N2NS_SIP2_ERI_F02_01_ProposalFeatures_1/3/3.mxd



Figure 7-1 Key features of the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 3 of 8

N2NS_SIP2_EIR_F02_01_ProposalFeatures_1303.mxd



Figure 7-1 Key features of the proposal

Data Sources: ARTC, IRD/JV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 4 of 8

N2NS_S2_ER_F02_01_ProposalFeatures_1303.mxd



Figure 7-1 Key features of the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Legend

- N2NS Phase 2 Alignment
- N2NS Phase 1 Alignment
- Existing Rail Line
- - - Existing Rail Line - to be removed
- Road
- River
- Watercourse/Creek
- Proposal Site
- Town
- Chainage
- Bridge Design / Earthworks
- Road Alignment / Earthworks
- Flood Relief Culverts

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 5 of 8

N2NS_SIP2_EIR_F02_01_ProposalFeatures_1303.mxd

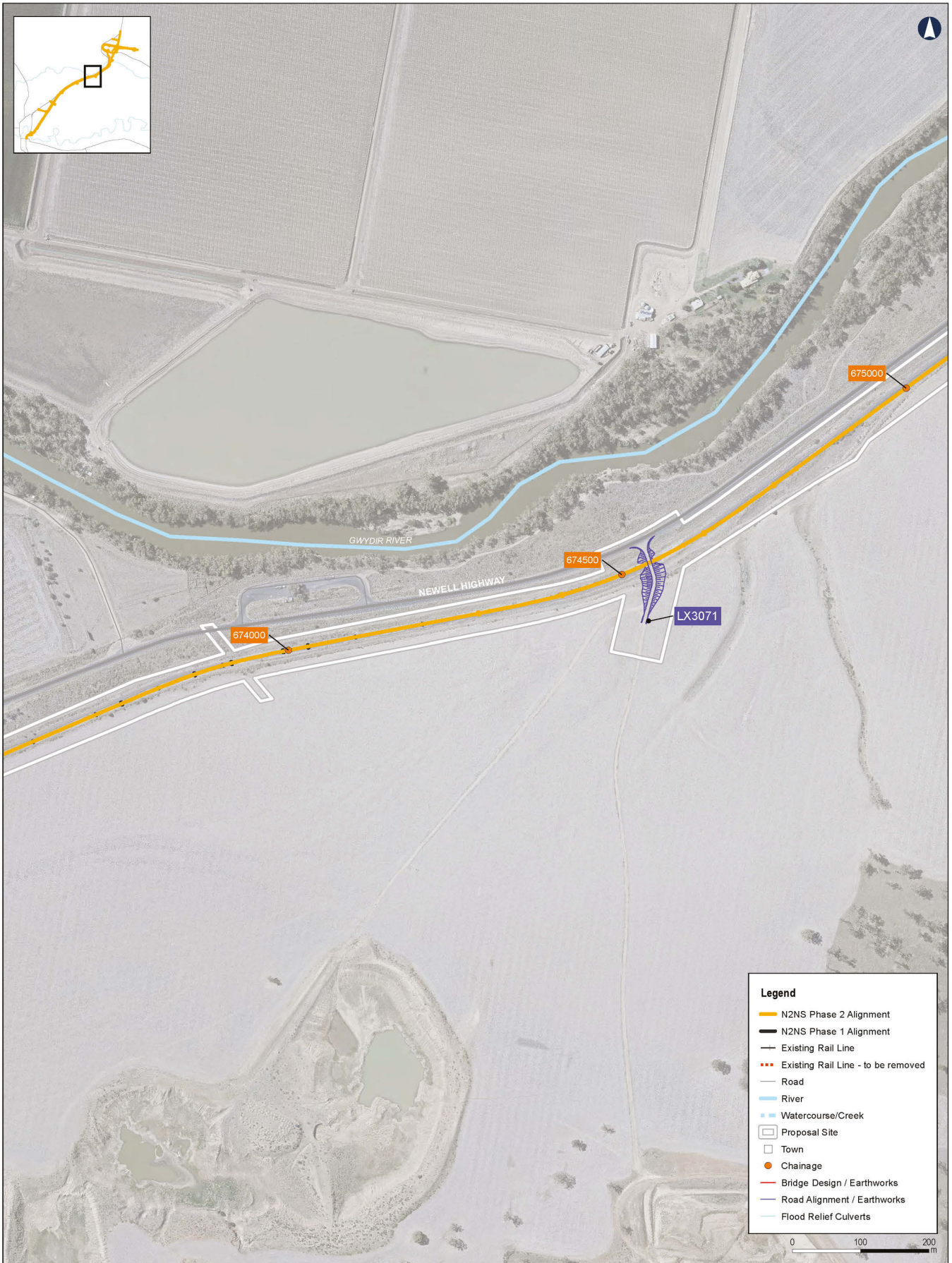


Figure 7-1 Key features of the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 6 of 8

N2NS_S2_ERI_F02_01_ProposalFeatures_1303.mxd



Figure 7-1 Key features of the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 7 of 8

N2NS_SIP2_ERI_F02_01_ProposalFeatures_703.mxd

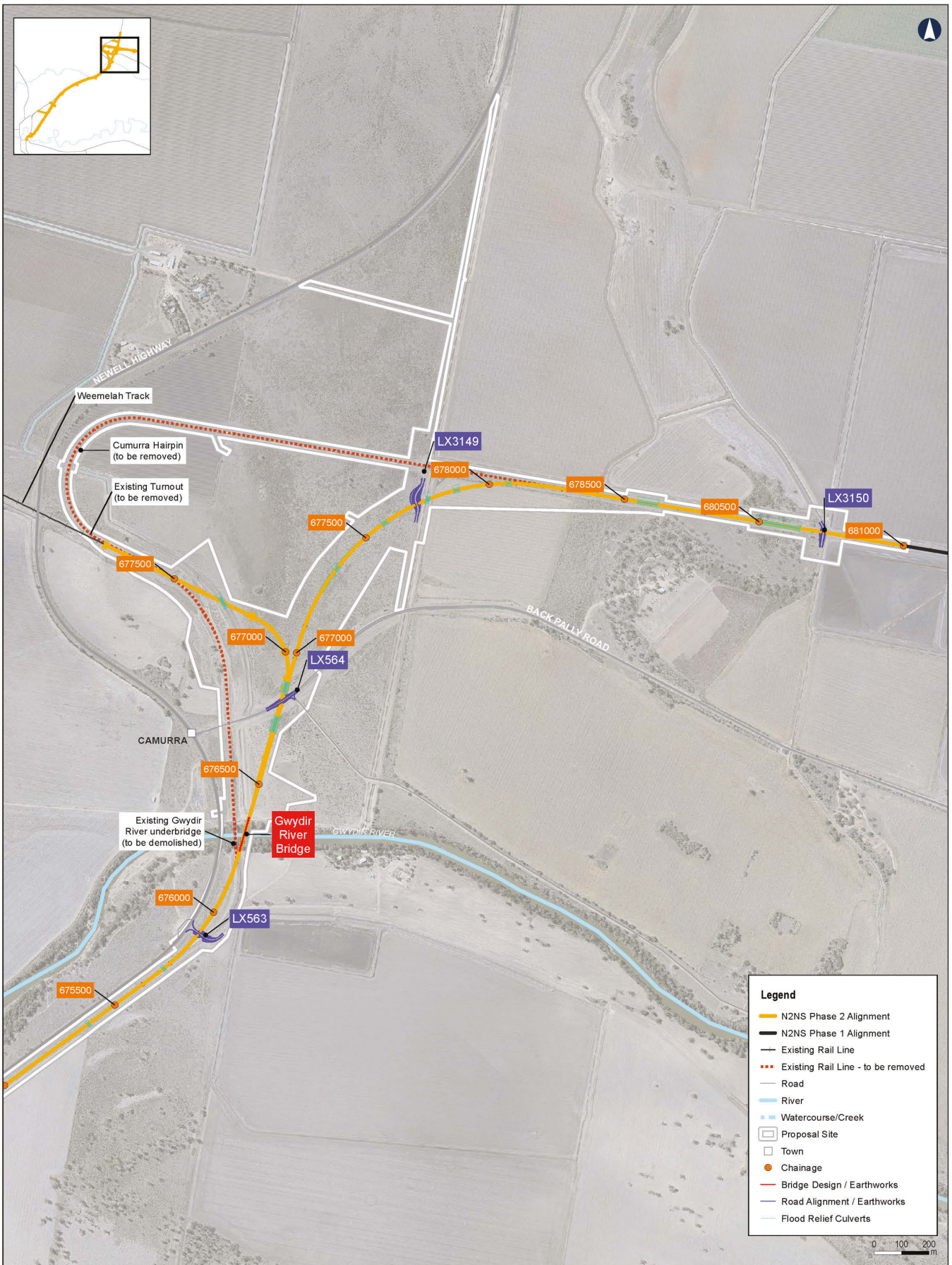


Figure 7-1 Key features of the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:12,500
 Paper size: A3
 Date: 9/22/2021
 Map 8 of 8

N2NS_S2_ER_F02_01_ProposalFeatures_3/03.mxd

7.2 Description of key proposal features

7.2.1 Track upgrade and realignment

The majority of the existing track would be upgraded within the existing rail corridor, for a distance of about 13.7 km from Ch 666.000 in Moree to Ch 675.800 just south of the Gwydir River bridge.

Track reconstruction would involve replacing the existing track and formation. Between Ch 672.600 and 675.800, a minor horizontal realignment (10 metres (m)) of the track, to the east, is required to solve short-stacking issues between the Newell Highway and existing level crossings. Minor curve easing is also required. This would require permanent land acquisition along the rail corridor to account for the changes.

An assessment of likely short-stacking issues was undertaken for the alignment using the Australian Level Crossing Assessment Model (ALCAM) to assess potential risks at all the level crossings. Short stacking occurs when a long vehicle, such as a semi-trailer, does not have enough space to completely clear the crossing and stops while part of the vehicle is still within the crossing. Level crossing 3070 would need to be moved slightly (approximately 10 m) to the south-east, requiring the purchase of a narrow portion of private agricultural land to safely accommodate the level crossing. Another minor portion of agricultural land would be needed to ensure a wide enough curve (curve easing) to maintain an 800 m radius curve, which is needed for the new trains. This ensures train speeds would be maintained safely without impacting the Newell Highway. A design principle of an 800 m radius curve has been adopted for the proposal wherever possible to ensure operational efficiencies can be maintained along the full alignment.

Upgrades of the rail line would seek to use the existing formation and ballast where possible. These materials would be blended at the site and tested to determine whether the new formation complies with the design requirements. Where additional material is required, this would be imported from an external source. Once the formation achieves the required structural performance, a new ballast layer would be imported and placed on the formation to allow installation of sleepers and rail.

The height of the rail line would also need to be increased between 300 millimetres (mm) and 1000 mm to prevent the flooding of the rail line, ensure resilience to flooding and limit ballast washout during large flood events (i.e. greater than a 1 in 10-year event). This would ensure the rail is able to continue operations during these events and minimise network congestion on the rail line.

An indicative representation of the design and cross-section of the proposal on the existing alignment close to the Newell Highway is shown in Figure 7-2.

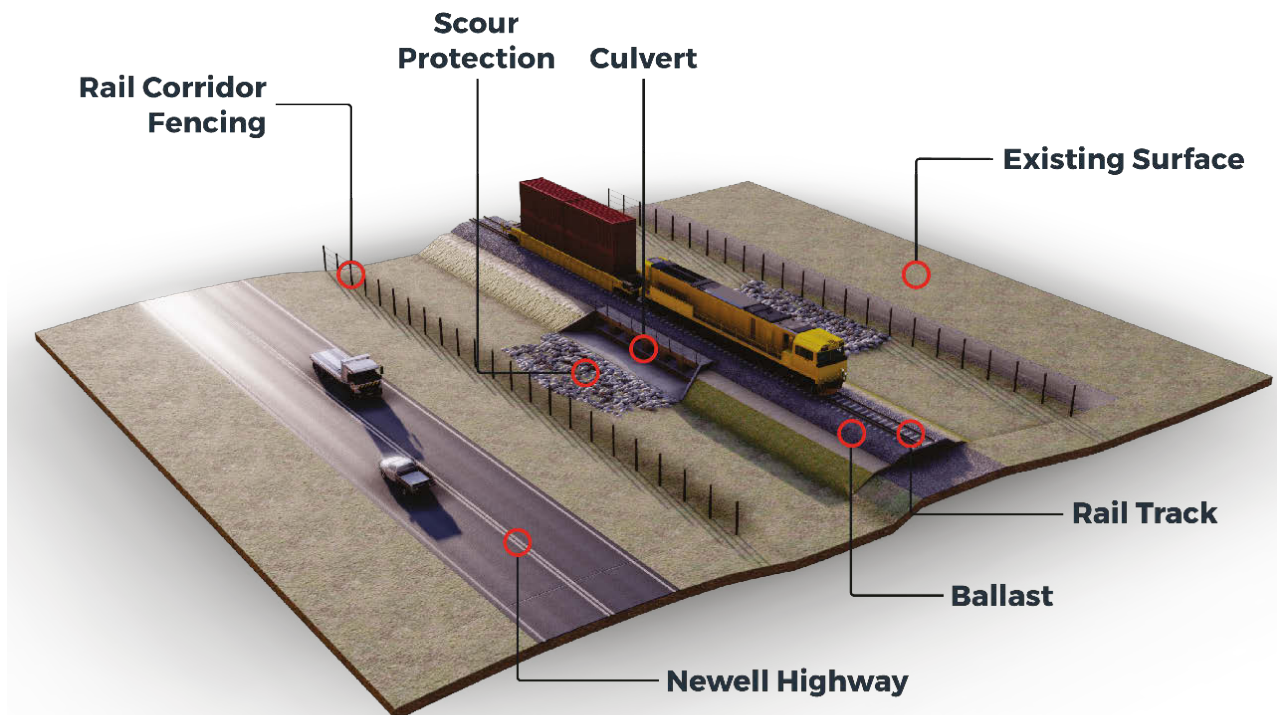


FIGURE 7-2 REPRESENTATION OF THE EXISTING RAIL CORRIDOR IN PROXIMITY TO THE NEWELL HIGHWAY

7.2.2 Camurra bypass

The proposal also involves the realignment of the existing track between Ch 675.800 and Ch 678.200 along the Camurra North section. The realignment would replace the existing Camurra hairpin loop. The realignment would involve the construction of about 2.4 km of new, single-track standard-gauge railway, within a maximum grade of 1:100. About 1.6 km of the new track is within a greenfield site.

The Camurra bypass would involve:

- ▶ 1.6 km of new track to the east of the existing turn, with an 800 m radius curve
- ▶ constructing seven culverts
- ▶ connections to the existing rail lines to the east and the Weemelah line to the west
- ▶ property acquisition, including 50 m of irrigation channel and a portion of a travelling stock reserve (TSR).

The Camurra bypass would be constructed on fill. An indicative design and a typical cross section of the new track is shown in Figure 7-3.

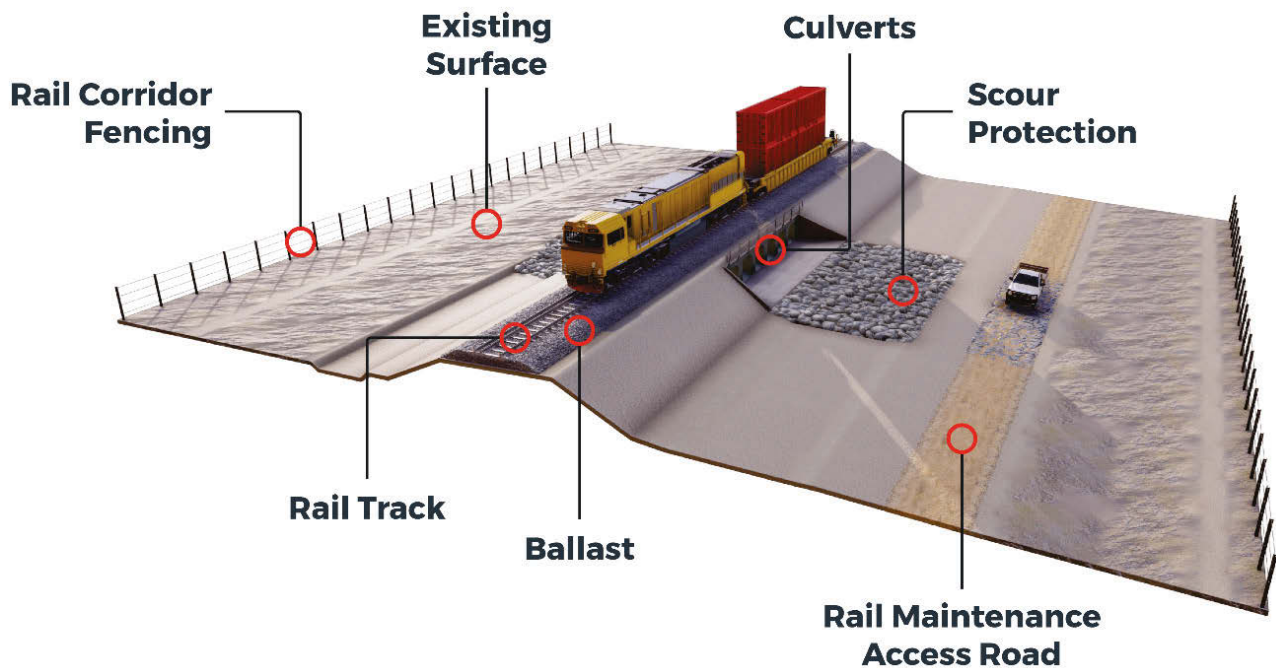


FIGURE 7-3 REPRESENTATION OF A TYPICAL NEW TRACK ALIGNMENT ON EMBANKMENT

Construction of the bypass would mean that the existing hairpin loop would no longer be required. Subject to detailed design and flood management outcomes which may require the retention of parts of the existing rail embankment, the hairpin would be demolished. The formation material would be excavated, treated and redistributed to other parts of the proposal where possible.

7.2.3 Turnouts

Turnouts allow the train to be guided from one track to another. The proposal involves providing a turnout at Ch 676.450, immediately north of the new Gwydir underbridge, to enable a connection from the new rail track to the Weemelah line (refer to Figure 7-1).

Currently, the Weemelah turnout is positioned along the existing hairpin curve, which would be decommissioned. The turnout would be moved from this current position to Ch 676.450, and a new track would be constructed between the new and original turnout point.

No other turnouts are proposed, as the Weemelah turnout is the only existing connection.

7.2.4 Bridges

The proposal involves the reconstruction of existing underbridges over the Mehi River and the Gwydir River, as the existing bridges do not meet Inland Rail structural requirements. The proposal also involves the upgrade of six underbridges required for other river and creek crossings. Details of the new or upgraded bridges, including the span arrangement (distance between supports for the bridge structure) and length, are summarised in Table 7-2, with the locations shown in Figure 7-1.

TABLE 7-2 PROPOSED NEW BRIDGES

Bridge crossing	Bridge location (start chainage)	Span arrangement (m)	Total length (m)	Additional details
Mehi River	666.450	9 x 9 3 x 23	150	Reconstructed over the same location, with new piers placed directly adjacent to existing piers towards the riverbanks.
Unnamed bridge 1	666.700	9 x 9	81	
Unnamed bridge 2	667.060	6 x 9	54	
Duffys Creek	667.260	7 x 9	63	
Duffys Creek tributary	667.430	9 x 9	81	
Unnamed bridge 3	667.710	2 x 9	18	
Skinner's Creek	667.990	12 x 9	108	
Gwydir River	676.240	6 x 9 3 x 23	123	Positioned 20–40 m to the east of existing bridge.

Depending on geotechnical conditions, driven steel piles are proposed for the bridge foundations, all of which have been designed to be made of reinforced concrete. All bridge piers would consist of reinforced concrete headstock supported on circular reinforced concrete columns or blade piers and shown in Figure 7-4.

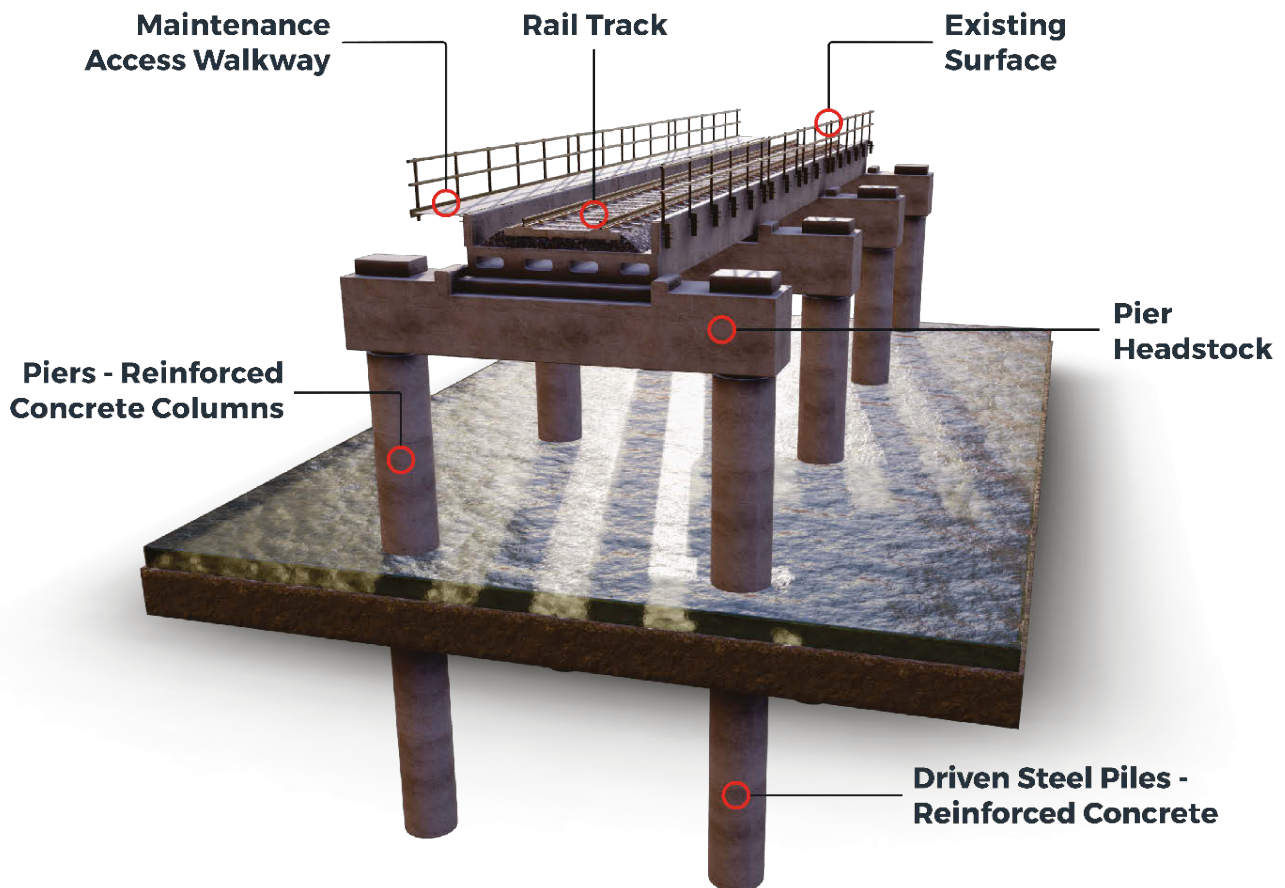


FIGURE 7-4 ARTIST IMPRESSION OF THE CROSSING OF THE MEHI AND GWYDIR RIVERS

7.2.5 Culverts

Culverts are structures that allow water (in a watercourse or drain) to pass under the rail line. Based on flood modelling undertaken to date, as described in Chapter 12: Hydrology and flooding, the proposal would require 1,100 culverts to be installed of varying types and sizes in about 32 locations along the proposal site. This would be refined through further flood modelling during detailed design.

The indicative design of new/replacement culverts has been informed by a hydrologic and hydraulic assessment of the proposal site and geotechnical assessment. An assessment of flooding events has been undertaken for each

structure. The proposed structures have been designed to provide the rail line a one per cent annual exceedance probability (1% AEP) flood event immunity. Further details of the flooding immunity are described in Chapter 12.

The culverts would be constructed of concrete and have been designed to:

- ▶ take into account local constraints and flooding/hydrological conditions
- ▶ permit an appropriate flow and minimise the potential for adverse flooding impacts
- ▶ meet ARTC design standards.

To meet the hydrological challenges experienced within the Gwydir Mehi floodplain, the culvert design has required the installation of culverts across two vertical arrangements so that the culverts placed higher in the formation only activate in rare flood events. The purpose of this design is to aid in managing impacts from all flood events, from frequent to infrequent. A depiction of the likely layout of the proposed culverts is shown in Figure 7-5.

Large banks of new reinforced box culverts between Ch 671.700 and 672.500 of the alignment are required to achieve flood immunity and to mitigate the overall flooding impacts. Refer to Figure 7-1 for the location of the proposed culverts.

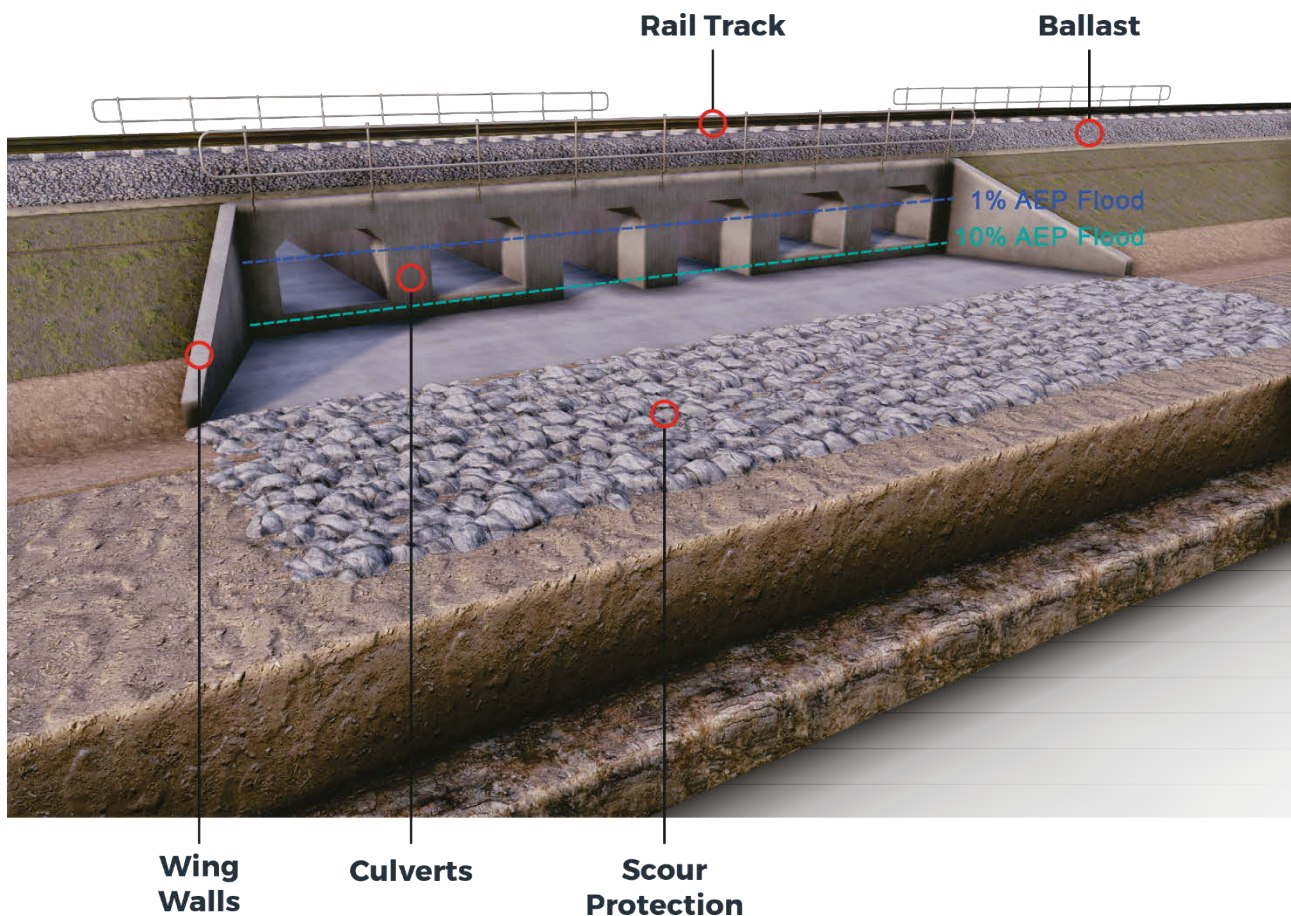


FIGURE 7-5 REPRESENTATION OF THE VERTICAL ARRANGEMENT OF CULVERT DESIGN ON THE GWYDIR MEHI FLOODPLAIN

Bridge and culvert freeboard would mostly increase across the entire alignment due to the slight raising of the rail track, to improve flood resilience. An exception to this is the Gwydirfield south underpass, which currently shows a minor reduction in freeboard of 40 millimetres (mm) due to the preliminary structural design of the bridge. Detailed design would refine these freeboard levels to ensure. Formation resilience would also be addressed through applying industry best practice and detailed geotechnical formation design to ensure the structural integrity and erosion resistance of the formation is an improvement over the current formation.

7.2.6 Level crossings

The proposal involves relocations and upgrades to three existing public level crossings, and works to six existing private level crossings, one of which would be removed at Ch 666.730. Ongoing consultation is underway to obtain agreements with landowners for works on private level crossings.

A variety of treatments for existing and new level crossings have been proposed to maintain the connectivity of the existing road network, both public and private. Treatments for level crossings (where the road and rail cross each other at the same level) are categorised as:

- ▶ passive—have static warning signs, including stop and give-way signs for motorists, and ‘Look for trains’ signs for pedestrians. This signage is unchanging with no mechanical aspects or light devices
- ▶ active—have flashing lights, alarms, and whistles, with or without boom barriers for motorists, and automated gates for pedestrians. These devices are activated prior to, and during, the passage of a train through the level crossing.

Figure 7-6 shows a cross section of the typical layout of an active level crossing and Figure 7-7 is of a passive crossing.

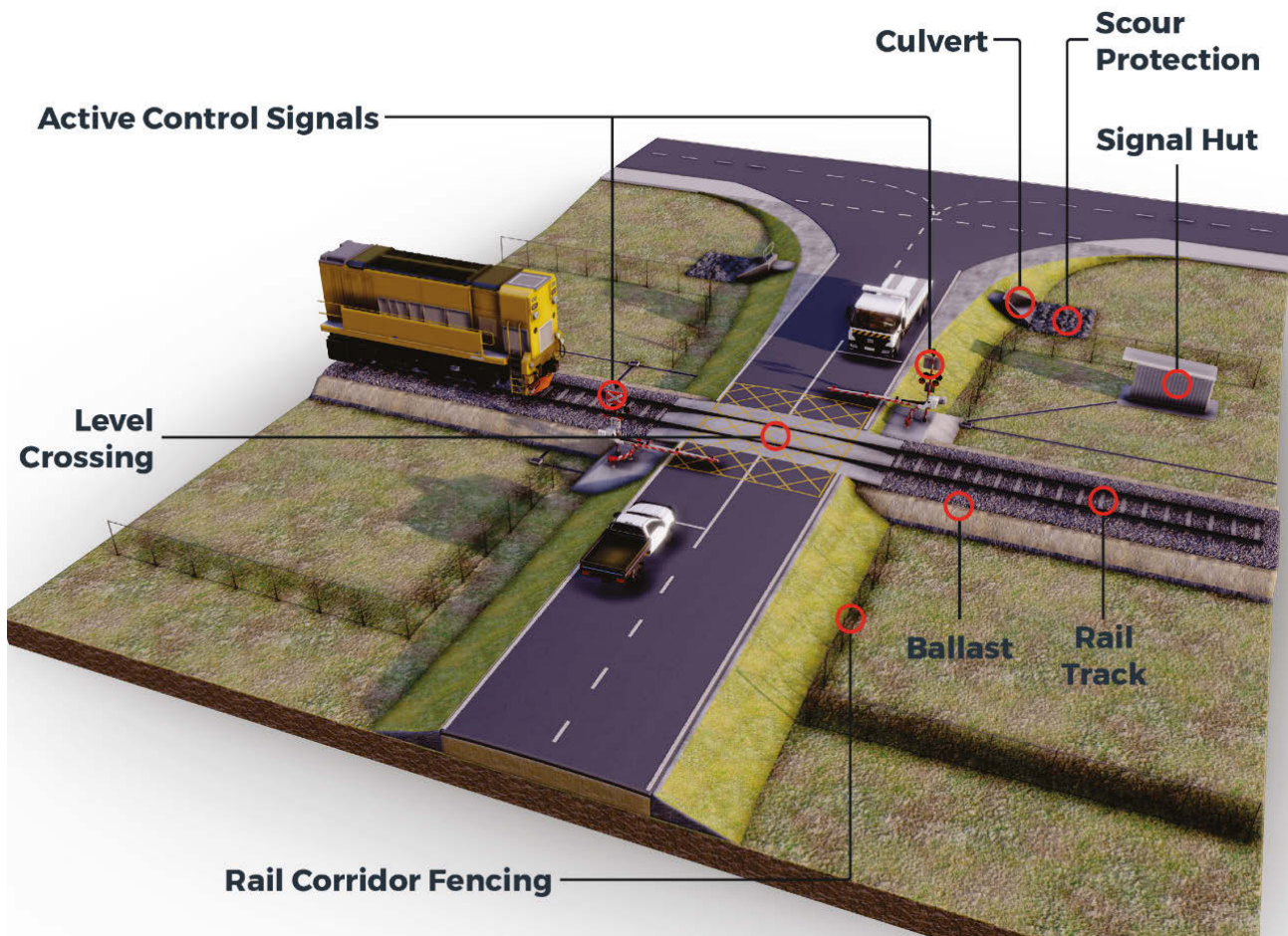


FIGURE 7-6 TYPICAL ACTIVE LEVEL CROSSINGS WITH FLASHING LIGHTS AND BOOM GATE (RX5)

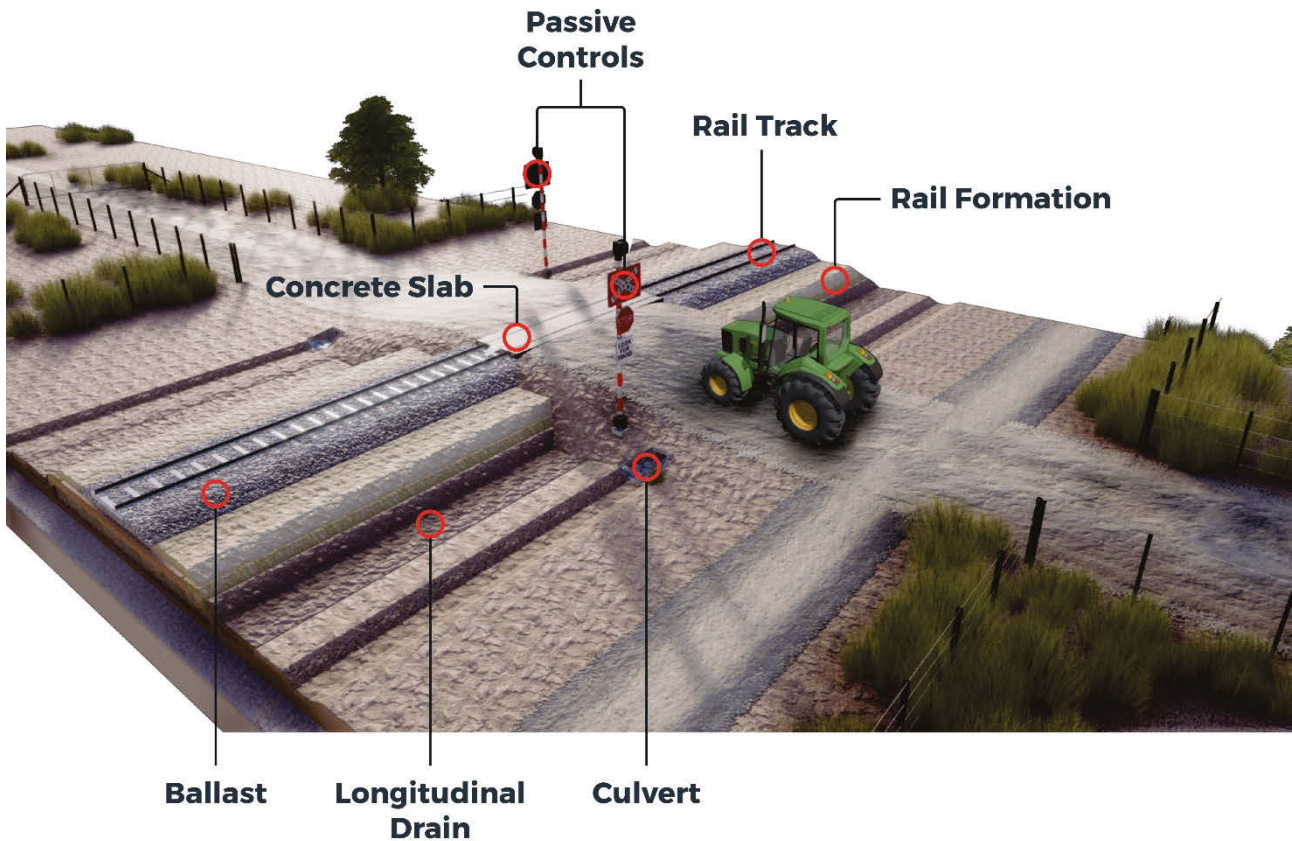


FIGURE 7-7 TYPICAL PASSIVE LEVEL CROSSINGS WITH STATIC WARNING SIGNS (RX2)

ARTC is applying the Inland Rail level crossing strategy for the proposal. The level crossing strategy involves reviewing all crossings along the proposal to determine the works required to meet relevant crossing standards, guidelines and inland Rail operational criteria. The preferred option for level crossings, developed as an outcome of the level crossing strategy, is a mix of retaining/refurbishing existing crossings, considering the consolidation or relocation of some crossings, or upgrading the level of control. Accordingly, an assessment of the appropriate design speed at each level crossing has been undertaken and an appropriate speed selected depending on the type of crossing, geometry, road and surface type, traffic volumes and regulatory speed signage. The design speeds adopted are as follows:

- ▶ private level crossings have been designed for a vehicle design speed of 20 km per hour (km/h) over the crossing
- ▶ public level crossings have been designed for various vehicle design speeds between 20 km/h and 100 km/h (see Table 7-3 for details).

7.2.6.1 Public road crossings

The proposal involves the crossing of local government roads, Gwydirfield Road, The Rocks Road and Back Pally Road. The preferred options for the three public road crossings for the proposal are summarised in Table 7-3 and shown in Figure 7-1.

Public level crossings would be designed to align with the road design speed at each crossing. Currently all public level crossings are passive crossings meaning that they do not use signals or booms and rely on the road user to be vigilant to passing trains. Passive crossings require significant vegetation clearing to maintain sightlines and to ensure approaching trains are visible in advance for road users. The new level crossings would be upgraded to active crossings including signals and booms. Active crossings are considered a safety improvement and reduce the need for extensive vegetation clearing to ensure adequate sight lines.

The new Rocks Road level crossing (LX563) and the Back Pally Road level crossing (LX564) would also function as a TSR, providing an east–west crossing point for the rail line. If the Rocks Road crossing is used to facilitate stock movement, adequate traffic control would be required for the Newell Highway.

TABLE 7-3 SUMMARY OF PUBLIC ROAD CROSSINGS

Road name	Feature ID	Chainage location	Proposed treatment	Details
Gwydirfield Road	LX562	669.900	Active level crossing	Existing passive level crossing to be upgraded to active: <ul style="list-style-type: none"> ▶ 90 km/h road design speed ▶ 9.2 m road width ▶ 10.8 m surface treatment length to be confirmed during detailed design.
The Rocks Road	LX563	675.900	Active level crossing	Existing passive level crossing to be relocated and upgraded to active level crossing where realigned rail track interfaces with The Rocks Road: <ul style="list-style-type: none"> ▶ 40 km/h road design speed ▶ 6 m road width ▶ surface treatment length to be determined during detailed design.
Back Pally Road	LX564	676.900	Active level crossing	Existing passive level crossing to be relocated and upgraded to active level crossing where realigned rail track interfaces with Back Pally Road: <ul style="list-style-type: none"> ▶ 110 km/h road design speed ▶ 9.2 m road width ▶ 18 m surface treatment length, to be confirmed during detailed design ▶ suitable for use as TSR.

7.2.6.2 Private crossings

The proposal crosses six private property accesses at existing passive level crossings that are to be realigned, upgraded or closed. Consultation with relevant stakeholders (including landowners and road owners) to confirm the preferred approach, and finalise designs for the works of each crossing, is ongoing. Consultation with landowners regarding the closure of level crossings is ongoing and initial agreements have been reached. Where an existing access to or within a property is proposed to be removed or altered, access to the property would be reinstated where practicable. It is likely that private crossings south of the Gwydir River would predominantly be fenced/gated; however, final treatment would be subject to consultation with landowners. A summary of the level crossings requiring an upgrade or removal is provided in Table 7-4.

TABLE 7-4 SUMMARY OF PRIVATE ROAD CROSSINGS

Feature ID	Chainage Location	Proposed treatment	Details
LX3068	666.730	Close/decommission	Existing level crossing panel and signage to be removed
LX3069	671.125	Passive level crossing	Upgrade of existing level crossing: <ul style="list-style-type: none"> ▶ 6 m road width ▶ 9.6 m surface treatment length
LX3070	672.770	Passive level crossing	Upgrade of existing level crossing: <ul style="list-style-type: none"> ▶ 6 m road width ▶ 7.2 m surface treatment length
LX3071	674.545	Passive level crossing	Upgrade of existing level crossing: <ul style="list-style-type: none"> ▶ 6 m road width ▶ 8.4 m surface treatment length
LX3149	677.725	Passive level crossing	Upgrade of existing level crossing: <ul style="list-style-type: none"> ▶ 8 m road width ▶ 9.6 m surface treatment length ▶ Suitable for use as TSR
LX3150	680.740	Passive level crossing	Upgrade of existing level crossing: <ul style="list-style-type: none"> ▶ 8 m road width ▶ 9.6 m surface treatment length

7.2.7 Road modifications

Modifications to local and arterial roads would be required where the track needs to be realigned and where new or upgraded crossings are installed. The following roads would require modification where they cross the rail track:

- ▶ Gwydirfield Road (south crossing)
- ▶ The Rocks Road
- ▶ Back Pally Road.

Gwydirfield Road south rail bridge would be demolished and replaced on the existing alignment, with a new concrete bridge suitable to carry the proposed locomotives and carriages. The current underpass would largely remain unaffected with a rail clearance of 3.66 m above the road. The height of the bridge would be developed during detailed design including options to lower the road to allow more clearance where possible (refer to Chapter 11: Traffic and transport for further details).

Where road modifications are required, this may involve resurfacing of existing pavements where:

- ▶ private road crossings would be generally unsealed
- ▶ public road crossings would match the existing (either sealed or unsealed) pavement surfacing
- ▶ installation of new signage and line markings (where required) to comply with the relevant standards.

The Rocks Road level crossing would be sealed, as it is currently the only unsealed public road crossing. The seal would provide various benefits, most notable being improved road user safety. It would also minimise the risk of rutting due to start/stop of heavy vehicles along this road. Back Pally Road would also be resealed in the vicinity of the new level crossing.

Consultation with landowners and the relevant roads authority would continue throughout detailed design to determine the appropriate road treatments.

7.3 Ancillary works and infrastructure

7.3.1 Track drainage

Surface drains (swale drains) would be installed within the rail corridor adjacent to the track. These surface drains would be located to the side of the tracks and would remove water that percolates through the ballast and flows along the capping layer towards the outside of the track formation. The surface drains protect the track formation by keeping it dry. All drains would be positioned to ensure water runoff is directed to the drain and not the surrounding land.

7.3.2 Rail maintenance access road

The proposal includes a rail maintenance access road (RMAR) to provide access to the rail corridor for maintenance of critical infrastructure, emergency recovery, and access to crew change and train stowage. Critical infrastructure includes bridges, culverts, the crossing loop and maintenance siding, turnouts and active level crossings.

The RMAR would run the length of the proposal in various locations within the proposal site. Generally, the RMAR would be left unsealed and with no specific pavement treatment. Where necessary for access arrangements, the RMAR would be constructed with a layer of compacted and graded pavement. Similarly, a wearing course layer may be adopted in some circumstances to provide a harder surface for improved trafficability. An indicative cross-section of the typical layout of the track including the rail maintenance access road is shown in Figure 7-1. The RMAR would be located within the rail corridor and would provide access for all rail maintenance activities via gates at various entry points along the alignment.

The design of RMAR creek crossings would be compliant with the NSW Fisheries guideline *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings* (Fairfull & Witheridge, 2003). Where RMAR creek crossings are unable to meet the guidelines due to steepness of banks or depth of water, alternative access would be developed during detailed design including turning areas and additional access points.

7.3.3 Signalling and communications

Signalling and communications would be newly installed as part of the level crossing works at the Gwydirfield Road, Rocks Road and Back Pally Road level crossings, to enable the public level crossings with new active controls to suit the new track and operational requirements.

ARTC's Train Control System (TCS) would be implemented to manage signalling and communications for the wider rail network. ARTC's Advanced Train Management System (ATMS) may be installed at a later date once construction is completed. ATMS is a communication-based train management system, which communicates via both voice and data between Network Control Centres and locomotives operating on ARTC's rail network. Connections for the signalling infrastructure and communications to the electricity network would also be installed where required along the proposal site.

7.3.4 New fencing

New boundary fencing is proposed to provide physical separation of the railway corridor from the adjoining land. The intention with a boundary fence is to protect the rail corridor and to mitigate the risks associated with individuals or livestock accessing the rail corridor or traversing the rail line.

New fencing would be installed along the majority of the proposal boundary, potentially only absent through exclusively cropping land, such as the area at Ch 681.000. Where the proposal abuts a public road, fencing would be installed on the non-road side only. Existing fencing along the existing rail corridor would be replaced as required.

Fencing would extend to the boundary of private landowners adjoining the rail line and would delineate the boundary of the rail corridor from residential and rural property areas. Where the rail corridor already exists, if it is currently fenced, it would be retained or replaced. If no fencing presently exists, a risk assessment would be undertaken on a site-by-site basis to determine if boundary fencing is required. The type of boundary fencing would reflect the adjoining land use and would generally consist of a standard stock fence (1.2 m high) in rural areas while in residential areas it would be more suited to an urban setting and consist of chain link or similar.

Fencing would funnel any animals in the area through the rail corridor via a fauna passage and would be designed in such a way to prevent animals becoming trapped in the corridor. Specific detail on fauna fencing is discussed in section 7.3.4.1.

During detailed design, the approach to fencing may need to be revised as further consultation with stakeholders is undertaken.

7.3.4.1 Fauna fencing

Fauna fencing can be an effective way of preventing fauna species from accessing rail corridors, minimising potential injury and mortality. Fencing would be used in conjunction with other crossing structures to exclude animals from sections of infrastructure corridors and to direct animals towards a safe crossing location—usually a bridge, a culvert, or at-grade crossing.

Typically, fauna fencing suitable to deter medium-sized mammals would generally be about 1.8 to 2 m in height and buried 30 centimetres deep (cm) to prevent fauna species from digging under the fence. Suitable fauna fencing and passage measures would be required in specific locations along the alignment; the final alignment and types of fauna fencing would be confirmed during detailed design.

Based on the results of Technical Paper 1: Biodiversity development assessment report, koala fencing would also be required in the southern section of the proposal site as well as areas immediately surrounding the crossing of the Gwydir River. The location and design of koala fencing would be confirmed during detailed design.

Figure 7-8 provides a representation of a standard fauna exclusion fence.

Further information is provided in Chapter 10: Biodiversity.

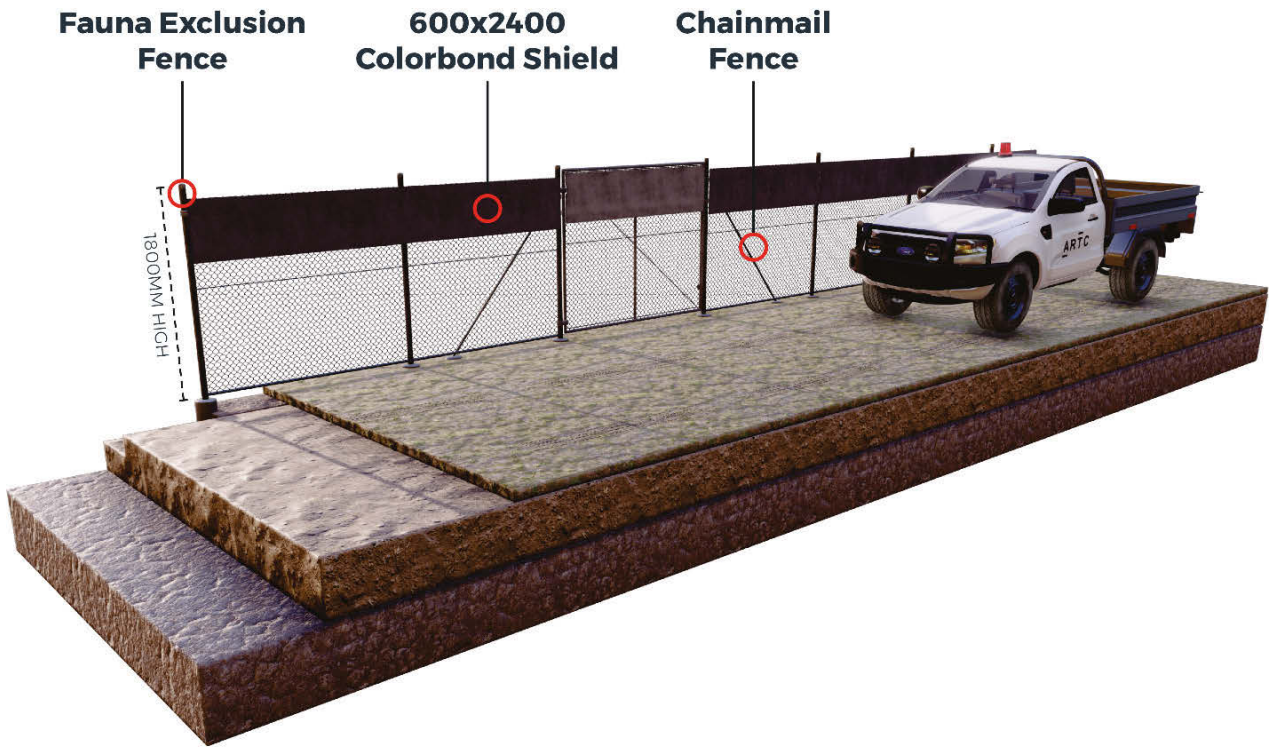


FIGURE 7-8 TYPICAL FAUNA FENCING ARRANGEMENT

7.3.5 Fauna crossings

Fauna crossings can provide connectivity of habitats for arboreal and land-based animals and may be constructed over or underneath/through a connectivity barrier. Approximately 1,100 new culverts would be included in the proposal and would provide passage for fauna in varying degrees from one side of the track alignment to the other. Accordingly, while specific fauna crossings have not been separately developed as part of the proposal, fauna crossings would be developed during detailed design of the drainage (culverts) along the entirety of the track alignment.

Culverts and underbridges for the proposal have the capacity to provide adequate fauna movement beneath the railway line. As the culverts and bridges for the rail line are not long, fauna furniture would not be provided within the culverts. Further information is provided in Chapter 10: Biodiversity. Figure 7-9 shows a typical fence arrangement over culverts and/or fauna crossings.

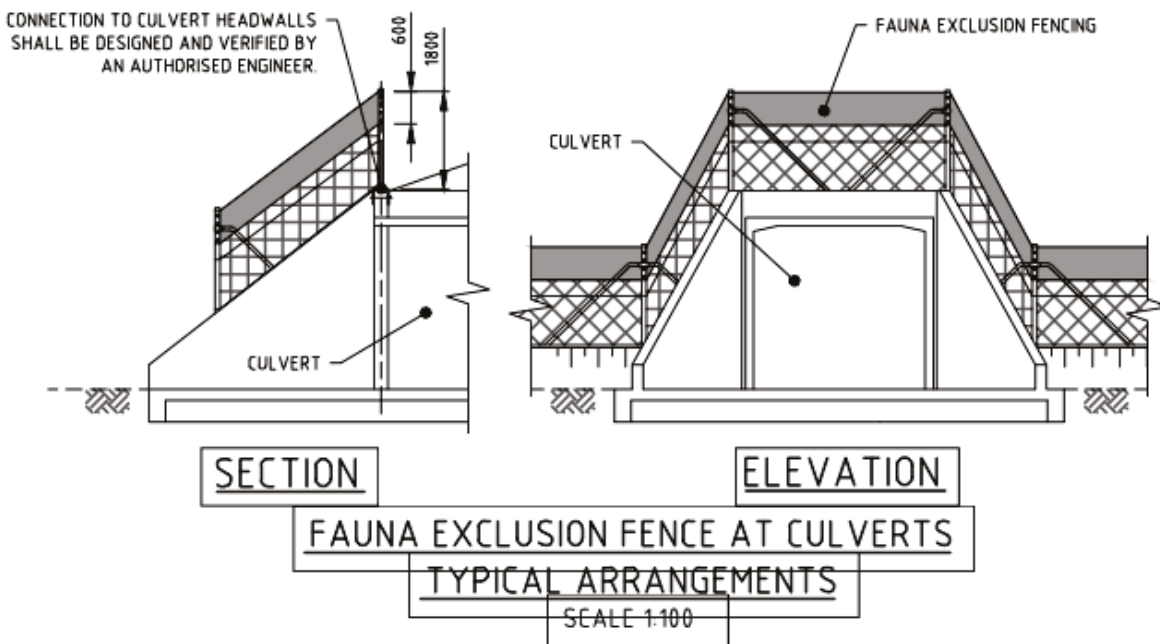


FIGURE 7-9 TYPICAL FENCE ARRANGEMENT OVER CULVERT OR FAUNA CROSSING

7.3.6 Signage

Typical signage within the rail corridor would include kilometre posts, creep markers, and track geometry and control markers, and would be provided where required. Signage required as part of the road modifications is discussed in section 7.2.7.

7.3.7 Spoil mounds

Excess material due to excavation of the Camurra hairpin, track formation and surface drains would be tested and, if found to be suitable, treated and reused in the new formation. Where material is found to be unsuitable, it would be assessed and managed in accordance with ARTC's Earthworks Materials Management Guideline (ETC-08-03), and alternative arrangements made to use the material either within the proposal footprint or on nearby projects. As a last resort, it would be disposed of to a suitably licensed facility. No stockpiles or spoil mounds would be left on the floodplain to ensure they do not impact on flooding or drainage.

7.4 Land acquisition

The existing rail corridor is owned by the NSW Government (Transport for NSW). The majority of the proposal would be undertaken within the existing rail corridor.

Property acquisition would be required for areas along the existing rail corridor where additional land is required, as well as areas between Ch 675800 and Ch 678200 along the Camurra North section for construction of the Camurra bypass. The area required under the current design for the proposal is summarised in Table 7-5. Further details of acquisition are provided in Chapter 9: Land use and property.

TABLE 7-5 LAND USE AND LAND AREA REQUIRED FOR THE PROPOSAL

Ownership	General Land use	total Approx. Land Area (m ²)	Number of Lots	Approx. Area required for proposal (m ²)
State Rail Authority of NSW	Rail corridor	3,130	4	2,226
Crown land (State of NSW)	Travelling stock routes and waterways	1,665,340	5	65,894
Transport for NSW	Roads and highways	17,604	3	12,811
Minister for Public Works	Rail corridor	1,163	1	667
Private (various owners)	Rural and rural residential	11,882,172	12	41,927
Not available	NA	53,194	2	12,607
Total		13,622,603	27	136,132

Acquisition would be undertaken in accordance with the requirements of the *Land Acquisition (Just Terms) Compensation Act 1991* (NSW). The preference is to achieve a negotiated agreement with the affected landowner, with the compulsory acquisition used as a last resort. The compensation payable is pursuant to Section 55 of the *Land Acquisition (Just Terms) Compensation Act 1991*, which includes (among other things) provisions for market value and disturbance items such as associated legal costs, valuation fees, relocation and removal expenses, and mortgage costs.

Present areas for acquisition are approximate and the extent of property impacts would be refined and confirmed during detailed design, in consultation with property owners. Private property would generally be partially acquired except for one property on two lots in Morton Street, Moree which would be fully acquired. Property adjustment plans would be developed in consultation with the property owners for partially acquired properties.

Temporary acquisitions required during construction would be undertaken following consultation with landowners prior to works commencing. Further details of temporary acquisitions are provided in Chapter 9: Land use and property.

7.5 Operation of the proposal

7.5.1 Train operations

The proposal would form part of the rail network managed and maintained by ARTC. Train services would be provided by a variety of operators. The northern section of the N2NS Phase 1 and the Weemelah line (described in section 2.5.2) would be isolated once construction commences, as the proposal requires full possession and removal of the existing rail track. Inland Rail, as a whole, would be operational once all 13 sections are complete.

Inland Rail would involve operation of a single rail track with crossing loops, to accommodate double-stacked freight trains up to 1,800 m long and allow clearance of 7.1 m. Train speeds would vary according to axle loads and range from 80 km/h to 115 km/h, except through Moree where the maximum train speed would be 60 km/h due to track geometry and safety.

Based on current demand forecasting, N2NS Phase 2 is expected to have an annual average of about 11 trains per day travelling between Camurra and Moree in 2027. This would increase to about 20 trains per day in 2040.

The new rail line would be a faster, more efficient route that bypasses the Sydney rail network and would enable the use of double-stacked trains along its entire length. The Inland Rail trains would be a mix of grain, bulk freight, and other general transport trains. Total annual freight tonnages would be about 11.8 million tonnes in 2027, increasing to about 19 million tonnes in 2040 (from the existing two million tonnes of grain per year).

Interim use of the proposal section would occur prior to operation of Inland Rail, as the section forms part of the presently active railway lines to North Star and Weemelah. This activity would recommence following the completion of construction of the proposal and N2NS Phase 1.

7.5.2 Maintenance activities

Standard ARTC maintenance activities would be undertaken during operations, as per the ARTC Environmental Protection Licence (EPL). Typically, these activities include minor maintenance works, such as bridge and culvert inspections, rail grinding and track tamping, through to major maintenance, such as reconditioning of track and topping up of ballast as required.

CHAPTER 08

Construction of the proposal

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

ARTC

INLAND
RAIL 
An Australian Government Initiative

8. Construction of the proposal

This chapter provides an outline of the indicative construction activities likely to be used to construct the Narrabri to North Star Phase 2—Moree to Camurra North (N2NS Phase 2) Inland Rail (the proposal). It includes a summary of the proposed timing, an indicative construction methodology, likely resources and proposed access arrangements. The construction methodology would be refined as the design of the proposal progresses and once the construction contractor is engaged.

8.1 Overview of construction scope and approach

Construction of the proposal would commence once all necessary approvals are obtained and would be carried out having regard to the detailed design process and outcomes. It is anticipated that construction would take about 24 months, commencing in 2024, with completion in 2026 to begin operations in 2027.

The proposal site is defined as the area that would be directly impacted by the construction and operation of the proposal and includes the location of construction worksites and operational infrastructure. The proposal site also encompasses all of the required track and associated infrastructure, haul roads, culverts and level crossings.

The construction of the proposal would require the temporary establishment of construction compounds, construction platforms and storage and laydown areas. Ancillary facilities may also include, mobile batch plants, accommodation for construction workers, and construction water supply and storage.

8.1.1 Approach to avoiding or minimising impacts during construction

As outlined, a buffer has been applied to form the proposal site, including areas directly impacted by construction and operation of the proposal and adjacent areas consisting of construction worksites and operational infrastructure. In areas where the proposal site impacts sensitive areas, further construction planning and design refinements would seek to minimise and/or avoid these areas.

Mitigation and management measures applicable to the design, pre-construction and construction stages would be implemented to avoid or minimise the construction impacts described in Chapters 9 to 25. Mitigation measures provided in these chapters are summarised in Chapter 27: Approach to environmental management and mitigation. The measures include preparing and implementing a construction environmental management plan (CEMP), including detailed sub-plans. The CEMP would be prepared for the construction phase of the proposal by the construction contractor and would provide a strategy for managing environmental impacts during construction.

The general intent of the construction approach is to reuse the majority of the existing formation material by excavating it, treating non-conforming material for reuse in the rail corridor earthworks and then reinstating the formation on the refined design alignment according to Inland Rail specifications. Additional material required would be imported from licensed/commercial quarries. Approximately 1,100 culverts would be installed to assist in achieving the required flood immunity and resilience for the track formation (refer to Chapter 12: Hydrology and flooding impact assessment for further information on flood immunity). The culverts would also preserve natural drainage patterns and promote fauna passage and connectivity beneath the rail alignment (where possible).

8.2 Indicative construction methodology

The majority of works involve upgrading approximately 13.7 kilometres (km) of existing track alignment within the existing rail corridor. There would also be approximately 1.6 km of new track realignment, which would bypass the existing Camurra hairpin curve. The Camurra hairpin curve would be removed, with the track formation reused in the new track realignment and the redundant rail corridor rehabilitated as part of the proposal.

For each stage, construction would typically involve:

- ▶ site establishment and enabling works (described in section 8.2.1)
- ▶ main construction works (described in section 8.2.2 to 8.2.10)
- ▶ test and commissioning (described in section 8.2.11)
- ▶ finishing works (described in section 8.2.12).

The construction methodology would be further developed and confirmed during the detailed design and planning stages, and with contractor involvement.

8.2.1 Site establishment and enabling works

Site establishment and enabling works would occur at the proposal's sites of major works, such as underbridges and culverts. Site establishment and enabling works would generally involve:

- ▶ establishment of environmental controls in accordance with the CEMP, including erosion and sediment controls, and temporary exclusion fencing
- ▶ construction of site access and egress arrangements and establishment of site traffic management controls
- ▶ survey of approved proposal site and erection of temporary site fencing or boundary bunting flags to clearly define work areas
- ▶ protection and/or relocation of existing utility services overhead and underground
- ▶ access road improvements and establish haul routes within the rail corridor
- ▶ geotechnical investigations and ground penetration
- ▶ environmental survey and pre-construction investigations
- ▶ vegetation clearing/removal and stripping topsoil where required and stockpiling in the proposal site for reuse as appropriate
- ▶ construction of temporary working platforms for machinery/cranes to operate from such as bridge pile foundations
- ▶ establishment of ancillary facilities including identification of stockpile locations for materials
- ▶ delivery of stockpile of new materials including rail, sleepers, ballast, culverts and formation material
- ▶ stripping and removal of existing rail, sleepers and ballast along the existing alignment.

The existing rail corridor would be used for material laydown and stockpile areas. At bridges and reinforced concrete box culvert locations, the width of the proposal footprint has been increased by 10 metres (m) on either side to allow for a wider construction impact zone to carry out the proposed works.

8.2.1.1 Temporary working platforms

Temporary working platforms for cranes and machinery to operate safely would be constructed as part of the proposal. Temporary working platforms would be needed at bridge pile locations in the Mehi and Gwydir riverbeds for the construction of bridge foundations. Construction of platforms would typically involve:

- ▶ placing timber bog mats where required for track machinery to operate
- ▶ stripping and removal of topsoil to subgrade
- ▶ covering subgrade with geotextile cloth
- ▶ placement and compaction of engineering fill or higher capacity pads (for larger mobile machinery e.g. crane) to temporary access/platform design
- ▶ installation of sheet piles or rock baskets to form bund at pile locations
- ▶ removal of temporary platforms/access on completion of works
- ▶ rehabilitation and revegetation of the area.

8.2.1.2 Existing utility services

The existing service utilities within the proposal's construction impact zone (CIZ) may require protection or relocation as part of the enabling works. Activities to protect and prevent damage to existing utility services include:

- ▶ erection of overhead cable hazard warning markers
- ▶ pothole locations of existing utility services and as built survey
- ▶ protection to shallow services or manhole covers in the path of heavy plant movements
- ▶ removal and diversion of utilities on existing structures or in the path of proposed construction works.

8.2.1.3 Removal of existing track

Construction of the proposal requires removal of the existing track along the entire length of the proposal. Track removal would generally involve:

- ▶ unclipping and removal of rail fasteners
- ▶ lifting and transport of existing rail and sleepers to predetermined storage areas
- ▶ stripping of existing ballast and bulk transport to stockpiles.

8.2.1.4 Access road improvements

The existing RMAR would be used for access to work sites along the proposal's alignment. Improvements may be required in places along the existing access road for construction vehicle usage. All road improvements would be designed in accordance with traffic safety requirements outlined in Austroads guidelines and in accordance with ARTC requirements. Improvements may include:

- ▶ excavation and removal of soft spots along the vehicle access road
- ▶ placement and compaction of engineering fill.

8.2.2 Demolition of existing structures

Existing bridges and culverts along the alignment would be demolished as part of the proposal. Demolition would generally involve:

- ▶ installation of erosion and sediment controls
- ▶ hazardous material testing
- ▶ removal of trees and vegetation (where required)
- ▶ relocation of existing utility services on bridges or culvert structures
- ▶ stripping bridge spans from rail track, sleepers and excess materials
- ▶ establishment of demolition controls such as temporary fencing, working platforms and noise mitigation measures
- ▶ separation of bridge spans from support bearings
- ▶ mobilising cranes to lift and remove the bridge spans
- ▶ demolition of abutments (where required) and bridge piers (down to the riverbed)
- ▶ separation of waste such as steel, concrete and timber for removal offsite.

Site establishment and working platforms for cranes and piling rigs would be required during demolition phases.

8.2.3 Earthworks and ground improvements

Earthworks for the rail corridor and track formation would generally involve:

- ▶ establishment of environmental erosion and sediment control measures
- ▶ stripping of approximately 24,000 cubic metres (m³) of topsoil and stockpiling inside the rail corridor for reuse in site rehabilitation (note, this number is indicative only and would be refined during detailed design)
- ▶ excavation of the existing track formation to subgrade level including the Weemelah line and the Camurra hairpin curve which, subject to flood management requirements, would be removed in full or part
- ▶ cutting rail corridor profile, including cess drains and maintenance access roads
- ▶ stabilisation of non-complying fill materials where required, by onsite mixing with additives, such as lime/cement, and the importation of general and structural fill to form the earthworks embankment
- ▶ construct new track formation, stabilising as required and compacting reused formation in layers
- ▶ import and treat any additional material required for the formation including lime stabilisation where needed
- ▶ construct embankments and cuttings to design profile
- ▶ construct bridge abutments
- ▶ earthworks for new road alignments at level crossings.

The total volume of fill required to build the formation is estimated to be 150,000 m³. This is material that is required to build the formation structure and excludes lime, capping material and rock ballast.

Estimated excavated material from the site is provided in Table 8-1, with estimated fill requirements for the proposal in Table 8-2. The proposal would reuse 82,000 m³ of excavated material from the existing rail corridor, resulting in 68,000 m³ of imported fill required to build the proposal. The calculations for the final fill balance for the proposal are indicative and would be confirmed during the detailed design stage.

TABLE 8-1 TRACK FORMATION MATERIAL QUANTITIES AVAILABLE

Excavated material	Approximate volume of material (cubic metres)
Excavation of existing alignment formation	27,000
Excavation of hairpin	33,000
Excavation for scour rock protection	22,000
Total existing formation to be stabilised and reused (excluding topsoil)	82,000

TABLE 8-2 ESTIMATED ADDITIONAL MATERIAL REQUIREMENTS FOR THE PROPOSAL

Material required	Approximate volume of fill (cubic metres)
Imported fill material	68,000
Material potentially requiring in-situ lime treatment	8,000
Capping material	13,000
Imported ballast required	12,550
Total materials to be imported for the proposal	101,550

8.2.4 Camurra hairpin

A general methodology to construct the 1.6 km of new track realignment to bypass the Camurra hairpin would typically include the following activities:

- ▶ demolition and removal of the existing Camurra hairpin track and re-use of sleepers and rail where possible
- ▶ excavate new alignment to subgrade formation and rail corridor profile, including surface drainage and install maintenance access roads
- ▶ carry out ground improvement works through the stabilisation of non-complying fill materials by onsite mixing with additives, such as lime/cement, and the importation of general and structural fill to form the earthworks embankment
- ▶ place new formation layers and compact
- ▶ layer and compact formation capping
- ▶ place new ballast bed on top of the formation
- ▶ install concrete sleepers and rail on ballast bed and weld rails
- ▶ place secondary ballast between the sleepers
- ▶ tamp and profile the ballast around the sleepers and line to a smooth alignment
- ▶ track stress assessments to be undertaken between final tamping and grinding
- ▶ undertake a profile grind of the rails using a rail grinder
- ▶ complete with testing and commissioning of the new line.

8.2.4.1 Turnouts

A general methodology for constructing turnouts is as follows:

- ▶ excavate a wider formation for the new track
- ▶ undertake formation improvement works as required
- ▶ install ballast, sleepers and rails
- ▶ install control mechanisms (point motor, power supply, etc.)

- ▶ testing and commissioning.

8.2.5 Bridges

The proposal includes the construction of two new bridges over the Mehi and Gwydir rivers, and the upgrades of six other bridges to cross various creeks and other areas of the floodplain. Construction of new bridges would generally be along the existing alignment, except at the Gwydir River Bridge, which would be undertaken upstream to suit the proposed new realignment.

Construction of the proposal's underbridge crossings over rivers and creeks would typically involve the following activities:

- ▶ vegetation clearing and creation of access/egress to bridge pier locations
- ▶ implementation of environmental controls, as per the CEMP
- ▶ construction dry working platforms at bridge pier locations
- ▶ installation of tubular steel pile foundations
- ▶ auguring and cleaning out of tubular steel piles
- ▶ installation of reinforcement cages and tubular pile extensions
- ▶ establishment of erosion and sedimentation controls and areas for concrete wash out
- ▶ pouring of concrete plugs
- ▶ installation of pier headstocks on top of steel tubular piles
- ▶ in-situ concrete works including formwork, steel reinforcement and concrete pouring
- ▶ construction of bridge abutments and controlled back filling
- ▶ lifting and installation of super T beams and bridge planks
- ▶ installation of edge barriers and walkways
- ▶ installation of scour protection
- ▶ rehabilitation, restoration and landscaping of disturbed areas.

ARTC's standard underbridge design consists of prestressed concrete (PSC) slabs spans of 9 m and super-T girder spans of 23 m. Civil infrastructure includes new bridges and new box culverts.

8.2.6 Culverts

Pre-cast reinforced concrete box culverts (RCBCs) would be fabricated offsite and installed along the alignment as the proposed construction progresses. A general methodology for the installation of culverts would include the following:

- ▶ demolish and remove all existing culverts and stormwater pipes
- ▶ excavate to the required formation depth, including any soft spoil removal where required
- ▶ pour concrete apron and box out any culverts requiring placement higher in the embankment
- ▶ place RCBCs on the apron
- ▶ place ballast matting
- ▶ install pre-cast headwalls
- ▶ excavate and install rip rap rock scour protection either side of the culverts
- ▶ construct track.

8.2.7 Level crossings

The proposal includes the upgrade or replacement or closure of a total of nine level crossings along the alignment. The proposal site has been increased at proposed level crossings to allow for additional space required for temporary access during construction as well as the movement of earthmoving machinery to construct the new raised road pavement and associated culvert cross drainage.

A general methodology for the construction of the proposed level crossings would involve:

- ▶ establishing traffic control measures

- ▶ installation of road culvert drainage
- ▶ earthworks to the new road alignment to the new rail level height
- ▶ installation of utility ducts where required
- ▶ installation of concrete footing for flashing signals and the boom barrier
- ▶ construction and compaction of road pavement layers
- ▶ installation of concrete or steel plate level crossings on the completed track section
- ▶ application of bituminous surfacing where applicable
- ▶ line marking and signage.

8.2.8 Rail maintenance access road

As part of the proposal, a rail maintenance access road would be upgraded and constructed within the rail corridor alignment. Construction of the rail maintenance access road may involve the following steps (which are dependent on existing conditions of the track and whether it is used as a haul route during construction):

- ▶ installation of environmental erosion and sediment controls
- ▶ stripping topsoil
- ▶ cutting of existing subgrade to road subgrade level
- ▶ covering existing subgrade with geotextile cloth where required
- ▶ placing and compaction of engineering fill to construct the road pavement layers to road formation level
- ▶ installation of road signage and fencing.

During construction of the proposal, the existing rail maintenance access road would provide a haul route along the rail corridor. Improvements would be carried to the haul route, where deemed necessary, to provide all weather access to construction vehicles.

8.2.9 Road modifications

The construction of the proposal requires road modifications at the nine level crossings (three public and six private). The proposal involves raising the existing track level between 0.5 m and 1 m along the alignment and road modifications would be required to provide level crossings at the new track height. Generally, works would include:

- ▶ relocate existing utility services
- ▶ install new services for signalled crossings
- ▶ install new road culverts
- ▶ earthworks for new road alignment
- ▶ construct new road pavement
- ▶ install road signage
- ▶ remove redundant rail crossings and reinstate road to match existing.

8.2.10 Rehabilitation

As part of the proposal, the Camurra hairpin would be removed and the existing rail corridor rehabilitated. The track formation would be excavated and transported to be stabilised and re-used for the new track formation re-alignment.

Rehabilitation of the works area would be undertaken in accordance with the *Inland Rail Landscape and Rehabilitation Framework* (ARTC, 2019) which supports the *Inland Rail Landscape and Rehabilitation Strategy* (ARTC, 2020). The framework outlines the final landform requirements, relating to reinstatement and stabilisation, and minimum requirements on how to achieve these. The framework addresses rehabilitation outcomes within rural landscapes, ecologically sensitive areas, townships and temporary treatments. Most of the proposal occurs within a rural landscape that already has an established rail corridor within it, therefore the rehabilitation and landscape treatments would be limited to:

- ▶ planting to provide effective screening to impacted receivers while ensuring operational maintenance remains cost effective and easy to manage

- ▶ ongoing consultation with local stakeholders to maintain the landscape context and any particular qualities of the protected landscapes
- ▶ providing ecological links through provision of underpasses and introduction of fauna fencing in ecological sensitive areas while ensuring maximising of linkages near waterways
- ▶ use of vegetation species that match adjacent landscapes in areas of ecological sensitivity.

South of the Mehi River, adjacent to the properties in Oak and Morton Street, specific rehabilitation and landscape treatments would be applied that consider the shared urban features and heritage values of this area. The final landscape and rehabilitation outcome in this area would include landscaping to benefit the local community and support health and wellbeing and tie in with existing street scapes and the existing Grose Walkway.

A landscape and rehabilitation plan in accordance with the *Inland Rail Landscape and Rehabilitation Framework* (ARTC, 2019) would be developed during detailed design and would include rehabilitation works to be undertaken during construction and operation including:

- ▶ testing and application of topsoil
- ▶ soil amendment and/or amelioration
- ▶ re-seeding
- ▶ establishment of vegetation cover
- ▶ ongoing fertilising and watering
- ▶ measurement and monitoring to demonstrate compliance.

8.2.11 Testing and commissioning

Testing and commissioning of the rail line and communication/signalling systems would be undertaken to ensure that all systems and infrastructure is designed, installed and operating according to ARTC's requirements.

8.2.12 Finishing works

All other construction site establishments and access routes would be reinstated to the same condition prior to construction commencing. Site reinstatement and rehabilitation would be undertaken progressively during the works and would include the following activities:

- ▶ demobilise and remove site establishments, compounds and facilities
- ▶ remove all materials, waste and redundant structures from the works sites
- ▶ remove any residual spoil mounds from corridor
- ▶ decommission all temporary work site signs
- ▶ remove temporary fencing
- ▶ reinstate footpaths, fencing and amenities to prior condition
- ▶ decommission site access roads that would no longer be required
- ▶ restoration of disturbed areas, including revegetation, as required.

8.2.13 Location of significant activities

Significant construction activities as part of the proposal are listed in Table 8-3. The location of these activities and areas required for site establishments, such as compounds, are in Figure 8-1.

TABLE 8-3 PROPOSED CONSTRUCTION ACTIVITIES

Name	Type of structure	Location (chainages)
Mehi River bridge	Underbridge	666.402 km
Unnamed bridge 1	Underbridge	666.662 km
Unnamed bridge 2	Underbridge	667.011 km
Duffys Creek bridge	Underbridge	667.237 km
Tributary to Duffys Creek bridge	Underbridge	667.387 km
Unnamed bridge 3	Underbridge	667.668 km
Skidders Creek bridge	Underbridge	667.950 km

Name	Type of structure	Location (chainages)
	Box culverts	668.15–668.255 km
	Box culverts	668.628–668.76 km
	Box culverts	668.830 km
	Box culverts	668.927–669.06 km
	Box culverts	669.12–669.253 km
	Box culverts	669.304 km
	Box culverts	669.407–669.54 km
	Box culverts	669.585–669.720 km
	Box culverts	669.783–669.915 km
LX562	Public level crossing	669.933 km (Gwydirfield Road)
	Box culverts	669.955–670.22 km
	Box culverts	670.275–670.695 km
	Box culverts	670.724–670.792 km
	Box culverts	670.887–671.110 km
LX3069	Private level crossing	671.128 km
	Box culverts	671.167–671.277 km
	Box culverts	671.345–671.457 km
	Box culverts	671.508–671.532 km
	Box culverts	671.690–672.270 km
	Box culverts	672.305–672.520 km
	Box culverts	672.677–672.747 km
LX3070	Private level crossing	672.770 km
	Box culverts	673.042–673.093 km
	Box culverts	673.235–673.287 km
LX3071	Private level crossing	674.545 km
	Box culverts	675.383 km
	Box culverts	675.725 km
LX563	Public level crossing	675.908 km (Rocks Road)
Gwydir River bridge	Underbridge	676.232 km
	Box culverts	676.7–676.757 km
LX564	Public level crossing	676.820 km (Back Pally Road)
	Box culverts	676.85–676.89 km
	Box culverts	677.336–677.355 km
	Box culverts	677.577–677.596 km
LX3149	Private level crossing	677.725 km
	Box culverts	677.765 km
	Box culverts	677.870–677.888 km
	Box culverts	678.065–678.08 km
	Box culverts	678.550–678.623 km
	Box culverts	680.491–680.65 km
LX3150	Private level crossing	680.740 km
Mungindi turnout	Box culverts	677.3 km

Proposed locations of construction compounds are provided in Table 8-4, and shown in Figure 8-1. Access to the compounds and construction sites is also shown in Figure 8-1. Access to the site via the Newell Highway would require traffic management and control. Further details regarding access to the proposal site are provided in section 8.10.

TABLE 8-4 PROPOSED SITE COMPOUNDS

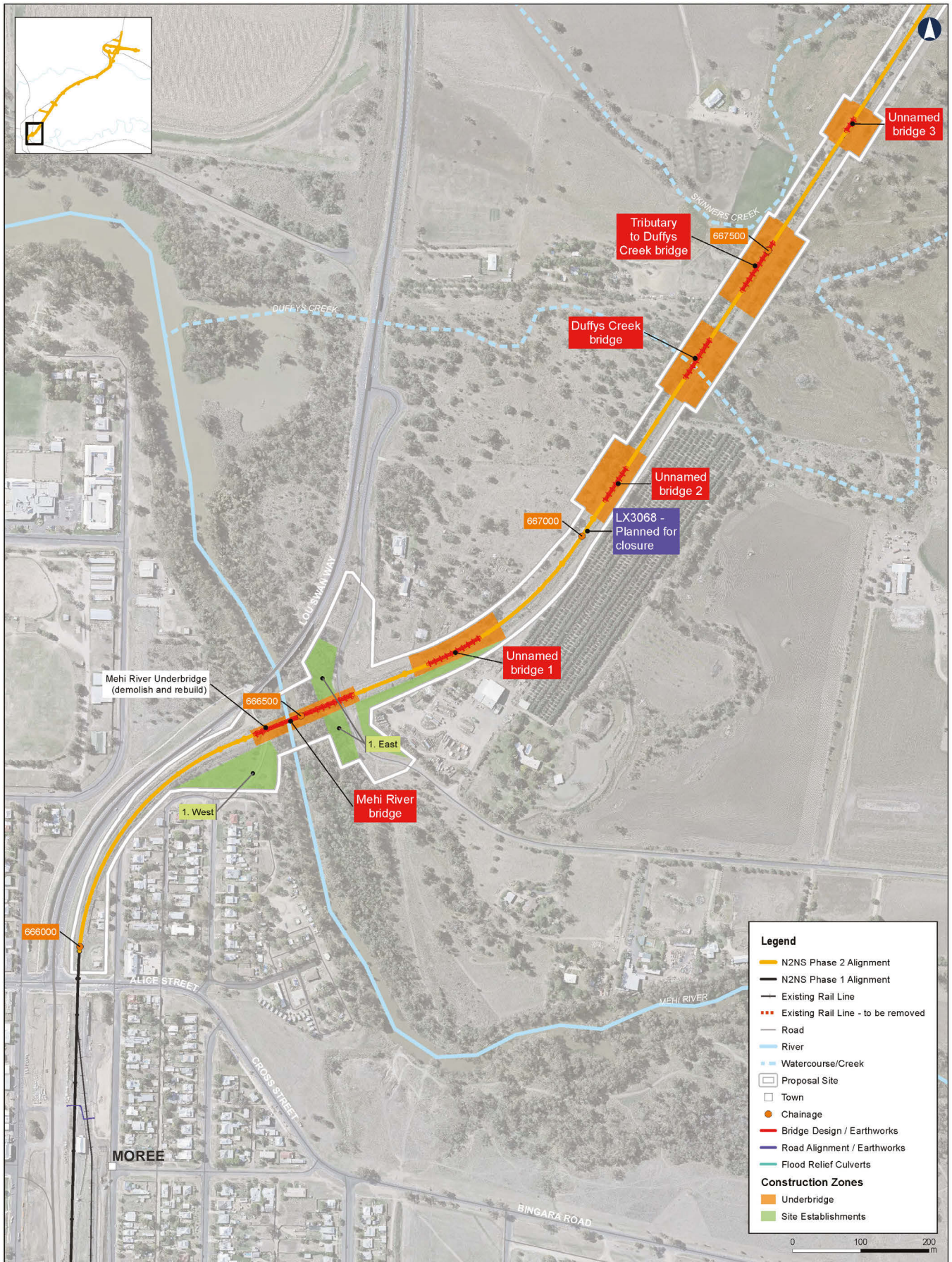


Figure 8-1 Proposal construction activities and site establishments

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 1 of 8

N2NS_SIP2_BIS_FIR_01_ProposalConstructionActivities_SiteEstablishments_1902.mxd



Figure 8-1 Proposal construction activities and site establishments

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2016)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 2 of 8

N2NS_SP2_EIS_P08_01_ProposalConstructionActivities_SiteEstablishments_rk2.mxd



Figure 8-1 Proposal construction activities and site establishments

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
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 Paper size: A3
 Date: 31/22/2021
 Map 3 of 8

N2NS_IP2_B1E_FSR_01_ProposalConstructionActivities_SiteEstablishments_032.mxd



Figure 8-1 Proposal construction activities and site establishments

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 4 of 8

N2NS_SP1_B13_P08_01_ProposalConstructionActivities_SiteEstablishments_rv2.mxd



Figure 8-1 Proposal construction activities and site establishments

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 5 of 8

N2NS_SP1_B13_P08_01_ProposalConstructionActivities_SiteEstablishments_rv2.mxd



Figure 8-1 Proposal construction activities and site establishments

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 6 of 8

N2NS_SF2_E15_P18_01_ProposeConstructActivities_SiteEstablishments_2x2.mxd

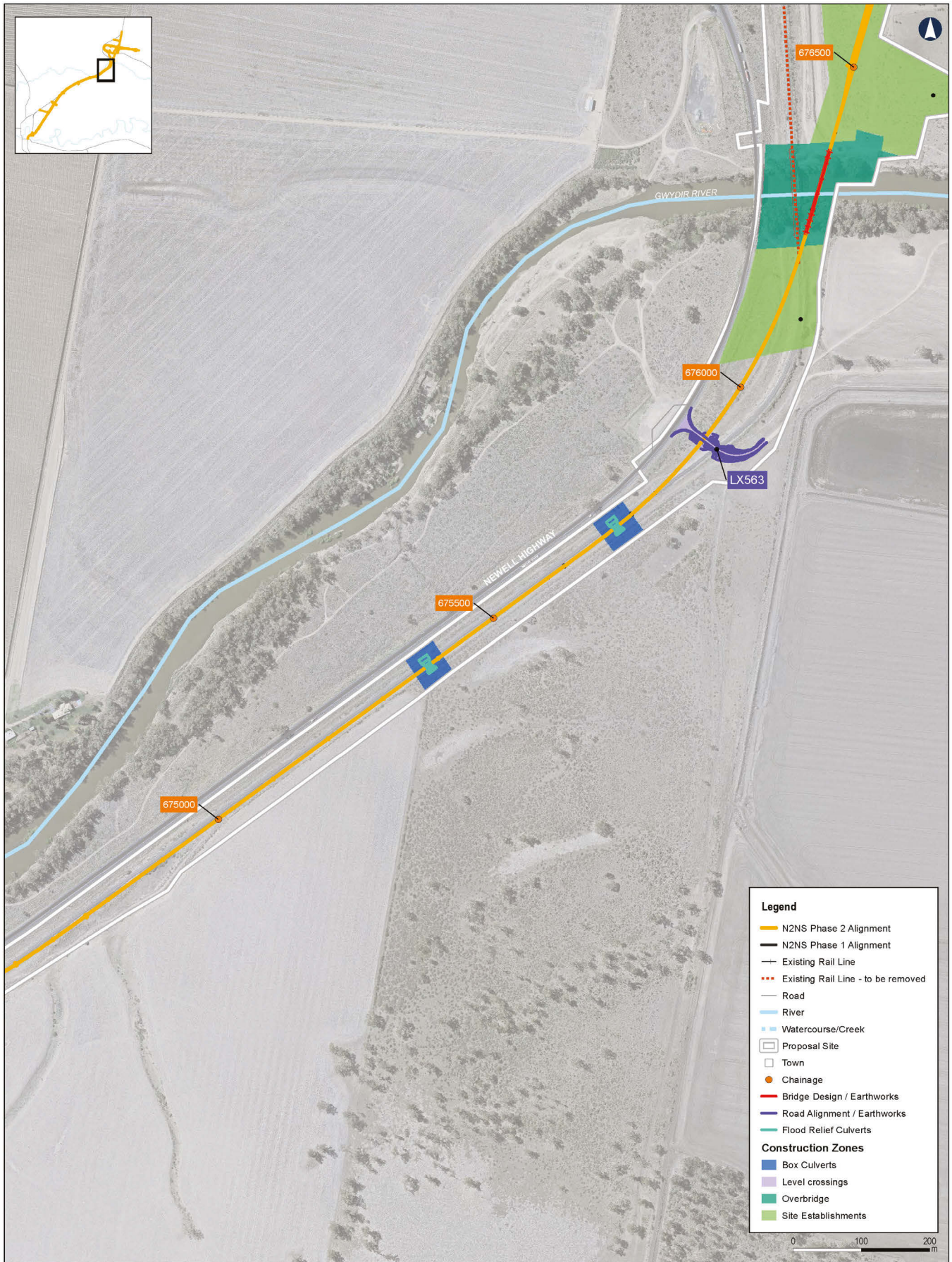


Figure 8-1 Proposal construction activities and site establishments

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:5,000
 Paper size: A3
 Date: 9/22/2021
 Map 7 of 8

N2NS_SP1_B13_P08_01_ProposalConstructionActivities_SiteEstablishments_792.mxd



Figure 8-1 Proposal construction activities and site establishments

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

N2NS_SF2_E10_P101_ProposalConstructionActivities_SiteEstablishments_2x2.mxd

8.3 Timing, staging and working hours

Construction of the proposal would commence in 2024 and is expected to take 24 months to complete.

Timing and staging for construction of the proposal would also include contingency for seasonal weather patterns in the region. As far as practicable, demolition of existing bridges and construction pile foundations at rivers and creeks would occur in drier periods of the year to mitigate risks of flooding and impacts on water quality.

8.3.1 Timing and sequencing

The proposal would include a number of steps during construction of various parts of the proposal. Table 8-5 identifies indicative construction steps or sequences of the proposal, from the south at Moree to the Camurra hairpin in the north. Construction sequencing would depend on the construction contractor's program and methods. Timing and sequencing of the works would also be reliant on agreement with the relevant stakeholders, including TfNSW and the local council, and is subject to ongoing detailed design.

TABLE 8-5 INDICATIVE SEQUENCING OF THE PROPOSAL

Indicative sequences	Work elements
SEQUENCE 1 (Site establishments and enabling works)	<ul style="list-style-type: none"> ▶ Survey, peg and flag construction impact zone. ▶ Relocation or protection of existing utilities within the construction impact zone. ▶ Use flood model results to identify areas free from flooding in a 1% AEP event, and locate construction facilities in these areas where possible. Where locating construction facilities within the floodplain is unavoidable, use flood model results to identify areas where flood depth and velocity are low, to prevent flood damage to facilities and environmental damage via runoff. ▶ Install environmental monitoring such as dust and noise. ▶ Create site establishments at Mehi and Gwydir bridge crossings, including access, clearing vegetation and working platforms. ▶ Create access/egress points along the rail corridor. ▶ Improvements, where necessary, to access maintenance roads within the rail corridor. ▶ Stripping and removal of existing track—rail, sleepers and ballast along the proposal.
SEQUENCE 2 (Demolition of existing structures, including bridges and culverts)	<ul style="list-style-type: none"> ▶ Undertake construction-stage flood modelling and impact assessment. ▶ Key stages of embankment works to be analysed using flood model, to determine most sensitive embankment sections and appropriate limits on extents of temporary embankment openings. ▶ Prepare construction-phase flood warning system and emergency response plan. ▶ Identify likely flood warning times between rainfall forecast and onset of flooding and, where required, stage works so that demolished sections of the embankment can be sufficiently reinstated and stabilised prior to onset of flooding. ▶ Create access to existing bridges for demolition. ▶ Bridge demolition of Mehi River crossing and moving north towards the final bridge over the Gwydir river. ▶ Lifting and removal of bridge spans. ▶ Demolition and removal of bridge piers. ▶ Demolition and removal of existing culvert structures along the alignment. ▶ Bulk excavation of bridge abutments.
SEQUENCE 3 (Construction of new bridges)	<ul style="list-style-type: none"> ▶ Key stages of embankment works to be analysed using flood model to determine most sensitive embankment sections and appropriate limits on extents of temporary embankment openings. ▶ Prepare construction-phase flood warning system and emergency response plan. ▶ Identify likely flood warning times between rainfall forecast and onset of flooding and, where required, stage works so that demolished sections of the embankment can be sufficiently reinstated and stabilised prior to onset of flooding. ▶ Construction of crane and piling rig access platforms on either side of the underbridge crossings. ▶ Construction of new pile foundations, bridge piers and abutments. ▶ Installation and construction of pre-cast and in-situ pier headstocks. ▶ Installation and construction of in-situ concrete deck slab for 23 m spans. ▶ Crane lifts and placement of precast pre-stressed concrete bridge beams. ▶ Installation of bridge parapets. ▶ Construction of track slab.

Indicative sequences	Work elements
SEQUENCE 4 (Installation of culverts)	<ul style="list-style-type: none"> ▶ Key works to be analysed using the flood model to determine appropriate limits on extents of works in overland flow paths and waterways. ▶ Identify likely flood warning times between rainfall forecast and onset of flooding and, where required, design the works to allow partial removal of key flow obstructions prior to the onset of flooding. ▶ Excavation to formation level and construction of box culvert blinding. ▶ Removal of soft spots/formation improvement. ▶ Installation of pre-cast box culverts and aprons. ▶ Construction of track formation above new culverts. ▶ Excavation and placement of rip rap rock scour protection.
SEQUENCE 5 (Track works)	<p>Civil works:</p> <ul style="list-style-type: none"> ▶ Key works to be analysed using the flood model to determine appropriate limits on extents of works in overland flow paths and waterways. ▶ Identify likely flood warning times between rainfall forecast and onset of flooding, and, where required, design the works to allow partial removal of key flow obstructions prior to the onset of flooding. ▶ Excavation of existing track formation to design levels. ▶ Re-use of excavated formation in new track design. ▶ Layering formation material for stabilisation treatment. ▶ Spreading lime/cement on constructed layer. ▶ Mixing of lime/cement and formation layer with rotary hoe. ▶ Compaction of formation layer with pad foot vibratory roller. ▶ Process is repeated until formation is constructed. ▶ Construction of formation capping. <p>Rail components:</p> <ul style="list-style-type: none"> ▶ Installation of ballast bed, track (sleepers and rail). ▶ Secondary ballast and rail tamping. ▶ Construction of level crossings to new track level.
SEQUENCE 6 (Camurra hairpin)	<ul style="list-style-type: none"> ▶ Key works to be analysed using the flood model to determine appropriate limits on extents of works in overland flow paths. ▶ Identify likely flood warning times between rainfall forecast and onset of flooding, and, where required, design the works to allow partial removal of key flow obstructions prior to the onset of flooding. ▶ Access/egress created for the new rail realignment. ▶ Stripping topsoil in greenfield site along track re-alignment. ▶ Ground improvements in-situ lime/cement stabilisation. ▶ Construction of track formation and final formation capping. ▶ Installation of ballast bed, track (sleepers and rail) and final ballast. ▶ Construction of level crossings (steel and concrete) with temporary traffic management plan in place.
SEQUENCE 7 (Rehabilitation)	<ul style="list-style-type: none"> ▶ Installation of all fencing and gates. ▶ Remove temporary working platforms and access ways. ▶ Topsoil stripped from the greenfield site is used to rehabilitate excavated areas. ▶ Approved hydroseeding and/or planting at disturbed sites, including the Camurra hairpin and Mehi and Gwydir riverbanks. ▶ Monitor performance of hydrology and, if necessary, provide additional scour protection on rail embankments and cross drainage structures, or provide additional cross drainage structures to provide more flow capacity in flood events.

An indicative construction program is provided in Figure 8-2.

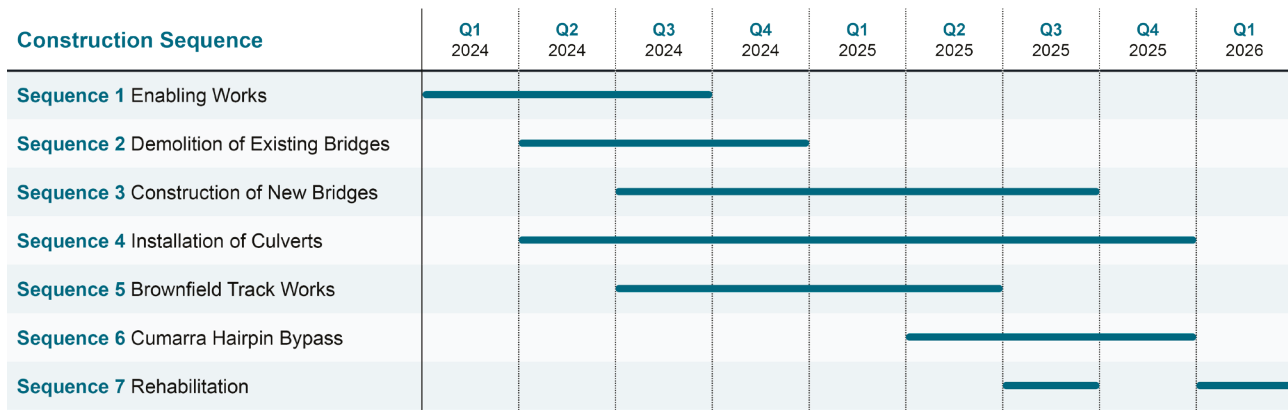


FIGURE 8-2 INDICATIVE CONSTRUCTION PROGRAM

8.3.2 Rail possessions

The proposal would require possessions where works would impact the operation of existing rail lines. The aim of track possession is to provide a safe, traffic-free worksite for maintenance or construction activities to be carried out. As the current rail line is still operational, full possession of the rail corridor would need to be obtained by ARTC for construction of the proposal. It would not be feasible to construct the proposal using short-term possessions of existing rail lines. Full possession would result in more efficient outcomes for the proposal. The likely impacts include the severance of the Weemelah and North Star (if finished) lines.

8.3.3 Working hours

Proposed construction hours would be from 6.00 am to 6.00 pm, Monday to Sunday, with respite provided every second weekend with works ceasing at 1 pm on Saturday and not occurring on Sunday. Work undertaken outside the *Interim Construction Noise Guideline* (DECC, 2009) standard hours (7.00 am to 6.00 pm Monday to Fridays, 8.00 am to 1.00 pm Saturdays, and at no time on Sundays or public holidays) would be in accordance with the *Inland Rail NSW Construction Noise and Vibration Management Framework* (ARTC, 2017). Under the framework, proposed construction hours have been developed to accommodate the remote location of worksites and efficient use of the workforce and minimise disruption to commuters and freight operators using existing operational rail lines. If approved, the proposed working hours would be:

- ▶ Monday to Friday 6:00 am to 6:00 pm
- ▶ Saturday 6:00 am to 6:00 pm
- ▶ Sunday and public holidays 6:00 am to 6:00 pm (occurring on every second Sunday).

Works that may need to be undertaken outside standard working hours would include the following activities:

- ▶ where out-of-hours work has been approved by the Environmental Representative for DPE or Environment Protection Authority (EPA)
- ▶ works requiring continuous construction support, such as continuous concrete pours, pipe-jacking or other forms of ground support necessary to avoid a failure or construction incident
- ▶ track possessions
- ▶ delivery of materials
- ▶ movement of heavy plant equipment
- ▶ oversize transport and assembly
- ▶ arrival of staff
- ▶ roadworks
- ▶ utility relocations that are required to be undertaken out of hours to avoid impact to residents and businesses
- ▶ installation of level crossings where road closures are not approved during normal hours.

Activities carried out in an emergency to avoid the loss of life, damage to property, or to prevent environmental harm may be undertaken at any time.

Construction works outside of the framework hours would comply with the *Interim Construction Noise Guideline* (DECC, 2009). Operational work undertaken outside of the *Rail Infrastructure Noise Guideline* (NSW EPA, 2013) standard hours would be in accordance with the *Inland Rail NSW Construction Noise and Vibration Management Framework* (ARTC, 2017).

Consultation would be undertaken with affected receivers to agree on acceptable construction hours outside the approved periods, consistent with obligations under the *Interim Construction Noise Guideline* (DECC, 2009).

8.4 Construction compounds and material laydown

Construction compounds would be created at major activity sites along the proposed route to provide an enclosed work site, not open to the public and used to support construction. A typical construction compound would include portable site offices, lunchroom and toilets.

Subject to the N2NS Phase 1 project being completed and the required land being made available, two existing ARTC compounds from N2NS Phase 1 may be used for construction of the proposal if available. If not available, then suitable industrial or other type of land situated outside the flood susceptible N2NS Phase 2 area would be used. Currently in the Phase 1 project area, one compound is located south of Moree and the other north of the Camurra hairpin. Construction compounds would be used for storage of equipment, mobile plant, fuel and hazardous materials as well as providing site office space. In the event of a flood warning for the region, plant and equipment would be evacuated from work sites to the compounds. Construction compounds would be subject to detailed design, landowner consultation and contractor involvement.

Proposed locations of construction compounds are provided in Table 8-4 and shown in Figure 8-1. Material laydown areas for the proposal would be required at bridge construction locations. All other material laydowns would be contained within the corridor.

Construction of the proposal would involve both onsite construction activities (for example, welding of track) and use of prefabricated structures (such as culverts) that would be manufactured offsite (with those facilities being outside the scope of the proposal).

Activities undertaken at construction compound sites would typically involve:

- ▶ plant and equipment operations
- ▶ delivery and storage of construction materials including pile casings, steel reinforcement, pier headstocks, pre-cast concrete beams, bridge components, reinforced concrete box culverts and structural fill material
- ▶ site environmental management controls.

The number and locations of construction compounds may change during the detailed design stage. Any additional construction compounds would be subject to a consistency assessment in accordance with the planning approval.

8.5 Site servicing requirements

Utilities and services, such as water and electricity, would need to be supplied to construction compounds. Where existing utilities are located close to site, there may be an opportunity to connect with the relevant service providers.

Portable toilet facilities would be used where existing infrastructure is unavailable and sewage pump out services would be used to remove waste offsite. Where a power connection is not available, generators would be used.

8.6 Construction workforce

The proposal would seek to hire workforce within the region to add local knowledge and support during construction.

8.6.1 Workforce numbers

The construction workforce would peak at about 150 people. For some limited items of work, an additional short-term workforce may be required.

8.6.2 Workforce accommodation requirements

Existing commercially available accommodation in Moree and surrounds is available for the construction of the proposal.

Further analysis regarding workforce accommodation requirements is provided in the social and economic impact assessments included in Chapters 17 and 18.

8.7 Construction resources

The proposal would require quantities of various materials including fill, capping, ballast, concrete sleepers, rail, precast concrete units, ready-mix concrete and water.

8.7.1 Quarried material sources

8.7.1.1 Hard rock quarries

Hard rock quarries would be used to source material for ballast, road pavement material and rip-rap rock (for scour protection). Hard rock materials would be sourced from licensed quarries, including (but not limited to) the following locations:

- ▶ Runnymede quarry
- ▶ North Star quarry (Tikitere).

The Runnymede quarry site is located 40 km to the north east of Moree and is primarily suitable for aggregates and ballast. The North Star (Tikitere) quarry is located approximately 95 km from the proposal and has the potential to extract up to 500,000 tonnes of hard rock per year.

8.7.1.2 Structural fill

Track formation material is a mix of quarried material and recycled ballast from the existing track. A number of local quarries operate in the area surrounding the proposal, which may provide structural fill to supplement any material shortfall, subject to agreements with suppliers and contractors.

Road access to the quarries and the rail corridor may require improvements and enabling works to suit the proposal's needs. These material requirements and proposed source locations are all subject to detailed design and contractor involvement.

8.7.2 Mobile batch plants

The requirement of a mobile batching plant is not anticipated for the construction of the proposal. Existing (commercial) concrete batching facilities in Moree require investigation during the detailed design stage. The facilities would need to meet the supply and quality demands for construction of the proposal.

Possible considerations are:

- ▶ ability to batch the proposals mix designs
- ▶ availability of admixtures and retarders
- ▶ plants production capacity and quality control
- ▶ concrete delivery capacity, number of trucks and condition.

8.7.3 Construction water supply

Water would be required for various construction activities, including:

- ▶ rail formation
- ▶ road pavement
- ▶ earthworks
- ▶ in-situ concrete structures
- ▶ rehabilitation works
- ▶ dust control
- ▶ potable water for construction compounds.

Preliminary estimates for water requirements for the placement and compaction of engineering fill range from 600 to 800 litres per m³. The estimated total formation fill is 150,000 m³ required for the proposal would take approximately 120 megalitres of water to construct the earthworks.

There are several potential water sources that may be used to source construction water for the proposal. Options include:

- ▶ Moree town water supply
- ▶ extraction of ground and/or surface water, using existing and/or new bores/infrastructure purchased from available water allocations

- ▶ onsite water collection and storage, including existing and/or new dams
- ▶ reuse of low-quality water from sediment dams for dust suppression
- ▶ processed recycled water from commercial operations (e.g. Moree STP, thermal pool operations etc.).

The primary source of potable water in the region comes from existing bores, which access groundwater supplies. Extraction of groundwater or surface water may be undertaken to supply water for construction (subject to further investigation and licencing) from private bores, new bores, or a combination. A number of farm dams are located along the proposal site, and a total of 353 bores are registered within the study area (as outlined in Chapter 14: Groundwater).

In NSW, water sharing plans establish rules for sharing water between water users and the environment, and rules for water trading. There are water sharing plans for regulated and unregulated river catchments and groundwater sources in water management areas. Water sharing plans describe the annual groundwater recharge volumes for each identified groundwater source and the volumes of water that are available for sharing. The plans generally operate for a period of 10 years and may be suspended during times of severe water shortages. There are currently no water sharing plans regulating water sources relevant to the proposal site.

Further investigation of options for the provision and storage of construction water would be undertaken during detailed design, in consultation with local councils and landowners. Negotiations with landowners are ongoing regarding water storage, involving the potential for refurbishment of existing farm dams or the use of private land for new water storage areas. The preferred source of construction water and method of storage would be confirmed prior to the construction commencement date.

Preferred water sources would depend on:

- ▶ climatic conditions in the lead up to construction and associated water availability
- ▶ access agreements with landowners for sourcing privately owned water
- ▶ access agreements with local governments for sourcing town water.

Where water is not available in proximity to the proposal, it would be transported to the site from the appropriate source via tanker truck and stored in temporary storage tanks. Where possible, the use of non-potable water would be used over potable water for construction activities. The use of non-potable water would be governed by workplace health and safety considerations, economic feasibility, the functional specifications of the design and the availability of non-potable water. Potable water for human consumption would be supplied via mains water supply or potable water tanks. Non-potable wash water would be supplied by the use of trailer-mounted storage tanks.

Opportunities to re-use/recycle construction water would be identified and implemented where feasible during construction; for example, water may be reused onsite, for dust suppression, to assist with compaction. A Water Reuse Strategy that sets out feasible and reasonable options for the reuse of collected stormwater and groundwater during construction and operation would be prepared prior to bulk earthworks being undertaken.

Additional information on potential sources for construction water is provided in Chapter 14: Groundwater and Technical Paper 5B: Groundwater impact assessment.

8.8 Plant and equipment

A range of plant and equipment would be used during construction of the proposal. The final equipment and plant requirements would be identified by the construction contractor, who would also be responsible for obtaining most of the relevant approvals and permits prior to construction. An indicative list of plant and equipment that would be used for each construction stage is provided in Table 8-6.

In the event of a flood forecast, plant and equipment would be demobilised and moved to the predetermined evacuation site. Fuel storage and hazardous substances would be stored in secure bunded containers above projected flood levels.

TABLE 8-6 INDICATIVE CONSTRUCTION PLANT AND EQUIPMENT

Construction phase	Plant and equipment
Establishment	<ul style="list-style-type: none"> ▶ Temporary fencing ▶ Cranes (mobile) ▶ Excavators ▶ Vegetation clearance equipment chainsaws and mulchers ▶ Vibratory rollers
Utility relocations and property adjustments	<ul style="list-style-type: none"> ▶ Excavators various sizes ▶ Directional drills and duct pulling ▶ Light trucks ▶ Pneumatic hammers ▶ Concrete saws ▶ Generators ▶ Hand power tools ▶ Cranes (mobile)

Construction phase	Plant and equipment	
Earthworks and drainage	<ul style="list-style-type: none"> ▶ Excavators various sizes ▶ Articulated dump trucks ▶ Truck and trailers ▶ HIAB trucks ▶ Padfoot vibratory roller compactors ▶ Watercarts ▶ Backhoe 	<ul style="list-style-type: none"> ▶ Dozers ▶ Graders ▶ Lime stabilising spreader ▶ Rotary hoe ▶ Generators ▶ Smooth drum vibratory roller compactors
Demolition of existing under bridges and culverts	<ul style="list-style-type: none"> ▶ Excavators various sizes ▶ Cranes (mobile) ▶ Oxy-cutting equipment ▶ Hydraulic breakers ▶ Concrete saws 	<ul style="list-style-type: none"> ▶ Long reach excavators ▶ Truck and trailers ▶ Hydraulic concrete pulveriser ▶ Hydraulic concrete shears
Track works	<ul style="list-style-type: none"> ▶ Excavators various sizes ▶ Articulated dump trucks ▶ Vibratory roller compactors ▶ Water carts ▶ Cranes (mobile) ▶ Truck and trailers 	<ul style="list-style-type: none"> ▶ Graders ▶ Bulldozer ▶ Lighting ▶ Skid steer loader ▶ Front end loader ▶ Tamper, regulator and other equipment
Rail underbridges and pavement works	<ul style="list-style-type: none"> ▶ Excavators ▶ Mobile cranes ▶ Piling rigs and equipment ▶ Crane vibratory hammer with power pack ▶ Concrete pumps ▶ Concrete delivery trucks 	<ul style="list-style-type: none"> ▶ Roller vibratory compactors ▶ Truck and trailers ▶ Road millers ▶ Graders ▶ Asphalt pavers ▶ Generators ▶ Welding equipment
Finishing and landscaping	<ul style="list-style-type: none"> ▶ Articulated dump trucks ▶ Excavators ▶ Graders ▶ Backhoe ▶ Trucks ▶ Rollers 	<ul style="list-style-type: none"> ▶ Generators ▶ Oxy-cutting equipment ▶ Watercarts ▶ Dozers

8.9 Other construction elements

8.9.1 Construction amenity

Noise, vibration and dust affecting properties, or other sensitive receivers during construction or demolition of the proposal, are required to be effectively managed to protect the amenity and wellbeing of the community.

Demolition of existing underbridges would involve noise, vibration and dust emissions; specifically, demolition of the existing reinforced concrete piers at the Mehi River.

Aspects of work likely to generate the most significant noise emissions include the demolition of the Mehi and Gwydir river bridges, and the use of a piling rig for the construction of piles for new bridges. Equipment associated with borrow pits and excavation is also predicted to generate construction-related noise, as well as construction traffic. The most vibration-intensive plant nominated as part of the work is the use of vibratory rollers. Other equipment, including the excavator, tamper and regulator, piling rig (bored) and breaker mounted on the excavator, may also generate vibration emissions.

Mitigation measures to consider would generally involve:

- ▶ control noise, vibration and dust at the source
- ▶ control noise, vibration and dust from the source to receiver transmission path
- ▶ control noise, vibration and dust at the receiver
- ▶ implement practicable and reasonable measures to minimise the noise, vibration and dust impacts of construction activities on local sensitive receivers.

A construction noise and vibration impacts assessment has been prepared and is included as Technical paper 10: Construction noise and vibration impact assessment. Further details of the noise and vibration impacts and mitigations are included in Chapter 16: Noise and vibration.

While specific lighting requirements during construction are not yet determined, light spill during construction is not expected to be an impact. This is due to the rural nature of the proposal, and the fact that most works would be undertaken during daylight hours. As a result, no light spill assessment was undertaken; however, mitigation measures for light spill impacts are detailed in section 19.4.

8.9.2 Demobilisation, rehabilitation and landscaping

At the end of construction, all construction equipment would be removed from the proposal site. Where relevant, sites that were occupied temporarily and do not form part of the permanent infrastructure, such as temporary construction site compounds, would be rehabilitated in accordance with the Rehabilitation and Reinstatement Plan (refer to Chapter 27: Approach to environmental management and mitigation).

8.9.2.1 Camurra hairpin and Weemelah line rehabilitation

Construction of the proposal would include removal of the existing Camurra hairpin and rehabilitation of the rail corridor. The existing rail corridor would be restored to allow for rural land use. Planting of native plant species along the rail corridor would be considered where agricultural land use cannot be reinstated.

Where land used for construction had been leased on a temporary basis from the landowner, land would be handed back in accordance with the terms of the lease.

In cases where residual land formed part of a landholding or lot acquired for construction of the proposal, where possible subdivision and sale of the residual lot in accordance with the provisions of local planning controls would be investigated during the detailed design stage.

8.10 Transport, access and haulage arrangements

Worker transport to proposed sites and work areas would be made via buses and private vehicles.

All construction material including fill culverts and ballast would be delivered via road to the site from various commercial suppliers.

Haulage of bulk materials would be by road trucks, carting ballast and aggregates to stockpile areas or waste material from site. Consideration has been given to a two-way haul road inside the rail corridor for trucks carting material to and from site. Refinement of haul routes would occur during detailed design and when construction methodology is confirmed.

8.10.1 Property access and temporary occupation

The proposal seeks to minimise impacts on private property where possible. At locations of proposed box culverts, underbridges and level crossings, the proposal would extend into private property. Generally, the proposal site has been extended 10 m into adjacent fields to provide working room for construction of the proposal. Any access to private property would be coordinated with property owners and lease, licence or temporary occupation agreements would be entered into as needed. In general, proposed property access would be required for:

- ▶ level crossing pavement works
- ▶ underbridge demolition and construction
- ▶ culvert installation
- ▶ maintaining access to construction sites if the normal route is blocked or severed.

8.10.2 Emergency access

Access for emergency vehicles would be maintained to all construction sites. The construction contractors would consult with emergency services (such as fire and ambulance) during the preparation of the site-specific traffic management plans, to obtain any specific requirements for the proposal. An emergency management plan would coordinate these measures and provide a framework for input to individual work site traffic management plans.

The nearest medical centre and hospital is in Moree town as shown in Figure 8-3.

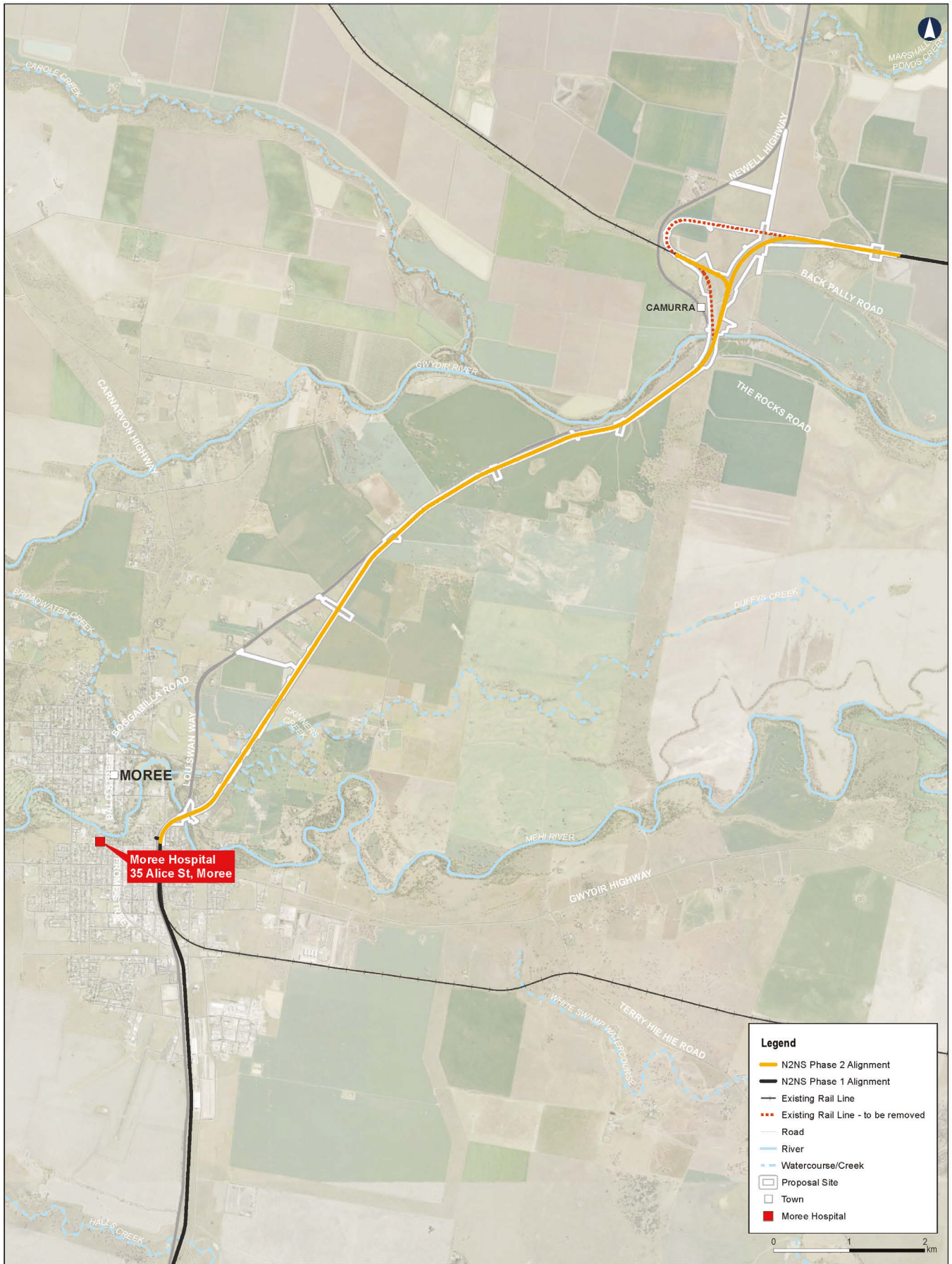


Figure 8-3 Indicative location of Moree hospital

Data Sources: ARTC, IRDJV, LPI

Coordinate System: GDA 1984 MGA Zone 55
 Scale: 1:45,000
 Paper size: A3
 Date: 9/22/2021
 Map 1 of 1

N2NS_SP2_EIS_F08_03_MoreeHospital_9/22.mxd

8.10.3 Access and egress along the rail corridor

Access and egress to the proposal's construction sites along the alignment would be via the Newell Highway and the eight public and private level crossings. The existing vehicle maintenance road at level crossings would be used for access and egress to the rail corridor. Improvements to the vehicle maintenance road may be required for construction vehicle use.

Table 8-7 lists the proposed access and egress links along the alignment and they are indicated on Figure 8-4.

TABLE 8-7 PROPOSED ACCESS AND EGRESS LINKS

Access ID No.	Access and egress links
1	Morton Street, Moree
2	Oak Street, Moree
3	Gwydirfield Road (south)
4	Temporary construction haul road to the Newell Highway (through paddock)
5	Gwydirfield Road (north)
6	Newell Highway
7	Newell Highway
8	Newell Highway
9	Rocks Road
10	Back Pally Road
11	Newell Highway and Back Pally Road
12	Back Pally Road

8.10.3.1 Access and egress to construction compounds

Access and egress to the proposed site compounds would be via the following routes:

- ▶ Access ID 2—Oak Street, Moree to Mehi River compound west
- ▶ Access ID 10—Back Pally Road to Gwydir River compound north
- ▶ Access ID 9—Rocks Road to Gwydir River compound south
- ▶ Access ID 3—Gwydirfield Road south to Mehi River compound east.

Utility protection and road improvements may be required for use by construction vehicles.

Compound locations presented in this environmental impact statement may be revised. Access and egress issues would need to consider safety and security requirements primarily, as well as constructability requirements, including:

- ▶ impacts on public roads or residential streets
- ▶ speed limits
- ▶ access and egress to the rail corridor
- ▶ provision of adequate turning circles for oversized deliveries—recommended 25 m turning circle for Super T delivery
- ▶ provision, where possible, for drive in/drive out access and egress.

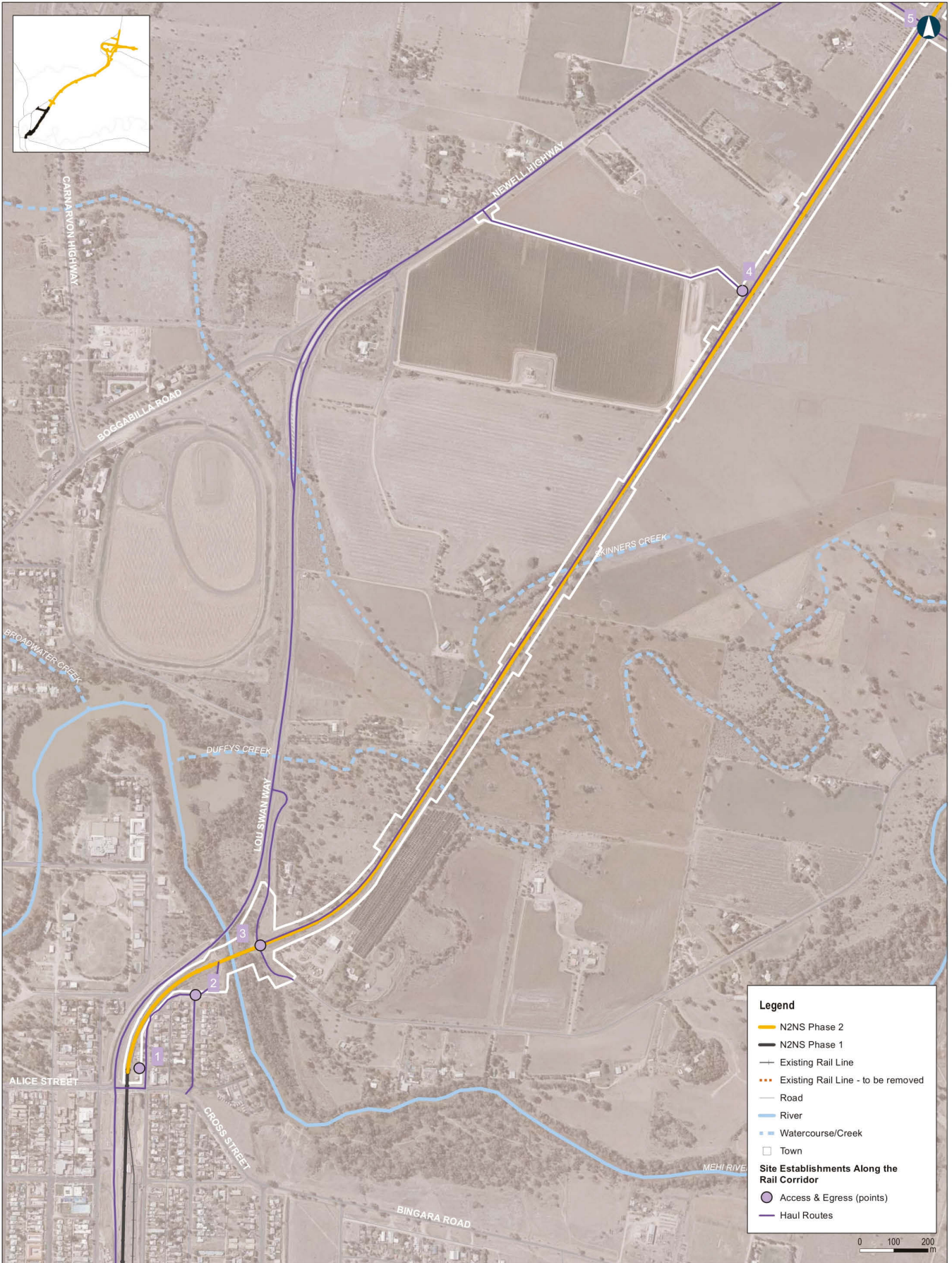


Figure 8-4 Proposed access and egress points and haul routes for the proposal

Data Sources: ARTC, IRD.V, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:10,000
 Paper size: A3
 Date: 3/16/2022
 Map 1 of 5

N2NS_Sp2_EIS_F08_04_ProposedAccess_cv7.mxd



Figure 8-4 Proposed access and egress points and haul routes for the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

N2NS_SPL_EIR_F08_04_ProposedAccess_047.mxd

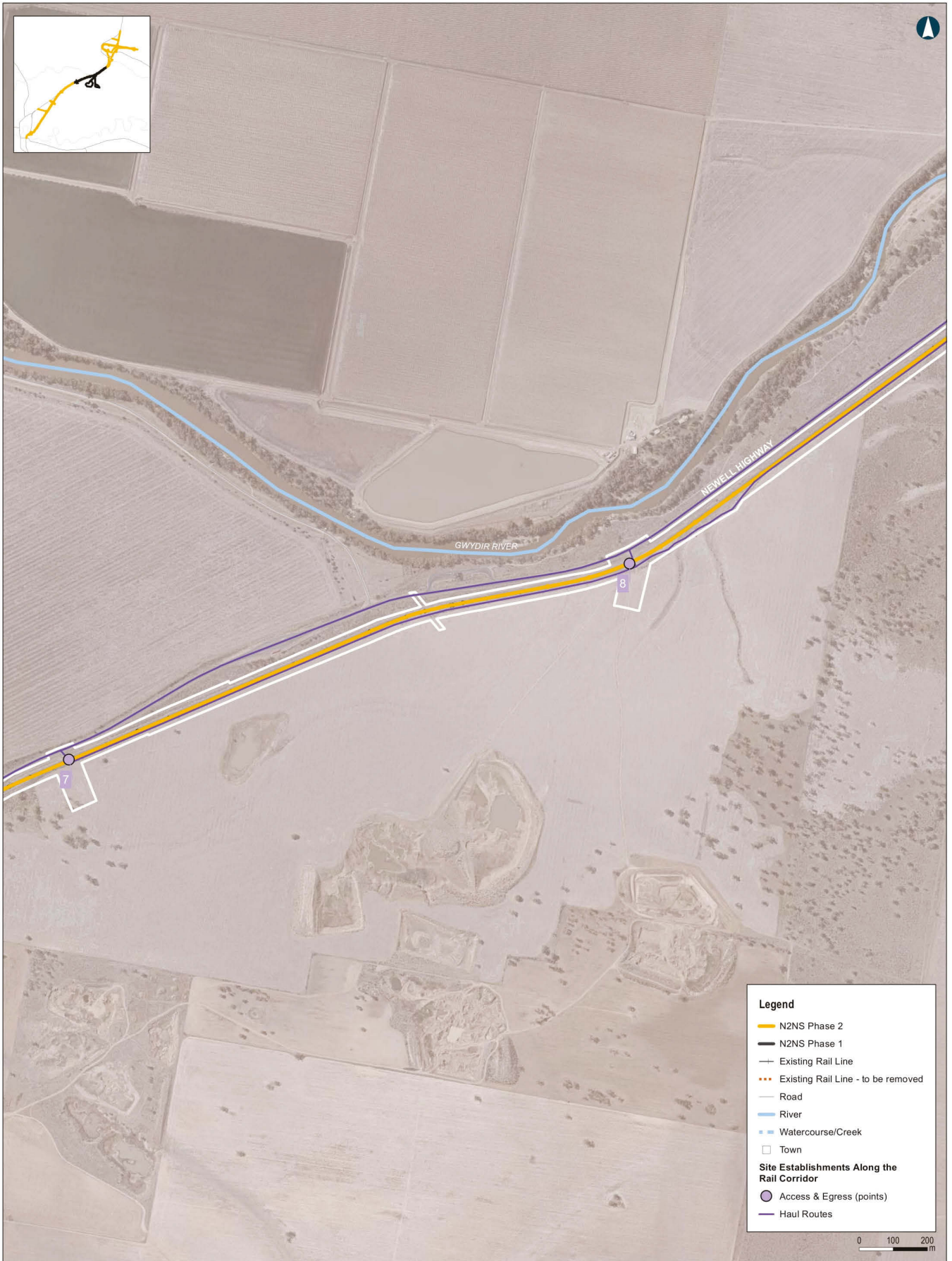


Figure 8-4 Proposed access and egress points and haul routes for the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:10,000
 Paper size: A3
 Date: 3/16/2022
 Map 3 of 5

N2NS_3P2_E18_F08_04_ProposedAccess_037.mxd

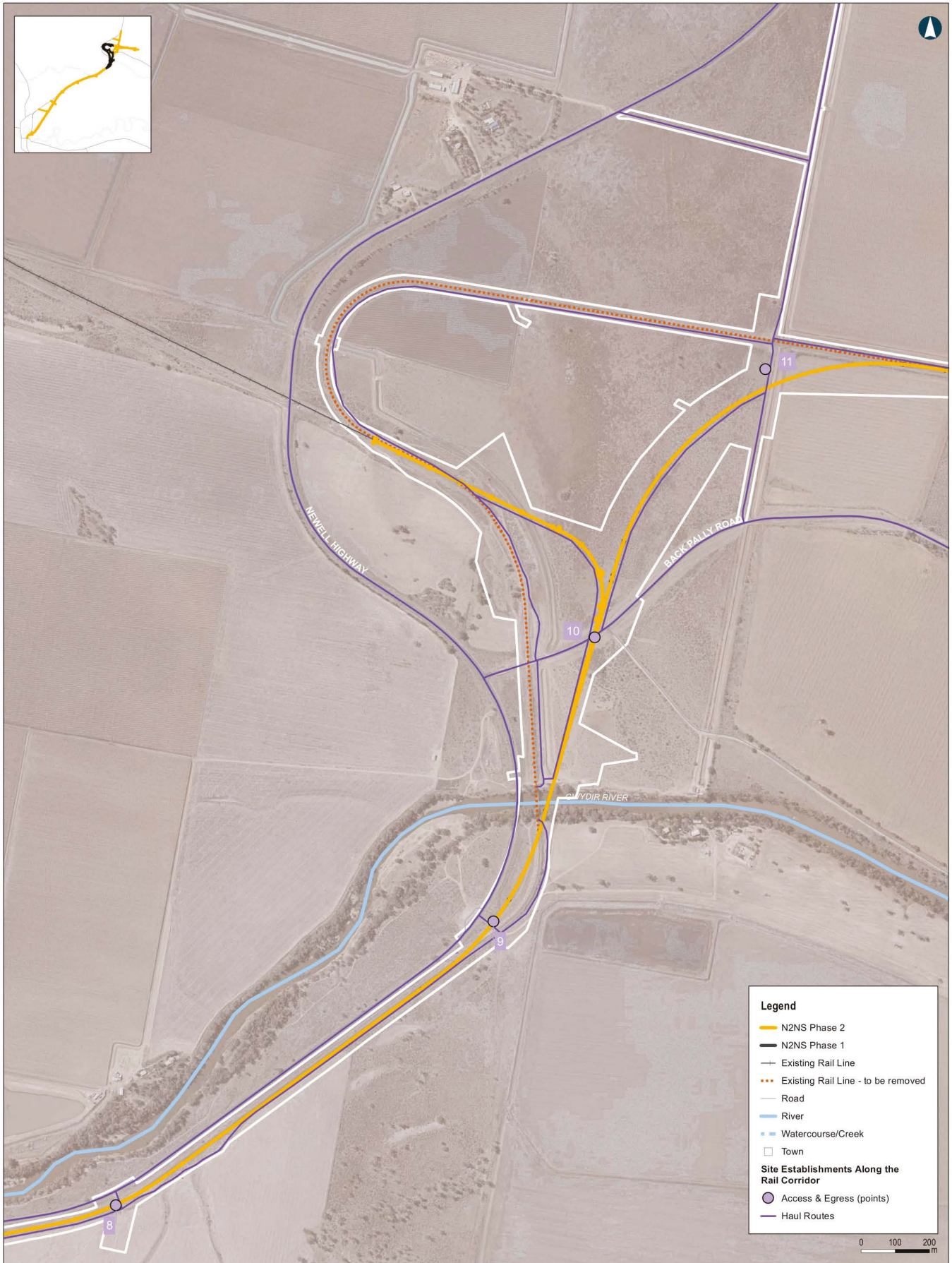


Figure 8-4 Proposed access and egress points and haul routes for the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:10,000
 Paper size: A3
 Date: 3/16/2022
 Map 4 of 5

N2NS_SPL_EIS_FR_04_ProposedAccess_0x7.mxd



Figure 8-4 Proposed access and egress points and haul routes for the proposal

Data Sources: ARTC, IRDJV, LPI, ARTC Aerial (2018)

Coordinate System: GDA 1994 MGA Zone 55
 Scale: 1:10,000
 Paper size: A3
 Date: 3/16/2022
 Map 5 of 5

N2NS_Sf2_EIS_F08_04_ProposedAccess_017.mxd

8.10.4 Haul routes

Potential hard rock quarry site options identified for use in the proposal are located at Runnymede and North Star. Additional quarries exist in the area that may also be used. Routes to and from quarries would be via the Newell Highway and Back Pally Road to Runnymede.

The prefabricated concrete culverts would be delivered to site by road via the Newell Highway and side roads to access the rail corridor.

Materials for the rail underbridges including piles, prefabricated beams and concrete would be delivered to site from and through Moree.

Rail components such as sleepers and track not already onsite would be transported to the work areas via road haulage (or via rail if available/operational). Prefabricated concrete units, fill, ballast and equipment deliveries would be via road from manufacturers, town centres or quarries.

For structural fill, haul routes would be through private property used for agricultural activities and would only require limited use of the Newell Highway and some local roads. All haul routes through private property and TSRs would be of a temporary nature and access would be maintained at all times.

8.10.5 Construction traffic numbers

The proposal's construction vehicle movements would be mainly comprised of the bulk material transport and pre-cast concrete structures deliveries. Construction traffic would generally involve:

- ▶ delivering of pre-cast concrete culverts and oversized bridge beams
- ▶ transport of bulk materials such as ballast, capping and importation of materials from quarry/borrow sites
- ▶ minibuses and private vehicles to transport people to work, generally from Moree.

Table 8-8 provides indicative types and movements.

TABLE 8-8 INDICATIVE VEHICLE TYPES AND MOVEMENTS

Vehicle type		Movements per day (each way)
Light vehicles	Cars and utility vehicles	25
Heavy vehicles	Haulage and delivery trucks	40
Buses		4
Water truck		10

8.11 Public utilities

Utilities within the proposal boundary have been assessed to determine impacts stemming from the upgrade works, and feasible mitigation measures.

8.11.1 Description of utility types and ownership

Assets belonging to the following third-party utility owners have been identified within the proposal:

- ▶ Essential Energy
- ▶ Moree Plains Shire Council
- ▶ Nextgen
- ▶ Private
- ▶ Telstra.

8.11.2 Utility interface with proposal

In general, utilities may clash with the proposed upgrade works by either crossing the rail alignment at a perpendicular angle or running longitudinally to the rail alignment. Those that are longitudinal to the rail alignment are at risk of being impacted during construction by either the provision of cess drains, construction of the rail formation toe or haulage vehicles.

8.11.3 Impacts and mitigation

Utility mitigation measures have been determined considering the existing utility's depth, the extent of proposed formation earthworks and the utility owner's requirements regarding minimum horizontal and vertical clearance. Where available, survey has been used to determine a utility's depth; however, in general, survey is not available and mitigation measures have been assessed using only a horizontal alignment determined through Dial Before You Dig (DBYD) data.

Where a perpendicular utility passes under the upgrade works and is at a sufficient depth under the formation, a permanent protection mitigation measure has been nominated. This protection consists of a concrete slab spanning over the utility for the length of the rail formation. Where a utility has insufficient depth or clashes with a new structure (e.g. a bridge), it is proposed for relocation. Typically, proposed relocations consist of a new like-for-like utility passing under the rail formation at a suitable depth and tying in to the existing services on either side.

Utilities running longitudinally to the rail formation have generally been nominated to be 'protected during construction'. It is expected that construction of the works is feasible without damage to the existing utility. Furthermore, future vibration propagating from the rail alignment is not expected to cause damage to the utilities, considering the typically sufficient horizontal offset. Care must be taken during construction to locate these longitudinal utilities, clearly demarcate the utility's alignment and ensure that no excessive loads are applied.

As in N2NS Phase 1, sections of the Nextgen optical fibre have been nominated for relocation. This utility runs longitudinally to the rail alignment, often coming within close proximity to the rail formation and proposed culvert structures. Minimum horizontal and vertical clearances must be confirmed with Nextgen prior to works being undertaken in proximity to the optical fibre.

Overhead electrical utility has been assessed for clearance over the proposed rail. The minimum required clearance from top of rail to conductor is 10.45 m for ≤ 33 kV and 11.25 m for $33 \text{ kV} < U \leq 132$ kV. Where sufficient vertical clearance exists, no further works are required. For overhead electrical utility with insufficient vertical clearance, the crossing is nominated to be raised. Proposed overhead electrical power is also nominated for connection to new signalling sites, including Rocks Road and Back Pally Road level crossings. These are provided by connecting from existing overhead power and running new lines through the rail corridor to the signalling infrastructure location. Existing power poles within the proposed rail corridor would need to be removed.

The proposal as declared does not include the relocation of utilities. Their relocation is not subject to the approval process under Division 5.2 and will be assessed separately.

Consideration has been given to the impact of construction works on utilities. Table 8-9 details elements of construction considered, assumptions made and how these elements affect utilities.

TABLE 8-9 INDICATIVE IMPACTS TO UTILITIES FROM CONSTRUCTION OF THE PROPOSAL

Construction element	Assumption	Impact to utilities
Material haulage	Haulage to occur on the east side of the rail alignment, using the RMAR where possible.	Mass haul plans to consider utility locations. No utility relocations nominated on the expectation of impact by heavy vehicles. Where haulage routes must cross utility alignments, temporary protection would be provided.
Rail Maintenance Access Road (RMAR)	The existing RMAR would be maintained where possible. Vehicles using the RMAR would not deviate from its alignment.	Utilities would not be impacted by vehicles using the RMAR
Site compounds	The primary site compound would be in Moree.	Utility connection to any new site compound to be considered on a case by case basis. Upgrade to existing utilities for the benefit of site compound amenity to be managed with utility authorities.
Stockpile and borrow pits	Stockpile and borrow pit locations would be nominated clear of utilities.	No utility relocation or protection nominated due to likely stockpile and borrow pit locations.
Ground improvement	Nominal ground improvement would be required below the subgrade level at all proposed culvert locations. This would increase the overall earthworks footprint.	Utilities in proximity to culvert construction to be assessed assuming that temporary excavation would be required. Generally, relocations to be nominated if utility is within 5 m of culvert apron.

8.12 Approach to avoiding or minimising impacts during construction

Where construction of the proposal impacts the public, further construction planning and design refinements would be required to minimise and/or avoid these impacts.

8.12.1 Potential impacts

Potential impacts from the construction of the proposal may include:

- ▶ construction traffic impacts on public roads and highways, including but not limited to noise, traffic congestion and deterioration of the local road pavements
- ▶ erosion and sedimentation of waterways
- ▶ dust from earthworks
- ▶ oversized deliveries (such as precast bridge beams or large box culverts) impacts on road users
- ▶ disruption to utilities services from diversion works
- ▶ noise and vibration, particularly during demolition of existing bridge spans and concrete piers, and works outside of standard work hours
- ▶ water quality impacts caused by the construction of new bridge structures in environmentally sensitive areas such as over waterways
- ▶ delays to road users caused by level crossing works
- ▶ speed restrictions on public roads caused by temporary site access/egress points along the alignment
- ▶ potential introduction or spread of weeds and pests
- ▶ impacts from incidents (including spills, crashes, water/soil contamination, etc.)
- ▶ impacts on landowners from major construction activities and realignment.

8.12.2 Mitigation measures

Mitigation and management measures applicable to the design, pre-construction and construction stages would be implemented to avoid or minimise the construction impacts. The measures include preparing and implementing a Construction Environmental Management Plan (CEMP), including detailed sub plans.

The CEMP would be prepared for the construction phase of the proposal by the responsible construction contractor. The CEMP would provide a centralised strategy through which all potential environmental impacts would be managed during construction and would include detailed management measures to avoid or minimise potential impacts. The requirements for the CEMP are described in Chapter 27: Approach to environmental management and mitigation.

Mitigation measures need to consider and assess all impacts caused by the construction of the proposal. Mitigation measures for construction of the proposal may, among other things, include:

- ▶ early engagement with stakeholders and landowner's approval
- ▶ information sessions for local residents, farmers, schools and public transport operators
- ▶ maintaining accesses at all times to private properties and where possible to public spaces such as shared paths and walking tracks
- ▶ environmental erosion and sediment control measures established at work sites
- ▶ additional environmental control measures at rivers/sensitive receivers in accordance with the CEMP
- ▶ construction traffic management plan established
- ▶ adopting recommendations from the pavement impact assessment, including undertaking pavement condition surveys on the impacted local roads before, during and after construction
- ▶ site traffic management systems established at interfaces with public roads
- ▶ temporary traffic control measures established during level crossing works
- ▶ logistics management of construction vehicle movements to avoid traffic congestion at site access/egress points
- ▶ driver hazard education
- ▶ using the existing rail corridor for haulage and construction plant/vehicle movements, as far as practical

- ▶ noise and vibration mitigation measures during demolition phases, including appropriate selection of work methods and equipment, and judicious placement and consideration to respite periods
- ▶ dust suppression on private roads and within the rail corridor
- ▶ spreading lime-stabilising agent in low wind conditions—all works and activities would be undertaken with consideration of prevailing and expected meteorological conditions
- ▶ provision of rumble grids and wheel wash for vehicles leaving site, as well as road sweepers on public roads to remove any soil tracking
- ▶ site rehabilitation and reinstatement in accordance with the Rehabilitation and Reinstatement Plan

8.12.3 Mehi and Gwydir rivers floodplain

The majority of the proposal is located between the Mehi and Gwydir rivers, which together form a single floodplain between them. The geotechnical material through the floodplain is highly susceptible to the effects of wet weather and may make access/egress limited during poor weather conditions. The approach to mitigate against potential flood impacts during construction would consider the short-term and long-term effects of a flood or rain event in the region.

Mitigation measures against potential flooding impacts may consider, among other things, the following:

- ▶ preparation of an emergency evacuation plan
- ▶ assessment of previous flood and historical rainfall data, in order to highlight a time of year to focus or avoid certain activities (EIS Technical papers 1: BDAR and 4: Hydrology and Flooding have conducted rainfall and flooding assessments)
- ▶ construction of all-weather access and egress
- ▶ undertake a flood/drainage assessment to inform the siting and scale of temporary construction areas (including stockpiles, construction compounds, fuel storage and laydown areas). Locate these areas on land that is not subject to flooding or in a manner that minimises external impacts, as far as practicable
- ▶ mobile plant and equipment that can demobilise and move in the event of evacuation notice
- ▶ construction or identification of existing elevated areas for equipment/material refuge in a flood event
- ▶ preparation of an emergency evacuation plan
- ▶ maintaining clear ways to access/egress points
- ▶ development of recovery plans for post flood events.