INLAND RAIL

Scoping Report

Phase 2 Narrabri to North Star Inland Rail

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

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Document Control

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EP&A ACT APPLICATION - INLAND RAIL PROJECT – NARRABRI TO NORTH STAR PHASE 2

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Wayne Window Senior Environment Advisor N2NS	WW	21/05/2020	

Submitted for Approval

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Glossary

Specific terms used throughout this document are listed and described in the table below.

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

Abbreviations

Specific terms and acronyms used throughout this document are listed and described in the table below.

ABBREVIATION	DEFINITION
AHD	Australian Height Datum in metres
AEP	Annual exceedance probability
AHIMS	Aboriginal Heritage Information Management System
ARTC	Australian Rail Track Corporation Ltd
BC Act	*Biodiversity Conservation Act 2016* (NSW)
CEEC	Critically endangered ecological community
CRN	Country Regional Network
CSSI	Critical State Significant Infrastructure
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DPIE	New South Wales Department of Planning, Industry and Environment
DPI	New South Wales Department of Primary Industries
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EPA	New South Wales Environment Protection Authority
EPL	Environment Protection Licence
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Reg	*Environmental Planning and Assessment Regulation 2000* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
FM Act	*Fisheries Management Act 1994* (NSW)
Golder	Golder Associates Pty Ltd
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
IRIG	Inland Rail Implementation Group
IS	Infrastructure Sustainability
ISCA	Infrastructure Sustainability Council of Australia
LEP	Local environmental plan
LGA	Local government area
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	New South Wales Office of Environment and Heritage (now part of DPIE)
PAH	Polycyclic aromatic hydrocarbons
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
Roads Act	*Roads Act 1993* (NSW)
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSI	State Significant Infrastructure

ABBREVIATION	DEFINITION
TEC	Threatened ecological community
The study	Melbourne to Brisbane Inland Rail Alignment Study
Umwelt	Umwelt (Australia) Pty Ltd

1 Introduction

1.1 Background

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

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

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

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

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

Australian Rail Track Corporation Ltd (ARTC) ('the proponent') is seeking approval to construct and operate the Narrabri to North Star (N2NS) section of Inland Rail.

The N2NS section was declared a Critical State Significant Infrastructure (CSSI) project under the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act), and is currently undergoing the environmental impact assessment process under the EP&A Act, and bilateral assessment under the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act).

The N2NS Project had an Environmental Impact Statement (EIS) prepared, which is currently undergoing assessment. Since that EIS was prepared and submitted in 2017, the alignment within what is now the N2NS Phase 2 area has changed (IRDJV, 2019a). Specifically, ARTC has modified the N2NS Project to upgrade a section of approximately 15 km of the corridor running from Moree north to beyond the Camurra Bypass, including the Mehi-Gwydir River crossings (Figure 1). Consequently, this section of the N2NS alignment has been omitted from the original Project and as Phase 2 requires separate environmental impact assessment (EIA) under the EP&A Act, and assessment under the EPBC Act. The Phase 2 component of N2NS will be based on a 30 per cent detailed design report (IRDJV, 2019a). The original N2NS Project is referred to as Phase 1.

Therefore, the project that is the subject of this application is the N2NS Phase 2 component ('the proposal'). This is primarily an upgrade of approximately 15 km of existing rail corridor between Moree and Camurra, with a small portion (~1.6 km) of greenfield re-alignment (IRDJV, 2019a) (Figure 2).

The ARTC is seeking approval under Part 5 of the EP&A Act to construct and operate the N2NS Phase 2 section of Inland Rail ('the proposal').

This document supports an application to the Department of Planning, Industry and Environment (DPIE) seeking the Secretary's Environmental Assessment Requirements (SEARs) for the EIS for the Phase 2 alignment, as part of the first step in the approvals process for the proposal.

NARRABRI TO NORTH STAR

Narrabri to North Star Alignment

MAP 1

NORTH STAR
MOREE
NARRABRI
681000
665920
N2NS Phase 2 Alignment
INVERELL SHIRE COUNCIL
MOREE PLAINS SHIRE COUNCIL
GWYDIR SHIRE COUNCIL
NARRABRI SHIRE COUNCIL
CARNARVON HWY
NEWELL HWY
GWYDIR HWY
KAMILAROI HWY
BRUXNER HWY
TACKINDRI CREEK
MUNGLE CREEK
FOREST CREEK
OTTLEYS CREEK
MOBBINDRY CREEK
YALLAROI CREEK
NEE NEE CREEK
MOUNT PLEASANT CREEK
GIL GIL CREEK
BOONAL CREEK
BUNNA BUNNA CREEK
CAROLE CREEK
GINGHAM WATERCOURSE
MARSALLS PONDS CREEK
MARSHALLS PONDS CREEK
CROPPA CREEK
ROCKY HOLE CREEK
GWYDIR RIVER
GOONAL CREEK
CREAMIN CREEK
MEHI RIVER
MOSQUITO CREEK
TARRAN CREEK
MOOMIN CREEK
WARIALDA CREEK
SPRING CREEK
MILLIE CREEK

Conservation Area
Cropping
Grazing
Horticulture
Intensive Animal Production
Mining & Quarrying
Power Generation
River & Drainage System
Special Category
Transport & Other Corridors
Tree & Shrub Cover
Urban
Wetland
OUTSIDE

0 5 10 15 20 Km

Coordinate System: GDA 1994 MGA Zone 55

Chainage (m)
ARTC Project Sections
N2NS Phase 2 - 30% Design Alignment
Main Roads
Narrabri to North Star Alignment
Other Track
Watercourses (major)
Local Government Authorities
NPWS Reserve

Date: 27-03-2020
Author: DP
Paper: A3
Scale: 1:500,000

Data Sources: **Project Sections, Major Rivers, Main Roads, Railways:** Sourced from BaseMapStreetPro;**LGAs:** PSMA Australia, 2020; **Landuse:** Office of Environment and Heritage NSW; **All other data:**NSW Clip 'N Ship,2020;**Service Layer Credits:** Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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NARRABRI TO NORTH STAR

N2NS Phase 2 Alignment

MAP 2

0 0.5 1 1.5 2 Km

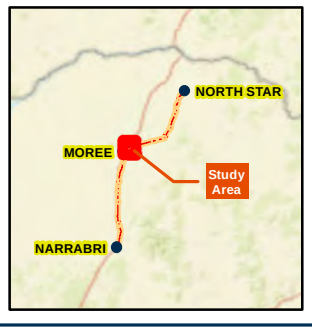
Coordinate System: GDA 1994 MGA Zone 55

Date: 20-04-2020
Author: DP

Paper: A3
Scale: 1:40,000

Data Sources: Project Sections: Sourced from BaseMapStreetPro; All other data: Sourced from Six Clip 'N Ship 2020; Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

- ARTC Project Sections
- Chainage (m)
- Non Aboriginal Heritage Sites (Inferred)
- N2NS Phase 2 - 30% Design Alignment
- Other Railways
- Roads
- Waterways
- Major Rivers
- Property Boundaries
- Waterbodies



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1.2 Overview of the proposal

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 of the town and farming communities. The rail alignment of N2NS between Moree and Camurra traverses directly through this floodplain. Due to the complex hydrology of this area, and the results of the original EIS for N2NS Phase 1, ARTC has modified the N2NS alignment and removed the section across the floodplain to form Phase 2.

The most significant changes are the re-alignment at the Camurra hairpin bypass near the Gwydir River crossing (IRDJV, 2019a). The alignment options analysis within the 2017 EIS document (the EIS alignment) concluded with the selection of Option 2 (of three options) (GHD, 2017), which introduced an 800 metre (m) radius curve to bypass the existing hairpin location. Since that EIS option, refinement of the design was completed to accommodate the desired optimal train speed. To that end, ARTC concluded that the horizontal alignment throughout this section should be upgraded so that the curve south of the Gwydir River bridge would also be upgraded to an 800 m radius, and that the existing level crossings, which were impacted, would be altered from their existing locations (IRDJV, 2019a). The realignment through this section is presented in Figure 3.

The alignment proposed in the EIS did not meet ARTC's requirements for detailed design in regard to flood immunity, and to maintain afflux of no more than 50 mm on sensitive land uses, such as dwellings and the Newell Highway, which are particularly sensitive receptors in this section.

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

Project construction for Inland Rail will be a single-track railway, with crossing loops to accommodate double stacked freight trains up to 1,800 m long (noting that crossing loops will not be required for the Phase 2 portion of N2NS). Components of the construction will include infrastructure to accommodate possible future augmentation and upgrades of the track as discussed above. However, the future upgrades to the track would be subject to their own planning, assessment and approval considerations. Clearing of the corridor, with an average width of 40 m, would be required to allow for construction and to maintain the safe operation of the railway.

The operational phase of Inland Rail will be of a single track with crossing loops to accommodate double stacked freight trains up to 1,800 m long. Impact assessments will be undertaken for rail traffic and associated activities projected at the year 2040.

Inland Rail train specifications and operation of the proposal are described below.

1.2.1 Key features

The key features of the proposal, based on the 30 per cent detailed design report (IRDJV, 2019a), include:

- Enhancement of approximately 13 km of existing track, and construction of approximately 1.6 km of realigned rail corridor, including rail embankments and cuttings
- Upgrades of nine existing level crossings: three public crossings and six private crossings
- Replacement of underbridges across the Mehi River and Gwydir River
- Eight new underbridges, new box culverts and the modification of existing structures to be retained.
- A new road crossing of Back Pally Road
- Crossings and culverts across Skinner's Creek, Duffy's Creek, two unnamed creeks, and three irrigation canals.

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

- Construction access roads and access tracks
- Permanent and temporary changes to the road network

- Construction compounds, storage areas and small quarries or borrow pits.

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

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

1.2.2 Timing and programme

Construction is anticipated to commence in November 2022 and is expected to take about 26 months to construct.

1.2.3 Operation

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

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

1.2.4 Capital investment value

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

CAMURRA LANE

CAMURRA

NEWELL HIGHWAY

Camurra
Hairpin Bypass

BACK PALLY ROAD

GWYDIR RIVER

THE ROCKS ROAD

Gwydir
River Bridge

NARRABRI TO NORTH STAR

N2NS Phase 2 Camurra Bypass Alignment

MAP 3

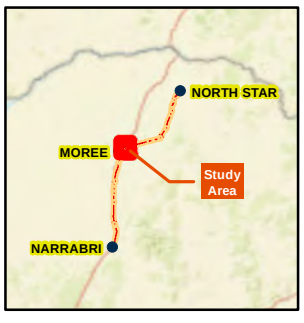
0 0.1 0.2 0.3 0.4 0.5 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 27-03-2020
Author: DP

Paper: A3
Scale: 1:7,500,000

- ARTC Project Sections
- N2NS Phase 2 Alignment
- Other Railways
- Roads
- Waterways
- Waterbodies



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© Department of Finance, Services & Innovation 2017

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1.3 The proponent and future operator

1.3.1 The proponent

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

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

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

1.3.2 Future operator

The proposal would form part of the existing rail network operated and maintained by ARTC. It is noted that ARTC does not operate train services, which would be provided by a variety of operators.

1.4 Purpose and structure of the report

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

- Section 1 – Introduction: outlines the key elements of the proposal, and the purpose of this report.
- Section 2 – Strategic context and justification: outline of why the proposal is required and alternatives considered.
- Section 3 – Site description: overview of the regional context of the proposal site.
- Section 4 – Planning and assessment process: outline of the statutory approvals framework for the proposal, including applicable legislation and planning policies.
- Section 5 – The proposal: outlines the scope of works, timeframe and likely activities involved with the proposal.
- Section 6 – Environmental considerations: preliminary assessment of the potential impacts of the proposal on the environment.
- Section 7 – Consultation: includes consultation undertaken to date, and what is proposed during the preparation of the EIS.
- Section 8 – Conclusion and next steps: outlines the conclusions of the document and the next steps in the process.

1.4.1 Scope of surveys

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

- Apart from the field inspections for ecology and cultural heritage, environmental assumptions are based on desktop information including existing N2NS EIS reporting, with no detailed fieldwork, modelling or surveys undertaken to verify actual conditions on the ground.

- The assessment is based on consideration of potential environmental constraints and impacts within the proposal site. Within the broad study areas, potential environmental constraints and impacts have been included for the entire study area. These are based on an initial assessment of the potential worst-case scenario. The potential impacts are therefore only indicative and would be refined during detailed investigations for the EIS.

2 Strategic context and justification

2.1 Existing rail infrastructure

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

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

2.2 Inland Rail development history and options considered

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

2.2.1 Melbourne-Brisbane Inland Rail Alignment Study

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

The conclusions of the study include:

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

2.2.2 Work undertaken to date

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

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

In conjunction with the Programme Business Case, the Inland Rail Implementation Group in 2015 recommended some variations to the corridor from that previously recommended in the 2010 Inland Rail Alignment Study. 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 programme.

The Australian Government has committed $9.3 billion to deliver Inland Rail.

2.3 Strategic planning context

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

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

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

2.4 Need for Inland Rail

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

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

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

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

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

2.5 Need for the proposal

The proposal is integral to the Inland Rail between Melbourne and Brisbane, and forms one of the 13 projects required to deliver the programme of works. The N2NS Phase 2 section is approximately 15 km in length, and has been designed to improve flood immunity, and re-align the track to maximise train-speed efficiency.

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 programme achieving an average Melbourne to Brisbane transit time (terminal to terminal) of less than 24 hours.

The proposal:

- Avoids potential flooding and subsequent disruption of the rail track on the Gwydir floodplain
- 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.

2.6 Key benefits of Inland Rail

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

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

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

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

- Reduction in travel time between Melbourne and Brisbane by up to 10 hours.
- A faster, cheaper, safer, less carbon intensive and more environmentally sustainable alternative to road freight.
- Provision of capacity to meet increasing freight demand.
- Creation of carryover benefits, including cost and time savings, to businesses and consumers that rely on freight.
- Creation and growth of businesses.
- Improvements to road safety, reduced road maintenance costs and reduced congestion through reduction of road freight on interstate highways.
- Creation of capacity for the existing rail line.

2.7 Key benefits of the proposal

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

The key benefits of the proposal include:

- Job creation during construction and operation, helping to sustain local communities.
- Boost to the local economy during construction and operation.
- Opportunities for private operators to develop local freight hubs connecting road and rail transport.
- Provides farmers and freight operators with alternative options to access export markets via ports in Brisbane and Melbourne.
- Stimulates competition, reducing cost to market.
- Improves rail network reliability.
- Facilitates local freight travel by rail, taking trucks off the road.
- Contributes towards improved sustainability and reductions in carbon emissions through construction of the Inland Rail programme.
- Safety and amenity benefits as a result of the reduction of freight transport on major road corridors.
- Avoids potential flooding and subsequent disruption of the rail track on the Gwydir floodplain.
- 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.

All of which directly support the benefits outlined in Section 2.6 for the proposal itself, and for Inland Rail more broadly.

2.8 Options considered

In 2016 and 2017, ARTC completed the EIS studies for the N2NS section of Inland Rail (see GHD, 2017). Part of those studies included extensive community consultation, which included information sessions, meetings with councils and other key stakeholders, mail outs and landowner meetings. The consultation informed the development of options that formed the basis of the design case for the EIS.

With regard to the N2NS Phase 2 section, within the EIS, six options were considered for the Moree section, and areas to the immediate north of Moree. Those options were considered based on stakeholder feedback, and primarily considered the potential for increased rail traffic through the Moree Station. That is, from the existing two to three trains per day, to about 12 trains per day in 2025, and about 21 trains per day in 2040, and the potential that this increased rail traffic could have on connectivity for the local Moree community (GHD, 2017).

The options considered included:

- Moree connectivity option – these included alternative connectivity solutions linked to the upgrade of the existing rail corridor. They considered: level crossing upgrades; footbridges; improved access for emergency vehicles; a detour of the Gwydir Highway to the south the town; a Gwydir Highway bypass; and overbridges within the town. The provision of 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 option – five possible bypass alignments were considered (GHD, 2017). These are summarised in Table 1, as indicated on Figure 4. At the time of the submission of the EIS, option 5 was the preferred alignment.

The conclusion of the multi-criteria assessment (MCA) of the options within 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 (GHD, 2017).

Table 1 Bypass options for Moree (GHD, 2017)

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, however, 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.

Since the submission of the EIS, detailed design of the N2NS section commenced. For the N2NS Phase 2 section, referred to as 'the proposal' in this report, a 30 per cent design report was completed based on detailed light detection and ranging (LiDAR) imagery, updated cadastral data, site investigations, geotechnical investigations, and hydrological assessments (IRDJV, 2019a).

It is noted that, given that design for Phase 1 has reached the Issue for Construction (IFC) stage, and that investment and constructions decisions have been made on that basis, the end points for the Phase 2 design are locked in. This generally negates any change to the route or reopening the MCA into bypasses.

An area of concern was identified within the section between Moree and Camurra. A significant portion of the alignment crosses the Mehi-Gwydir floodplain. This floodplain is complex, where flooding can have significant impacts on the local area, including extensive flooding events of the town and farming communities (Golder, 2019). The potential overtopping of the alignment during a flood event does not meet ARTC's requirements. Therefore, the alignment has been designed to achieve the required flood immunities through incorporation of appropriate cross-drains, scour protection, and new underbridges across the Gwydir and Mehi Rivers (IRDJV, 2019a).

The Camurra hairpin bypass near the Gwydir River crossing has also been realigned (IRDJV, 2019a). This realignment was based on option 2 (see Table 1 and Figure 4) presented in the original EIS (GHD, 2017). The realignment introduced an 800 m radius curve to bypass the existing hairpin bend. This option was preferred because it will allow 115 km/hr running speed for the Inland Rail traffic. However, as the detailed design has developed, it was noted that this alteration would not allow Inland Rail traffic to achieve the desired running speed, because that traffic would still be restricted by the small radius curve south of the Gwydir River bridge, of approximately 240 m radius, with an existing speed of 45 km/hr (IRDJV, 2019a).

Therefore, to achieve the desired optimal speed, ARTC concluded that the horizontal alignment throughout this section should be upgraded so that the curve south of the Gwydir River bridge would also be upgraded to a 800 m radius, and the existing level crossings that were impacted would be altered from their existing locations (IRDJV, 2019a).

NARRABRI TO NORTH STAR

Moree Bypass Options

MAP 4

0 0.5 1 1.5 2 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 27-03-2020
Author: DP

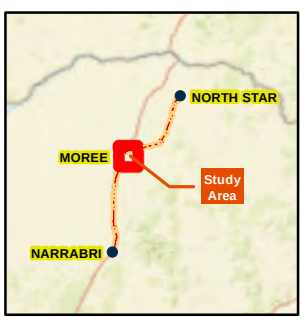
Paper: A3
Scale: 1:60,000

Data Sources: Project Sections: Sourced from BaseMapStreetPro; All other data: Sourced from Six Clip 'N Ship 2020; Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

- ARTC Project Sections
- N2NS Phase 2 Alignment
- Other Railways
- Roads
- Waterways
- Major Rivers

Moree Bypass Options (Inferred)

- Option 1
- Option 2
- Option 3
- Option 4
- Option 5



INLAND RAIL ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

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3 Site description

This section provides a description of the proposal site, and its regional context within the north-west NSW. The existing rail infrastructure and its operation is described in Section 3.4.

3.1 Regional context

The study area is located in central north-west NSW. The proposal site traverses one local government area (LGA), the Moree Plains LGA. The primary land use within the LGA is rural, with the predominant local industries based around agriculture (mainly cotton and grains) and grazing (GHD, 2016). The LGA adjoins the NSW–Queensland border.

The town of Moree is about 473 km south-west of Brisbane, 623 km north-north-west of Sydney, 1,210 km north-east of Melbourne, and about 103 kilometres north of Narrabri. It is located on the Mehi River at the junction of the Newell and Gwydir highways (GHD, 2016). At the 2016 census, Moree had a population of 9,311 people (ABS, 2020).

Moree is an important regional town providing a range of services to the surrounding agricultural areas. The Midkin Nature Reserve is approximately 13 km north-west of the proposal site, the Gwydir wetlands are located approximately 40 km west-north-west, downstream of the proposal site, and the Kirramingly Nature Reserve is located approximately 35 km south-south-west of the site.

3.2 Description of the proposal site

The proposal is for approximately 15 km of upgraded, single-track rail line predominantly within an existing 'brownfield' rail corridor. Approximately 1.6 km of the rail line consists of a realigned rail corridor through 'greenfield' areas (ARTC, n.d.). It runs from Moree north-easterly to beyond the Camurra Bypass, including the Mehi and Gwydir River crossings (ARTC, n.d.).

Upon leaving the township of Moree, the existing rail corridor crosses the Mehi River and Gwydirfield Road, and then swings in a north-easterly direction. Here it crosses Duffy's Creek at approximately 800 m, Skinner's Creek at approximately 1.5 km, and Gwyderfield Road before running adjacent to the Newell Highway. Within this corridor, it crosses three unnamed roads and an unnamed drainage line before swinging north to cross the Gwydir River. At this point, the proposed alignment leaves the existing rail alignment to bypass the Camurra hairpin turn and travel for approximately 1.6 km to eventually rejoin with the existing Camurra to Boggabilla rail line. Along this new section it crosses The Rocks Road twice, the Camurra-Warialda Road (Back Pally Road) approximately 200 m east of the existing rail line, and two irrigation canals. Seven new culverts are proposed for this section of the alignment to accommodate existing drainage features.

In respect of the Camurra hairpin curve, the proposal will address how this will be managed. This section of rail line has four existing culverts, and it is expected that ponding may occur between the existing and proposed new alignment (GHD, 2017).

The proposal will include the replacement of the Mungindi connection to the existing rail line.

3.3 Land ownership

Most of the proposal site is located within an existing rail corridor, which is public land owned by the NSW Government (Transport for NSW). A limited amount of property acquisition would be required for the Camurra Bypass. Some of this land is privately owned and primarily used for agricultural purposes, while the remainder is Crown land set aside as travelling stock reserve. The extent of property impacts will be refined and confirmed during detailed design, in consultation with property owners. For partial acquisitions, property adjustment plans would be developed in consultation with the property owner.

Leasing requirements are unknown at this stage. Consultation regarding agreements will be undertaken with landowners prior to works commencing. All permanent acquisitions would be undertaken in accordance with the requirements of the Land Acquisition (Just Terms) Compensation Act 1991.

3.4 Existing rail facilities

3.4.1 Overview

The proposal site is predominantly brownfield, within an existing rail corridor. Therefore, it does interact with the existing rail line within that corridor. The N2NS alignment is generally located within the existing rail corridor between Narrabri and the village of North Star, via Moree.

Narrabri and Moree are located on the existing Mungindi (North West) line, which branches from the Main North line at Werris Creek Station and heads north-west through the towns of Gunnedah and Narrabri to Moree. From Moree, the Mungindi line travels north-west to Mungindi on the NSW-Queensland border.

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

The Phase 2 section of N2NS consists of approximately 15 km of the N2NS corridor from Moree north to beyond the Camurra Bypass, including the Mehi-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 (ARTC, n.d.). The realignment through this section is presented in Figure 2.

3.4.2 Track characteristics

The existing N2NS track is a mixture of rail weights (47 and 53 kilograms per metre) mainly supported on steel sleepers. The track was originally constructed for light traffic on the existing sub-grade materials. Over time, the track has been re-ballasted and maintained, but no significant improvements have been made to the track formation.

Sections of track pass-through low-lying flood prone areas, and wash-aways have occurred in the past after heavy rain events. The maintenance access track along the existing rail corridor is not continuous and can be impassable during and after wet weather. There are about 12 sidings between Narrabri and North Star that provide access to and from the main line for private operations.

4 Planning and assessment process

This section provides an overview of the legislation and environmental planning processes that are relevant to the environmental assessment and approval of the proposal.

4.1 Overview

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

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

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

4.2 Environmental Planning and Assessment Act 1979

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

4.2.1 Part 5 of the EP&A Act

Part 5 of the EP&A Act defines the assessment process for proposals that do not require development consent. Section 5.5(1) requires a determining authority to '*examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity*'.

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

As such, in accordance with the provisions of Section 5.7, ARTC has concluded that the proposal is likely to significantly affect the environment and, as a result, an EIS is required. Therefore, the proposal is SSI under Schedule 3 of the State and Regional Development SEPP, as detailed in Section 4.1 above. The proposal therefore becomes subject to the assessment and approval process in Division 5.2 of the EP&A Act.

4.2.2 Division 5.2 of the EP&A Act

Division 5.2 of the EP&A Act establishes an assessment and approval regime for SSI. Division 5.2 applies to development that is declared to be SSI by a SEPP. Under section 5.12(3), development cannot be SSI unless it is of a kind that may be carried out without development consent under Part 4 of the EP&A Act and comprises:

a) infrastructure, or

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

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

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

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

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

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

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

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

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

4.2.3 Landowner's consent

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

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

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

- By notice to relevant landowners, no later than 14 days after the application has been made; or
- By advertisement published in a newspaper circulating in the area in which the infrastructure is to be located.

4.2.4 State environmental planning instruments

4.2.4.1 State Environmental Planning Policy (Infrastructure) 2007

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

Typically, the provisions of the Infrastructure SEPP prevail over other environmental planning instruments unless the work is located on land reserved under the *National Parks and Wildlife Act 1974* (NPW Act) or is regulated by State Environmental Planning Policy (Coastal Management) or State Environmental Planning Policy (State and Regional Development) 2011. As the proposal is not located on land reserved under the NPW Act, or is within a coastal zone, those exclusions are not applicable.

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

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

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

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

Clause 16 states that development is Critical SSI if it:

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

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

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

4.2.5 Local environmental planning instruments

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

4.2.6 Legislation and approvals that do not apply

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

- A permit under section 201, 205 or 219 of the *Fisheries Management Act 1994*
- Approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*

- An Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974*
- A bush-fire safety authority under section 100B of the *Rural Fires Act 1997*
- A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000.*

4.2.7 Approvals to be applied consistently

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

- An environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act* (POEO Act) *1997*
- Consent under section 138 of the *Roads Act 1993.*

4.3 Other relevant legislation

4.3.1 Biodiversity Conservation Act

Following submission of the EIS in 2017 for N2NS Phase 1, the biodiversity management framework in NSW changed with the commencement of the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and the implementation of the new *Biodiversity Assessment Method 2017* (BAM) (Office of Environment & Heritage, 2017). Under this legislation, a Biodiversity Development Assessment Report (BDAR) must be prepared by an Accredited Person in accordance with the BAM for all major projects, including CSSI.

On this basis, the environmental impact assessment for Phase 2 must include the preparation of a BDAR. While some information from the original biodiversity assessment prepared under the FBA will still be relevant, such as threatened species information, new vegetation surveys will be required under the BAM. Additional threatened species surveys will also be required to address BAM requirements and to capture any new species listed under NSW or Commonwealth legislation since the submission of the original EIS for Phase 1.

As part of the biodiversity reforms, changes were also made to the *Local Land Services Act 2013* (NSW) (LLS Act). As a result of this, land that is categorised as Category 1 (Exempt Land) under the LLS Act is managed differently under the BC Act and the BAM. Specifically, no biodiversity credit obligation resulting from native vegetation clearing is created on Category 1 land.

4.3.2 Protection of the Environment Operations Act 1997

The POEO Act establishes, amongst other things, the procedures for issuing environment protection licences for specific activities relating to waste, air, water and noise pollution control. Environment Protection Licences

(EPLs) are generally required for scheduled activities or scheduled development work. The relevant definitions of scheduled activities provided in Schedule 1 of the POEO Act (Clause 33) include:

33 Railway activities – railway infrastructure construction

1. This clause applies to railway activities – railway infrastructure construction, meaning the following:

(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.

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

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

4.3.3 Roads Act 1993

Under section 138, Part 9, Division 3 of the *Roads Act 1993* (Roads Act), a person must not impact or carry out work on or over a public road other than with the consent of the appropriate roads authority. Construction of the proposal may impact on public road reserves under the control of various authorities. The proponent would seek the necessary approvals under the Roads Act. As noted above, section 5.24 of the EP&A Act provides that consent to a permit under section 138 must be granted.

4.4 Commonwealth legislation

4.4.1 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, the environment of Commonwealth land, or that are being carried out by an Australian Government agency, must be referred to the Australian Minister for the Environment for assessment. If the Minister determines that a referred project is a 'controlled action' under the EPBC Act, the approval of the Minister would be required.

Phase 2 will be referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the EPBC Act for consideration of whether the proposal is deemed to be a controlled action, due to significant impacts on one or more Matters of National Environmental Significance (MNES). Opportunities may exist for Phase 2 to be assessed as a controlled action under the 'preliminary documentation' approach.

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

4.4.2 Native Title Act 1993

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

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

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

5 The proposal

5.1 Overview

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

To provide the context for the proposal, Section 5.1.1 describes the proposed features and specifications of the Inland Rail, an indicative preliminary review of the main construction activities that would be undertaken is provided in Section 5.3, along with an outline of the indicative operation and maintenance regime in section 5.4. The proposal site is shown on Figure 2.

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

5.1.1 Inland Rail performance specifications

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

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

5.1.2 Proposal timeframe

Construction is anticipated to commence in November 2022 and is expected to take about 26 months. This is indicative only at this stage. The construction commencement time and construction duration would be firmed up and may be revised as the assessment of the proposal progresses.

5.2 Scope of works

The proposed action involves upgrading approximately 15 km of the existing rail line track and track formation within the N2NS corridor running from Moree north to beyond the Camurra Bypass, including the Mehi-Gwydir river crossings and the associated floodplain, and replacement of two bridges and construction of approximately 1.6 km of realigned rail corridor.

Key features of the proposed action are:

- Upgrading approximately 13.4 km of track and track formation, and culverts within the existing rail corridor
- Construction of a new passing loop at Moree, including construction of a new section of track up to about 2,165 m long (to accommodate 1,800 m long train), roughly parallel to the existing track with consideration for possible future upgrades
- Replacing 8 under-bridges to meet the 30 Tonne Axle Load structural load requirement
- Significant flood immunity improvements in the Gwydir-Mehi floodplain, including extensive culvert banks
- Upgrading, relocating or consolidating nine level crossings on the existing brownfield alignment including changing property access and local road networks in some locations as a result of the rationalisation of level crossings
- Local signalling works including revised naming conventions for push button operated motorised points on the new loops with the addition of train detection to facilitate this functionality, considerable

upgrades to signalling systems around existing active level crossings and several upgrades of existing passive level crossings to active level crossings
- Ancillary works also include improving stormwater and drainage, upgrading signalling and communications, establishing or upgrading existing fencing of the rail corridor, potential construction of noise walls and relocating impacted services and utilities.

5.3 Construction of the proposal

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

The sequence of construction activities would be dependent on local conditions and track operational requirements however a typical construction sequence is as follows:

- Establish construction work sites and environmental controls, and undertake enabling works.
- Remove redundant structures and material, including removal and storage of existing track components and ballast, demolition of existing sub-structures and excavation of unsuitable material.
- Construct new structures, including placement of suitable formation material and installation of new culverts and associated structures.
- Track works including removal and storage of existing track components and ballast, construction of cuts and fills, replacement of ballast and installation of new track and track components.
- Installation of new services.
- Commissioning works.
- Site rehabilitation.

5.4 Operation of the proposal

Projected train movements across the entire Inland Rail route (round trips, most heavily trafficked section of Inland Rail) is expected to be up to 123 trains per week in 2024-25 with a peak demand in 2049-50 where train numbers are expected to reach up to 174 per week (ARTC, 2015). The new rail line would be a faster, more efficient route that bypasses the Sydney rail network and would enable the use of double stacked trains along its entire length.

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

6 Environmental considerations

6.1 Overview

This section provides a preliminary assessment of the potential environmental impacts that are likely to be associated with the construction and operation of the proposal. This assessment has been based on the current level of design for the proposal; that is, the 30 per cent design (IRDJV, 2019a). Some impacts may change as the design progresses and more detail becomes available. These changes would be considered as the environmental impact assessment process continues and the EIS is prepared.

To support the environmental impact assessment for the Phase 2 portion of N2NS, a Preliminary Environmental Assessment Report was prepared (Golder, 2019). It included a description of Phase 2, a summary of baseline and impact assessment undertaken to date, a gap analysis to identify the aspects which require additional assessment and a summary of the 'key issues' and 'other issues' as defined by the *Draft Scoping and Environmental Impact Statement Guidelines* (Department of Planning and Environment, 2017).

Where an impact on a matter is likely, the characteristics of the impact have been described to determine if it is likely to have a material effect. If not material, the reasons why are presented in the Scoping Report and the impact will not be considered any further in the EIS unless new information comes to light during the assessment which requires the potential impact to be re-evaluated. If a material effect on a matter is likely, it must be assessed further in the EIS. The level of assessment of the matter to be included in the EIS is categorised into either ''Key Issue'' or ''Other Issue.''

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

The 'Key' environmental issues are defined as those impacts that are considered to require further detailed investigation during the preparation of the EIS as they would result in a moderate to high impact on the environment. The Scoping Report identifies biodiversity as the key environmental issue.

The 'Other' environmental issues are defined as those impacts that are not expected to be as significant, and would be manageable through the application of industry-standard environmental management measures. Four issues (Aboriginal heritage, non-Aboriginal heritage, noise and vibration and hydrology, flooding and water quality) were identified as 'Other' environmental issues.

Additional environmental issues that have not been categorised as either 'Key' or 'Other' are also described in the Scoping Report.

6.2 Key environmental issues

6.2.1 Biodiversity

The following section provides a summary of the results from a preliminary assessment of the proposal site, undertaken by Umwelt (Australia) Pty Limited (Umwelt) and GHD for the EIS (GHD, 2017). Additional, more recent assessments were completed by Golder in late 2019 and early 2020 (see Golder, 2019, 2020a, 2020b) to supplement those original assessments.

All the assessments included desktop assessments and literature reviews to identify threatened flora and fauna species, populations, and ecological communities. The more recent surveys and assessment (that is, Golder, 2019, 2020a, 2020b) were completed in accordance with the BAM, as required under the BC Act. It is noted that the surveys completed for the Phase 1 EIS predated the implementation of the BAM.

The reviews and surveys also identified MNES, listed under the EPBC Act, which may be impacted by the proposal.

Aquatic surveys required under the *Fisheries Management Act 1994* (FM Act) will be undertaken when there is sufficient water in waterways and in accordance with relevant survey guidelines.

The desktop assessments and literature reviews included a search of the NSW Department of Planning, Industry and Environment's (DPIE) BioNet Atlas database (BioNet), the EPBC Act Protected Matters Search Tool (PMST), and the NSW Department of Primary Industries' (DPI) Fishing and Aquaculture Records Viewer (DPI, 2020a). These searches were conducted in October 2019 for an area including the proposal site, and a 10 km buffer around the proposal site (termed the 'study area').

The review utilised regional vegetation mapping covering the proposal site. It is noted that under Section 6.8(3) of the BC Act, the assessment should exclude the assessment of impacts of any clearing of native vegetation and loss of habitat on Category 1-exempt land (within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act)). Additionally, in accordance with section 2.3.1.1 of the BAM, biodiversity values that do not need to be assessed under the BAM include: (d) biodiversity values associated with the assessment of the impacts of any clearing of native vegetation and loss of habitat on category 1-exempt land (within the meaning of Part 5A of the LLS Act), other than the additional biodiversity impacts in accordance with clause 6.1 of the BC Regulation.

The boundaries delineating Category 1-exempt, and Category 2-regulated, land on the Native Vegetation Regulatory (NVR) map are not yet publicly available. During the transitional period (until the entire NVR map is released), accredited assessors may establish the categorisation of land for the consent authority to consider by approximating the method used to make the NVR map under the provisions of the BC Act and the LLS Act.

To meet the Category 1-exempt land requirement, land must be:

- Legally cleared at or since 1 January 1990 (woody vegetation only).
- Significantly disturbed or modified since 1990 (non-woody vegetation).

Most of the land surrounding the proposal site is subject to the LLS Act and, therefore, the NVR Map, with the exception being Moree itself, and a small area of land zoned R5. Most of the land adjacent to the rail corridor is mapped, and clearly identified as cropping areas, which is Category 1 exempt land. Areas identified as grazing – modified pasture and areas of grazing – native vegetation, are identified as Category 2 land. A land categorisation assessment is currently being prepared to provide to DPIE for confirmation of the underlying categories. Following that process, land confirmed as Category 1 will be excluded from the offset calculations needed in the BDAR, as required by the BAM.

For the original EIS, rapid field surveys of the proposal site were completed in April and October 2016, and April 2017. Additional, detailed biodiversity field surveys of the proposal site were undertaken in December 2019 and February 2020 across most of the Phase 2 area (with the exception of those areas where land access was not obtained), in accordance with the BAM. These surveys identified plant community types (PCT), threatened ecological communities (TECs), and threatened fauna and flora species, and identified constraints.

Potential impacts to PCTs/habitats (including TECs), and threatened species, listed under the BC Act and EPBC Act are presented in Table 2, and shown on Figure 5, Figure 6 and Figure 7. The proposal site is within the existing rail corridor, except for the Camurra bypass section (as shown on Figure 2 and Figure 3, respectively). The potential impacts listed in Table 2, and shown on Figure 5, Figure 6 and Figure 7, are reasonably will understood, nonetheless, these will be refined during detailed investigations for the EIS.

6.2.1.1 Existing environment

6.2.1.1.1 Vegetation communities

The desktop assessment and literature review identified NSW-listed Plant Community Types (PCTs) and Threatened Ecological Communities (TECs) as potentially occurring within the study area. The PMST identified five EPBC Act-list TECs as potentially occurring in the study area (Appendix A).

The desktop assessment identified most of the vegetation within the study area, outside of the existing rail corridor, has been subject to historical clearing and agricultural land use. This has typically occurred along existing fence lines for the establishment of farm access tracks, and to create cropping lands for primarily cotton and grain (Golder, 2019b). Grazing of improved pasture and native groundcover vegetation occurs on both private land and along Travelling Stock Routes (TSR).

Table 2 presents the PCTs recorded within the proposal site during the field surveys, and the corresponding TECs, as indicated on Figure 5, Figure 6 and Figure 7. These figures also present the extent of those communities as mapped during the field surveys, and the corresponding constraints.

Table 2 Vegetation communities within the proposal site

PLANT COMMUNITY TYPE	THREATENED ECOLOGICAL COMMUNITY	BC ACT STATUS	EPBC STATUS
Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion (PCT 27)	Weeping Myall Woodlands	Endangered	Endangered
River Red Gum tall to very tall open forest/woodland wetland on rivers on floodplains mainly in the Darling Riverine Plains Bioregion (PCT 36)	-	-	-
Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion (PCT 52)	Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	-	Critically endangered
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW (PCT 56)	Poplar Box Grassy Woodland on Alluvial Plains	-	Endangered
Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and eolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion (PCT 71)	Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions	Endangered	-
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion (PCT 78)	-	-	-

CAMURRA LANE

CAMURRA

NEWELL HIGHWAY

Gwydir River Underbridge

GWYDIR RIVER

THE ROCKS ROAD

BACK PALLY ROAD

681,000

PCTs

PCT52: *Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion*

PCT56: *Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW*

PCT71: *Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and eolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion*

PCT78: *River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion*

NARRABRI TO NORTH STAR

Vegetation Communities Within The Proposal Site (North)

MAP 5

0 250 500 Metres

Coordinate System: GDA 1994 MGA Zone 55

Date: 27-03-2020
Author: HPB

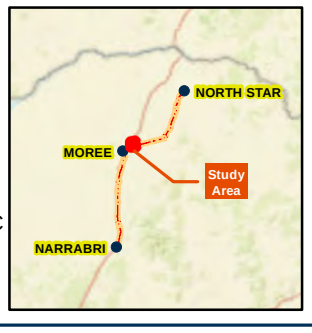
Paper: A3
Scale: 1:15,000

Data Sources: Project Sections: Sourced from BaseMapStreetPro; Threatened Ecological Communities, PCTs: NGH 2020; All other data: Sourced from Six Clip 'N Ship 2020; Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

- ARTC Project Sections
- Chainage (m)
- Non Aboriginal Heritage Sites (Inferred)
- N2NS Phase 2 - 30% Design Alignment
- Other Railways
- Roads
- Waterways
- Major Rivers

Threatened Ecological Communities

- Natural Grasslands TEC
- Poplar Box TEC
- Weeping Myall Woodland TEC
- Study Area



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CAROLE CREEK

GWYDIR RIVER

BOOLOOROO WEIR ROAD

RIVER STREET

NEWELL HIGHWAY

GWYDIRFIELD ROAD

DUFFYS CREEK

PCTs

PCT27:	*Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion*
PCT36:	*River Red Gum tall to very tall open forest / woodland wetland on rivers on floodplains mainly in the Darling Riverine Plains Bioregion*
PCT52:	*Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion*
PCT56:	*Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW*
PCT71:	*Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and eolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion*
PCT78:	*River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion*

NARRABRI TO NORTH STAR

Vegetation Communities Within The Proposal Site (Central)

MAP 6

0 250 500 Metres

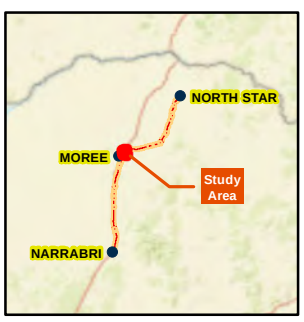
Coordinate System: GDA 1994 MGA Zone 55

Date: 27-03-2020 Paper: A3
Author: HPB Scale: 1:15,000

- ARTC Project Sections
- Chainage (m)
- Non Aboriginal Heritage Sites (Inferred)
- N2NS Phase 2 - 30% Design Alignment
- Other Railways
- Roads
- Waterways
- Major Rivers

Threatened Ecological Communities

- Natural Grasslands TEC
- Poplar Box TEC
- Weeping Myall Woodland TEC
- Study Area



Data Sources: Project Sections: Sourced from BaseMapStreetPro; Threatened Ecological Communities, PCTs: NGH 2020; All other data: Sourced from Six Clip 'N Ship 2020; Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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MYORA STREET
ALABAR ROAD
CARNARVON HIGHWAY
NEWELL HIGHWAY
BROADWATER CREEK
BALO STREET
BOGGABILLA ROAD
IRIS STREET
WEBB AVENUE
LOU SWAN WAY
SKINNERS CREEK
DUFFYS CREEK
GWYDIR STREET
AUBURN STREET
HEBER STREET
ROSLYN LANE
WESLEY LANE
FROME STREET
BANK STREET
ALBERT STREET
MOREE
MEHI RIVER
Mehi River Underbridge
MCELHONE STREET
GWYDIRFIELD ROAD
VICTORIA TERRACE
ALICE STREET
665,920
CROSS STREET
Moree Railway Station
ANNE STREET
BINGARA ROAD
DOVER STREET
WARIALDA STREET
OAK STREET
ADELAIDE STREET
GOSPORT STREET
JAMES STREET
WIRRILA STREET
THOMPSONS AVENUE
TYCANNAH STREET
MAUDE STREET
DRIVE IN ROAD
JONES AVENUE

PCTs

- PCT27: *Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion*
- PCT36: *River Red Gum tall to very tall open forest / woodland wetland on rivers on floodplains mainly in the Darling Riverine Plains Bioregion*
- PCT52: *Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion*
- PCT56: *Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW*

NARRABRI TO NORTH STAR

Vegetation Communities Within The Proposal Site (South)

MAP 7

0 250 500 Meters

Coordinate System: GDA 1994 MGA Zone 55

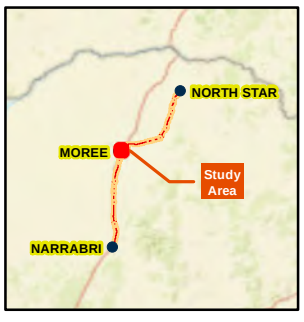
Date: 27-03-2020 Paper: A3
Author: HPB Scale: 1:15,000

Data Sources: Project Sections: Sourced from BaseMapStreetPro; Threatened Ecological Communities, PCTs: NGH 2020; All other data: Sourced from Six Clip 'N Ship 2020; Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

- ARTC Project Sections
- Chainage (m)
- Non Aboriginal Heritage Sites (Inferred)
- N2NS Phase 2 - 30% Design Alignment
- Other Railways
- Roads
- Waterways
- Major Rivers

Threatened Ecological Communities

- Natural Grasslands TEC
- Poplar Box TEC
- Weeping Myall Woodland TEC
- Study Area



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6.2.1.1.2 Threatened flora

The desktop assessment and literature review identified threatened flora species as potentially occurring within 10 km of the proposal site (Appendix A). Detailed investigations for these species are required as part of the BAM assessment, and such surveys were completed in December 2019 and February 2020. The results for these surveys are summarised in Table 3.

Nonetheless, with the prevailing drought conditions (the surveys were undertaken before the significant rainfall event that occurred in February 2020), there is potential that many species may not be able to be detected. This will be investigated during the EIS. Alternatively, the species could be assumed to be present, or an expert report could be commissioned to determine the likelihood of their presence and impact from the proposal.

Table 3 Threatened flora species confirmed within the proposal site

COMMON NAME	SPECIES	EPBC ACT STATUS	BC ACT STATIS
Creeping Tick-trefoil	*Desmodiopsis campylocaulon*	-	Endangered
Finger Panic Grass	*Digitaria porrecta*	-	Endangered

6.2.1.1.3 Threatened terrestrial fauna

The desktop assessment and literature review identified threatened fauna species as potentially occurring within 10 km of the proposal site (Appendix A provides the BioNet and PMST search results). Detailed investigations for these species are required as part of the BAM assessment; such surveys were completed in December 2019 and February 2020. The results for these surveys are summarised in Table 4. Nonetheless, with the prevailing drought conditions (the surveys were undertaken before the significant rainfall event occurred in February 2020), there is potential that many species may not be able to be detected. This will be investigated during the EIS. Alternatively, they could be assumed to be present, or an expert report could be commissioned to determine the likelihood of their presence and impact from the proposal.

Table 4 Threatened fauna confirmed within the proposal site

COMMON NAME	SPECIES	EPBC ACT STATUS	BC ACT STATIS
RECORDED DURING SURVEYS			
Little Lorikeet	*Glossopsitta pusilla*	-	Vulnerable
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable
Little Pied Bat	*Chalinolobus picatus*	-	Vulnerable
Yellow-bellied Sheath-tail Bat	*Saccolaimus flaviventris*	-	Vulnerable
Inland Forest Bat	*Vespadelus baverstocki*	-	Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable

6.2.1.1.4 Aquatic species and communities

Both the Mehi and Gwydir Rivers contain important aquatic habitat for a number of riparian-dependent species, and aquatic species. The literature review and database searches, including a review of the key fish habitat mapping from the NSW Department of Primary Industries, identified that the Gwydir and Mehi 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. Table 5 summarises the threatened aquatic species potentially occurring within the proposal area.

Table 5 Potential aquatic species within the proposal site listed as threatened

COMMON NAME	SPECIES	EPBC ACT STATUS	FM ACT STATUS	LIKELIHOOD FOR FURTHER ASSESSMENT
Silver Perch	*Bidyanus bidyanus*	-	Yes	Likely
Murray Cod	*Maccullochella peelii*	Yes	Yes	Likely
Freshwater Catfish	*Tandanus tandanus*	-	Yes	Likely

Numerous ephemeral tributaries, inclusive of Duffy's Creek and many unnamed watercourses, occur within the proposal site. However, these are likely to support minimal fish habitat values due to their intermittent and highly ephemeral nature.

The mapped distribution of the Lowland Darling River aquatic ecological community, or Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Darling River, as listed under the FM Act, occurs within the proposal site. This TEC includes all native fish and aquatic invertebrates within all natural creeks, rivers, streams and associated lagoons, billabongs, lakes, flow diversions to anabranches, the anabranches, and the floodplains of the Darling River, and, more specifically, includes the Gwydir River downstream from Copeton Dam, including Mehi River channel west of Moree.

The prevailing drought conditions precluded the assessment of aquatic species during the December 2019 and February 2020 surveys. The need for detailed surveys will be assessed during the EIS.

6.2.1.1.5 Other matters of national environmental significance

Four wetlands listed as wetlands of international importance (that is, Ramsar wetlands) were identified by the EPBC Act PMST (Appendix A). These wetlands occur upstream and downstream of the proposal site (Table 6).

Table 6 Wetlands of international importance

WETLAND	PROXIMITY
Banrock Station Wetland Complex	1000 to 1100 km downstream
Gwydir Wetlands; Gingham and lower Gwydir (Big Leather) watercourses	40 km downstream
Riverland	900 to 1000 km upstream
The Coorong, and Lakes Alexandrina and Albert Wetland	1100 to 1200 km downstream

Banrock Station Wetland Complex, Riverland, and Coorong and Lakes Alexandrina and Albert are all within South Australia and are unlikely to be impacted by the proposal. Gwydir Wetlands; Gingham and lower Gwydir (Big Leather) watercourses are downstream of the proposal, approximately 40 km to the west. These wetlands are unlikely to be impacted by the proposal.

6.2.1.2 Potential impacts

The main potential impacts of the proposal include:

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

Potential impacts to native vegetation/habitats (including TECs) are shown on Figure 8. Most of the proposal site is located within the existing rail corridor, with areas required for ancillary activities located immediately

adjacent to that corridor. The exception is the 1.6 km associated with the realignment of the Camurra hairpin bend (refer to Section 1.2 and Figure 7). The alignment will be refined further as the design process progresses from the 30 per cent stage (that is, IRDJV, 2019a). Therefore, the potential impacts listed in Table 6-1 in IRDJV (2019a), and shown on Figure 5, Figure 6 and Figure 7 are only indicative and would be refined during detailed investigations for the EIS.

Clearing portions of the existing corridor to accommodate works associated with the Mehi River and Gwydir River underbridge replacements, upgraded culvers, and level crossings will be required. Clearing of native vegetation will be required for the realignment of the Camurra harpin bend (Figure 7).

Based on the investigations undertaken to date (that is, Golder, 2019, 2020a, b) the proposal site contains areas of native vegetation, including TECs. These areas potentially provide important habitat for threatened fauna and flora species. These TECs represent a key ecological constraint to the proposal (Figure 8). In particular, there are areas of remnant and regenerating vegetation communities, including:

- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South-western Slopes bioregions
- Poplar Box Grassy Woodland on Alluvial Plains
- Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions
- Natural grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland.

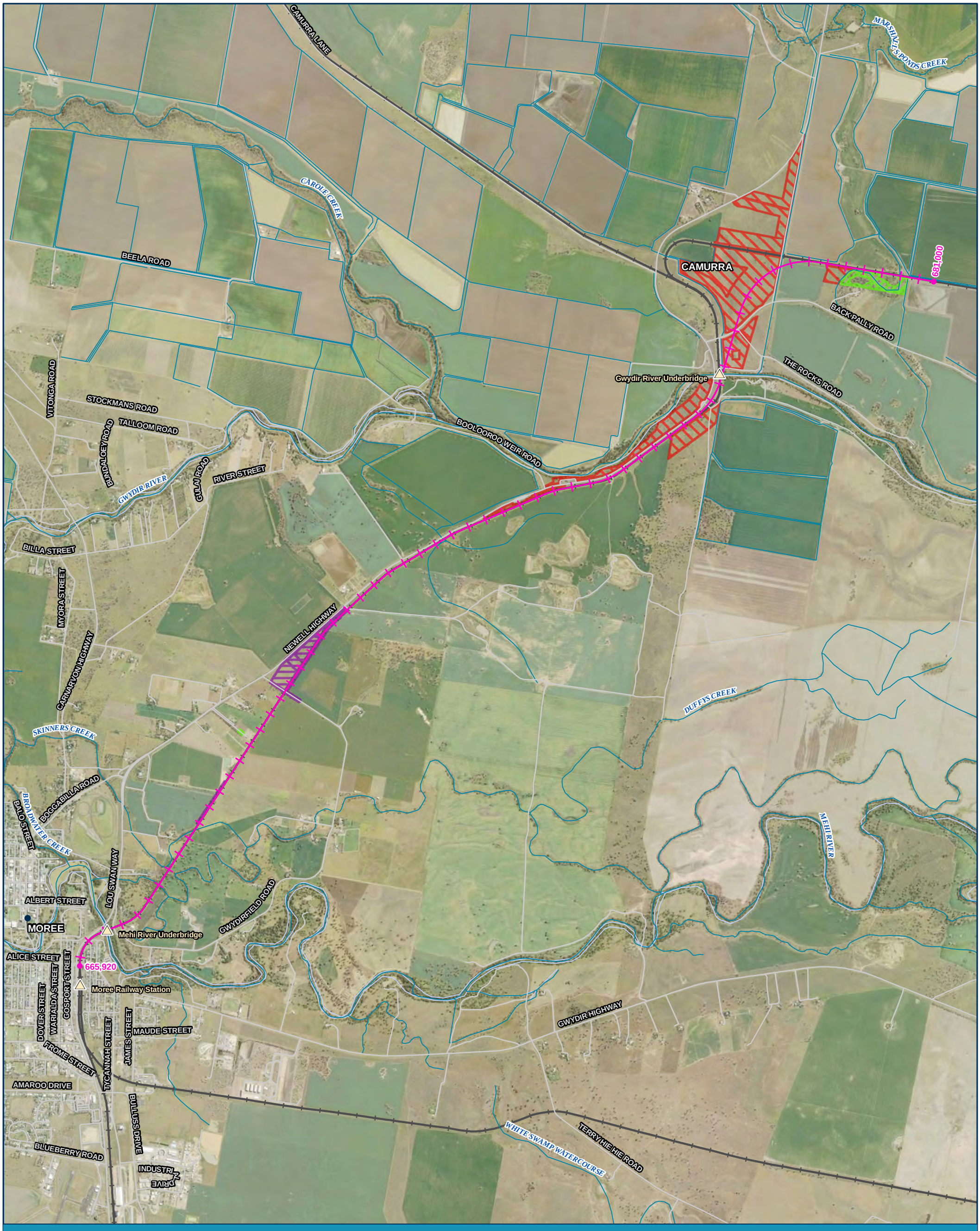
6.2.1.3 Scope for further assessment

A biodiversity assessment was completed based on the field surveys completed in December 2019 and February 2020. These were completed in accordance with the BAM as required under the BC Act. This assessment has generated a BDAR, which identifies how ARTC will avoid and minimise impacts, potential impacts that could be characterised as serious and irreversible according to the specified principles, and any offset obligations required to offset the likely biodiversity impacts of the proposal. The assessment also has regard to the extent of any impacts on matters under the EPBC Act. Aquatic surveys will also be undertaken when sufficient water is present in waterways.

NARRABRI TO NORTH STAR

Ecological constraints overview within the proposal site

MAP 8



0 0.5 1 1.5 2 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 27-03-2020 Paper: A3
Author: HPB Scale: 1:40,000

Data Sources: Project Sections: Sourced from BaseMapStreetPro; All other data: Sourced from Six Clip 'N Ship 2020; Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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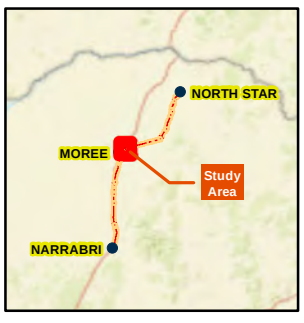
Threatened Ecological Communities

- Natural Grasslands TEC
- Poplar Box TEC
- Weeping Myall Woodland TEC



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6.3 Other issues

6.3.1 Aboriginal heritage

An assessment of the Aboriginal heritage within the area of the proposal site was completed as part of the original EIS (GHD, 2017; Umwelt, 2017). A copy of the draft Aboriginal cultural heritage and archaeological assessment report was provided to all registered Aboriginal parties in June 2017, with an invitation to review and comment on all aspects of the document. No further detailed comments or responses to the draft report were received from the registered Aboriginal parties.

6.3.1.1 Existing environment

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. Nonetheless, it passes through areas of undisturbed native vegetation, such as the area of the Camurra bypass, and will require the replacement of the underbridges across the Mehi and Gwydir Rivers, which could harbour potential archaeological sites and archaeologically sensitive landforms.

The original EIS (that is, GHD, 2017) identified that those areas of the proposal site associated with water resources, such as the Mehi River and Gwydir River would have provided an environmental context attractive to Aboriginal people. However, that EIS acknowledged that historical land use of the proposal site and surrounds, including the construction of the current rail line, has the potential to have significantly impacted any archaeological deposits that may be present.

Aboriginal people within the region 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 (GHD, 2017). There was a history of significant conflict between Aboriginal people living in these fringe camps on the edges of Moree and town authorities, and this site is listed on the DPIE's Aboriginal Heritage Information Management System (AHIMS) database (item #10-3-0032) (GHD, 2017). Indeed, there is a possibility that archaeological deposits may be present at depths less subject to disturbance in the terrace landforms bordering the Mehi and Gwydir Rivers. The original EIS stated that the potential for artefacts in these areas is moderate to high, based on the permanent nature of these watercourses (GHD, 2017).

Based on available information, stone artefact scatters and scarred trees are predicted to be the most likely site types within the proposal site. GHD (2017) identifies that stone artefact scatters will be most frequent in number, and will be larger in size in proximity to reliable sources of water, such as the Mehi and Gwydir River.

6.3.1.2 Potential impacts

Based on information within the original EIS (that is, GHD, 2017), the proposal is likely to result in harm to archaeological sites of high archaeological significance on the Mehi River terraces (AHIMS item #10-3-0032), and an area of artefact scatter (AHIMS item #10-3-0035), and areas associated with the Gwydir River terraces.

The scope of the original EIS's Aboriginal heritage assessment was not sufficient to assess impacts to cultural heritage in the vicinity of the Camurra hairpin bypass at the Gwydir River crossing (IRDJV, 2019a). The N2NS Phase 2 alignment at this location is external to the buffer applied by Umwelt (2017) to the alignment proposed as part of the original EIS for their assessments.

It is noted that the assessment of potential harm to those archaeological features was not based on the detailed design. Changes during detailed design may result in changes in the potential to harm Aboriginal objects.

Those changes will be considered in finalising management and mitigation works within those areas such that, if impacts are avoided within the identified sites or areas of moderate to high archaeological potential, it will not be necessary to undertake the specific mitigations works recommended in the EIS (GHD, 2017).

6.3.1.3 Scope for further assessment

An assessment of Aboriginal heritage is planned for the proposal site as part of the EIS to supplement the works completed for the original EIS. That assessment will include:

- A review of available site data based on a search of the DPIE's AHIMS database.
- A search of the Native Title Tribunal website to identify Native Title claims in the vicinity of the proposal site.
- Targeted field inspections of selected portions of the proposal site.
- Use of the above information to identify potential impacts to Aboriginal cultural heritage associated with the proposal and recommendations for further investigation.

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

- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010a).
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010b).
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010c).

The assessment would include consultation with the relevant stakeholders and Aboriginal parties, including Native Title parties. It will describe and assess the significance of any Aboriginal objects and/or places that may be impacted by the proposal, and provide options to avoid, mitigate or manage the harm to those object and/or places.

6.3.2 Non-Aboriginal heritage

The original EIS identified listed historical heritage items located within of in the vicinity (that is, 500 m) of the proposal site. That assessment used desktop searches of the following heritage registers and local planning instruments:

- NSW State Heritage Register and State Heritage Inventory.
- Australian Heritage Places Inventory.
- Australian Heritage Database (including Commonwealth and National heritage lists).
- Register of the National Estate (non-statutory list).
- ARTC Section 170 register
- Moree Plains Local Environmental Plan 2011.

Field assessment looked at impacts to cultural heritage within a 60 m buffer around culverts, underbridges and overbridges, and an approximate 120 m buffer around level crossings and some other areas (GHD, 2017).

6.3.2.1 Existing environment

The potential non-Aboriginal heritage resources of the proposal site generally reflect the history of the surrounding region, and the existing NSNS rail alignment. The existing rail lines were constructed between Moree and Camurra in 1932 (GHD, 2017).

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; the grain rail-sidings and landmark grain silos (GHD, 2017).

6.3.2.1.1 Heritage listings

The searches completed as part of the original EIS indicate that three listed items are located within the vicinity (500 m) of the proposal site. These are summarised in Table 7. While there are additional listed items

in the wider area, these are not within the vicinity of the proposal site (that is, within 500 m) and would not be impacted.

Table 7 Listed heritage items in the vicinity of the proposal site

ITEM	LOCATION	LISTING AND SIGNIFICANCE
Mehi River bridge Database number 4281692	Moree – Mungindi Line; 666.340 km from Sydney	Australian Rail Track Corporation S170 Heritage and Conservation Register (local significance)
Moree Railway Station Database number 4801208	As listed in LEP: Gosport Street, Moree Adjacent to Lot 158, DP 1157018 As listed on S170: Morton Street	Moree Plains LEP 2011 (state significance) Australian Rail Track Corporation S170 Heritage and Conservation Register (local significance)
Gwydir River Bridge Database number 4281693	Camurra – Mungindi Line; 676.220 km from Sydney	Australian Rail Track Corporation S170 Heritage and Conservation Register (local significance)

6.3.2.1.2 Potential heritage items with no statutory listing

A number of potential heritage items were identified during investigations of the proposal site as part of the original EIS (GHD, 2017). These are summarised in Table 8.

Table 8 Potential heritage items with no statutory listing

ITEM	LOCATION	DISTANCE FROM PROPOSAL CENTRE LINE
Rail line	Along entire proposal site	In proposal site
Surveyors blazes – historical scarred trees	Along proposal site	In proposal site
Timber constructed underbridges and culverts	Moree (chainage 666.645) Moree (chainage 666.945) Moree (chainage 667.21) Moree (chainage 667.37)	-

6.3.2.2 Potential impacts

The proposal has the potential to impact on heritage-listed items, and items of potential heritage significance within the proposal site, and the immediate vicinity. Primarily, these include:

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

These items were assessed in the original EIS, as per relevant standards and guidelines, including the *NSW Heritage Manual 1996, Archaeological Assessments and Assessing Heritage Significance* and with consideration of the principles contained in the Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance.

There are also potential sites that exist within the revised alignment at the Camurra hairpin bypass, which has not yet been surveyed.

The proposal will see the complete removal and replacement of the Mehi and Gwydir River bridges. The demolition and removal of these underbridges will detrimentally impact on heritage significance. The original

EIS (that is, GHD, 2017) proposed mitigation measures for the management of impacts from those activities. They remain the same for this proposal.

6.3.2.3 Scope for further assessment

The scope of assessment used for the original EIS (including the buffer) was not sufficient to assess impacts to heritage in the vicinity of the Camurra hairpin bypass at the Gwydir River crossing (IRDJV, 2019a). Therefore, additional non-Aboriginal heritage assessment will be undertaken as per relevant standards and guidelines, including the *NSW Heritage Manual 1996, Archaeological Assessments and Assessing Heritage Significance* and with consideration of the principles contained in the Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance.

6.3.3 Hydrology, flooding and water quality

This section provides a preliminary hydrology, flooding, and water quality assessment for the proposal. The original assessment, undertaken as part of the original EIS (that is, GHD, 2017), included a review of relevant literature and databases to assess:

- Existing surface and groundwater resources.
- Existing regional flood extents.
- Changes in upstream and downstream flood levels.
- Changes in regional flood extents.
- Mitigation measures (track lifts, culverts and bridges).

These included, amongst other resources:

- NSW Water Information (DPI, 2017)
- Moree Plains Local Environmental Plan 2011.

Since the submission of that EIS, additional documents and reports have become available. These were reviewed, and included:

- Moree Regional Flood Model (MPSC, 2018)
- The Flood Study Report for Separable Portion 2 30% Design (IRDJV, 2019b).

6.3.3.1 Existing environment

6.3.3.1.1 Flooding and hydrology

The proposal crosses the Mehi River and Gwydir River, Skinner's Creek, Duffy's Creek, at least two unnamed creeks, and three irrigation canals (Figure 1).

The entire length of the proposal site is located within an area that has been subject to significant floods. The Mehi-Gwydir floodplain is a complex where flooding can have significant impacts on the local area, including extensive flooding events of the town and farming communities. The Gwydir catchment is characterised by a temperate to sub-tropical climate, with a considerable gradient from east (cooler and wetter) to west (hotter and drier). Average rainfall ranges from 1000 mm per year in the east to around 500 mm in the west. Annual rainfall at Moree totals around 600 mm (DPI, 2018).

Regional flood modelling covering the proposal site is shown on Figure 9, which shows the flood depths for the existing one per cent annual exceedance probability (AEP). Based on that modelling, the area to the north of Moree is susceptible to flooding, specifically due to the hairpin in the rail line. Flooding would occur on both sides of the hairpin, with water depths in the order of one to two metres, which will impact the Newell Highway and local roads.

Figure 9 Existing flood conditions with 1% AEP (reproduced from Figure 1 (WSP, 2019))

6.3.3.1.2 Water quality

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 Masterman's Range, and from the Namoi catchment to the south by the Nandewar Range. It extends 670 km from the Great Dividing Range to the Barwon River near Collarenebri (DPI, 2018).

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 four per cent of land use (DPI, 2018).

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.

Publicly available information indicates that water quality within the Gwydir River catchments typically exceed guideline values for turbidity, salinity, pH, total nitrogen, and phosphorus. This poor quality is likely to reflect existing soil conditions, and agricultural land use practices within the proposal area (GHD, 2017).

To create a reliable understanding of baseline water quality, GHD (2017) recommended that the available public water quality data would need to be supplemented by pre-construction monitoring of perennial watercourses (that is, the Gwydir and Mehi Rivers).

6.3.3.1.3 Groundwater

A search of the Water NSW Information Database (DPI, 2020b) on 6 February 2020 identified 164 registered groundwater bores within the surrounding area of the proposal. The depths of the bores extend up to 61 m below ground level. Standing water levels were not available.

A search of the Bureau of Meteorology's Groundwater Dependent Ecosystem (GDE) Atlas identified the following:

- Mapped high potential GDEs along the Gwydir River approximately 10 km upstream from the Phase 2 section of the alignment. A second area of mapped high potential GDEs is located along the Gwydir River from approximately 10 km downstream from the Phase 2 section of the alignment.
- Mapped high potential GDEs along the Mehi River from approximately 6 km upstream of Moree (the start of the Phase 2 section of the alignment), to approximately 40 km downstream.

Local environment plan mapping for the Moree Plain LGA indicates the proposal site traverses areas of groundwater vulnerability.

6.3.3.2 Potential impacts

6.3.3.2.1 Hydrology and flooding

The SP2 Flood Report assessed flood behaviour within the portion of the Gwydir-Mehi floodplain affected under existing conditions and for the design case. The report documented the 30% detailed design flood modelling analyses for Phase 2; the hydraulic design of cross-drainage structures based on the flood modelling; and assessment of the compliance of the design with the currently assumed flood management objectives (or flood impact limits). The basis for the 30% detailed design was a solution involving upgrade of existing bridges and culverts and provision of new culverts to achieve the following:

- Minimum formation flood immunity as determined by ARTC's Flooding Multi-Criteria Analysis
- No overtopping of the rail for the 1% AEP event throughout
- Flooding impacts to meet the requirements of the Requirements Analysis, Allocation and Traceability Matrix (RAATM).

The SP2 Flood Report identified non-compliances with the afflux criteria in the RAATM for the 1% AEP event as follows:

- Exceedances of 10mm afflux on the Newell Highway at the following approximate locations:
  - 668.6 to 669.9 km
  - 670.8 to 673.7 km.
- Exceedances of 10mm afflux at the following locations where dwellings and/or access to dwellings occur:
  - Properties along the north eastern end of River Street adjacent to the main Gwydir River channel
  - Properties west of the Newell Highway (and west of Gwydir River) at approximately 674.5 km
  - Back Pally Road.

In addition to these, the afflux was also identified as non-compliant with the flood management objectives for exceeding 200 mm upstream of rail corridor around the hairpin bypass.

The SP2 Flood Report noted that the following items will continue to be resolved as detailed design continues:

- Flood models to be updated based on the latest rail and road design.
- Resolution of as many non-compliances with the flood impact assessment criteria as reasonably practical.
- Completion of more detailed checks to confirm flood velocity, hazard and duration impacts, and all parameter impacts for events less than the 1% AEP, and resolution of these impacts where practical.

- Coordination of the cross-drainage design (including hydraulic model checks) with some infrastructure elements that have been either recently developed or are still in development, including:
    - Level crossings
    - Passing loops
    - Sidings.
- Identification and design of channel works that may extend beyond the land ownership boundary.

6.3.3.2.2 Water quality

Construction activities may impact on water quality, either:

- Directly, by:
    - Erosion of watercourse banks and beds during watercourse crossings and resultant sedimentation.
    - Disturbance of ballast which may contain contaminants such as asbestos dust from train brakes.
    - Contamination of water during watercourse crossings.
- Indirectly, by:
    - The generation of sediment-laden overland run-off which flows to watercourses.
    - Contamination of overland run-off which flows to watercourses.

Potential sources of contamination may include:

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

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

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

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

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

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

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

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

- Sediment and gross pollutants – from movement of soils during rainfall events and gross pollutants such as coal dust, litter, cargo spillages.

- Metals – from abrasion, for example brake pads, track and points wear.
- Organic compounds from oils and lubricants, including hydrocarbons, polycyclic-aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and phenolics.
- Nutrients and sulphates.
- Herbicides/pesticides – from maintenance practices to control weeds.

6.3.3.2.3 Groundwater

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

There is potential for construction activities to cause contamination of soils and, therefore, groundwater as a result of oil and/or fuel leaks from operating construction equipment. However, based on the implementation of standard construction management measures, the depth to groundwater and the results of vulnerability mapping, the likelihood and potential significance of these impacts is considered to be low. The proposal does not include any deep cuts along the proposed alignment, and is, therefore, considered unlikely to impact on groundwater. The need may arise to extract groundwater or surface water for construction purposes. If this occurs, the necessary approvals would be obtained if required.

6.3.3.3 Scope for further assessment

6.3.3.3.1 Hydrology and flooding

A hydrology and flooding assessment would be continued during the EIS as the detailed design progressed. It will include:

- Flood models to be updated based on the latest rail and road design.
- Resolution of as many non-compliances with the flood impact assessment criteria as reasonably practical.
- Completion of more detailed checks to confirm flood velocity, hazard and duration impacts, and all parameter impacts for events less than the one per cent AEP, and resolution of these impacts where practical.
- Coordination of the cross-drainage design (including hydraulic model checks) with some infrastructure elements that have been either recently developed or are still in development, including:
    - Level crossings
    - Passing loops
    - Sidings.
- Identification and design of channel works that may extend beyond the land ownership boundary.

6.3.3.3.2 Water quality and groundwater

Although the available water quality data for the original EIS was limited (and therefore that available for the proposal site is also limited), the potential impacts to water quality identified in the EIS from construction and operation activities are still relevant. Therefore, specialist assessment that will be undertaken include:

- Further consideration of flooding and hydrology.
- A water-quality monitoring programme will be developed prior to construction activities commencing. This will include:
    - Documentation of the ambient NSW Water Quality Objectives and environmental values for the receiving waters relevant to the proposal, including the indicators and associated trigger values or criteria.

- Identification and estimation of the quality and quantity of all pollutants with potential to be introduced as a result of the proposal, identifying their source and discharge point. This would include consideration of potential impacts on the environment and human health.
- Demonstration of how construction and operation of the proposal would ensure NSW Water Quality Objectives are, or would continue to be, met.

- An assessment of the availability of suitable construction water will be completed prior to construction to identity water sources.

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

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

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

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

- NSW Water Quality and River Flow Objectives.
- Using the ANZECC Guidelines and Water Quality Objectives in NSW (DEC, 2006).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2018).
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DECC, 2008b).
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (DECC, 2008a).

6.3.4 Noise and vibration

A Noise and Vibration Assessment Report was completed for the original EIS (see GHD, 2017), which was intended to provide an assessment of the potential noise and vibration impacts of the proposed N2NS rail alignment.

The study area for the assessment included the rail corridor and adjacent land between Narrabri and North Star. It encompassed the operational and construction footprints, including areas that could be indirectly impacted by the N2NS Project. Within this area, residential sensitive receivers include dwellings located within Moree, or are scattered across large areas between the major centres. Noise sensitive receiver locations were identified using aerial imagery and geospatial information (GHD, 2017).

6.3.4.1 Existing environment

6.3.4.1.1 Noise

Background noise in most of the proposal site, and the immediate surrounds, is characteristic of rural areas with low ambient noise levels. Typical noise would be associated with farming activities, road traffic, rail operations and operation of grain storage and handling facilities.

Sensitive receivers are concentrated in Moree, with other sensitive receivers, including scattered dwellings on rural landholdings, located more than 100 m from the proposal site. Sensitive receivers located close to the proposal site are shown on Figure 10.

Operational noise was assessed with regard to the NSW Rail Infrastructure Noise Guideline (RING), and included modelled operational scenarios at current and future horizon timeframes for both the 'no-build' case and the 'build' case that included the N2NS Project and associated increase in train movements (GHD, 2017). The RING criteria for redeveloped rail lines provide trigger levels for noise at residential receivers (LAeq and LAmax), and an increase in noise levels resulting from the proposal. The noise assessment identified 152 residential receivers along the entire N2NS alignment where the criteria established by the RING for the 2040 design assessment year were exceeded. Of these, 79 were identified in Moree, and an additional 16 between Moree to North Star (GHD, 2017).

Noise emissions emanating from construction activities were assessed during the primary proposal construction hours, and outside the primary proposal construction hours, and carried out in accordance with the Interim Construction Noise Guideline (ICNG) and with consideration to the Inland Rail NSW Construction Noise and Vibration Management Framework (GHD, 2017). For construction activities, rail line redevelopment construction activities are predicted to exceed the noise management level at receivers nearest to the construction footprint. Impacted receivers are located within approximately 1500 m of bridge works and 700 m of other works activities.

6.3.4.1.2 Vibration

Operational vibration impacts with consideration to structural damage are not considered likely to result from the proposal. While an increase in vibration due to increased axle loads and speeds is anticipated, vibration is predicted to remain within acceptable levels given the distance to most nearby receivers (GHD, 2017).

Daytime vibration levels are predicted to be within the acceptable range for human comfort impacts at distances of more than 17 m from the track, while night-time levels are predicted to be acceptable at distances of more than 23 m from the track (GHD, 2017).

Vibration from general construction activities is not expected to be sufficient to cause structural damage if the equipment operates at distances greater than 18 m from standard residential buildings or structures of similar construction (GHD, 2017).

Heritage structures proximal to the wider N2NS alignment consist of station buildings, sidings and silos which are directly adjacent to the track and bridges that form part of the proposed alignment. The expected magnitude of ground vibration is not expected to be sufficient to cause structural damage if the equipment operates at distances greater than 35 m from heritage buildings and structures (GHD, 2017).

Vibration emanating from general construction activities may be perceptible to humans up to 140 m from the works site. For piling activities that will occur during the bridge construction, is it expected that (GHD, 2017):

- Activities have the potential to exceed structural vibration values for standard dwellings at distances of up to 100 m from the activity.
- Activities have the potential to exceed structural vibration values for heritage structures at distances of 180 m from the activity.
- For piling activities associated with bridge construction, receivers may receive perceptible vibration where impact piling is used. These receivers are within 700 m of piling locations and located mostly within Moree and are near to the Mehi River underbridge.

MARSHALLS PONDS CREEK
Shed
NNS_Rx2264
NNS_Rx2263
NNS_Rx2262
CAMURRA LANE
CAMURRA
NNS_REAx0018
Camurra Hairpin Bypass
BACKPALLY ROAD
Shed
Water Pump
THE ROCKS ROAD
Rx2261
Gwydir River Bridge
GWYDIR RIVER
Rx2502
Shed
NEWELL HIGHWAY
Rx2260
NNS_Rx2259
Rx2256
Rx2258
NNS_Rx2255

NARRABRI TO NORTH STAR

N2NS Phase 2 Camurra Bypass Sensitive Receptors

MAP 10

0 0.1 0.2 0.3 0.4 0.5 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 27-03-2020
Author: DP

Paper: A3
Scale: 1:7,500,000

- ARTC Project Sections
- N2NS Phase 2 Alignment

Sensitive Receptors

- Active recreation
- Residential receiver
- Other Railways
- Roads
- Waterways
- Waterbodies

Additional Identified Receiver

- Shed
- Water Pump

INLAND RAIL
ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

Data Sources: Project Sections: Sourced from BaseMapStreetPro; All other data: Sourced from Six Clip 'N Ship 2020; Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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6.3.4.2 Potential impacts

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

6.3.4.2.1 Construction

Potential noise and vibration sources during construction would include:

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

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

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

The degree of impact from construction noise would depend on the relative exposure of sensitive receivers and the type and duration of construction activities in the area. However, as the proposal is linear, impacts on individual sensitive receivers during the construction phase would be for limited periods.

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

6.3.4.2.2 Operation

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

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

Many of these noises are dependent on the nature of operation of the trains. The above noise sources would represent a long-term impact on the local environment.

6.3.4.3 Scope for further assessment

The NVA Report explicitly considers noise and vibration impacts associated with the construction and operation of the Camurra hairpin bypass on identified sensitive receptors, identified from a combination of aerial imagery and other geospatial information. Mapping provided within the EIS (GHD, 2017) identifies sensitive receivers near to the proposal site, in particular the alignment associated with the Camurra hairpin bypass. Therefore, the conclusions of the EIS (that is, GHD, 2017) are directly applicable for the proposal site.

Potential impacts to sensitive receivers were considered in the EIS document, as such, impacts from noise and vibration resulting from the proposal are expected to be consistent with those results (GHD, 2017).

However, four potential additional sensitive receivers for noise and vibration impacts were identified to those receivers outlined in the EIS; these are indicated on Figure 10. Further investigation will be undertaken to determine the impacts on these additional receivers, and if the existing information is suitable to assess the potential impacts the proposal.

6.4 Additional issues

6.4.1 Topography, geology and soils

A preliminary geotechnical assessment was completed for the 30 per cent design studies based on studies for the full N2NS alignment (IRDJV, 2019a). As such, those studies were not specific to the proposal site. This assessment included:

- Desktop review of existing reports and data.
- Intrusive geotechnical investigations comprising test pitting (conducted between 14 December 2017 and 12 March 2018, and 17 July 2018 and 2 September 2018).
- Borehole depths ranged from 15.45 to 40.95 m along the alignment.
- Test pits excavated in the rail formation were typically terminated 2.0 m below the top of rail or prior refusal on very stiff to hard clay, and were excavated to depths of up to 2.2 m at structure locations.
- Soil and rock samples collected during the geotechnical investigation were subject to laboratory testing.
- Site assessment of potential borrow site undertaken between 21 and 25 January 2019.

6.4.1.1 Existing environment

6.4.1.1.1 Geology and soils

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

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

In general, ground conditions were consistent with those presented in available geological mapping and existing geotechnical reports for the wider proposal area. The geotechnical materials encountered along the proposal site have been classified to provide relevant geological and geotechnical context for the engineering and construction of the proposal (as presented in IRDJV, 2019a), and include:

- Alluvial soils – these are generally comprised of clays and silty-clays.
- Bedrock was not encountered within the proposal site.

6.4.1.1.2 Topography

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), with these rivers' associated floodplains (Figure 2). As such, relief is slight, with the terrain flat to gently undulating. The proposal site's topography is generally very flat, and the existing natural drainage lines have grades less than 0.5 per cent (IRDJV, 2019a).

Reduced levels along the proposal site are typically between 209 m AHD to 213 m AHD.

6.4.1.2 Potential impacts

Based on initial desktop investigations, there are not considered to be any major issues associated with the nature of the substrate throughout the proposal site.

The clayey alluvial soils can result in higher rail embankments and deeper structural fill layers to manage the shrink/swell properties of these reactive soils.

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

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

6.4.1.3 Scope for further assessment

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

Consideration of soils and geology, and contamination (refer to Section 6.4.5) would form part of the EIS process, including:

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

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

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

Potential impacts from erosion and groundwater vulnerability would be addressed in the assessments described in Section 6.3.3.

6.4.2 Land-use, socio-economic and visual impacts

The Socio-Economic Report, which forms part of the original EIS (GHD, 2017), assessed the benefits and impacts of the entire N2NS Project alignment, during both the construction and operation phases. The socio-economic assessment considered the community surrounding the N2NS Project area, including Moree, and scattered residences on rural properties (GHD, 2017).

6.4.2.1 Existing environment

6.4.2.1.1 Land use

Most of the proposal site is 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 site is dominated by agricultural industries, with significant cropping and livestock production. The Moree Plains LGA is dominated by irrigated cropping and other broad-acre cropping (DPI, 2018).

Most of the proposal area has been cleared of the original vegetation for agricultural activities generally consistent with those described above. Scattered patches of remnant vegetation remain, mainly in the

vicinity of watercourses, and travelling stock routes. Scattered paddock trees can be observed in various locations throughout the area.

Residences within close proximity to the proposal site are concentrated in Moree. Based on the noise and vibration assessment (see Section 6.3.4), residential and non-residential users (such as places of worship, education and other community facilities) are located within two kilometres on either side of the rail corridor. Land ownership surrounding the proposal site includes private landholders, various State Government departments, Crown land, including reserves, waterways and public roads (GHD, 2017).

6.4.2.1.2 Socio-economics

A review of the 2016 census data (ABS, 2020) was undertaken to identify the community profile and economic environment of Moree. These are summarised in Table 9.

Table 9 Socio-economic characteristics of Moree

CHARACTERISTIC	VALUE
Population	13,350
• Male (%)	49.9
• Female (%)	50.0
• Aboriginal or Torres Strait Islander Population (%)	21.6
Employment	
• Labour force	5897
• Unemployment rate (%)	6
Main Industry of Employment	Agriculture 25.1
• Dwelling tenure	
• Owned outright (%)	28.5
• Owned with a mortgage (%)	24.2
• Rented (%)	40.7
• Other tenure type (%)	1.4
• Tenure type not stated (%)	5.2

6.4.2.1.3 Visual

The proposal site traverses a predominantly rural area, with rural properties surrounding most of the proposal site. The land surrounding the proposal site is used for cropping and dryland grazing purposes (GHD, 2017).

Sensitive receivers are primarily concentrated in Moree. Other sensitive receivers include scattered dwellings on rural landholdings. Most of the receivers outside of Moree are located more than 100 m from the proposal site (Figure 10).

The main road within the proposal site is the Newell Highway, which is offset some distance from the proposal. Therefore, visual impacts are typically very low to low throughout the agricultural areas. Traffic and roads are discussed further in Section 6.4.3.

6.4.2.2 Potential benefits and impacts

6.4.2.2.1 Land use

Most of the work associated with the proposal will entail works with the existing rail corridor. The exception being lands required for the construction of the new underbridges across the Mehi and Gwydir Rivers, and the Cumarra bypass (which is located within the travelling stock route).

During construction, there may be temporary changes in land use from the existing uses for temporary access tracks, and laydown and compound areas. During operation, direct land uses impacts would result from any change in use associated with the operation of the proposal and its associated facilities. The EIS would investigate options for the movement of equipment and stock across the proposal site.

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

6.4.2.2.2 Socio-economics

The key benefits would potentially include:

- Increased employment opportunities through demand for construction and operation workforce and business opportunities through demand for goods and services mainly during the construction phase
- Potential of reduced freight road traffic along regional and local roads as some freight would be transported by rail during operation.

Adverse social impacts would include:

- Impacts on properties and landholders due to property acquisition and land access required during construction.
- Altered access during operation for some rural properties due to fewer level crossings, and more frequent closures. This may change agricultural practices, such as the safe movement of livestock and farming equipment.
- More frequent delays at level crossings in Moree town due to higher train frequency, potentially exacerbating existing social disconnection of the east side of town from the west.
- Increased frequency of trains exacerbating safety concerns of the community, such as illegal crossing of the rail line in Moree.
- Amenity impacts due to changes in noise levels, air quality, views and landscape during construction and operation are expected to be experienced by residents close to the proposal site especially in Moree town and proximal to the Mehi Bridge.

6.4.2.2.3 Visual

The original EIA concluded that it was unlikely that the proposed works would result in a high visual impact once construction had been completed, given the proposal predominantly entails the reinstatement of an existing rail corridor. The proposal to primarily upgrade existing railway tracks would result in changes to the existing setting which would be difficult to perceive, given they are such a small component within the wider landscape, in both agricultural and urban areas.

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

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

6.4.2.3 Scope for further assessment

The Land-use, Socio-Economic, and Visual assessment reports completed for the original EIA (see GHD, 2017) considered potential impacts to these aspects. The potential impacts from the proposal are expected

to be consistent with those results. No further specialist impact assessment is required because the existing information is suitable to assess the potential impacts from the proposal.

6.4.3 Traffic and transport

Within the original EIS, a detailed traffic, transport, and access study and assessment is included (GHD, 2017). The assessment detailed the traffic, transport and access impacts of the entire N2NS section of Inland Rail, including the proposal site.

6.4.3.1 Existing environment

6.4.3.1.1 Road network

The road network within and adjacent to the proposal site consists mainly of the Newell Highway, and local and private rural roads. The Newell Highway has a posted speed limit of 110 km/h, while the other roads vary between 50 and 80 km/h (GHD, 2017).

The road network and major highways in proximity to the proposal is indicated on Figure 2.

6.4.3.1.2 Rail network

The existing rail network in the proposal site consists of the existing rail line, as indicated on Figure 2.

6.4.3.2 Potential impacts

The original EIS concluded that the preferred approach to level-crossings involves a combination of retaining/refurbishing the existing crossings, the consolidation of some crossings, upgrading the level of control, and/or installing a gated crossing. Consultation with potentially affected landowners would be undertaken during the design stage and closures or adjustments would only be undertaken following consultation with the landowner, the local council and/or Roads and Maritime Services.

During the construction period, the workforce would be transported to the construction site each day by bus or car. Materials would be delivered by truck. Total additional activity associated with construction will need to be determined.

Localised traffic management would be put in place to manage traffic movement around any works that interact with the road network, including access to construction areas (GHD, 2017). In order to manage the expected impacts, the TTAR recommended the preparation of a specific Construction Traffic Management Plan to guide the interaction of construction traffic with public access roads and be subject to periodic review as agreed between stakeholders (GHD, 2017).

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

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

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

During the operation phase, minimal traffic generation is expected. Where there is the potential for public roads to be closed, detours are available, and in most situations the number of road users who will be affected is low (GHD, 2017).

As identified in the original EIS, the key traffic impacts of N2NS Phase 1 relate to more frequent train activity at level crossings, although this will, in part, be offset by faster train speeds that will slightly reduce delays associated with individual trains (GHD, 2017). Traffic activity at most level crossings subject to the proposal is low, and the volume of traffic likely to be delayed by train activity is not substantial. There is capacity at each level crossing for delayed traffic to queue clear of adjacent intersections (GHD, 2017).

6.4.3.3 Scope for further assessment

The scope of the original EIS considered the traffic, transport and access impacts of the entire N2NS Phase 1 section of Inland Rail, including that of the proposal site. All level crossings are existing, and will be upgraded to optimise safe crossing of the rail corridor where impacted by the track level and/or rail infrastructure upgrade (IRDJV, 2019a).

Within the proposal area, nine existing level crossings were identified: three public crossings and six private crossings (IRDJV, 2019a). The proposal design alignment only significantly differs at the Camurra hairpin bypass, compared to the original EIS (that is, GHD, 2017), with no additional road crossings identified (IRDJV, 2019a).

Given the dominant land-use within the proposal site (that is, rural farmland), there is no predicted increase in local traffic (IRDJV, 2019a). In addition, there is no evidence to suggest that traffic volumes associated with the construction and operational phases of the proposal are expected to deviate significantly from the original EIS study. As such, local road traffic volumes and capacity has not meaningfully changed since the GHD (2017) report, and, therefore, conclusions from this report can be directly applied to the proposal site.

Therefore, no further specialist impact assessment is required as the existing information is suitable to assess the potential impacts from the proposal.

6.4.4 Air quality

Ambient air quality in the proposal are is characteristic of rural areas, which tend to have low particulate matter and pollutants in the air. The EIS identified that regional air quality within the N2NS area is mainly influenced by rural activities, vehicle emissions, and limited industrial/processing activities (GHD, 2017). Due to the inland location of the proposal site, and the lack of any concentrated emission sources, the ambient background levels of gaseous pollutants such as SOx, NOx and carbon monoxide (CO) was considered to be negligible, at a level of zero. Background levels of odours were also considered to be negligible (GHD, 2017).

Air quality would be lowest in the larger towns, particularly Moree, where there are increased activities including commercial/industrial operations. Sensitive receivers are concentrated in Moree (Figure 10). Other sensitive receivers include isolated dwellings on rural residences. Most receivers outside Moree are located more than 100 m from the proposal site.

Construction impacts to air quality include:

- Generation of dust and emissions from construction works and the movement of equipment and machinery.

During operation potential impacts include:

- Increase in the number of diesel freight trains has the potential to increase levels of pollutants such as nitrogen oxides and particulate matter.
- Decreasing the number of heavy vehicles using major transport routes such as the Newell Highway would have a positive impact on air quality for sensitive receivers along these routes.

Impacts to the sensitive receptors were considered in the EIS (GHD, 2017), as such, impacts to air quality resulting from the proposal are expected to be consistent with those results. No further specialist impact assessment is required as the existing information is suitable to assess the potential impacts from the proposal.

6.4.5 Contamination

This section summarises a review of the NSW EPA Contaminated Land: Record of Notices database and NSW EPA contaminated sites register for Moree Plains Shire Council (SC) area.

A search of the list of NSW contaminated sites notified to the EPA for Moree Plains SC area identified 30 notices relating to five contaminated sites. These notifications are entirely attributed to the storage of underground petroleum storage systems at current and former service station facilities. None of these sites are located within 200 m of the proposal site.

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

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

It is considered unlikely that unknown significant contamination would be encountered during construction activities. However, construction activities would have the potential to result in contamination of the surrounding soils as a result of possible spills and leaks from construction equipment and site compounds. Furthermore, during the operational phase, there exists the potential for contamination to occur as a result of spills and leaks from trains. Measures would need to be implemented to manage any contamination encountered and to minimise the likelihood of spills or leaks during both construction and operation phases.

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

6.4.6 Waste and resource use

Construction activities are likely to generate waste, and are likely to include:

- General domestic waste.
- Green waste.
- Spoil from excavation.
- Spoil and groundwater (if groundwater is encountered) that is potentially contaminated.
- Surplus construction materials.
- Waste from construction site compounds.
- Demolition rubble from structure replacements (for example, culverts).
- Wastewater from dewatering activities, such as groundwater (should groundwater be encountered), stormwater and construction site run-off.

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

During operation and maintenance activities, only minimal waste would likely be generated. Waste was considered in the preparation of the EIS (that is, GHD, 2017), which assessed predicted waste generation during construction and operation including:

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

An assessment of waste will include consideration of relevant legislation and guidelines, including:

- Waste Classification Guidelines – Part 1: Classification of Waste (NSW EPA, 2014a).
- NSW Waste Avoidance and Resource Recovery Strategy 2014-21 (NSW EPA, 2014b).

- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (DECC, 2008a).

6.4.7 Greenhouse gases and energy

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

During operation, greenhouse emissions would be generated by the operation of the rail line, and would predominantly be from the use of diesel locomotives. This would, in part, be offset by reducing the amount of freight moved by road, which would potentially result in a reduction of emissions generated by freight vehicles.

A Scope 1 greenhouse gas assessment will be undertaken, based on the Australian National Greenhouse Accounts Factors 2019, prepared by the Commonwealth Department of the Environment and Energy (DoEE, 2019).

6.4.8 Climate change

Due to the anticipated construction schedule, impacts arising as a result of climate change would not be expected to be significant during the construction phase of the proposal. Operationally, potential issues from climate change would include track damage and buckling due to more extreme temperature variations and more extreme weather events (for example, flooding of the rail corridor). Climate change adaptations will be considered in the design process of the proposal, including the flooding and hydrology studies. A climate-change risk assessment will be completed and will provide recommendations to minimise the impacts of climate change.

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

- Commonwealth Scientific and Industrial Research Organisation's (CSIRO) Climate Change in Australia Technical Report 2015.
- Australian Government's Climate Change Impacts and Risk Management – A Guide for Business and Government (2006).
- NSW Government's Climate Change Policy Framework (2016).
- ISO 31000-2009; Risk Management – Principles and Guidelines.
- AS 5334 – Climate Change Adaptation for Settlements and Infrastructure.
- AS/NZS 3100:2009 Risk Management – Principles and Guidelines.
- ARTC's Inland Rail Program Climate Change Risk Assessment Framework.

6.4.9 Hazards and risk

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

- The stoage and handling of dangerous goods (that is, hazardous chemicals).
- The use of heavy machinery.
- Works conducted within an operational rail corridor.
- Works within, over or adjacent to, an operating roadway.
- Works conducted over, or adjacent to, a major waterway, notably Gwydir and Mehi Rivers.

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

Operational hazards and risks would include train incidents (such as derailment, collision or impact), level crossing collisions, spills from train and equipment (such as oil and cleaning chemicals) and accidents

involving hazardous cargo. These risks would be managed through design and the application of education programmes, and standard mitigation measures and plans (that is, emergency response plans).

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

6.4.10 Utilities and services

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

- Electricity assets maintained by Essential Energy.
- Water and sewer assets maintained by Moree Plains Shire Council.
- Telecommunications assets owned and maintained by local providers (that is, Telstra, Optus, etc.).

Due to the requirement for double-stack clearance, it can be assumed that all crossings typically would require services to be modified. Where there is insufficient clearance, then raising, relocation, or undergrounding of power lines may need to be considered to provide adequate clearance.

The proposal would also require installation of rail utilities within the greenfield areas of the proposed corridor and relocation of existing rail utilities within the Werris Creek Mungindi rail line where there is interaction with the current alignment proximal to the Camurra hairpin bypass.

All construction activities would be carried out in consultation with relevant stakeholders, and infrastructure and services providers, to minimise adverse impacts arising from construction and operation activities.

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

6.4.11 Cumulative impacts

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

The cumulative impact assessment will also need to provide consideration for the other Inland Rail projects. In particular, the projects that adjoin to the N2NS section, which include the Parkes to Narromine and the Narromine to Narrabri sections.

6.4.12 Sustainability

A sustainability assessment will be undertaken as part of the EIS. The sustainability assessment would be prepared in accordance with the Inland Rail sustainability strategy and the Infrastructure Sustainability (IS) Rating Scheme version 1.2 developed by the Infrastructure Sustainability Council of Australia (ISCA). The assessment will:

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

7 Consultation

7.1 Overview

ARTC's values commit the organisation to active engagement with stakeholders and the community. In early 2015, ARTC developed the Inland Rail Strategic Stakeholder and Engagement Plan for Inland Rail that will guide the consultation activities for the proposal.

The overall proposal consultation activities are continuing, which includes discussions with councils and other local stakeholders. Formal consultation will continue with State and Federal representatives and departments, Moree Plains Shire Council, nearby sensitive receivers/landholders, traditional owners and environmental stakeholders. The Moree Plains Shire Council provided specific comments on the Project EIS (ARTC, n.d.) relating to potential flooding impacts in the areas north of Moree. They have also commented that consultation to date has been of good quality and this should continue for future phases and design changes.

7.2 Consultation strategy and objectives

The consultation objective for the proposal have been to introduce the overall Inland Rail programme and the N2NS section to applicable stakeholders and the local community. The focus of the community engagement is to provide clear, effective information on the proposal, and to engage with stakeholders to identify and respond to suggestions and concerns where relevant. The strategic objectives of the consultation strategy are to:

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

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

7.3 Consultation to date

7.3.1 Inland Rail programme

ARTC's staff and consultants have undertaken consultation with stakeholders, landowners and the community, both as part of the original EIS (ARTC, n.d.). A summary of the consultation activities up to 2017 includes the following (ARTC, 2018):

- The ARTC has engaged with Moree Plains SC.
- Landowner consultation commenced in early 2016 to provide access to private properties for preliminary field investigations. This was followed by consultation on the Melbourne–Brisbane Inland Rail Alignment Study (ARTC, 2010).
- In early 2016, a series of information sessions were held throughout the study area consulting on the alignment from the Melbourne–Brisbane Inland Rail Alignment Study (ARTC, 2010).
- Feedback from landowner and broad community consultation in early 2016 was the catalyst for ARTC to consider alternative route options.

- ARTC continued to engage with landowners while undertaking further review of the Melbourne–Brisbane Inland Rail Alignment Study (ARTC, 2010) and developing options based on community feedback.
- Mail out to over 17,000 residences across the study area inviting consultation on the proposed options at upcoming information sessions.
- In November 2016, community information sessions were held to gather further feedback on the new options.
- The community engagement team has established and maintained relationships with landowners and responded to landowners who have come forward and requested further information and consultation.
- During March and April 2017, the community engagement team conducted over 400 face-to-face meetings with property owners/tenants across options that were further refined following the November information sessions as well the 2016 concept alignment.
- Landowners have also written to ARTC and political stakeholders identifying their preferred alignment.
- Consultation with landowners would continue during the design development, environmental planning and approvals, and construction phases of the proposal.

7.3.2 The proposal – informing and scoping investigations

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

The recent *Narrabri to North Star Submissions Preferred Infrastructure Report* (ARTC, 2019) outlines the consultation activities subsequent to those described above. During the EIS exhibition period, government agencies, key stakeholders (including interest groups and organisations), and the community were invited to make written submissions. As the EIS was being finalised at this time, these additional activities were not described in the EIS.

7.3.3 Consultation outcomes

Preliminary consultation has focussed on providing information about the proposal. Limited feedback has been received on specific issues and opportunities to date. It is anticipated that opportunities for more detailed discussions will take place during the preparation of the EIS.

7.4 Consultation during the preparation of the EIS

The ARTC and the Inland Rail project team would continue to consult with stakeholders and the community during the preparation of the EIS. Consultation activities which would be undertaken during the preparation of the EIS are outlined in sections 7.4.1 to 7.4.4.

7.4.1 Inland Rail communications

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

7.4.2 Proposal community engagement lead

The Community Engagement Lead dedicated to the proposal would continue their role as a vital link in maintaining close and ongoing contact with local communities and stakeholders during preparation of the

EIS. The Community Engagement Lead is the key 'on the ground' project representative and would continue to seek to understand local issues and provide this feedback to the proposal team.

7.4.3 Stakeholder and community engagement

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

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

7.4.4 Community contact and information

The community contact details outlined in Table 10 would remain in place for the preparation of the EIS and the planning and approval process.

Table 10 Community contact and information points available during the planning and approval process

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

7.5 Public exhibition of the EIS

Public exhibition of the EIS would be for a minimum of 30 days, as stated in section 5.17 of the EP&A Act. Advertisements would be placed in local media giving information regarding the proposal and display of the EIS.

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

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

- Community Information sessions.
- Local newspaper advertising.
- Inland Rail website updates.
- Stakeholder meetings.
- Government stakeholder engagement.

7.6 Consultation during construction

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

8 Conclusion and next steps

The proposal is subject to assessment under the EP&A Act. The capital investment value of the proposal is estimated to be over $50 million, and ARTC has formed the view that the proposal is likely to significantly affect the environment and, as a result the proposal is SSI under State Environmental Planning Policy (State and Regional Development) 2011. The proposal is, therefore, subject to Part 5, Division 5.2 of the EP&A Act and an EIS is required as part of the process of seeking the approval of the NSW Minister for Planning. In addition, ARTC is seeking to have the proposal declared CSSI under Clause 16 of the State Environmental Planning Policy (State and Regional Development) 2011.

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

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

The EIS would include the following:

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

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

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

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Appendix A Bionet and PMST search results

Data from the BioNet BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Licensed Report of all Valid Records of Threatened (listed on TSC Act 1995) ,Commonwealth listed ,CAMBA listed ,JAMBA listed or ROKAMBA listed Entities in selected area [North: -29.32 West: 149.73 East: 150.04 South: -29.57] returned a total of 149 records of 24 species.
Report generated on 20/10/2019 3:56 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Reptilia	Elapidae	2675	*Hoplocephalus bitorquatus*		Pale-headed Snake	V,P		1	
Animalia	Aves	Anseranatidae	0199	*Anseranas semipalmata*		Magpie Goose	V,P		2	
Animalia	Aves	Ciconiidae	0183	*Ephippiorhynchus asiaticus*		Black-necked Stork	E1,P		2	
Animalia	Aves	Threskiornithidae	0178	*Plegadis falcinellus*		Glossy Ibis	P	C	6	
Animalia	Aves	Accipitridae	0218	*Circus assimilis*		Spotted Harrier	V,P		3	
Animalia	Aves	Accipitridae	0226	*Haliaeetus leucogaster*		White-bellied Sea-Eagle	V,P	C	2	
Animalia	Aves	Accipitridae	0225	*Hieraaetus morphnoides*		Little Eagle	V,P		2	
Animalia	Aves	Accipitridae	0230	*Lophoictinia isura*		Square-tailed Kite	V,P,3		2	
Animalia	Aves	Falconidae	0238	*Falco subniger*		Black Falcon	V,P		3	
Animalia	Aves	Scolopacidae	0157	*Actitis hypoleucos*		Common Sandpiper	P	C,J,K	1	
Animalia	Aves	Scolopacidae	0163	*Calidris acuminata*		Sharp-tailed Sandpiper	P	C,J,K	1	
Animalia	Aves	Scolopacidae	0168	*Gallinago hardwickii*		Latham's Snipe	P	C,J,K	1	
Animalia	Aves	Scolopacidae	0151	*Numenius minutus*		Little Curlew	P	C,J,K	1	
Animalia	Aves	Strigidae	0246	*Ninox connivens*		Barking Owl	V,P,3		1	
Animalia	Aves	Pomatostomidae	8388	*Pomatostomus temporalis temporalis*		Grey-crowned Babbler (eastern subspecies)	V,P		2	
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*		Koala	V,P	V	33	
Animalia	Mammalia	Macropodidae	1260	*Macropus dorsalis*		Black-striped Wallaby	E1,P		1	
Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*		Yellow-bellied Sheathtail-bat	V,P		1	
Animalia	Mammalia	Muridae	1461	*Pseudomys gouldii*		Gould's Mouse	E4,P	X	1	
Plantae	Flora	Fabaceae (Faboideae)	2835	*Desmodium campylocaulon*		Creeping Tick-trefoil	E1		56	
Plantae	Flora	Fabaceae (Faboideae)	3048	*Swainsona murrayana*		Slender Darling Pea	V	V	2	
Plantae	Flora	Poaceae	4895	*Dichanthium setosum*		Bluegrass	V	V	2	
Plantae	Flora	Poaceae	6850	*Digitaria porrecta*		Finger Panic Grass	E1		13	
Plantae	Flora	Poaceae	5007	*Homopholis belsonii*		Belson's Panic	E1	V	10	

Data from the BioNet BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Licensed Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Communities in selected area [North: -29.32 West: 149.73 East: 150.04 South: -29.57] returned 0 records for 11 entities.
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Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Community				*Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions*		Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	E3	E	K	
Community				*Brigalow-Gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions*		Brigalow-Gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions	E3	E	P	
Community				*Cadellia pentastylis (Ooline) community in the Nandewar and Brigalow Belt South Bioregions*		Cadellia pentastylis (Ooline) community in the Nandewar and Brigalow Belt South Bioregions	E3		K	
Community				*Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions*		Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions	E3		K	
Community				*Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions*		Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions	E3	E	K	
Community				*Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions*		Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	E3		K	
Community				*Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions*		Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	E3	E	P	
Community				*Marsh Club-rush sedgeland in the Darling Riverine Plains Bioregion*		Marsh Club-rush sedgeland in the Darling Riverine Plains Bioregion	E4B		K	
Community				*Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions*		Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	E3	E	K	
Community				*Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions*		Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions	E3	E	P	
Community				*White Box Yellow Box Blakelyâ€™s Red Gum Woodland*		White Box Yellow Box Blakelyâ€™s Red Gum Woodland	E3	CE	K	

Australian Government
Department of the Environment and Energy

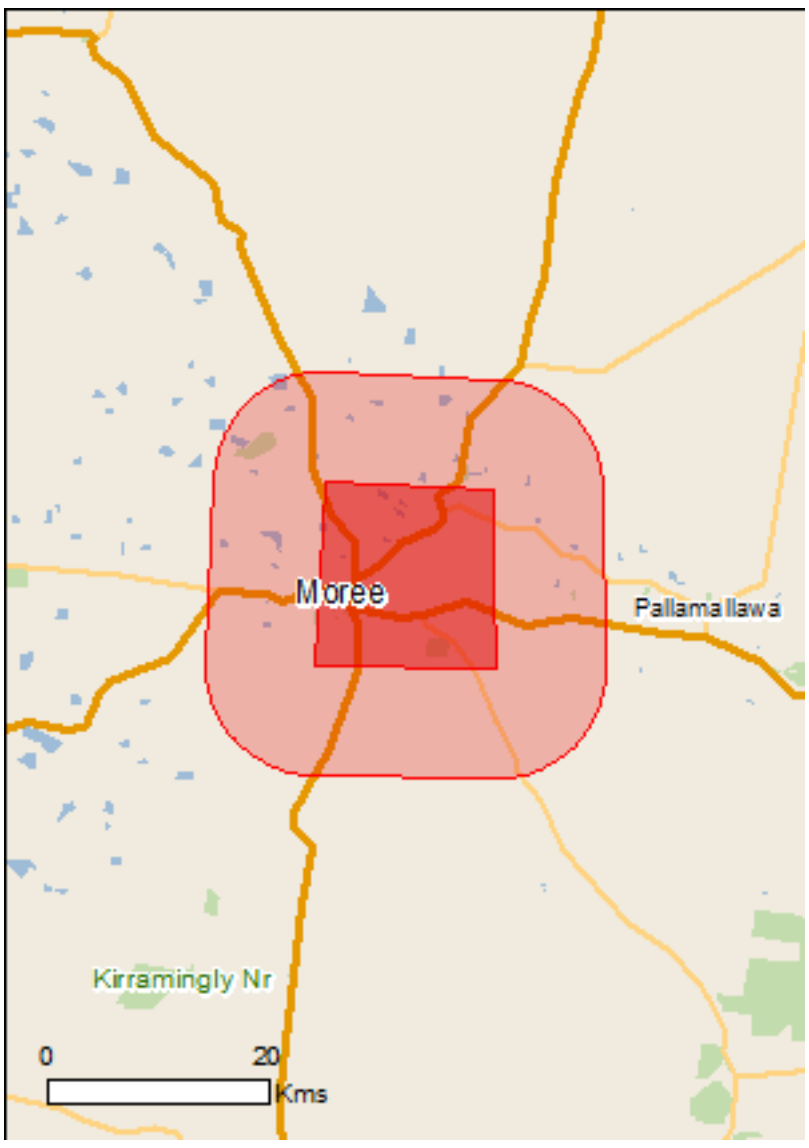
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 20/10/19 15:54:33



Coordinates
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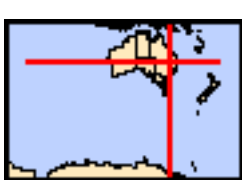

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	16
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	4
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	24
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Indigenous		
Moree Baths and Swimming Pool	NSW	Listed place

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Banrock station wetland complex	1000 - 1100km
Gwydir wetlands: gingham and lower gwydir (big leather) watercourses	30 - 40km upstream
Riverland	900 - 1000km upstream
The coorong, and lakes alexandrina and albert wetland	1100 - 1200km

Listed Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community likely to occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Rostratula australis		
Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Fish		
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Plants		
Cadellia pentastylis		
Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat known to occur within area
Homopholis belsonii		
Belson's Panic [2406]	Vulnerable	Species or species habitat may occur within area
Swainsona murrayana		
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Anomalopus mackayi		
Five-clawed Worm-skink, Long-legged Worm-skink [25934]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Telstra Corporation Limited

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Midkin	NSW

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

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Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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BAM Candidate Species Report

Proposal Details

Assessment Id 00017933/BAAS17051/19/00017934	Proposal Name	BAM data last updated * 17/10/2019
Assessor Name	Report Created 18/10/2019	BAM Data version * 16
Assessor Number	Assessment Type Major Projects	BAM Case Status Open
	Assessment Revision 0	Date Finalised To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
Ardeotis australis Australian Bustard		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Burhinus grallarius Bush Stone-curlew		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Dichanthium setosum Bluegrass		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Calyptorhynchus lathami Glossy Black-Cockatoo		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Cyperus conicus Cyperus conicus		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Desmodium campylocaulon Creeping Tick-trefoil		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Digitaria porrecta Finger Panic Grass		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hoplocephalus bitorquatus Pale-headed Snake		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Lepidium aschersonii Spiny Peppercress		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Lophoictinia isura Square-tailed Kite		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Jalmenus eubulus Pale Imperial Hairstreak		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Ninox connivens Barking Owl		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Phascolarctos cinereus Koala		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Polygala linariifolia Native Milkwort		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Pteropus poliocephalus Grey-headed Flying-fox		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Swainsona murrayana Slender Darling Pea		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Setirostris eleryi Bristle-faced Free-tailed Bat		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Homopholis belsonii Belson's Panic		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hieraaetus morphnoides Little Eagle		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Haliaeetus leucogaster White-bellied Sea-Eagle		Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

200528_Scoping Report Phase 2 N2NS

Final Audit Report 2020-05-31

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