Inland Rail – Narromine to Narrabri

State Significant Infrastructure Assessment SSI-9487

February 2023

NSW Department of Planning and Environment | dpe.nsw.gov.au

Published by the NSW Department of Planning and Environment

dpie.nsw.gov.au

Title: Inland Rail – Narromine to Narrabri

Subtitle: State Significant Infrastructure Assessment SSI-9487

Cover image: Existing Walgett Rail Branch, ARTC 2020

Glossary

Abbreviation	Definition
AHD	Australian Height Datum
ARTC	Australian Rail Track Corporation
BAM	Biodiversity Assessment Method
BCS	Biodiversity, Conservation and Science Directorate, Department of Planning and Environment
BDAR	Biodiversity Development Assessment Report
CIP	Community Involvement Plan
CIV	Capital Investment Value
Council	Narromine Shire, Gilgandra Shire, Coonamble Shire, Warrumbungle Shire and/or Narrabri Shire
CSSI	Critical State Significant Infrastructure
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cwth)
Department/ DPE	Department of Planning and Environment
DPI	Department of Primary industries
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
FCNSW	Forestry Corporation New South Wales
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
Minister	Minister for Planning

NAIP	NSW Aquifer Interference Policy
N2N	Narromine to Narrabri
OEH	Former Office of Environment and Heritage
PIAR	Preferred Infrastructure / Amendment Report
Planning Secretary	Planning Secretary of the Department of Planning and Environment
RtS	Response to Submissions
SAP	Special Activation Precinct
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
TfNSW	Transport for New South Wales

Executive Summary

The Australian Rail Track Corporation (ARTC) (the Proponent) is constructing the Inland Rail project, a 1,700 km freight rail line between Melbourne and Brisbane. The Narromine to Narrabri project is one of seven Inland Rail projects in NSW. This stage proposes to construct a new 306 km rail line in a greenfield corridor between Narromine and Narrabri via Gilgandra, Curban, Baradine and the Pilliga Forest.

Inland Rail will provide economic benefits to NSW and Australia. Inland Rail's business case indicates it will increase gross domestic product by $16 billion over the 10-year construction period and 50 years of operation. At peak construction, the Narromine to Narrabri project is expected to create 2000 additional jobs.

The Narromine to Narrabri project will provide economic growth in western NSW and development opportunities in the region through the improved reliability, efficiency and capacity of rail freight transport provided by this section of the Inland Rail project.

The project complies with the objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and is consistent with the Government's key priorities and transport planning framework including *NSW Freight and Ports Plan 2018-2038, 2020 Infrastructure Priority List, State Infrastructure Strategy 2022-2042, Future Transport Strategy 2056*, and *Regional NSW Service and Infrastructure Plan*. This project is State significant infrastructure (SSI) and was declared critical State significant infrastructure (CSSI) under section 5.13 of the EP&A Act. The Minister for Planning is the approval authority.

The environmental impacts of construction and operation are considered acceptable, subject to implementation of appropriate mitigation and management measures, and compliance with the Department's recommended conditions of approval.

The Commonwealth Department of the Environment and Energy (now Commonwealth Department of Climate Change, Energy, the Environment and Water) determined the project to be a 'controlled action' under sections 18 and 18A *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as it was considered likely that the project could have a significant impact on listed threatened species and communities. Following this notification, the Department confirmed that the project would be assessed under the NSW Assessment Bilateral Agreement.

Engagement with the community

The Environmental Impact Statement (EIS) was publicly exhibited from 8 December 2020 until 7 February 2021 (62 days) on the Department's website. 108 submissions and 10 pieces of government agency advice were received during the exhibition period. Five submissions were received from local council, and 103 from the community, including 88 from individuals and 15 from interest groups. 71 of the community submissions were objections. Key issues raised in the submissions included route selection and project justification, hydrology and flooding, biodiversity, noise and vibration, property and land use, traffic and access, and groundwater impacts.

The Proponent responded to the submissions and Department's concerns regarding hydrology and flooding impacts. These were provided in their Response to Submissions (RtS) and Preferred

Infrastructure and Amendment Report (PIAR) on 31 August 2022. The PIAR was publicly exhibited from 31 August 2022 until 23 September 2022 (24 days) on the Department's website. 56 submissions and 10 pieces of government agency advice were received during the exhibition period. Four submissions were received from local council and 52 from the community, including 43 from individuals and nine from interest groups. 41 of the submissions from the community were objections. Key issues raised in the submissions were the same as raised in the EIS submissions. The Proponent responded to these submissions in an RtS that was made publicly available on the Department's website on 18 November 2022.

Key assessment issues

Flooding and hydrology

The project is located within the Macquarie, Castlereagh, and Namoi catchments. The area already experiences flooding, and the project change the landscape through the introduction of embankments, bridges, culverts and a viaduct. The project has potential to change flooding characteristics including depth, velocity, and duration. The Department engaged an independent hydrologist to review the flooding and hydrology assessment, and created a Hydrology Working Group comprised of government and Proponent representatives, for ongoing review of the Proponent's hydrology assessment and proposed mitigation measures.

The Proponent prepared revised hydraulic and hydrological modelling in the PIAR, in response to recommendations of the Department's independent hydrologist and the Hydrology Working Group. The revised modelling is considered adequate to assess the project's impacts for all flood criteria except velocity and erosion impacts.

The revised modelling indicates that within the study area, the project would exceed the afflux (increased flood height) criteria at 51 of the 6,198 buildings currently at risk of above floor flooding in a 1% AEP flood event. Afflux will also exceed the Qualitative Design Limits (QDL) at 2,196 hectares of non-urban land (1.8% of the land area currently flooded in a 1% AEP event), and 52 km of roads (11% of current flooding).

The Department does not accept the outcomes of the Proponent's revised modelling to determine flood flow velocities resulting from the project, or the Proponent's calculation of Erosion Threshold Velocities that would set velocity limits based on their likelihood of causing soil erosion.

The Department has recommended QDLs for managing the project's flooding and hydrological impacts during design development and is satisfied that the project can meet these limits in most locations, subject to further mitigation measures and pre-construction verification. Conditions are recommended requiring consultation, mitigation and agreement with the landholder and roads authority where the design results in exceedances of the QDLs. The Department has also recommended a revised calculation of Erosion Threshold Velocities as part of the pre-construction verification. Other recommended conditions require review and monitoring of compliance with the QDLs and to manage any risks from erosion, and emergency management plans.

Biodiversity

The assessment of biodiversity impacts of the project has been undertaken in accordance with the Biodiversity Conservation Act 2016 (BC Act), Biodiversity Assessment Method 2020, Biodiversity Offset Scheme, and Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act). The project will clear 1,791 hectares of native vegetation, which will directly impact threatened

ecological communities and species listed under the BC Act and EPBC Act. Although the project removes breeding and foraging habitat for the Koala and several other threatened fauna species, the Department considers that the provision of ecosystems and species credits will help offset the vegetation and Koala habitat impacts of the project.

The Department considers that the impacts of the project on Matters of National Environmental Significance (MNES) have been adequately addressed by the Proponent. The Department also considers that the likely impacts to the Weeping Myall Woodlands, Brigalow (Acacia harpophylla dominant and co-dominant), Grey Box (Eucalyptus macrocarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia, Poplar Box Grassy Woodland on Alluvial Plains, and White Box-Yellow Box-Blakely's Red Gum and Derived Native Grassland Threated Ecological Communities (TECs), and the four flora and six fauna species assessed as significantly impact by the project would be effectively managed and offset through recommended conditions of approval. The Department recommends that the Department of Climate Change, Energy, the Environment and Water (DCCEEW) considers and adopts these recommendations. Appendix H of this report sets out additional EPBC Act considerations, including the Australian Government's international obligations and consideration of relevant approved conservation advice, threat abatement plans, and recovery plans.

The project will cause a serious and irreversible impact on one threatened ecological community, the Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions (Fuzzy Box Woodland). It will clear 3.6 ha of this community, which is approximately 0.9% of the community extent in NSW. The Department has recommended a condition requiring the Proponent to realign the project to avoid or reduce the impact on this community.

Noise and vibration

Noise and vibration impacts are expected during construction and operation of the project at a number of receivers. The project will require construction works outside of the standard daytime construction hours, with noise levels exceeding the noise management levels at nearby residents. Construction noise will exceed guideline levels at 2,894 residential receivers. This number reflects low background noise levels in the project's largely rural environment, and the majority of receivers will not experience construction noise that will significantly affect their day-to-day life. 17 residences would be highly noise affected experiencing noise levels exceeding 75dB(A). Respite will be provided in consultation with affected receivers, and alternative mitigation measures implemented for those impacted by works occurring outside of standard construction hours.

The Department has recommended a condition requiring the Proponent appoint an independent Acoustic Advisor to review the Proponent's construction noise management processes, particularly in relation to out of hours work, and assist the Proponent and Planning Secretary in responding to any noise related complaints.

Noise impacts from operation of the project would result in 53 residences experiencing noise exceeding recommended levels in the *Rail Infrastructure Noise Guideline* (NSW EPA, 2013). These exceedances will be caused by train engine noise, wheel-rail noise, train horns and level crossing alarms. The Department recommends conditions requiring an Operational Noise Verification Report to confirm anticipated operational noise, and locations and types of acoustic treatment for residential receivers, and an Operational Noise Compliance Report after the start of operation, to confirm actual noise levels and trigger further noise mitigation if required.

Traffic and transport

Regional and interstate operational traffic benefits are expected by moving freight from the road network onto the rail network, reducing the stress on roads for passenger vehicles. The local network experiences seasonal variation, with increased heavy vehicle traffic during harvest season from trucks and farm machinery moving between properties.

Construction of the project will bring traffic delays, with light vehicles moving construction workers from the accommodation camps to the construction site, and heavy vehicles moving materials for the rail construction. All roads are expected to maintain a Level of Service of A. Construction vehicle routes include urban areas of Narromine, Gilgandra, and Narrabri, which introduces amenity and safety risks for residents and other road users. The Department has recommended conditions requiring a Construction Traffic Management Plan that considers seasonal traffic variations, informs road users of changes to traffic conditions, and reduces noise of construction vehicles. Further, the Department has recommended a Road Dilapidation Report to record existing conditions of roads, and requires the Proponent to make good damage to roads following construction, and repair road damage affecting safety or trafficability, as soon as practicable.

The project introduces eight grade separated crossings, with 49 new public level crossings and approximately 30 private level crossings installed. Transport for NSW objected to the provision of level crossings on classified roads, stating that all classified road crossings should be grade separated. The Department considers delays at levels crossings are acceptable, but acknowledges their road safety risks. Grade separated crossings are proposed at the two busiest roads affected by the project (the Mitchell Highway and Kamilaroi Highway). In addition, Transport for NSW is planning grade separations at the Castlereagh Highway and Tomingley Road, the next busiest crossings.

The Department has recommended conditions requiring a Level Crossing Treatment Report, that justifies level crossing treatments in terms of safety, and a Level Crossing Performance Report once the project is operational, that reviews level crossing traffic and road safety performance.

Land use and property access

The project would result in acquisition of all or part of 310 properties. This will affect land use, agricultural practices, property access, utilities, and travelling stock reserves (TSRs). The project will bisect properties, which will affect access to and within them. Agricultural properties will be particularly affected, as the project will limit the ability to move livestock and specialised agricultural equipment within properties. The project will also impact on TSR R27999 (north of Narrabri), by narrowing the TSR in its access to an existing road underpass and proposed rail underpass.

Access impacts will be considered through property acquisition under the *Just Terms (Land Acquisition) Act 1991*. The Department has recommended conditions which strengthen the requirement to consult with landowners regarding temporary and permanent access changes, require the Proponent to prepare individual property management plans to ensure the requirements of different agricultural operations are considered, and provide for mediation should a dispute arise. A recommended condition also requires the Proponent to consult with North West Local Land Services and TSR users, to relocate or redesign TSR R27999 to ensure safety for stock and stock managers.

Aboriginal cultural heritage

The project lies within Wiradjuri, Gomeroi, Ngemba, Ngiyampaa, Wangaaypuwan and Wayilwan land. Aboriginal cultural heritage has been identified within the project's footprint, with both direct and

indirect impacts expected from construction works. The project will impact, or potentially impact, on 48 Aboriginal heritage items and six Potential Archaeological Deposits. Of these, five items are considered by the Proponent to be of medium to high overall significance. The project will also impact on cultural values embedded in waterways, plants and animals, pathways, and tangible and intangible relations within Aboriginal culture and dreaming. The Proponent has not had access to the entirety of the project's alignment and further investigation post-determination may find more items. The Proponent's predictive model has targeted ten locations for further investigation.

Registered Aboriginal Parties (RAPs) have reviewed the Aboriginal Cultural Heritage Assessment Report, and informed the cultural values assessment. The RAPs will be involved in further investigation and salvage. The Department acknowledges the Proponent's collaboration with Aboriginal stakeholders, and considers it is essential to manage impacts to Aboriginal cultural heritage.

The Proponent has committed to ongoing stakeholder consultation with Aboriginal stakeholders, to minimise and manage impacts to Aboriginal cultural heritage sites, intangible cultural heritage, and to develop suitable salvage methodology to mitigate impacts to culturally modified trees.

The Department has recommended conditions requiring preparation of a Construction Heritage Management Plan that provides for salvage of impacted items and their long term care and protection of sensitive areas, an unexpected finds protocol, an Aboriginal Cultural Values Plan to minimise impacts on cultural values and reflect these values in the project, and an Aboriginal Engagement Strategy that guides Aboriginal engagement on cultural and heritage management, social and economic impacts, and opportunities from the project.

Groundwater

The project will use approximately 4,635 megalitres (ML) of water for construction (approximately 1,400 ML per year) and will likely source this from deep groundwater aquifers. There is sufficient unallocated capacity in these aquifers to service construction, while maintaining water availability for other users and environmental purposes. The Proponent's assessment indicates drawdown of up to 4 m at an existing bore near bore field PB2. This may affect water availability for users of that bore. The Proponent would be required to obtain licences to use groundwater, which would further consider the impacts.

The Department has recommended conditions that require further modelling to confirm groundwater impacts and document mitigation and management measures, and a Soil and Water Management Plan, which includes a Construction Groundwater Management Plan and a Borefield Management Plan, to confirm bore locations, water take and quality, and minimise impacts. Other conditions require further groundwater monitoring and, if necessary, changes to extraction rates to minimise impacts, and provision of alterative water supply or compensation to users of licensed bores affected by the project.

Contents

1 Introduction

In May 2017, the Australian Government announced the Inland Rail program, which is a series of freight rail projects that will form a 1,700 km freight rail network between Melbourne and Brisbane via Central West NSW and South East Queensland. The Inland Rail program crosses three states (Victoria, NSW and Queensland) and comprises 13 sections, with 7 of those in NSW as shown in **Figure 1**.

The Australian Rail Track Corporation Ltd (ARTC) (the Proponent) is seeking approval to construct and operate the Narromine to Narrabri (N2N) section of Inland Rail (the project). The project contributes a significant component of the Inland Rail program as the longest single section of track, approximately 306 km of new single-track railway with crossing loops in a new rail corridor.

The project would link the recently completed Parkes to Narromine section of Inland Rail in central western NSW with the Narrabri to North Star section (under construction) in north-western NSW. The proposed rail alignment, shown in **Figure 2**, traverses the Narromine, Gilgandra, Warrumbungle, Coonamble, and Narrabri local government areas (LGAs). The five LGAs are predominantly rural, with the main local industries based around agriculture, extractive industries and related services. Other towns, villages, and communities located near the project include Gilgandra, Gulargambone, and Baradine.

The Proponent anticipates that in the year of opening (2026), an estimated 10 double-stacked container 1,800 metre long trains would operate each day (both directions). This would increase to approximately 14 trains per day by 2040. The project would be used by trains carrying a mix of grain and bulk freight, coal and other general goods. Total annual freight tonnages are expected to be about 10 million tonnes in 2027, increasing to about 17.5 million tonnes in 2040 (compared to the two million tonnes of grain per year carried on the existing rail network).

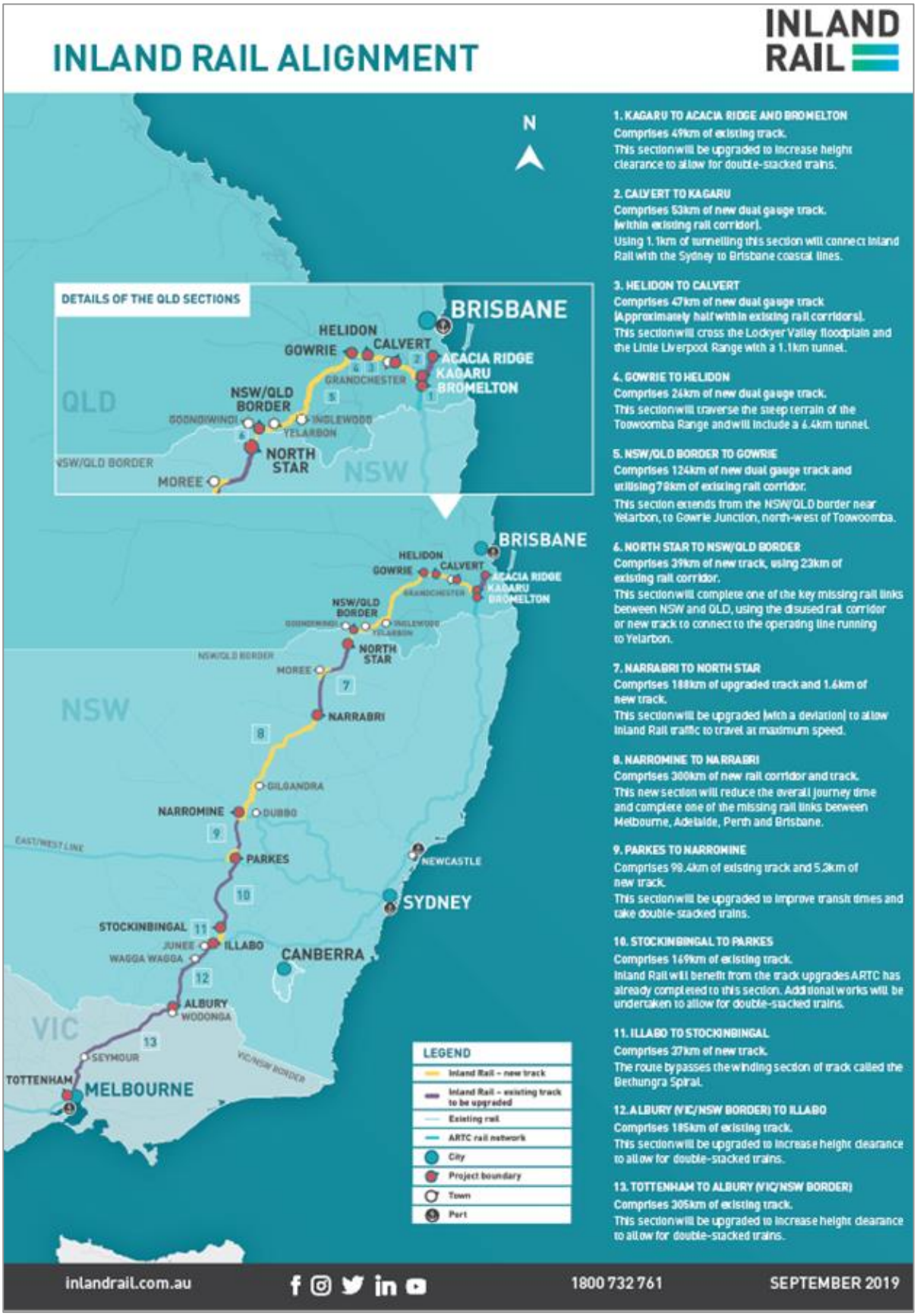


Figure 1 | Inland Rail overview (Source: ARTC Website 17 December 2021)

Figure 2 | Proposed rail alignment (Source: ARTC PIAR 2022)

2 Proposal

The Proponent is seeking approval for the construction and operation of the Narromine to Narrabri section of Inland Rail, which comprises approximately 306 kilometres of new single-track railway.

Key features of the project include:

- A new 306 km long rail corridor between Narromine and Narrabri
- A single-track railway and track formation within the new corridor
- Seven crossing loops located at Burroway, Balladoran, Armatree/Tonderburine, Mt Tenandra, Baradine, The Pilliga and Bohena Creek
- Bridges over rivers and other watercourses (including the Macquarie River, Castlereagh River, and the Narrabri Creek/Namoi River system), floodplains, and roads
- 49 new public level crossings, 15 with active controls and 34 with passive controls (e.g. stop signs)
- Grade-separated crossings at Mitchell Highway, Kamilaroi Highway, Webbs Siding Road, Old Mill Road, Kickabil Road, Cains Crossing Road, Yarrie Lake Road, and The Island Road
- New rail connections and possible future connections with existing ARTC and country regional network rail lines, including a new 1.2 km long rail junction between the Parkes to Narromine section of Inland Rail and the exiting Narromine to Cobar Line (the Narromine West connection)
- Road realignments at various locations, including realignment to the Pilliga Forest Way for 6.7 km
- Road closures that include Dappo Road, Brooks Road, Nalders Access Road, and Munns Road.
- Drainage control areas at a number of drainage structures, to provide additional space outside the rail corridor to manage exceedances of the quantitative design limits.

2.1 Physical layout and design

The main components and operational features of the project are described in **Table 1**.

Table 1 | Main components of the project

Aspect	Description
Track construction	• 306 km single-track standard-gauge railway within a rail corridor with a 40 m minimum width.
Crossing loops	• Seven crossing loops located at Burroway, Balladoran, Armatree/Tonderburine, Mt Tenandra, Baradine, The Pilliga, and Bohena Creek. • Each crossing loop would be approximately 2.2 km in length, accommodating 1800 m length trains. • Each crossing loop would include a maintenance siding for temporary storage of maintenance trains (250 m long).
Connections with other rail lines	• New rail connections proposed: - Parkes to Narromine – the southern end of the project connects with the northern end of the Parkes to Narromine (Inland Rail) line - Narrabri to North Star – the northern end of the project connects to the southern end of Narrabri to North Star (Inland Rail) Line (currently the Mungindi Line) - Dubbo to Coonamble Line – an at-grade connection would connect the project and the existing Dubbo to

	Coonamble Line. Of the four components of this connection, two will be constructed (north to west and south to east) and two (west to south and east to north) are possible future connections. The new connections would include 4.6 km of new track. • Possible future connections: - Narromine West Connection - Narrabri to Walgett Line – the project includes 1.8 km of new track allowing trains from the west to access the project and travel south.
Rail bridges	• Construction of 75 new bridges along the rail alignment ranging in length from 15 m to 3904 m. The bridges would span watercourses, floodplains, existing rail lines, and main roads.
Level crossings	• Construction of 49 new public level crossings along the rail line (15 with active controls and 34 with passive controls), to maintain vehicular access along public roads that cross the rail corridor.
Public road closures and realignments	• The majority of road closures would involve closures near the end of the road, realignments to a new level crossing, or around the project via an existing road. • Two council managed roads would be closed (Dappo Road completely and Munns Road closed and diverted 650 m north of its existing location). • Realignment of 51 roads (Pilliga Forest Way in the Pilliga East State Forest for 6.7 km to avoid the rail corridor), Nancarrow Road in Gilgandra at two locations (560 m and 750 m), and 49 roads for short sections for new level crossing alignments.
Embankments and cuttings	• Embankments and cuttings vary in size and shape in response to the local topography. • Embankments would have a 3.5 m shoulder at the top of capping and batters with a 3:1 slope. • Cuttings would have a 3.5 m shoulder at the top of capping, 2:1 cutting slope and benching at 7 m where the depth of the cut exceeds 10 m.
Track drainage	• Top drains, toe drains and cess drains would be incorporated within the rail corridor to divert and capture surface flows.
Spoil	• The construction of the project is expected to generate approximately 690,000 m^3 of general fill which is unable to be used to meet the track formation fill requirements. • The excess material would be used to reshape and rehabilitate the borrow pits.
Corridor fencing	• Fencing would be provided along the corridor where it adjoins private land, and on both sides of the rail corridor where it abuts an existing public road with stock movements. • Fencing would consist of a standard stock fence (1.2 m high) with gates provided in locations aligning with access roads.
Culverts	• Construction of approximately 630 individual drainage culverts of varying types and sizes. The majority of culverts

	would be reinforced concrete box culverts, and some road culverts would be constructed from reinforced concrete pipe.
Drainage control areas	• 200 drainage control areas outside the rail corridor for the management of flow velocities at culverts. The drainage control areas are typically 50 m wide downstream, 15 m wide upstream, and variable length to suit the drainage structure configurations. • The extent of work within each drainage control area could include erosion protection by existing or planted vegetation, construction of drainage channels, concrete aprons and installation of rock boulders (rip rap).
Ancillary rail infrastructure	• Signalling and communications, signage, operational access roads, noise attenuation structures, and services and utilities.

2.2 Construction works

Construction of the project is likely to take 48 months to complete.

Detailed construction planning, including timing, staging, and work sequencing, would be confirmed once construction contractors have been engaged. Overall, the construction strategy is based on an approach of dividing the project into four construction areas, with each construction area comprising a number of smaller work areas. The construction areas are as follows:

- Narromine – southern end of the project to Wyuna Road
- Gilgandra – Wyuna Road to Merriwindi State Forest
- Pillaga – Merriwindi State Forest to the northern end of the Pilliga East State Forest
- Narrabri – northern end of the Pilliga East State Forest to the northern end of the project.

Construction in each area would generally involve the following main phases of work:

- Pre-construction activities
- Site establishment and preliminary activities
- Main construction works
- Testing and commissioning
- Finishing and rehabilitation.

A number of ancillary facilities (construction compounds) would be required along the rail alignment to construct the project. These include three major compounds (known as multi-function compounds) at Narromine South, Curban, and Narrabri West, on land that has been acquired or leased for the project. Key facilities and activities undertaken at these compounds include office and amenities, laydown, material and topsoil storage, fixed or mobile concrete batching plant, fuel and hazardous materials storage, maintenance areas, and welding yard.

Other compounds to support construction would be required at regular locations along the alignment, with three types of compound areas proposed:

- Structure compounds at the Macquarie River, Castlereagh River, and Narrabri Creek/Namoi River, to support major bridge construction
- General compounds approximately every 10 km, to support construction activities within the construction area including office and amenities, storage for a range of materials, concrete batching, maintenance, and mobile accommodation facilities

- Minor construction compounds approximately every 5 km between the general compounds, to include offices and amenities, laydown, and materials storage areas.

The Proponent will finalise the location of construction compounds following detailed design.

The project includes the establishment, operation, and rehabilitation of borrow pits to supply general and structural fill. Three borrow pits are located near Narromine and one near Narrabri. Access from the burrow pits would be via new access roads to the nearest public road, and then via the public road network to the project site. Blasting would be undertaken at two of the borrow sites, Borrow Site C near Narromine and Borrow Site D near Narrabri, if hard rock is encountered.

Temporary workforce accommodation is also included in the project, with sites to be established at Narromine North, Gilgandra, Baradine, and within the Narromine South and Narrabri West multi-function compounds. These temporary workforce accommodation sites would operate for the duration of construction, and each accommodate up to 500 people. These sites would provide facilities for workers, such as accommodation, recreation, ablution, laundry and kitchen facilities, waste disposal, water tanks, generators, and parking.

In addition, mobile accommodation facilities would be established within the general construction compounds, to allow for short term use by workers required to focus on a specific work activity, and timely access to the temporary workforce accommodation is more difficult. Mobile accommodation facilities would contain up to 30 self-contained small rooms, accommodating up to 30 people, and established for a period of up to three months.

2.3 Related development

The project connects to other Inland Rail sections in NSW:

- Parkes to Narromine – operational
- Narrabri to North Star (Phase 1) – under construction
- Narrabri to North Star (Phase 2) – Proponent preparing Response to Submissions.

The project is adjacent to the Narromine Materials Distribution Centre (MDC) at Narwonah, approximately 8 km south of Narromine. Material required for the construction of Inland Rail projects in NSW, such as concrete sleepers, rail track, pre-cast concrete products and rail ballast and other construction material, will be stockpiled at the MDC. When operational, the MDC will support the installation of approximately 368 km of new track infrastructure between Narromine and the NSW / QLD border. Construction of the MDC has commenced, and is expected to be operational in 2023.

In November 2020, the NSW Government announced the establishment of the Narrabri Special Activation Precinct. Special Activation Precincts (SAPs) are part of the Government's 20 Year Economic Vision for regional NSW, and plan and deliver industrial and commercial infrastructure projects in dedicated areas. The Narrabri SAP is strategically located on the Inland Rail corridor, the Narrabri West - Walgett Line, and the Narrabri Northern NSW Inland Port. The investigation area of the SAP includes the Narrabri Northern NSW Inland Port, approximately 6 km from the town centre on Yarrie Lake Road. The Department is working with Narrabri Shire Council on the preparation of a draft Master Plan for the Narrabri SAP.

Other SAPs located near Inland Rail projects are at Wagga Wagga, Parkes, and Moree.

3 Strategic context

3.1 Strategic justification

The Narromine to Narrabri project is a key section in the Inland Rail program between Melbourne and Brisbane. The overall Inland Rail program will cater for projected economic growth in the eastern states of Australia, and address constraints on the existing rail network between Brisbane and Melbourne. Australia's east coast population is forecast to increase by 60 % over the next 40 years, accompanied by substantial growth in freight demand, which is projected to increase by 70 % by 2030. The Melbourne to Brisbane freight task is currently dominated by road transport, which accommodates approximately 100,000 truck trips per year, principally on the Newell Highway in NSW. When complete, the Inland Rail program will remove approximately 160 trucks for every train between Melbourne and Brisbane, minimising network congestion and improving safety for road users.

The Department considers that the project is strategically justified, and consistent with the State Government's commitment to creating jobs, economic growth, and providing increased regional freight capacity and infrastructure. This has been identified through strategies and initiatives including:

- Infrastructure NSW *State Infrastructure Strategy 2022-2042* – emphasising the regional development opportunities Inland Rail provides
- Transport for NSW *Future Transport Strategy 2056* – Inland Rail is recognised as part of the solution to improving freight movements
- Transport for NSW *Regional NSW Services and Infrastructure Plan* – Inland Rail is listed as a key initiative which provides a once-in-a-generation opportunity to reconfigure the regional freight network in NSW
- Transport for NSW *NSW Freight and Ports Plan 2018-2023* – aligning with the *Future Transport Strategy 2056*, the goal of this plan is "moving goods in an efficient, safe and environmentally sustainable manner, providing successful outcomes for communities and industry". Inland Rail is consistent with the plan's priority action areas to strengthen freight industry and government partnerships, increase access for freight across the rail network, and ensure safe, efficient and sustainable freight access
- Department of Planning and Environment *New England North West Regional Plan 2041* and *Central West and Orana Regional Plan* – these plans recognise that Inland Rail is central to transport and economic development opportunities in the region.

3.2 Proposal benefits

The project would improve freight transport outcomes by increasing the capacity of the freight network and address the following constraints on freight movement:

- capacity – there is insufficient capacity to meet future freight demand on existing freight infrastructure between Melbourne and Brisbane
- productivity – north-south rail freight infrastructure is constrained by geography (inability to accommodate double stacked container trains) and priority given to passenger services (particularly through Greater Sydney)
- Social and economic – reliance on road freight transport has safety, environmental and community impacts
- Regional and growth – existing north-south freight infrastructure impacts access to supply chain networks for regional producers and industries

- Resilience – lack of resilience on existing north-south freight infrastructure exposes supply chains to disruptions and greater unreliability.

Inland Rail will provide a rail line between Melbourne and Brisbane which is 100 kilometres shorter than the existing route via Sydney, and reduce Melbourne to Brisbane transit time to less than 24 hours, compared to the existing 27.5 hours via Sydney. Bypassing Sydney would not only reduce travel times, but also free up coastal rail paths through Sydney for both passenger and freight services.

This will encourage growth and investment in the area and expand regional economic development opportunities in logistics and agriculture. Beneficial impacts during construction include employment (an estimated workforce of approximately 2000 people over the construction period, with an average workforce of 500 people in each of the four construction areas, would be required to construct the project), training opportunities, and flow on local and regional economic benefits.

The Department is satisfied that construction of the project Rail will realise economic benefits in rural and regional areas of NSW. Inland Rail will assist future economic development opportunities in regional NSW and provide a key transport connection that supports SAP development at Wagga Wagga, Parkes, Narrabri, and Moree.

3.3 Proposal development and alternatives

The Proponent considered the merits of the project in the context of alternative project options including:

- do nothing
- alternative freight transport – maritime freight, air freight, road freight
- alternative rail solutions.

The Proponent's assessment addressed alternative designs and 136 potential route options, including two main options between Melbourne and Parkes (via Albury or Shepparton), four main options between Parkes and Moree (via Werris Creek and Binnaway, Binnaway and Narrabri, Gwabegar and Narrabri, or Coonamble and Burren Junction), and two main options between Moree and Brisbane (via Warwick or Toowoomba).

Do nothing

This approach would result in continued growth in use of the road network for freight transport between Melbourne and Brisbane. Substantial investment would be required to ensure the road network can accommodate forecast increased freight volumes.

The Department is satisfied that this is not a desirable alternative, and is not consistent with the government's commitments to creating regional jobs and economic growth in NSW, and provision of increased freight capacity.

Alternative freight transport solutions

Improvements to freight movements could be achieved through provision and/or upgrading of alternative freight transport solutions such as maritime, rail, air and/or road freight. The Proponent's options assessment compared progressive road upgrades, upgrading the existing east coast railway, and constructing an inland railway, against Infrastructure Australia's Reform and Investment Framework Guidelines and seven step framework that requires a Proponent to complete goal definition, problem identification, assessment and analysis, operational generation, and assessment and solution evaluation (Infrastructure Australia, 2013). Constructing an inland railway ranked highest, with an average high likelihood of improving outcomes across all criteria, compared to progressive road upgrades, and upgrading the existing east coast railway, which both had a medium average ranking.

The *Inland Rail Implementation Group Report to the Australian Government* (Inland Rail Implementation Group 2015) compared maritime freight, air freight, road freight, and upgrading the existing east coast railway, to constructing Inland Rail. It found maritime shipping and air freight were not viable alternatives to Inland Rail. Road transport would require substantial additional investment that is unlikely to meet the long term needs for Australia's freight task.

Alternative rail solutions

The *Inland Rail Implementation Group Report* assessed the feasibility of upgrading the existing east coast railway, and constructing a new inland railway. It determined that progressive upgrades of the north-south rail corridor (coastal railway) delivered significant improvements in capacity, performance, and reliability. However, structural limitations of the existing rail alignment, shared track with passenger rail in some locations, and inability to accommodate double stacked container trains, constrain rail's capacity to support additional freight on the east coast, particularly between Sydney and Brisbane.

The Department acknowledges the constraints associated with moving freight trains through the Sydney rail network, and accepts that its use would not be competitive with road transport in terms of cost or time, even with significant further investment.

Alternative corridors

The *North-South Rail Corridor Study* (Department of Transport and Regional Services, 2006) and *Melbourne-Brisbane Inland Rail Alignment Study* (ARTC, 2010) identified potential routes for Inland Rail, which were compared based on operating efficiency, infrastructure requirements, market demand, environmental constraints, land issues, railway operation considerations, and financial and economic viability.

The Department is satisfied that the proposed alignment provides a considered balance between environmental costs and benefits, engineering constraints, railway operational requirements, and economic viability. Inland Rail will increase capacity for freight and passenger services by reducing congestion along the coastal route.

3.4 Preferred route selection

An inland rail has been undergoing route selection since 2006, with the first route identified in 2010 in ARTC's *Melbourne to Brisbane Inland Rail Alignment Study* (2010). The *Melbourne to Brisbane Inland Rail Alignment Study* (ARTC, 2010) identified potential routes for Inland Rail, which were compared in terms of operating efficiency, infrastructure requirements, market demand, environmental constraints, land issues, railway operation considerations, and financial and economic viability. To support the development of a freight route between Melbourne and Brisbane, four sub-corridors were identified as potential connections, with alternative routes between Melbourne and Junee, via Shepparton or via Albury. The four sub-corridors comprised:

- Far-western sub-corridor (shown in **Figure 3**) – linking Junee to Brisbane via Parkes, Dubbo and/or Narromine, Coonamble, Burren Junction, Narrabri and/or Moree, North Star, Goondiwindi, Warwick and/or Toowoomba
- Central inland sub-corridor – linking Junee to Brisbane via any inland route that includes the Werris Creek to Armidale to Tenterfield rail links
- Coastal sub-corridor – following the existing coastal route between Junee and Brisbane (via Goulburn), through Sydney

- Hybrid sub-corridor – combining elements of an inland and coastal route, linking Junee to Brisbane via Muswellbrook and Maitland.

Within each of these sub-corridors, 136 possible route options were investigated. The study identified that the far-western sub-corridor was preferred, subject to potential demand, financial issues, environmental issues, and infrastructure costs relevant to the four sub-corridors. The Narromine to Narrabri section is within this sub-corridor.

Planning for the preferred route in the far-western sub-corridor investigated 136 potential route alignments. Four key routes were short-listed after analysing route options using the following methodology:

- identification of the route – evaluation of the route options
- analysis of the route – in terms of capital cost, environmental impacts, and journey time, as well as preliminary economic and financial viability
- development of the preferred alignment – the alignment considered environmental and engineering factors.

Figure 3 | Far-western sub-corridor identified by the North-South Rail Corridor Study (Source: PIAR)

The four main routes identified are shown in **Figure 4** (in the Central Section):

- Parkes to Moree via Werris Creek, using existing track (with a new section of track at Binnaway and Werris Creek)
- Parkes to Moree via Binnaway and Narrabri, using existing track to Binnaway, then a new section connecting to the existing track near Emerald Hill or Baan Baa

- Parkes to Moree via Curban, Gwabegar, and Narrabri, using existing track to Narromine, predominately new track between Narromine and Narrabri, and existing track from Narrabri to Moree
- Parkes to Moree via Burren Junction, using existing track to Narromine, and predominately new track via Coonamble and Burren Junction to Moree.

Figure 4 | Short-listed options (Source: PIAR)

The outcome of the investigations determined that the Parkes to Moree via Curban, Gwabegar, and Narrabri was the preferred option. However, further assessment was required between Narromine to Narrabri and the selected route / concept alignment.

From 2016 to 2017, options analysis considered the preferred location for the route between Narromine to Narrabri and study area. The study area refined the route to provide opportunities to address flooding, community and environmental impacts. The route selection process identified key considerations including whether the route should:

- travel east or west from Narromine towards Narrabri
- travel via Gilgandra, Coonamble, or Gulargambone using existing rail lines, or a more direct alignment involving greenfield track through the Pilliga Forest
- travel east or west of Narrabri.

East or west of Narromine

Travelling east of Narromine was identified as the preferred option, as it was the best performing in terms of technical viability, constructability, safety outcomes, flooding risk, and community impacts. The Proponent acknowledged that travelling west of Narromine increased community and amenity impacts of the project, as the rail line would be located further within the defined study area. The eastern option locates the route alignment further away on the southern edge of the study area.

Flood impacts were another key consideration. The Proponent identified that locating the eastern option upstream from Narromine would provide less flood risk to the town compared to the western option. Travelling to the east also has a shorter track length within the Macquarie River floodplain, of 10 km rather than 21 km required with the western option.

Gilgandra, Coonamble, Gulargambone, or via the Pilliga Forest

A direct route through the Pilliga Forest was preferred as it reduced transit times, property impacts and construction costs. The Pilliga Forest route also improved geotechnical and hydrology impacts.

Alternative route alignment options via Gilgandra, Coonamble, and Gulargambone increased property and amenity impacts, required longer transit times, higher capital costs, increased flood risk and associated mitigation, and increased soil erosion concerns.

East or west of Narrabri

The Proponent's route analysis indicates that route options through and to the east of Narrabri were not considered viable, primarily due to operational constraints, community severance, and amenity impacts. The eastern option would also threaten further growth within Narrabri.

The alternative route proposed by the community was located 8km further west of the preferred alignment,. This route closely parallels parts of two alignments considered by the Proponent in its route analysis. This analysis indicated that flooding risks were considerable with this western option, and other options further west of Narrabri. These routes were located in a lower catchment within the Namoi River, which would increase flood risk for properties located near the project. Mitigation measures and controls to address flooding impacts would increase construction costs and the construction process, reducing the overall benefits of the project.

While the eastern option would not increase flood risk, this route option was not preferred as it would impact on future growth of the area and would impact on Narrabri Airport. The eastern option contained geotechnical and access constraints, requiring additional rail infrastructure including grade separations (bridges).

Following further consideration, the western option was identified as preferable, to minimise community and amenity impacts, and reduce construction costs due to the minimal earthworks and rail structures required in comparison with the eastern route.

Preferred alignment

A number of community submissions raised concerns with the route options selection process, particularly the lack of community consultation about the change from the western Narromine option to the east of Narromine, and the alignment's proximity to Narrabri, with consequential flooding risks. The Department particularly acknowledges the time and resources expended by the Narrabri Inland Rail Concerned Residents Group in advocating for its suggested alignment to the west of Narrabri.

Submissions from community groups such as Knitting Nannas, Friends of the Pilliga, the Native Title claimant group, and separate individuals raised concerns with the alignment traversing the Pilliga, concerned that viable alternatives avoiding this large remnant bushland were discounted.

The Department exhibited the PIAR's additional information on the route selection process, and the Proponent's further assessment about the ability to mitigate flood damage on the selected alignment through design initiatives. This has provided additional opportunity for the Proponent to engage with the community regarding the route selection process, and for the community to comment on the supplementary assessment and justifications.

Whilst reduced construction costs and flood impacts could potentially favour the alternate routes over the final selected route, consideration of environmental, social, operational and other factors were important considerations for the Proponent in determining its preferred alignment.

The Department has not undertaken a comparative environmental assessment of alternative routes for the proposal. The Department is satisfied that an adequate investigation of alternatives has been undertaken by the Proponent and clear responses to justify the preferred alignment have been provided. Given this, the Department's role is to assess the proposal as presented in the EIS and PIAR to determine whether its residual environmental impacts (i.e. those remaining after application of the Proponent's mitigation measures and any conditions of approval) are acceptable. As discussed in **Section 6**, the Department is satisfied that is the case.

4 Statutory context

4.1 State significance

The project is critical State significant infrastructure (CSSI) under section 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Minister for Planning is the approval authority.

4.2 State and Commonwealth approvals and legislation

State approvals and legislation

The project is for the purpose of a railway or rail infrastructure facilities and is characterised as development permitted without consent in accordance with clause 2.92 of *State Environmental Planning Policy (Transport and Infrastructure) 2021* (the Transport and Infrastructure SEPP). The Department notes the project route does not include land reserved under the *National Parks and Wildlife Act 1974* that would limit the ability to undertake the project as development without consent.

In accordance with section 5.22(2) of the EP&A Act, environmental planning instruments that apply to the project are the Transport and Infrastructure SEPP (where it relates to the declaration of development that does not require consent) and *State Environmental Planning Policy (Planning Systems) 2021* (which declared the infrastructure as State significant infrastructure). No other environmental planning instruments apply to the project.

The construction of the project is likely to require an Environment Protection Licence (EPL) issued by the EPA under the *Protection of the Environment Operations Act 1997*.

Other legislation that applies to the project includes *Land Acquisition (Just Terms Compensation) Act 1991* and *Contaminated Land Management Act 1997*.

Commonwealth approvals and legislation

On 5 November 2018, the former Commonwealth Department of the Environment and Energy (now the Department of Climate Change, Energy, the Environment and Water (DCCEEW)) determined the project to be a 'controlled action' under section 18 and 18A of *the Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as it was considered likely that the project could have a significant impact on listed threatened species and communities.

Following notification from the Commonwealth that the project was a controlled action, the Department confirmed the project would be assessed in accordance with an accredited assessment process under section 87 of the EPBC Act. Schedule 1 of the NSW Assessment Bilateral Agreement, as amended by the Amending Agreement No.1 (dated March 2020) has accredited the NSW assessment process under the EP&A Act for the purposes of the EPBC Act, thus enabling a single assessment of the project. Approval under the EPBC Act is still required from the Commonwealth decision-maker.

Assessment of Matters of National Environmental Significance is provided in **Section 6.2** and includes sufficient detail such that the Commonwealth decision maker may consider these impacts when determining whether to approve the project. Additionally, this report makes a recommendation and proposes conditions to the Commonwealth Minister for the Environment and Water in relation to an approval decision under the EPBC Act.

4.3 Mandatory matters for consideration

Objects of the Environmental Planning and Assessment Act 1979

The determination must have regard to the objects of the EP&A Act. The Department considered the objects of the EP&A Act including:

- ecologically sustainable development (see **Section 4.3** and **6**)
- social and economic welfare (see **Section 6**)
- justification of the project, in terms of the orderly and economic use of land, and how it would affect travel and access (see **Section 6**)
- protection of the environment, including in relation to biodiversity, traffic, noise and vibration, air quality, surface and groundwater, hydrology and flooding, urban design, amenity and social and economic issues (see **Section 6**)
- sustainable management of built and cultural heritage, including Aboriginal cultural heritage (see **Section 6**)
- good design and amenity of the built environment (see **Section 6**)
- promote the sharing of the responsibility for environmental planning and assessment between the different levels of government (see **Section 5**)
- community participation in the assessment of the project (see **Section 5**).

Ecologically sustainable development

The EP&A Act adopts the definition of ESD found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental consideration in decision-making process and that ESD be achieved through the implementation of:

- the precautionary principle
- inter-generational equity
- conservation of biological diversity and ecological integrity
- improved valuation, pricing and incentive mechanisms.

The Proponent addressed these principles in the EIS, including detailed discussion on the sustainability of the project, detailed studies and/or consideration in the areas of noise and vibration, air quality, heritage, biodiversity, socio-economic, flooding and hydrology, climate change, and cumulative impacts. The Proponent identified a range of mitigation measures to manage impacts associated with these. Further, projectobjectives which guide the delivery and operation of the project contribute to the sustainability of the project and the meeting of ESD principles.

The Department has recommended conditions of approval requiring the:

- preparation of a Sustainability Strategy implemented throughout the design, construction and operation of the project. The Strategy will identify opportunities to reduce operational greenhouse gas emissions and other sustainability initiatives
- project to achieve a minimum “Excellent” ‘Design’ and ‘As built’ rating under the Infrastructure Sustainability Council of Australia infrastructure rating tool **OR** the project achieve a best practice level of performance for the CSSI using market leading sustainability ratings tools, such as ISCA and Greenstar
- Proponent to offset the biodiversity impacts of the project.

The precautionary principle is applied throughout the EIS, and the Department considers the assessment and range of mitigation measures adequately adopt the principle. The Department is satisfied that the valuation and pricing of the environmental resources associated with the project has been adequately undertaken and internalised through the project design and mitigation measures.

In conclusion, the Department considers that the project is consistent with the principles of ESD.

4.4 Biodiversity Development Assessment Report

A Biodiversity Development Assessment Report (BDAR) was prepared in accordance with the Biodiversity Assessment Method 2020 (BAM) and requirements of the *Biodiversity Conservation Act 2016* (BC Act). The revised BDAR and Aquatic Ecology report assessed the biodiversity values of the study area, and considered construction and operational impacts on native vegetation including terrestrial and aquatic threatened species and communities, and Matters of National Environmental Significance (under the EPBC Act). Most of the project is located on freehold land used for grazing and cropping, and forestry land in the Pilliga State Forest managed by Forestry Corporation of NSW.

The BDAR confirmed the project would impact threatened flora, fauna and ecological communities identified as Matters of National Environmental Significance (MNES) under the EPBC Act. Ecological species impacted include 6.5 hectares (ha) of Weeping Myall Woodland, 7.2 ha of Brigalow (*Acacia harpophylla* dominant and co-dominant), 15.9 ha of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and derived native grasslands, 76.3 ha of Poplar Box grassy woodland, and 8.0 ha of White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Of these, three are subject to serious and irreversible impacts (Box Gum Woodland, Fuzzy Box Woodland, and Brigalow). Threatened flora species with significant habitat impacts include *Commersonia procumbens, Tylophora linearis*, *Lepidium monoplocoides*, and *Lepidium aschersonii*.

Threatened fauna species with significant impacts include the Koala, Corben's Long-Eared Bat, Pilliga Mouse, Painted Honeyeater, Regent Honeyeater, and Swift Parrot. In addition to the flora, fauna, and ecological MNES communities, substantial impacts on species credit fauna species under the BC Act are expected to impact the Barking Owl, Masked Owl, Glossy Black-cockatoo, Squirrel Glider, Eastern Pygmy-possum, Bush Stone-curlew, Little Eagle, Square-tailed Kite, Rufous Bettong, and Pale-headed Snake.

The Aquatic Ecology report identified one aquatic endangered ecological community (EEC), two endangered populations, and six threatened species listed under the EPBC Act and/or *Fisheries Management Act 1994* (FM Act) recorded or predicted to occur in watercourses within the project construction footprint. The report concluded that the project would not have a long-term adverse impact on threatened aquatic species or communities due to the proposed design, mitigation measures, and rehabilitation strategy.

The Proponent has committed to implement mitigation measures, including improving fauna connectivity by implementing a fauna connectivity strategy, locating temporary infrastructure in disturbed or non-native vegetation areas where possible, conducting pre-clearing surveys for flora and fauna, minimising impacts to riparian vegetation and aquatic habitat, mapping and fencing sensitive areas, and implementing biosecurity and weed management measures.

The Department has recommended conditions that specify the ecosystem credits and species credits required for the project, preparation and implementation of a Biodiversity Management Plan to manage impacts on biodiversity during the construction and operation of the project, and implementation of a fauna connectivity strategy.

5 Engagement

5.1 Department's engagement

Under section 5.28(1)(c) of the EP&A Act, the Planning Secretary is required to make the EIS publicly available. The EIS (see **Appendix B**) was made publicly available from 8 December 2020 until 7 February 2021 (62 days) on the Department's planning portal.

Notification of exhibition of the EIS was advertised in The Australian, Sydney Morning Herald, Daily Telegraph, Coonabarabran Times, Gilgandra Weekly, Narromine News, Narrabri North West Courier, Dubbo Mailbox Shopper, and Coonamble Times newspapers on 8, 9 and 10 December 2020. The Department notified relevant State and local government authorities of the exhibition in writing.

5.2 Summary of advice received from Government agencies

During the EIS exhibition, the Department received advice from ten Government agencies. A summary is provided in **Table 2.** A link to the full copy of the submissions is provided in **Appendix C.**

Table 2 | Summary of EIS agency advice

Government agency	Advice
Biodiversity and Conservation Science Directorate (BCS)	BCS made detailed recommendations for biodiversity, flooding and hydrology and recommended the Proponent undertake further biodiversity and flooding assessments to mitigate impacts to urban centres and threatened fauna and flora species. BCS also noted that, in reference to the Biodiversity Assessment Method (BAM), separate habitat suitability assessments must be completed for each Interim Biogeographic Regionalisation for Australia (IBRA) subregion the project intersects. BCS noted this will alter vegetation mapping, species credit species polygons, and ecosystem and species credit requirements, making it crucial to ensure the proper assessment of the project's impacts.
Crown Lands	Crown Lands advised that a license must be in place prior to any works commencing on any Crown land and that acquisition may be required for project use of Crown land.
DPI Agriculture	DPI Agriculture advised the Proponent to have ongoing consultation with any impacted agricultural operators to deal with both immediate issues and ongoing operational impacts associated with the project.
DPI Fisheries	DPI Fisheries advised that the design of any proposed bridge, culverts or waterway crossings, must comply with *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (NSW Fisheries 2003), and *Policy and Guidelines for Fish Habitat Conservation and Management* (update 2013). Additionally, scour protection below waterway crossings must be designed to ensure fish passage is not impeded. Environmental management plans should be prepared to minimise disturbance footprints and re-establish riparian and aquatic habitat features. The Proponent is recommended to consult DPI Fisheries

	regarding use of felled trees as snags to rehabilitate the habitat of Key Fish Habitats.
Environment Protection Authority (EPA)	EPA provided comments: • clarification be provided on impacts to receivers further than 3 km from works • clarification of sensitive receivers that have been considered in assessment • further information and justification be provided if work outside of standard hours is proposed • in accordance with the requirements of the Noise Policy for Industry (NPfI), EPA requests assessment of the construction camp assess modifying factors according to NPfI Fact Sheet C • requests that further information and clarification be provided for the potential noise mitigation measures available to reduce impacts at receivers, including administrative measures such as respite, engineering controls and community engagement • requests that an unexpected finds protocol be included as a condition of Approval EPA made recommendations: • that architectural treatments be considered for implementation prior to construction works starting, to reduce noise from construction in addition to operational noise • Conditions of Approval require a Soil and Water Management sub-plan as part of a Construction Environmental Management Plan (CEMP) and a Water Quality Monitoring Program • Conditions of Approval include preparation and implementation of an Air Quality Management Plan as part of the CEMP.
Forestry Corporation NSW (FCNSW)	FCNSW **-** Western Region projectmade comments: • details of the electricity supply system proposed to service the Pilliga crossing loop • that the Proponent further considers the potential road closures outlined in the EIS, and a commitment to work with FCNSW regarding the 6.7 km realignment of Pilliga Forest Way, to ensure any road closures and changes to existing road interactions do not impact land access arrangements • requests further information regarding whether the Proponent would provide vehicle access opposite the rail line to compensate for the closure of Pilliga Forest Way • traffic numbers listed in for Pilliga Forest Way are underestimated • requests clarification regarding how length of the temporary closure of the Aloes picnic and camping site, and whether alternate facilities would be provided • requests clarification relating to ground water overflow impacts from culverts • requests the preservation of construction haulage routes for future use by FCNSW • requests further discussion relating to forest clearing • requests that the Response to Submissions (RtS) address how the Proponent would re-establish fencing and access in State Forests where grazing activities are impacted

	• requests further information regarding whether the dam in Cumbil State Forest that would be impacted by the project would be relocated and re-established • requests information relating to bushfire concerns in State Forests • requests that a member of FCNSW is a member of any biodiversity advisory panel to provide input into the projects affecting State Forest.
Heritage NSW - Aboriginal Cultural Heritage	Heritage NSW - Aboriginal Cultural Heritage –recommends actions to further minimise potential threats to Aboriginal objects, strengthen the intergeneration equity opportunities for local Aboriginal people and offset harm to Aboriginal heritage. It included several recommendations including: • Establish precautions for minimising harm to potential traditional burials • Implement sediment control measures to protect Aboriginal sites in proximity to creek lines • Undertake cultural plant surveys • Undertake Aboriginal Cultural Heritage Surveys outside of the study area to offset damage to Aboriginal sites and objects from the project • Validate Aboriginal scarred trees post project approval.
Heritage NSW – Heritage Council of NSW	Heritage NSW – Heritage Council of NSW project provided the following comments: • supports the detailed assessment that has been undertaken to avoid and minimise impacts to heritage items located outside the 500 m buffer either side of the project • requests an archaeological assessment, supported with a research design and methodology, be prepared where impacts to archaeology are expected to occur. Test excavations should also be undertaken in the development footprint. Heritage NSW recommends Conditions of Approval including: • requirement to engage a suitably qualified archaeologist to prepare a detailed archaeological assessment for each archaeological/heritage item subject to impact • all archaeological investigations be undertaken by a suitably qualified excavation director • production of a final report within twelve months of the completion of the archaeological activity, submitted to Heritage NSW • formulation of an unexpected finds protocol.
Transport for NSW (TfNSW)	TfNSW made comments on the proposed at grade crossings on classified roads. TfNSW advised that the number of level crossings and proposed road alignment are unsatisfactory regarding road safety. TfNSW highlighted matters in the EIS that require further information, relating to traffic and transport matters.
Water Group – Department of Planning and Environment (DPE Water)	DPE Water advised that insufficient information was supplied to determine whether a secure water supply is available, and advised adequate compensation must be given, or an alternative water supply be arranged, as a result of any bores being decommissioned. The Proponent must also assess whether the flood related impacts meet the criteria of the respective floodplain management plans.

5.3 Summary of submissions

During the EIS exhibition, the Department received a total of 108 submissions on the project, including 88 from individuals, 5 from local council and 15 from special interest groups. A summary of the submissions is provided in **Table 3** and **Table 4,** and a link to the full copy of the submissions is provided in **Appendix C**.

Table 3 | Summary of Council submissions

Council	Comments
Coonamble Shire Council	Council does not object to the project. However, Council requests that an alternate rail route be considered to provide direct access to Coonamble township and maximise the economic, social and environmental benefits of the project. Council also requested: • all design plans that interact with public road, waste management, and water supply network, and all design plans of level crossings, be submitted to Council for approval • Council, the Proponent, and TfNSW, must meet to discuss road related issues, design requirements for level crossings, and agree on a consistent approach to improve the road network • that any construction compounds and material stockpiles be designed to enable safe access onto public roads, and adequate buffers between dwellings and waterways • adequate consultation with Coonamble Local Aboriginal Land Council be undertaken.
Gilgandra Shire Council	Council does not object to the project, but made comments on the EIS' adequacy and the social, economic, biodiversity, water and flooding, and traffic and transport impacts of the project.
Narrabri Shire Council	Council does not object to the project. However, Council acknowledged that the proposed route does not provide a positive economic outcome for the Narrabri Shire. Council raised concerns relating to the accuracy of the flood modelling undertaken to inform the project, and request the Proponent demonstrate that the project would not negatively impact the community from increased flood risk.
Narromine Shire Council	Supports the project. However, Council has raised concerns relating to the potential social, economic, traffic and transport, land use, water and flooding, and biodiversity impacts from the project. Council raised concerns relating to: • the lack of grade separation planned for the Eumungerie–Narromine Rail Road and Tomingley–Narromine Road • the lack of detail regarding traffic management and haulage and construction routes • flood modelling • impacts on agricultural land.
Warrumbungle Shire Council	Did not object to the project. However, Council raised concerns relating to the impact that the project would have on the community.

Table 4 | Summary of special interest group and community submissions

Submitter	Number	Position
Special Interest Group	**15**	
Baradine Showground Racecourse	1	Support
DWF Australia	1	Object
Friends of the Pilliga	1	Comment
GrainCorp Operation Pty Ltd	1	Support
IMAC Ag Pty Ltd	1	Object
Knitting Nannas New England North West	1	Object
Narrabri Shire Council Floodplain Risk Management Committee	1	Comment
Neville Roberts Family Settlement	1	Comment
North West Local Land Services	1	Comment
North West Protection Advocacy	1	Object
NSW Farmers and the Country Women's Association of NSW	1	Object
Regional Quarries Australia Pty Ltd	1	Object
Singleton Shire Healthy Environment Group	1	Comment
Tomingley Gold Operations Pty Ltd	1	Comment
Wando Conservation and Cultural Centre Inc	1	Object
Community Members	**88**	
Within project area	69	50 object 14 comment 5 support
Within NSW	15	10 object 5 comment
Interstate	4	4 object

5.4 Key issues raised in submissions

The Department received 88 submissions from community members and 15 submissions from special interest groups. Details and consideration of the issues raised are provided in the key assessment issues in **Section 6** and **Appendix F**.

The key issues related to the project are summarised below.

Route selection

- The project does not align with the original project intent of supporting the economic development and export potential of rural areas
- The alignment through the Pilliga is in the private interest and not the public interest
- Concern for the lack of connectivity with existing rail lines
- The route should not go through the Pilliga, and existing rail lines should be considered to avoid impacts to both the unique and diverse environment, and to landholders
- Concern for the rail alignment through travelling stock reserves
- Concern for the restricted future development of rural towns
- Lack of benefits to regional communities under the proposed alignment, and lack of accessibility for regional produce
- Concern that the project is not justified, has inappropriate impacts, inadequate assessment, and does not demonstrate regard for the objects of the EP&A Act and the precautionary principle
- Concern for property severance and impacts to agricultural land, adequate compensation, and loss of access to private property
- Concern for a thorough cost/benefit analysis for the project, and a proper economic analysis
- Inadequate environmental risk assessment and underestimation of direct and indirect impacts.
- Concern that the project does not comply with legislative and planning requirements
- Need to consider an electric train to reduce climate impact, as well as construction of an asset that does not rely on diesel, to remain competitive (e.g. electric trucks).

Alternate route

- The need to consider an alternative alignment to the west of Narrabri
- Concern for the lack of consideration of the alternate route option using the existing track at Coonamble
- Concerns with the eastern alignment of Narromine and lack of consultation in changing the western alignment
- Concerns for the route selection process and necessity for an independent review and evaluation.

Traffic and transport

- Inadequate traffic and transport assessment and absence of traffic access management plans
- Impacts to local roads during construction and operation
- Inadequate consideration of level crossing impacts
- Insufficient grade separation
- Concern for increased traffic during construction of the project.

Noise and vibration

- Concern for operational noise and vibration impacts to business and livestock, sleep disturbance, noise impacts during construction, and inadequate criteria to assess actual noise impacts experienced by receivers
- Noise impacts of level crossings
- Concern for the assessment of noise and vibration impacts, and subsequent acoustic treatments, as well as commitment to deliver noise treatments for sensitive receivers
- Request for noise walls
- Adequacy of the noise assessment and consideration of low levels of background noise
- Need for more detailed identification of construction and operational noise mitigation measures
- Concern for vibration impacts on neighbouring buildings and infrastructure.

Amenity

- Concern for air quality impact and visual impacts
- Inadequate visual impact assessment in consideration of the high visual amenity of the project area
- Inadequate air quality impact assessment and consideration of the scope of emissions
- Impacts on amenity of village life.

Flooding

- Concern for the flooding assessment at Narromine, regarding the unusual hydraulic characteristics of the area
- Concern for the flooding impact at Narrabri, and the modelling and assessment undertaken
- An alternative route to the west of Narrabri would improve flood outcomes
- Flood modelling is inconsistent with Council modelling
- Increased flood risks and impacts, including impacts on flood evacuation routes
- Inadequate flood mapping, flood modelling, lack of clarity on input data/omission of data in the EIS, lack of information in the EIS to enable an independent review of modelling assumptions, and for individual property owners to determine impacts to properties
- Flood modelling underestimates Warrumbungles runoff
- Insufficient number of drainage structures
- Flood impacts on soil erosion
- Concern for construction in flood prone areas and increased flood risk.

Biodiversity

- The potential mortality impact for fauna along the Pilliga alignment
- Concern for biosecurity and weed impacts to the Pilliga
- Concern for the impact to threatened flora and fauna and ecological communities throughout the Pilliga
- The need for adequate rehabilitation plans and management
- Inadequate cumulative impact assessment and inability to achieve appropriate offsets
- Concern for the lack of consideration in the ecological assessment, with regard to the footprint identified.

Property and land use

- Proposal negatively affects existing property access
- Negative impacts on farm operations
- Insufficient rail crossing points within properties
- Impacts on travelling stock route access
- Suggestion to use Baradine Showground as an accommodation camp site
- Impact on current and potential future rural-residential developments
- Proposed fencing is not appropriate for agricultural uses
- Property access during construction
- Impacts on property values.

Water supply for construction and groundwater bores

- Lack of clarity on the number of bores required, location of bores, construction water supply/volume and sources, and if water would be sourced from the Great Artesian Basin
- Concern for the lowering of the water table and the subsequent operation of existing bores
- Concern for the assessment and impacts of construction water use on water drawdown and groundwater
- Need to mitigate impacts on groundwater supply

- Concern in relation to operational vibration impacts on existing bores, and potential need for new bores and compliance requirements that would be less productive.

Heritage

- Inadequate assessment of Aboriginal heritage with regard to the significance of the landscape, as opposed to individual sites
- Concern for the cumulative impact to Aboriginal cultural heritage
- Concern for the impact to non-Aboriginal heritage.

Community and stakeholder consultation

- Superficial consultation, lack of meaningful engagement, and consideration of local knowledge
- Concern for lack of transparency and discussion of potential issues with the public
- Concern for lack of transparency from the Proponent and the involvement of the Community Consultative Committee in meaningful discussions
- Inadequate communication of the route selection and discussion with the community
- Concern for the disregard of community suggestions and the ability to have an open discussion and ask questions
- Concern for the lack of involvement and consultation in selecting appropriate mitigation measures.

Construction impacts

- Need to clarify location for temporary workers accommodation and reach agreement with affected stakeholders
- Inadequate consideration of the impact on housing and accommodation in consideration of anticipated four years of construction, and availability of workers for other local employment
- Concern for the impacts on local emergency and health services with additional construction workers
- Concern for the operation of temporary workforce accommodation sites and rehabilitation of construction areas
- Querying need for borrow sites when there are existing quarries in the area.

Operational impacts

- Concern for the safety of level crossings in certain locations, especially to vehicle traffic at night
- Concern for adequate fencing along the alignment, fencing maintenance, and safety
- Concern for the design and location of level crossings
- Concern for the maintenance of culverts, and impacts of proposed culverts on surrounding area.

The main issues mentioned in the community submissions is illustrated in **Figure 5**.

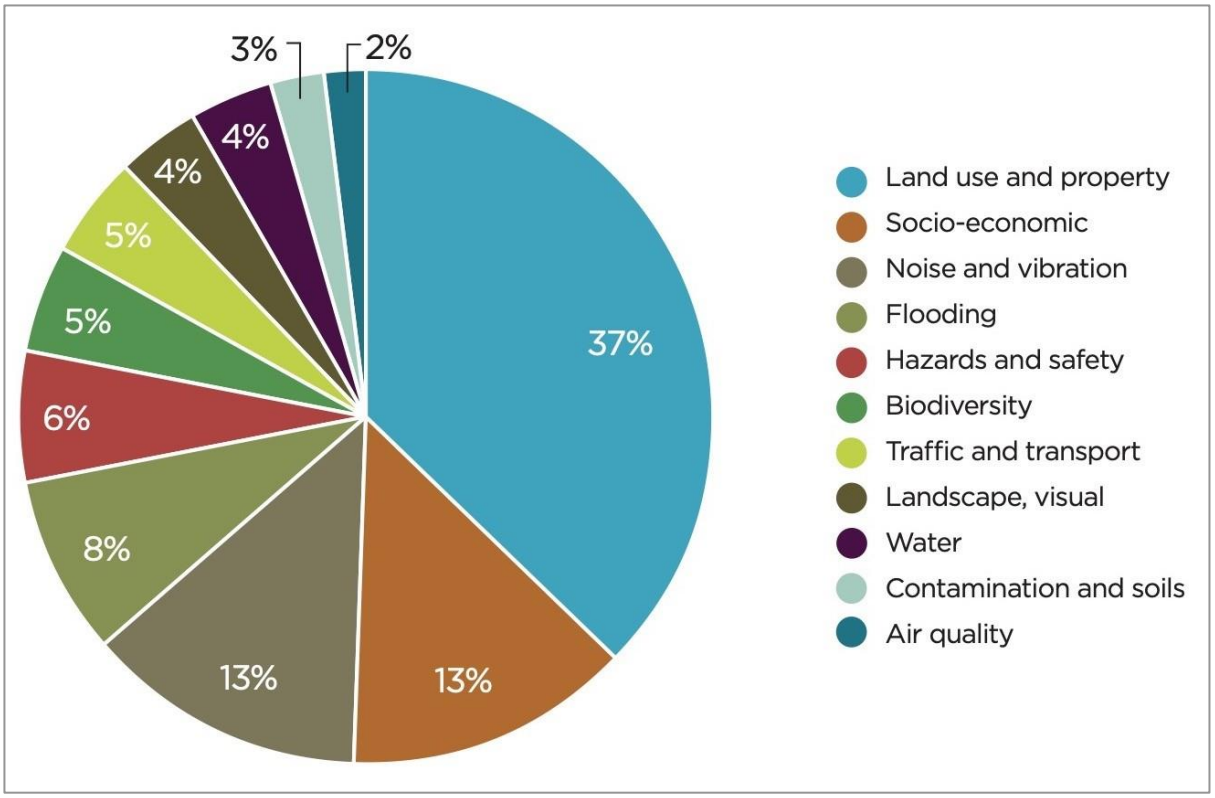


Figure 5 | Main issues in community submissions (Source: ARTC RtS 2022)

5.5 Response to submissions

Following the exhibition of the EIS, the Department provided the Proponent with submissions and requested the Proponent prepare a response to submissions. The Proponent's RtS (**Appendix D**) was made publicly available on the Department's website on 31 August 2022. The RtS updated the:

- mitigation measures
- biodiversity development assessment report
- noise and vibration assessment – construction and other operations report
- noise and vibration assessment – operational rail report
- flooding and hydrology assessment report.

5.6 Preferred Infrastructure Report / Amendment Report

On 30 April 2021, the Department required the Proponent prepare a Preferred Infrastructure Report (PIR) to address the hydrology and flooding impacts raised by submissions and its independent review, justify the design of the project, and outline alternate rail alignments considered where flooding impacts are predicted.

On 17 May 2021, the Proponent sought the Planning Secretary's approval to prepare an Amendment Report on proposed changes to the design of the project, to minimise its environmental impacts and respond to concerns raised in EIS submissions.

The Proponent submitted a combined Preferred Infrastructure and Amendment Report (PIAR) (see **Appendix E**) in August 2022. The Department made the PIAR publicly available between 31 August 2022 and 23 September 2022 (24 days) on the Department's website.

The Department advertised exhibition of the PIAR in the Coonabarabran Times, Gilgandra Weekly, Sydney Morning Herald, Narrabri North West Courier, Dubbo Mailbox Shopper, Daily Telegraph, Coonamble Times, and The Australian newspapers on 30 August, 31 August and 1 September 2022. The Department notified State and local government authorities of the PIAR exhibition.

The proposed amendments to the project would minimise potential impacts of the project in respect to land use and property, and traffic and access, and to consider further design refinements. A summary of the proposed amendments is provided in **Table 5**.

Table 5 | Summary of proposed amendments

Proposal feature	Proposed amendment
Crossing loops	Relocation of seven crossing loops to new locations to minimise overall impacts
Public level crossings	Changes to crossing numbers, locations and treatments due to changes to crossing loop locations, updated traffic data and refinement of sight distances
Public road closures	Reduction in the number of public road and access tracks that would need to be closed as a result of the crossing loop relocations
Public road realignments	Changes to the public roads requiring realignment to minimise property impacts
Temporary workforce accommodation	Changes to the location of the Narromine North and Baradine temporary workforce accommodation facilities based on consultation with key stakeholders Mobile accommodation facilities to be provided within some general compounds to improve workforce flexibility
Construction and operation footprint	Adjustments to the construction and operation footprints as a result of the above amendments and other proposed design refinements. Drainage control areas at a number of drainage culverts to provide space outside the rail corridor to manage exceedances of the quantitative design limits

The exhibition of the PIAR resulted in advice from 10 government agencies and 56 submissions, including, 4 from councils, 43 from the community and 9 from special interest groups. A summary of the issues raised in the advice and submissions received is provided at **Table 6** to **Table 8**.

5.7 Summary of PIAR advice received from Government agencies

During the PIAR exhibition period, the Department received advice from ten Government agencies. A summary is provided in **Table 6**.

Table 6 | Summary of agency advice

Government agency	Advice
Biodiversity, Conservation and Science Directorate of Environment and Heritage Group (BCS)	BCS supported the refinement of likely impacts on biodiversity through ongoing field surveys, noting the significance of confirming the absence of Coolabah Bertya as a serious and irreversible impact entity.

	BCS raised concern regarding the assessment of residual prescribed impacts on fauna connectivity in the Pilliga Forest, noting assumptions made on impacts and efficacy of structures, and how it affects the calculation of final credits. BCS raised concern regarding inadequate response to previous comments on the expert report on the impacts to the Koala. BCS noted comments must be addressed to ensure the BAM requirements are satisfied, and that impacts are appropriately reflected in the species credits for the Koala.
DPI Agriculture	DPI Agriculture supports the commitment to ongoing consultation with the community and key stakeholders, and development of a communication management plan. DPI Agriculture acknowledged amendments to the project design and noted no further issues of concern.
DPI Fisheries	DPI Fisheries recommended conditions with regard to fish passage, riparian buffer zones, and consultation relating to CEMPs.
Environment Protection Authority (EPA)	EPA raised concerns regarding noise and vibration. EPA noted the project does not comply with the *Interim Construction Noise Guideline* concerning works outside of the standard hours, justification for the project, evidence of community support, and management and mitigation of impacts. EPA recommended that conditions address early implementation of mitigation and respite periods during construction, as it will be essential for the community. EPA noted no further concern on water quality, air quality or contamination.
North West Local Land Services (NWLLS)	NWLLS raised concern with regard to consultation on the Calrossie TSR, management of culverts to ensure functionality and maintenance, and inadequate mitigation measures for a high-level unacceptable risk to human and livestock safety in the Arrow TSR. NWLLS raised concern with recommendations based on unknown levels of risk and lack of consideration for an alternate TSR area or rail realignment, as opposed to reducing risk of the project.
Heritage NSW - Aboriginal Cultural Heritage	Heritage NSW - Aboriginal Cultural Heritage supports the proposed management recommendations and recommended a draft condition for an Aboriginal Cultural Heritage Management Plan to allow post approval surveys and excavations, and for consideration for potential burials in alluvium landforms to be mapped. Heritage NSW requested evidence of continuous consultation with RAPs, and clarification on the number of scarred trees impacted by the project. Heritage NSW requested further consultation in relation to additional surveys and test excavations.
Heritage Council of NSW	Heritage Council of NSW noted that no additional non-Aboriginal heritage items would be impacted by the project and no concerns were raised.
Transport for NSW (TfNSW)	TfNSW raised concern in relation to unresolved matters regarding grade separation, flooding, construction access points, and maritime requirements. TfNSW requested an opportunity to comprehensively assess outstanding information prior to determination of the project.
Water Group – Department of Planning and Environment (DPE Water)	DPE Water recommended amendments to mitigation measures in relation to surface water, to demonstrate consistency with submitted documentation and additional post-construction monitoring, to ensure the intended outcomes of the design are achieved. In relation to groundwater, DPE Water noted the Proponent is required to replace any decommissioned monitoring bores as a result of the project..

WaterNSW	project

5.8 Summary of PIAR submissions from councils

During PIAR exhibition, the Department received submissions from four local councils, and issues raised are summarised in **Table 7**.

Table 7 | Summary of council submissions

Council	Comments
Narrabri Shire Council	Council is supportive of the project. However, raised concern regarding the lack of assessment and consideration of the 'Narrabri Alternate Route' suggested by Council that demonstrates benefits for the community and the Proponent (primarily in relation to flood impact and capital investment value respectively). Additionally, Council raised concern with the location of temporary workforce accommodation, the nature of stakeholder engagement in the process, adequacy of the heritage assessment, traffic and transport impacts, and social and amenity impacts.
Gilgandra Shire Council	Gilgandra, Narromine and Warrumbungle Shire Councils made separate but nearly identical submissions. The councils are supportive of the project but raised concern with the post approval process with regard to the detailed design of the CSSI, local social and economic issues and communication with local communities, traffic and transport issues, impact upon Council drainage assets, groundwater impacts as a result of construction, and agricultural and land use issues as a result of land acquisition.
Narromine Shire Council	
Warrumbungle Shire Council	

5.9 Summary of PIAR submissions

During PIAR exhibition, the Department received 52 submissions, including 43 from community members and nine from special interest groups. The issues are summarised in **Table 8**.

Table 8 | Summary of community and special interest group submissions

Submitter	Number	Position
Special interest group	**9**	
APA Group	1	Comment
Auscott Properties Limited	1	Comment
Australian Plants Society – NSW	1	Object
Koala Action Inc.	1	Object
Narrabri Inland Rail Concerned Residents Group	1	Comment

National Parks Association of NSW	1	Object
North West Protection Advocacy	1	Object
NSW Farmers	1	Object
Wando Conservation and Cultural Centre Inc.	1	Object
Community Members	**43**	
Within project area	35	2 Support 4 Comment 29 Object
Within NSW	6	1 Support 1 Comment 4 Object
Interstate	1	Object
Unknown	1	Object
TOTAL	**52**	

The key issues raised in the submissions are summarised below.

Alternate route

- Need to consider and analyse alternate routes is a requirement under the SEARs for the project and was not adequately assessed by the Proponent
- Failure to conduct a proper cost benefit analysis for the provision of tangible and enduring benefits to regional communities in selecting the proposed route alignment
- Existing Coonamble to Gilgandra and Tomingley to Curban lines were not assessed/considered
- Alternative Narrabri route proposed and supported by the community was not assessed or acknowledged.

Traffic and transport

- The proposed alignment would not facilitate local freight travel and encourage more road freight in regional areas
- Concern for wait times and safety at level-crossings.

Noise

- Concern about the height of the viaduct at Narrabri, noise impacts, and the need for noise mitigation.

Amenity

- Concern for air quality impact and visual impacts.

Flooding

- Inadequate and outdated flood mapping
- High risk flood areas along the proposed alignment have not been appropriately assessed, through lack of informed analysis and holistic data
- Omission of catchments, watercourses and details about culverts
- Flood risk east and west of Narromine not adequately addressed.

Biodiversity

- Destruction of the Pilliga is not appropriate as it is a National Biodiversity hotspot
- Cumulative fragmentation and habitat destruction will alter the behaviour of threatened and endangered species, and increase light and noise impacts, feral pests, and changes to forest hydrology
- Concern for impacts to wetlands, lack of considerations to biodiversity, calculation of offsets, and achieving offsets
- Inadequate EIS/BDAR/PIAR as there was a failure to identify numerous EEC populations
- Inadequate vegetation mapping.

Community and stakeholder consultation

- Concern for the accuracy of the information provided by the Proponent, and the transparency, integrity and accountability in decision making for the project
- Concern for the utilisation of the Community Consultative Committee in decision making and achieving meaningful engagement. The concept of an inland rail line is generally supported, although local knowledge and advice has not been considered in the project design
- Concern for the absence of a social assessment and consultation
- Concern for the lack of information and detail in the Proponent's documentation regarding the property acquisition and compensation process, access to and within private property, and how detailed design during post approval will affect these processes.

Operational impacts

- Concern for fencing maintenance along the rail alignment
- Concern for safety with regard to stock movements and property severance
- Failure to consider all economic and social considerations for regional localities, their long-term agricultural productivity, and opportunity for use of freight rail.

The main issues raised are illustrated in **Figure** .

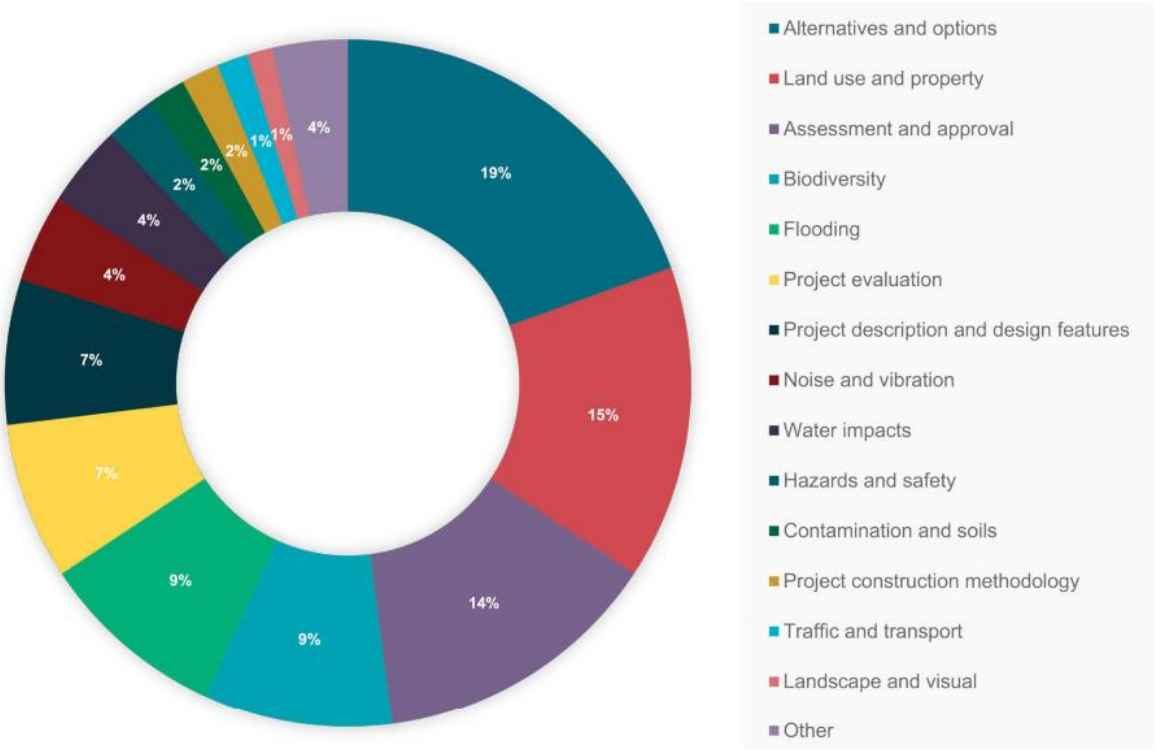


Figure 6 Key issues raised in community and special interest group submissions (Source: ARTC PIAR 2022)

5.10 PIAR RtS

Following the PIAR exhibition, the Department provided the Proponent with the government agencies advice and submissions from the councils and the community, and required the Proponent prepare an RtS. The Proponent's RtS was made publicly available on the Department's website on 18 November 2022. The Proponent reviewed issues raised in PIAR submissions and did not propose any further changes to the project as amended in the PIAR.

Mitigation measures identified in the EIS and amended in the PIAR were reviewed after consideration of the issues raised in submissions, and additional work undertaken since exhibition of the PIAR. These were updated to:

- make additional commitments to respond to issues raised in the submissions
- modify the wording in some instances so that the intent of the measure is clearer.

5.11 Community engagement

Department officers met with stakeholders prior to, during, and following exhibition of the EIS and PIAR, including included Councils that the project traverses, Narrabri and Narromine Local Aboriginal Land Councils, and landowners to provide an opportunity for stakeholders to discuss the project. The Department gained an understanding of local concerns, constraints, and issues. Ongoing engagement with government and non-government stakeholders has occurred prior to and during the assessment of the project.

The Proponent organised community engagement sessions on the EIS between 15 and 18 December 2020 at:

- Narrabri (15 December 2020)

- Baradine (16 December 2020)
- Coonamble (16 December 2020)
- Curban (17 December 2020)
- Gilgandra (17 December 2020)
- Narromine (18 December 2020).

The Department attended the Narrabri, Baradine, Coonamble and Curban sessions by videolink and Gilgandra and Narromine sessions in person. In addition, the Department met council officers and landowners at Gilgandra and Narromine separately to community engagement sessions.

On 3 and 4 February 2021, Department officers met with Narrabri Council and Warrumbungle Council officers, Narrabri Local Aboriginal Land Council members, and landowners in the northern part of the project. Concerns about the flooding impacts around Narrabri and impacts on agricultural land uses were raised. The Department attended the Narrabri community engagement session on 4 February 2021.

The Proponent established a Community Consultative Committee (CCC) for the project in late 2018, to inform community views on the project. Due to the length of the rail alignment, three sub-committees were established: Narromine CCC, Gilgandra CCC, and Narrabri CCC. The Department attended the December 2020 meetings of these three sub-committees and discussed EIS exhibition and how to make a submission. On 28, 29 and 30 March 2022, the Department attended meetings of the three CCC sub-committees and discussed the status of the project, and the Department's requirement that the Proponent prepare a PIAR to address flooding impacts.

The Department attended face to face community information sessions between 5 - 8 September 2022 during the exhibition of the PIAR. Engagement sessions were held at:

- Narrabri (5 September 2022)
- Baradine (6 September 2022)
- Coonamble (6 September 2022)
- Curban (7 September 2022)
- Gilgandra (7 September 2022)
- Narromine (8 September 2022).

The Department also met with Narrabri Council and Gilgandra Council officers, Narromine Local Aboriginal Land Council, and local landowners. Issues raised included construction management plans, alternative alignments, flooding, and property impacts.

6 Assessment

The Department assessed the Proponent's EIS, PIAR, submissions and agency advice regarding the project, and advice from the independent hydrology (Bewsher Consulting) and acoustic (Pulse White Noise Acoustics) experts the Department engaged.

Key issues for assessment are flooding and hydrology, biodiversity, noise and vibration, traffic and transport, surface and groundwater impacts, Aboriginal cultural heritage and social impacts (**Section 6.1** to **6.8**). Other issues considered are discussed in **Section 6.9**.

6.1 Flooding and Hydrology

The project is located in the major water catchments of the Macquarie-Bogan River, Castlereagh River, and Namoi River basins. The construction of new rail infrastructure to 1% Annual Exceedance Probability (AEP) flood immunity may affect surface water flows and result in increased flood impacts, and erosion from overland flows.

As a result of the project being located in an area regularly subjected to flooding, the Proponent undertook modelling to identify flood risk from the construction and operation of the project. The Department is generally satisfied that the potential flood impact to property, and the receiving environment, are understood, and that flood impacts can be appropriately managed. The Department has recommended alternate flood management objectives (in the form of Quantitative Design Limits (QDLs)), and an independent review, to ensure that the final design and flood management measures adequately respond to the environment.

The proposed introduction of rail embankments, 75 new bridges/viaducts, and approximately 630 reinforced concrete box culverts throughout the corridor, would impact existing flow paths and may result in increased flooding impacts including erosion of adjacent private landholdings.

To assist in the consideration and assessment of flooding and hydrology impacts, and updates to the QDLs, the Department engaged an independent hydrology expert (Bewsher Consulting Pty Ltd) to undertake a specialist review, provided in **Appendix II**. In addition, a Hydrology Working Group was created with technical representatives from the Department, Bewsher Consulting, and the Proponent, to provide iterative advice and feedback on the revisions to flood modelling assessment, any agreed changes to the QDLs and proposed mitigation measures.

A Preferred Infrastructure and Amendment Report (PIAR) was prepared to respond to concerns raised in the review and by the Department, agencies and potentially impacted landowners. Revised modelling prepared for the PIAR (see **Appendix E**) was used as the basis of the Department's assessment of the project.

The Department considers that flooding and hydrology impacts can be managed, with conditions.

Issue

Existing flooding affects various land uses, including buildings in Narromine and Narrabri

The study area comprises relatively flat land, with various land uses including highly productive farmland (used for cotton, wheat and livestock), bushland (State Forest/National Parks) and relatively small and local pockets of urban development (centred around Narromine, Gilgandra, Baradine, and Narrabri). With the exception of the Macquarie River, Namoi River, and Narrabri Creek (which are permanent), surface water near the project is characterised by intermittent watercourses from the contributing catchment, rainfall patterns, and lack of groundwater baseflow. Much of the landscape has been altered by existing land uses and vegetation removal, with the fragility of all watercourses assessed as moderate to high. The project will

traverse various floodplains, which are variable environments featuring erosive soils with high scour potential in some areas. Erosion of the bed and banks of watercourses is evident throughout the corridor.

Existing flooding behaviour varies across the study area, according to the size of the waterway and contributing catchment area. Flooding of the Macquarie and Namoi Rivers spills onto adjacent floodplains and impacts the towns of Narromine and Narrabri, typically lasting a few days following relatively frequent rainfall events.

As the only major town centre downstream of the project, riverine flooding of the Macquarie River and Wallaby Creek regularly impact on Narromine. Extreme flood events have the potential to result in overtopping of the Narromine to Dubbo rail line at Webbs Siding, and cause increased flows in the Backwater Cowal, with flood depths between 3.5 m and 7.5 m in certain areas.

Similarly, Narrabri, which is surrounded by a confluence of rivers and creeks, is one of NSW's most flood prone towns which experiences regional and local flooding due to its low-lying floodplains. The Namoi River and Narrabri Creek run through the centre of town and connect with minor waterways including Mulgate, Eathers, Horsearm, and Bohena Creeks. During major flooding events, these tributaries create sub-branches that inundate the town, resulting in isolated areas and precincts that cause significant damage.

Under existing conditions (without the project) during a 1% AEP, around 6,200 buildings are subject to above floor level flooding along the proposed corridor, comprising approximately 2,570 habitable and 3,628 non-habitable buildings. Most are located near or within Narromine, Curban, Baradine, and Narrabri.

The Mitchell, Newell, and Oxley Highways are often inundated in the 20% AEP event and greater, as well as existing rail lines with the exception of the Main Western Railway (Dubbo to Narromine and Narromine to Cobar Lines) and the Narrabri to Walgett Railway. About 125,000 hectares of land is subject to inundation, with flooding impacting land used for agricultural cropping, grazing land, and forested areas. Business operations, infrastructure, and farm machinery are often impacted.

Quantitative Design Limits (QDLs) set the basis for understanding impacts and potential mitigation

QDLs are used as a basis for assessing potential changes from flooding, as outlined in **Table 9**, and allow the Department to benchmark environmental performance of the design, by nominating limits for acceptable differences between existing modelled flood conditions and predicted changes after development of the project. The term "Quantitative Design Objective" used in the EIS was replaced by QDLs following EIS exhibition. The change in nomenclature better represents their purpose but does not materially affect their function.

QDLs address the following flood metrics:

- afflux: the change in flood level between existing and developed conditions
- duration: the change in the length of time of flood inundation
- velocity: the change in speed of water movement, which determines potential for erosion and, at a local level
- Erosive Threshold Velocity (ETV): the speed at which water movement has the potential to create erosion and scour. In the absence of site investigations by a suitably qualified specialist, and for the purposes of assessment, this was assumed to be 0.5 m/s
- hazard: the change in depth-velocity (dv) and/or flood hazard category (H). Flood hazard reflects when flooding can cause danger to people and animals, vehicles and buildings.

Table 9 | Quantitative Design Limits (QDLs)

Parameter	Land use or setting/scenario	Performance limit
Afflux i.e. increase in flood level from implementation of the project	Habitable floors and sensitive infrastructure	10 mm increase
	Non-habitable floors	20 mm increase
	Urban and infrastructure land - surrounds of residential buildings, other urban, open space recreational land, and infrastructure (excluding sensitive infrastructure)	100 mm increase
	Agricultural	200 mm increase
	Other non-urban land - forest and unimproved grazing land	300 mm increase
	Classified roads managed by TfNSW	50 mm on areas flooded under existing conditions. Otherwise, no increase
	Highways and sealed roads >80 km/hr	No afflux where aquaplaning risk exists and remains unmitigated. Otherwise 50 mm increase
	Unsealed roads and sealed roads <80 km/hr	100mm increase
Scour/erosion potential i.e. increase in flood velocity resulting from the implementation of the project	Sealed surface - ground surfaces that have been sealed or otherwise protected against erosion. This includes roads and most urban, commercial, industrial, recreational and forested land	20% increase in velocity where velocity already exceeds 1 m/s.
	Other areas including watercourses, agricultural land, unimproved grazing land, and other unsealed or unprotected areas	An Erosion Threshold Velocity (ETV) is to be adopted through site specific assessment(s) conducted by an experienced geotechnical or scour/erosion specialist. In the absence of a site specific assessment, ETV of 0.5 m/s is to be adopted. Where existing velocity exceeds ETV, velocity is limited to a 0.025 m/s increase. Where existing velocity is less than ETV, velocity is limited to the lesser of: • ETV • 20% increase in existing velocity or 0.5 m/s, whichever is greater
Flood hazard i.e. increase in depth velocity product (dv)	Urban, commercial, industrial, highways and sealed roadways	10% increase in dv
	Classified roads managed by TfNSW[4]	10% increase in dv where this does not increase hazard category. Otherwise, no increase.

Parameter	Land use or setting/scenario	Performance limit
and/or flood hazard category resulting from implementation of the project. (Does not apply where dv is less than 0.1 m^2/s).	Elsewhere	20% increase in dv
Flood duration i.e. increase in duration of inundation resulting from implementation of the project.	Habitable floors	Where existing above floor flooding is: • less than 1 hour in flood duration, the post-development flood duration shall not exceed 1 hour • greater than 1 hour in duration, up to 5% increased inundation duration. Where existing below floor flooding is: • less than 1 hour in flood duration, the post-development flood duration shall not exceed 1 hour • greater than 1 hour in duration, up to 10% increased inundation duration.
	Classified roads managed by TfNSW	No increase in duration of flood inundation to sections of road not already inundate. Otherwise, 10% increase in inundation duration.
	Highways and sealed roads >80km/hr	10% increase in inundation duration.
	Elsewhere	Where existing inundation is less than 1 hour in flood duration, the post-development flood duration shall not exceed 1 hour. Where existing inundation is greater than 1 hour in flood duration, up to 10% increase in duration of inundation. No duration limits apply to newly flooded land no greater than 1,000m^2 in area.

EIS flood modelling used QDLs that ARTC had derived from the Narrabri to North Star Inland Rail project, based on qualitative “objectives” to meeting the QDL rather than adhering to set limits. As a result, the assessment identified substantial flooding impacts to towns and the receiving environment which were considered unacceptable to the Department. The key changes to the QDLs in the Proponent’s PIAR, based on discussions with the Department through the Hydrology Working Group were to change qualitative objectives to measurable quantitative standards for scour/erosion potential, afflux for impacted roads, flood hazard and flood duration.

A key concern for the Department was the calculation of the metric to determine erosion velocity, which is a measure of the likelihood of scour and erosion from surface water run-off leaving culverts; an important consideration where fragile soils on agricultural land occur. The updated QDLs were generally agreed prior to modelling provided for the PIAR, resulting in a greater understanding of flood impacts to towns and rural land. The changes to the QDLs will enable the Proponent to mitigate Project impacts to the surrounding area and will consider the sensitivity of the environment to erosion.

Compliance with a QDL does not necessarily mean there would be no impact, but that the impact would be manageable in accordance with flood mitigation measures. The project's detailed design will be modelled prior to construction. Where changes in flood behaviour caused by the project are predicted to exceed the agreed QDLs, the design will be revised to reduce impacts and meet criteria, or mitigation measures implemented with the agreement of affected landholders.

The design of the project has been informed by hydrologic and hydraulic assessment to minimise changes to existing flooding conditions along the length of the corridor. As the distance extends over 300 km, this has not always been possible. The railway embankment would be designed to be above the 1% AEP, however due to various constraints including local topography, water could flow through the ballast and over the top of the rails during larger flood events. Potential overtopping locations were considered for the 1% AEP, 1% AEP + blockage, 0.2% AEP and 0.05% AEP events.

Overtopping for various distances from the alignment are predicted for larger events, with the maximum depth expected south of Webbs Siding Road east of Narromine, however no significant risk to life or property were identified.

To manage expected exceedances of the QDLs, the Proponent has assessed about 200 potential drainage control areas to provide additional space outside the rail corridor, for the management and physical mitigation of erosion impacts. Precise areas have not been provided, however the Proponent has stated that they would typically be 50 m wide downstream and 15 m wide upstream, and of variable length to suit drainage structure configurations. This would result in additional private land take, including highly productive agricultural lands.

Additional consultation with affected landowners was undertaken during exhibition of the PIAR. During detailed design, the Proponent is confident that the size of these drainage control areas can be refined and reduced to minimise property and environmental impacts (biodiversity, cultural heritage), or their need eliminated through assessment of erosion potential, further geomorphological studies, and consideration of other solutions. Where this is not practicable, the Proponent has stated that departures from the QDLs would be managed in accordance with specific conditions of approval.

Localised increase in flood flow velocities could occur at culverts and bridge locations, impacting agricultural land

Bridges will span rivers and defined watercourses, with changes to flood flow velocities potentially limited to local effects around piers and abutments. These will be further investigated during detailed design, and erosion protection measures provided within and potentially outside of the rail corridor.

Changes in flood flow velocities in exiting culverts under the proposed rail formation, and on certain soil types such as black cracking clays, could result in erosion and scour from increased water velocities, as flood waters are concentrated upstream and downstream of the structures. Due to the high number of culverts proposed (over 600), and the lack of access to private property, the Proponent has not undertaken individual site assessments of each culvert location to assess the erosive threshold velocity (ETV) of soil types in the study area. A conservative value of 0.5 m/s was adopted in accordance with the existing floodplain management plans along the route and NSW soil conservation guidelines. The 0.5 m/s velocity value is equivalent to the velocity at which sandy loams and fine gravels would be mobilised in a bare soil environment.

Additional investigations were undertaken as part of the PIAR, where a range of proposed bridge and culvert locations along the alignment were inspected by an experienced geotechnical engineer and geomorphologist. Site observations and soil testing found that many creek banks and floodplains exhibited a high clay content and were assessed to have ETVs of between 1 m/s and 2 m/s, and channel geomorphology and vegetative cover significantly influence potential erosion.

The Proponent developed separate TUFLOW models to provide fine grid modelling of velocities at 24 selected culvert locations and claimed that 23 culverts would comply with the scour/erosion QDLs when its site assessed ETVs are used. The methodology undertaken to determine ETVs at these locations is not supported by the Department's technical experts, due to an over-reliance on desktop assessments that use soil guidance not appropriately reflective of the project's local conditions. The Department therefore requires further investigation to be undertaken during detailed design to assess ETVs at bridges and culverts with the results used to re-evaluate the design against the scour/erosion QDLs.

Houses, structures, agricultural farms, and roads may be subject to increased flood levels

Under existing conditions, 2,570 habitable buildings, mainly within Narromine and Narrabri, were identified as being at risk of flooding above floor level in the 1% AEP. The project could result in afflux QDL exceedances in 23 of these buildings, where flood levels could increase by more than the 10 mm limit (two of these exceedances would occur in flood levels less than the 1% AEP, the others from the 1% AEP event). A total of 3,628 non-habitable buildings are at risk of flooding in the 1% AEP under existing conditions. With the introduction of the project, afflux QDL exceedances are predicted to worsen impacts on 28 buildings, where flood levels could increase by more than the 20 mm limit in this event. Five non-habitable buildings would be impacted by increases of more than 20 mm, in flood events less than the 1% AEP.

The project may also result in increases to flood depth, flood hazard and flood duration to other land uses, including urban and non-urban infrastructure, agricultural and forestry land uses, highways and roads, as well as exceedances of the scour/erosion potential, flood hazard and flood duration QDLs, as summarised in Table 10.

Table 10 | QDL Compliance Departures for Other Land Uses and Roads (Source: PIAR)

Parameter	Land use or setting/scenario	Exceedances
Afflux	Habitable buildings	23 buildings
	Non-habitable buildings	28 buildings
	Urban and infrastructure land	1.61 ha
	Agricultural land	120.6 ha
	Other non-urban land	367.2 ha
	Classified roads managed by TfNSW	2,113 m
	Highways and sealed roads >80km/hr	6 km
	Unsealed public roads and sealed roads <80 km/hr	26.2 km
Scour/erosion potential (velocity)	Sealed surfaces – sealed land surfaces	3.5 ha
	Sealed surfaces – sealed roads	277 m
	Unsealed surfaces – unsealed land surfaces	935.2 ha
	Unsealed surfaces – unsealed roads	16.4 km
Flood hazard	Habitable buildings	Nil
	Non-habitable buildings	4 buildings
	Urban and infrastructure land	4.2 ha
	Classified roads managed by TfNSW	1,420 m

Parameter	Land use or setting/scenario	Exceedances
	Sealed roads	3,958 m
	Other land	713.9 ha
Flood duration	Habitable buildings	13 buildings
	Classified roads managed by TfNSW	501 m
	Highways and sealed roads >80km/hr	1,969 m
	Sealed roads <80 km/hr and all unsealed public roads	19.3 km
	Other land	1,036 ha

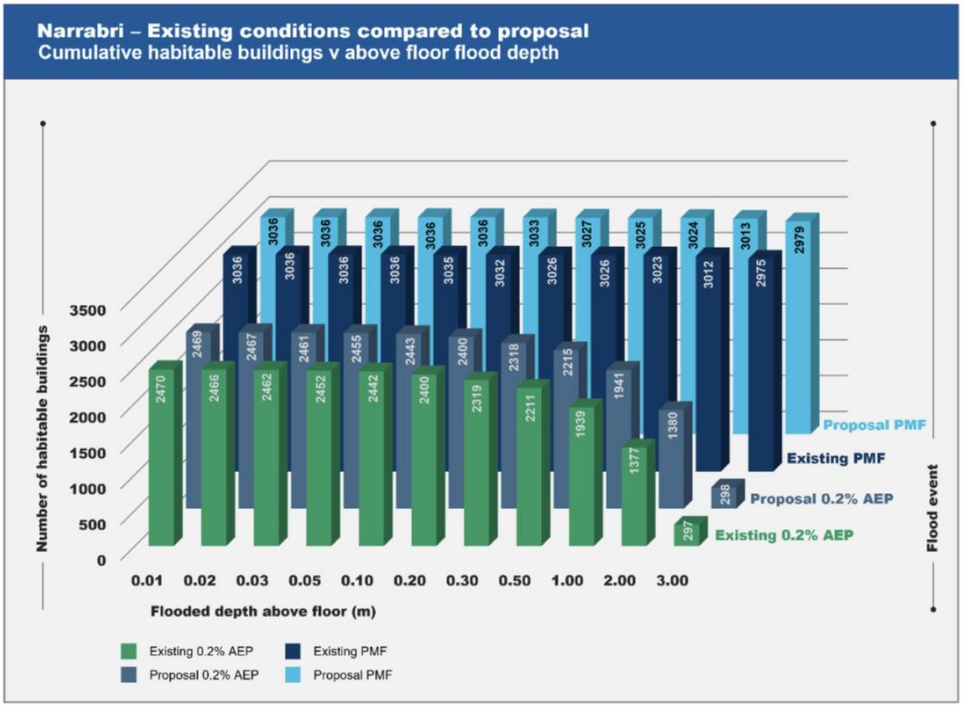
Additional survey and modelling is proposed during detailed design, to confirm building floor levels and further refine the project so that flood impacts are not worsened, or minimised as far as practicable, up to and including the 1% AEP event. Potential design solutions include:

- replacing culverts with bridges
- increasing the number of culverts and/or further distribution of culverts
- extending scour protection measures into private land with possible provision of improved property access
- construction of diversion bunds or drainage to protect buildings and land uses.

The Department notes the risks to property, infrastructure, and the environment, and that the solution(s) will be subject to further design development and consultation with individual landowners.

Flood modelling results show the project is not expected to exacerbate flooding for rare flood events

In addition to considering flood impacts against the QDLs, for flood events up to and including the 1% AEP, the Proponent considered flood risks in rarer events, particularly in relation to Narrabri and Narromine. The modelling results for a 0.2% AEP (1 in 500 year event), and probable maximum flood (PMF) indicated the number of habitable buildings impacted in both Narrabri and Narromine is not expected to change significantly with the project during rarer events, as demonstrated in **Figure 77**.



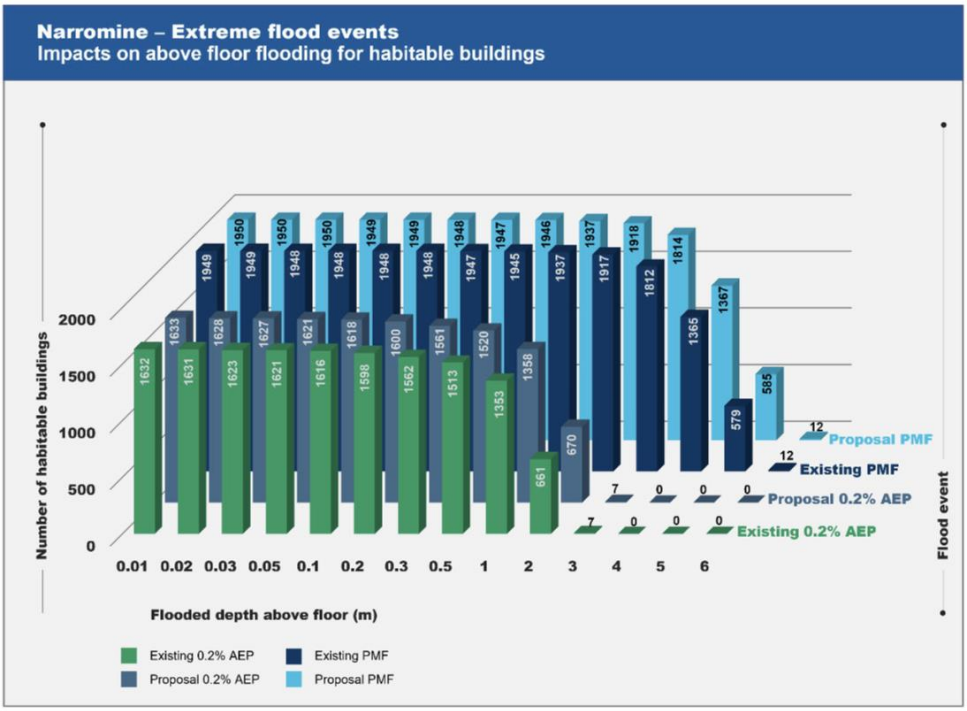


Figure 7 | Number of habitable buildings flooded in Narrabri and Narromine by extreme flood events, with and without the project (PIAR ARTC 2022)

Effects from climate change could result in increased flood impacts

An assessment of the project against larger flood events than the 1% AEP (factoring in climate change up to the probable maximum flood (PMF)) marginally increased flooding impacts from the project. The climate change scenario applied a 22.8 per cent increase in rainfall depth, compared to the 1% AEP event, to both the existing and design cases within the model. The results can be summarised as:

- Of the total 5,267 habitable buildings subject to above-floor flooding under existing conditions (most of which are located in Narromine and Narrabri), an additional 47 habitable buildings would experience an

afflux of greater than 10 mm in the 1% AEP with climate change scenario, and 3,147 in the PMF with the project
- Of the 7,177 non-habitable buildings subject to above-floor flooding under existing conditions, an additional 51 would experience an afflux of greater than 20 mm in the 1% AEP with climate change scenario, and 3,408 in the PMF with the project
- Average duration of inundation for habitable and non-habitable buildings is similar to existing conditions
- Minor to negligible changes in flooding impacts above existing conditions predicted for highways, roads, existing rail lines and major land uses (agricultural, forestry and cropping lands).

In relation to flood hazard, the operational impacts are relatively minor for the 1% AEP with climate change scenario event compared to the flood hazard under existing conditions. An additional 35 habitable buildings subject to above floor flooding and afflux greater than 10 mm and an additional 34 non-habitable buildings (subject to above floor flooding and afflux greater than 20 mm) located on lands subject to high flood hazard in rare events are predicted when the project is operational.

While construction of the project is temporary, it may impact on the geomorphological condition and stability of existing waterways and associated floodplains

The proposed alignment of the rail corridor intersects a number of watercourses and floodplains. The activities which pose the greatest risk and could result in channel and floodplain instability as well as hydraulic changes, increased flooding impacts, and erosion and sedimentation, include the construction of waterway crossings, construction of the new railway line, access and haulage roads, provision of instream structures, and removal of vegetation. Temporary measures such as stockpiles could also obstruct the passage of floodwater and overland flow, which could exacerbate flooding conditions.

Potential also exists for construction to coincide with flooding within the floodplain, particularly where large construction sites are located near towns. There are 67 construction compounds proposed along the length of the project, with 27 of these affected by 1% AEP flooding and 25 affected by 5% AEP flooding. The Proponent has committed to siting temporary construction facilities and laydown areas outside high hazard areas with provision of safe evacuation routes. For sites with a flood immunity of less than 5% AEP, a Flood and Emergency Response Plan would be prepared, to consider the likelihood of flooding, evacuation routes, warning times, and impacts from compound flooding.

Submissions

Community submissions

Key flooding and hydrology issues raised in community submissions included:

- uncertainties about data used, the accuracy of the data, impacts of climate change in the flood modelling, and specific property impacts
- differences between the Proponent's flood modelling and that of Councils
- scale and accuracy of flood mapping
- modelling results do not reflect the lived experiences of many landowners
- reliance on culverts rather than viaducts which would not disturb natural flows
- the project does not comply with the QDLs
- the project causing irreversible erosion leading to reduced production capacity and safety hazards for stock and personnel
- the overtopping assessment for Narromine and the subsequent risk to life and property
- underestimation of flows in key areas including Backwater Cowal and the Warrumbungles Watershed
- lack of reference to two significant flood studies – the Macquarie River (Narromine to Oxley) Floodplain Management Plan 2008 and the Narromine Town Levee Concept Design (SMEC, 2019)

- an increase in severity of floods
- blocked access to roads needed during flooding events
- the design and location of culverts and insufficient quantity
- the flood risk east and west of Narromine has not been adequately addressed
- changes in the distribution of flows downstream of the line resulting in greater scouring and erosion impacts
- the impact of catchment springs and seeps in the Backwater Cowal systems can result in prolonged inundation, and have not been adequately addressed
- afflux at the Mitchell Highway crossing which could divert flood currents onto the highway and cause additional afflux prolonging impacts
- potential blockage of culverts and ongoing maintenance by the Proponent
- the communication of flooding impacts to the community and key stakeholders.

Special interest group submissions

NSW Farmers and Country Women's Association (CWA) raised concerns about the flooding and hydrology modelling, stating it was inadequate and does not reflect the lived experiences of landowners in the area. Significant threat of serious and irreversible environmental damage as well as risks to people and property would occur. There was insufficient consideration of the impacts of the project on soil and erosion, despite the potential to impact prime agricultural farmland which is highly productive. At a minimum, the submission requests that the significant discrepancy regarding the modelling and actual flow rates in Backwater Cowal and the Warrumbungles watershed should be addressed, and questions why a desktop analysis is preferred over lived experiences of those in the community.

Concerns were raised whether the design and location of culverts will manage the anticipated volume and velocities of flows, rather than using more bridges and viaducts. The reliance on culverts was a concern as it is considered to result in shadowing during small and medium sized floods, where concentrated flows across long distances would remove soil and, over time, create deep pronounced flow lines that become prone to accelerated erosion.

The submission also referred to the reference design not being provided to landowners, or exhibited as part of the EIS, which has not permitted the design to be adequately reviewed.

Narrabri Inland Rail Concerned Residents Group stated that the design of the project does not comply with the Department's QDL for flood afflux with 13 buildings impacted. WRM was engaged to undertake a flooding and hydrology assessment for an alternative route to the west of Narrabri and stated results indicated that no dwellings are negatively impacted in a 2% AEP, with the alternative alignment requiring less bridge length.

Council Submissions

Gilgandra Shire Council requested clarity regarding use of climatic data over the past 100 years, noting the wettest period occurred in 1955, which is outside the rainfall data period used in the modelling. Questions were raised on the comprehensiveness of other datasets and how it impacted flood modelling results. Council expressed concern that flood risk association with La Niña was not considered as part of the flood risk assessment and requested the modified 1% AEP event be assessed with 1955 rainfall conditions (a La Niña event).

Council stated that the Gilgandra LGA has a paucity of historic flood and stream data, which made it difficult to identify flood impacts, and requested that all existing Council infrastructure affected by flood events with AEP of 1%, 5% and 20% be identified.

Council considers the alteration of flood impact metrics from flood management objectives (in the EIS) to quantitative design limits in the PIAR are confusing for both Council and residents attempting to establish long term impact of the project. In relation to flooding scour/erosion impact, Council requested the actual footprint of drainage control areas at 100% capture of QDL scour/erosion potential exceedances be made public, to allow the maximum impact to be understood.

Narrabri Shire Council stated the flood modelling and conclusions drawn are incorrect, specifically due to exclusion of Mulgate Creek flooding, assumption that bridge piers would not accumulate debris causing additional blockage, and that the number of properties flooded above-floor level under existing conditions were over-estimated.

Concerns were also raised that predicted impacts to residential and commercial properties would make the project non-compliant with the Narrabri Local Environmental Plan 2012. Council stated that no suitable mitigation measures had been proposed, and that flooding impacts to properties in Narrabri Shire is not acceptable, due to the embankment starting on the northern side of Wee Waa Road. Council considered that the viaduct is required to be extended 1 or 2 bays to alleviate flooding in this area. Recommendations for improved modelling and mitigation, and a potential realignment of the project, were suggested.

Council noted the route does not meet the Department's QDLs for flood afflux and flood duration, with a number of habitable and non-habitable buildings experiencing increases of above-floor flood levels and duration for the 1% AEP. It also stated that modelling of the Mulgate Creek/Horsearm Creek was undertaken as part of the PIAR, however the results predict that one dwelling will no longer be impacted, which is not correct.

Narromine Shire Council requested clarity regarding the input data used for the flood model. For example, use of Narromine rainfall dataset (which started in 1969) would have missed the wettest period of the last 100 years which occurred in 1955, and this may have influenced flood modelling results. Council also considers that the climate change assessment should have used this worst case scenario (1955 flood / La Niña event).

Council acknowledges the updated flooding and hydrology assessment in the PIAR considers the importance of the future construction of the Narromine Town Levee, and the project's integration with the levee during detailed design would involve consultation with Council. Council made similar comments as Gilgandra Shire Council regarding confusion surrounding the use of QDLs instead of the flood management objectives, and stated it is particularly concerned about flooding impacts between McGrane Way and the Mitchell Highway. It also requested that the footprint of drainage control areas be made public, to allow the maximum impact to be better understood.

Coonamble Shire Council stated that the concentration of overland flows under bridges and through culverts could increase flow velocities and result in scour at outlets, worsening existing erosion in watercourses if scour protection is not provided.

Council is also concerned about the increased flooding potential on farming properties, dams, roads, and natural ecosystems within the LGA, and considers the introduction of new rail infrastructure will change the flooding regime and affect surface water flows across floodplains and near the Warrumbungles. Council is concerned about ongoing maintenance of infrastructure.

Government agency advice

Transport for NSW (TfNSW) does not accept any new inundation of the State road network, including the pavement and unsealed or unprotected road edges. TfNSW would revisit these concerns if suitable QDLs can be agreed on that do not introduce new flooding to State assets.

BCS participated in an iterative process of the hydrology assessment by attending the Hydrology Working Groups.

It provided 10 recommendations relating to the flood modelling undertaken, including additional studies regarding impacts to wetlands and flood-dependent ecosystems across a range of floods, impact from increased erosion beyond the corridor boundary, reliability of the assessment, mitigation of flood impacts to buildings, and emergency management arrangements.

DPI Fisheries were concerned with the project impacting fish passage, stating that the design of bridges, culverts, and waterway crossings should be in accordance with relevant policy, to not hinder fish passage.

Forestry Corporation NSW (FCNSW) requested further detail regarding culvert dimensions adjacent the State Forest, concerning the ability of fire suppression vehicles to access both sides of the corridor via culverts. FCNSW were concerned about culverts increasing the concentration of surface water flow, requesting quantification from the Proponent on impacts within State Forest outside the rail line corridor, surface water flows damaging forestry roads, and how it is proposed to protect these road surfaces.

DPE Water Group recommends that flood related impacts comply with the assessment criteria of management plans such as the *Floodplain Management Plan for the Lower Namoi Valley Floodplain 2020* and the *Draft Floodplain Management Plan for the Macquarie Valley Floodplain 2018*.

Additional recommendations included further identification of sites at higher risk of change, more detailed modelling, and more detail regarding proposed mitigation measures, particularly to prevent damage to watercourses including scour protection design. Updating mitigation measure FH2 was requested, to state that erosion control design will include a geomorphic, vegetation and watercourse sensitivity assessment, consistent with the process used for Erosion Potential and Fluvial Geomorphology Assessment (Appendix O) in the updated Flooding and Hydrology Assessment in the PIAR and to FH5 to include mitigation measures referred to in the updated Flooding and Hydrology Assessment.

Consideration

The Department's independent expert and Government regulatory agencies consider that the updated flood modelling presented in the PIAR provides greater confidence in the likely flooding and hydrology impacts of the project. The complexity of the hydrology assessment, technical input from DPE Water, BCS, the Department's independent reviewer, and the Proponent through 13 meetings of the Hydrology Working Group, resulted in a greater understanding of flooding impacts. Impacts from flooding and hydrology changes are predicted to impact a small number of properties, and compliance with the QDLs would generally occur for most flood metrics.

The Department notes that many of the issues raised in submissions and through the various Hydrology Working Group meetings and independent reviews were addressed in the updated flooding assessment provided within the PIAR. The Department considers that the updated assessment has demonstrated that the project is acceptable in terms of flooding impacts, however, the Department has a number of concerns associated with expected non-compliances of the flood velocity QDLs, specifically in relation to proposed culverts within the floodplains and potential erosion and scour impacts. The Department considers that these can be appropriately addressed through specific conditions, particularly in relation to proposed drainage control areas.

Regarding the alternative alignment proposed by the community, the Department notes the selection of an optimum route for the project requires the consideration of several issues, of which flooding is one. In some respects, while changes in project construction costs and reduced flood impacts might favour an alternate route downstream of the Narrabri urban area, the Proponent's route selection process also considered other environmental factors and operational requirements. Ultimately, the Department considers that the route

alignment is a decision for the Proponent, provided the environmental, social and economic impacts are understood and appropriately mitigated, and the project proceeding is in the public interest.

Predicted flood impacts are acceptable for most criteria

Flood and hydrology impacts from the project affect a relatively small number of buildings, amount of land, and length of road. Expected departures from the afflux QDLs for the 1% AEP event are:

- habitable buildings – 23 predicted to be impacted by afflux above the 10mm QDL. This represents 1 % of habitable buildings subject to above-floor flooding under existing conditions. One building is newly flooded by 4 mm (afflux of 11 mm). All other buildings are subject to above-floor flooding from 40 mm to 1.48 m under existing conditions. With the project, this increases by 11 to 58 mm
- non-habitable buildings – 28 are predicted to be impacted by afflux which represents 1 % of habitable buildings subject to above-floor flooding under existing conditions. One building is newly flooded by 21 mm (afflux of 27 mm). All other buildings are subject to above-floor flooding from 85 mm to 1.51 m under existing conditions. With the project, this would increase by 21 to 181 mm
- 2,196 ha of land is predicted to be impacted, which represents 1.8 % of the land within the study area, subject to flooding under existing conditions. In relation to highways and road, 52 km would be impacted. This represents about 11 % of those already subject to flooding under existing conditions.

The Department notes that the project would have greater afflux impacts in larger and rarer floods than the 1% AEP event. This is particularly pronounced for the PMF impacts (an extremely rare event) in Narrabri, where a substantial number of buildings would experience afflux of up to 100 mm. Narrabri is subject to substantial flooding in a PMF event under current conditions (with 3,036 habitable buildings impacted by flooding). With the project, the expected afflux, while larger than the QDL, would have a relatively modest increase on the expected height of existing above floor flooding in 2,980 of these buildings, with the majority (2,570) predicted to experience afflux of up to 100mm in these events. A smaller number of buildings would experience greater increases:

- 100-200 mm increase in 363 habitable buildings
- 200-300 mm increase in 38 habitable buildings
- 300-500 mm increase in nine buildings
- No habitable buildings would experience an afflux of over 500 mm.

QDL departures for the duration and hazard criteria affect fewer buildings and roads and less land than the afflux departures.

The Department considers that, based on the modelling undertaken for the PIAR, the afflux, duration, and hazard impacts are acceptable, subject to further refined modelling and mitigation measures undertaken during detailed design. While there are QDL non-compliances, the number and extent of afflux, duration, and hazard departures are typical for a linear transport project of this scale. The Proponent is required to revise the design and obtain landholder agreement for residual non-compliances.

Additional flood modelling undertaken during detailed design must be independently verified and the project's flood performance appropriately documented

Further flood modelling is proposed during detailed design where the project would be refined to reduce flooding impacts. The Proponent has committed to undertaking more detailed survey and further consultation with relevant authorities, landowners, and the community, to reduce the number of departures from the QDLs.

The Department considers the flood model that informs the PIAR provides an adequate understanding of the project's afflux, duration, and hazard impacts to allow determination. However, the project's detailed design

must be remodelled to accurately reflect the impacts of that design. In consultation with its independent hydrologist, the Department has nominated minimum requirements for this further flood modelling and required that it complies with specifications using a hydraulic model grid size no larger than 2.5m within 100m upstream and 300m downstream of any culvert or bridge.

In addition, the Department requires that the revised flood modelling of the final design of the project be independently peer reviewed by a suitably qualified and experienced hydrologist who is independent of both the Proponent and the work carried out in previous modelling. The peer reviewer (who must be approved by the Planning Secretary) is required to comprehensively review the flood model files and to verify whether the flood model and the modelled final design of the project complies with the nominated flood modelling specifications, modelling limitations, and whether it accurately determines the flood related aspects of the final design.

In order to document the detailed design's QDL compliance and any necessary landholder agreements to non-compliances and mitigation measures, the Department has recommended a condition requiring the Proponent prepare a Flood Design Verification Report (FDVR) for the Planning Secretary's approval, prior to the commencement of construction. The FDVR must be prepared and submitted for review by BCS, DPE Water, TfNSW, and relevant Council(s), with comments received and addressed prior to submission of the final report to the Planning Secretary for approval. The report must detail flood behaviour under existing conditions, and with the final detailed design of the project and demonstrate compliance with specific conditions of the approval, including QDL compliance. If this is not possible, the FDVR must outline the process for addressing non-compliances. Mitigation measures proposed to address adverse effects of the project must be included in the FDVR. The Department also requires an Operational Erosion Monitoring and Mitigation Program be developed to outline how the Proponent would respond to changes in erosion as a result of the project and this program must form part of the FDVR.

The Department acknowledges that, given the complexity of the task and the project scale, the design of flood mitigation will be an iterative process, and recommends the Proponent provide a program for the review of an interim FDVR at designed points of project design development, to allow each agency to progressively refine the design and prepare the final FDVR for Planning Secretary approval.

Non-compliance with QDLs will require design refinement and associated mitigation measures in consultation with landowners and other stakeholders

Flooding impacts may not be perceptible compared to the existing situation without the project, and/or within the margin for flood modelling tolerances. Importantly, where a QDL cannot be achieved, the Department expects the Proponent's initial response is to change the design to ensure compliance with the QDL. In instances where strict compliance with the QDL is not practicable, appropriate justification is required and other mitigation measures must be considered, in consultation and agreement with the landowner or authority.

In recognition of the existing flood affected environment, the predicted additional impact to some habitable and non-habitable buildings, infrastructure, and ongoing design development, the Department has recommended conditions to allow the Proponent to negotiate mitigation of non-compliance(s) with the QDLs with landowners.

The Proponent and landowner may reach a mutually agreed outcome, instead of changing the projects design to ensure strict QDL compliance. In seeking agreement with a landowner in response to a non-compliance with the QDLs, the Department recommended conditions requiring:

- documentation of the extent of the non-compliance, and full disclosure of likely impacts to all landowners

- justification why it is not practical to achieve compliance of the QDLs through design changes, including provision of design options investigated to achieve the QDLs
- consultation with and the written agreement of the relevant roads authority (where the non-compliance relates to a road)
- consultation with, and the written agreement of, the landowner regarding the non-compliance. Agreement may involve works, measures, maintenance activities, acquisitions, or other
- an outline of this process and outcomes in the FDVR.

The Department has recommended that a Flood Design Consultation Protocol be prepared and made publicly available, to outline the steps the Proponent will take regarding consultation with landowners and road authorities where there are expected non-compliances with the QDLs. The Protocol must outline when non-compliances would be notified, time allowed for the landowner to consider the non-compliance, process for seeking agreement of the non-compliance, process for mediation, and dispute resolution.

In instances where an agreement on a non-compliance can't be reached, the Department has recommended conditions which allow for either the Proponent or landowner to refer the disagreement to an Independent Flood Impact Assessment Panel (IFIAP) for advice (see

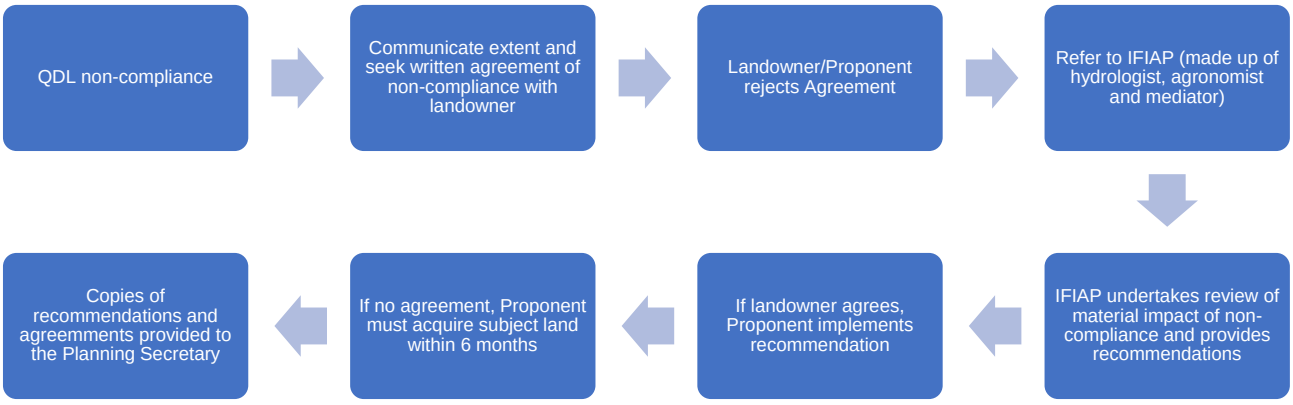


Figure 8 4). Recommended conditions require the IFIAP to comprise experts in agronomy, hydrology, and engineering, and provide recommendations about the material impact from any non-compliance with the QDLs and practical design changes or mitigation/management measures to resolve these. The Department has recommended that the IFIAP be established before works have the potential to result in a non-compliance, with costs borne by the Proponent. The IFIAP would review reports prepared by the Proponent and investigate landowner concerns. The Proponent would be required to implement recommendations made by IFIAP or, where this cannot be undertaken, the Proponent must offer to acquire land that would be required to implement mitigation.

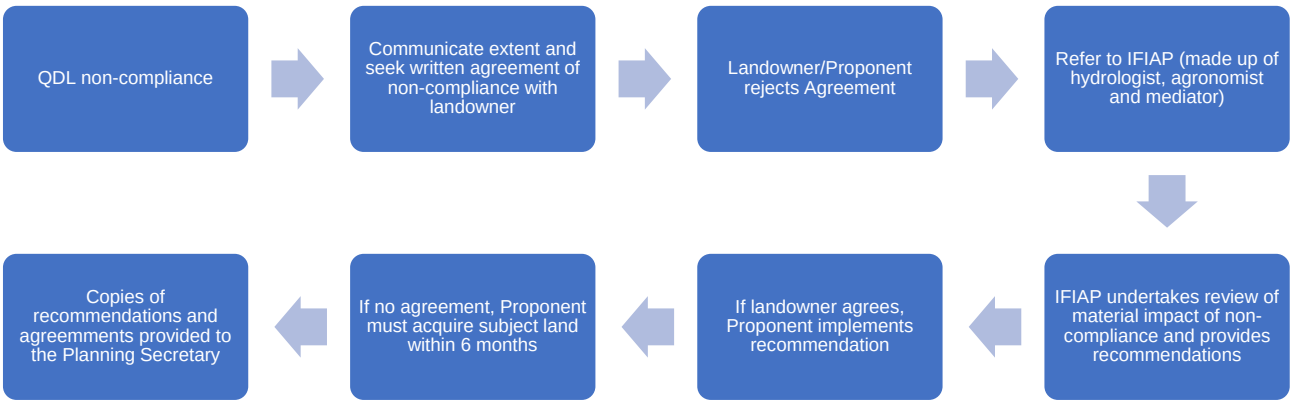


Figure 8 4 | Process for engagement of Independent Flood Impact Assessment Panel for QDL mitigation and dispute resolution

Local soil surveys and design refinement must be undertaken, to enable the potential for increased scour and erosion to be appropriately mitigated

A number of locations in the study area for the project are characterised by highly erosive soils. Concentrated flows could create erosion, resulting in ongoing impacts to adjoining private property and infrastructure. Conversely, reduced flow velocities could lead to sedimentation impacts.

To assess the erosion potential of velocity increases caused by the project, the Proponent prepared a finer grid model for two TUFLOW flood models (PIAR Technical Paper 3 Appendix P) and a fluvial geomorphological and erosion potential assessment to determine site-specific ETVs (PIAR Technical Paper 3 Appendix O).

The sample finer grid model provided a more precise understanding of expected velocities. The 10 m grid is a coarse model of velocities within a stream, as it averages velocities across the 10 m of each grid cell. In doing this, the model flattens out the highest and lowest velocities within each cell. A finer grid model will provide a wider and more accurate range of velocities but is considerably more expensive and time-consuming to run. The Department accepted a sample finer grid model in principle, provided it was appropriately representative of the project as a whole.

The areas in PIAR Technical Paper 3 Appendix P were selected as they contained examples of culverts representative of the overall project, and small enough to run efficiently for results to be provided in a reasonable timeframe. The models applied a minimum 25% blockage, to factor in the effect of debris. TUFLOW flood models N2N9 and N2N13 were selected to be transferred to TUFLOW-2020-10-AD for more detailed analysis using quadtree mesh with a grid resolution of 2.5 m.

The N2N9 10m grid TUFLOW model includes 33 culvert locations, which cross floodplains of Baronne Creek, the main channel of Tenandra Creek and its floodplain, and several unnamed watercourses. Seventeen of these culvert locations were selected for fine grid modelling. All seven culvert locations within the N2N13 10m grid TUFLOW were selected for fine grid modelling, with these proposed to cross the main channel of Goulburn Creek and its floodplain, and other minor tributaries and their floodplains.

The Proponent assessed the site-specific Erosion Threshold Velocity (ETV) values provided in PIAR Technical Paper 3 Appendix O, by applying a predictive model of soil erosivity based on geotechnical soil characteristics and fluvial geomorphology, to assess the erosion potential at each culvert location, which were then ground-truthed on site.

The Proponent used the site specific ETVs to assess the finer grid model's compliance with the QDLs and found 23 out of the 24 culvert locations in N2N9 and N2N13 model areas complied with the QDL. However, the Department does not accept this conclusion due to uncertainties and inadequacies of the methodology of both the sample finer grid model and the site-specific ETV assessment.

While the Proponent used the N2N9 and N2N13 models, the Department's peer reviewer noted that the majority of the non-compliances with the QDLs occur in the NFM, NSN8 and N2N1 models (see p178 PIAR Technical Report 3). It is unclear why finer grid modelling was not undertaken for these three model areas, to provide a more precise understanding of the areas with the most non-compliances. Additionally, the finer grid model was not directly derived from the 10m grid model used for the entire alignment. The Department is not satisfied that the finer grid model is an appropriate sample of the entire project that would allow its results to reliably inform this assessment.

The Department does not support the Proponent's assessed ETVs, as the assessment did not use direct methods of assessing the erosive potential of soil samples and relied on a moderate to high level of vegetation coverage within and adjacent to waterways that does not realistically reflect drought conditions. The Department considers the on-site observations of erosion do not justify the predictive model's assessment of erosion potential, and in some cases contradicts them.

The Department sought greater clarity on these matters through the Hydrology Working Group and its review of draft PIAR documentation. While the Department acknowledges the degree of uncertainty for affected landholders regarding erosion impacts and required mitigation, and potential increased land take to manage it, it has recommended stringent and prescriptive QDLs, how they should be assessed, and measures to deal with non-compliances.

To ensure this requirement is met, the Department has recommended detailed local soil surveys by a qualified and experienced soil scientist are required, to verify the local erosive threshold. If the Proponent seeks site-specific ETVs to replace the QDL of 0.5 m/s, the Department has recommended that an Erosion Threshold Velocity Report is prepared by a suitably qualified geomorphologist or scour/erosion specialist with experience in calculating ETV of erosive floodplain soils, using both laboratory and direct, field-based approaches. To ensure the methodology/ies proposed to be used to determine the ETVs are robust, the Department has recommended that these be submitted in advance of the submission of the Erosion Threshold Velocity Report and require approval by the Planning Secretary.

The Erosion Threshold Velocity Report must determine ETVs for every location where site-specific ETVs are sought, be based on relevant location specific literature and guidelines, consider local floodplain management plans where they interact with the project, use direct laboratory methods (such as hydraulic flume modelling), and assume worst case soil conditions. Consultation with BCS is required and the report approved by the Planning Secretary.

Drainage control areas are not supported, but processes for landholder agreements for QDL non-compliances will have a similar function in securing access to land outside the rail corridor required to manage velocity

The Proponent has identified approximately 200 culvert locations where the QDL cannot be met for flow velocity, based on the 10 m grid model and default 0.5m/s ETV. In these instances, drainage control areas have been provisioned adjacent to the corridor, to allow velocities to dissipate naturally, or where erosion and scour protection measures could be implemented to reduce flow speed. Given much of the land within the study area is agricultural the acquisition of additional land would result in additional impacts to the community. Therefore, it is the Department's preference that other measures be implemented in the first instance.

The Department does not endorse the proposed drainage control areas in their current form. These areas are imprecise, and the Proponent has not presented evidence they accurately reflect the land required to reduce velocities and minimise erosion and/or scour. Given the Department's concerns about the accuracy of the finer grid modelling and the Proponent's assessed ETVs, the Department does not have confidence that velocity impacts can be adequately controlled within those areas.

The Department notes that recommended conditions relating to the process for addressing QDL non-compliances also apply to velocity impacts. This will occur through an agreement with the landholder or authority, or through the IFIAP, and may include mitigation such as scour protection being applied to the adjoining land, at no cost to the landowner. Where this occurs on private land, easements may be required. This would have the same effect as the proposed drainage control areas, but with a greater evidence base to inform the land requirements.

The Department acknowledges there is currently greater uncertainty about the required land take to address velocity impacts compared to other criteria. However, it is likely that land acquisition would involve obtaining an interest in land (such as an easement) for the purpose of allowing the impact, or the stream stabilisation measures, rather than the purchase and sterilisation of the land. By requiring the Erosion Threshold Velocity Report to be submitted for approval prior to construction of permanent built works, along with the Flood Design Review Report, the Department can adequately determine the extent of land required to manage velocity.

To provide further assurance that erosion impacts will be addressed, the Department has required ongoing operational monitoring against baseline conditions, through the Operational Erosion Mitigation and Monitoring Program. This program includes monitoring all mitigation measures to be implemented within the project corridor, and adaptive management measures including, but not limited to, identification of monitoring areas upstream and downstream of drainage structures, baseline pre-construction surveys of conditions within the monitoring areas, annual monitoring after rain events greater than 20% AEP, and a process whereby if monitoring identifies that the project is adversely affecting erosion, what adaptive management measures could be implemented and associated timeframes for these. The Department has confidence that should site-specific ETVs be determined in accordance with an approved Erosion Threshold Velocity Report, the Operational Erosion Mitigation and Monitoring Program would ensure erosion is monitored in the operational phase, and additional mitigation measures implemented if required.

Flooding impacts to roads will be subject to further consultation with the road authority

Roads within the project area have a low level of existing flood immunity. Changes to flooding of roads above the QDLs are unlikely to change trafficability of the road, compared to the existing situation, consistent with current advice of not driving through flood waters.

The Department notes TfNSW concerns about new and increased flooding of roads and has consulted with TfNSW about the QDLs. Recommended conditions require the Proponent to consult with, and obtain the written agreement of, the roads authority in any instance where the impacts of the project exceed the QDLs. The Department notes that as the design develops to address the QDLs, it will change flooding impacts, including to roads. Management of impacts to roads and road users requires consultation with the roads authority, which the Proponent has commenced.

The Department supports refining the project to address flooding impacts, and that ongoing discussions with the roads authority and TfNSW is required to ensure impacts to roads and road users are minimised.

Flood emergency management plans must be updated to consider extreme flood events

The Department considers that flood risks in the rail corridor must be appropriately managed to minimise the risk to life and property. The Department has recommended that a Flood Emergency Response Plan (FERP)

be prepared, to outline how flood risks within the rail corridor would be managed during a flood. The FERP must be appended to the FDVR. To ensure that flood risks beyond the rail corridor are adequately addressed, the Department has recommended that sufficient information is appended to the FDVR so relevant emergency services personnel and affected parties can prepare, respond to, and recover from future flood emergencies. The Proponent is required to respond to specific requests for information from relevant personnel and/or agencies (including NSW SES, local council, affected property or infrastructure owners) to assist in preparation of their own flood emergency response plans.

The Department has required that flood models developed for the project be made available to the relevant councils and government agencies for use in future flood studies and management plans.

6.2 Biodiversity[1]

The construction and operation of the project will result in impacts to biodiversity values within and adjacent to the project's disturbance area. The Proponent has identified direct impacts to threatened species and threatened ecological communities listed under the NSW *Biodiversity Conservation Act 2016* (the BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). The project is a controlled action under the EPBC Act.

Where possible, these impacts will be reduced in the detailed design phase of the project. In the southern and central areas of the project, this will include locating the project in mostly cleared farmland rather than in remnant native vegetation within road reserves. In the northern area, impacts on biodiversity values reflect the project's location in the Pilliga East Forest.

The Proponent has committed to implement mitigation measures, including the implementation of a fauna connectivity strategy in the Pilliga East Forest to maintain fauna connectivity across the rail alignment, locating temporary infrastructure in disturbed or non-native vegetation areas wherever possible, conducting pre-clearing surveys for flora and fauna, minimising impacts to riparian vegetation and aquatic habitat, mapping and fencing sensitive areas and implementing biosecurity and weed management measures.

There is potential for some proposed activities to have a cumulative or permanent impact on biodiversity values, even after the implementation of mitigation measures. To address this the Proponent has committed to offset impacts in accordance with the BC Act and the EPBC Act. This includes the acquisition and retirement of ecosystem credits and species credits or payment into the Biodiversity Conservation Fund. Impacts to aquatic habitats will be offset under the *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management 2013*.

The Department has recommended conditions that specify the ecosystem credits and species credits required to offset the project's impacts, the preparation and implementation of a Biodiversity Management Plan to manage impacts on biodiversity values during the construction and operation of the project, and implementation of a fauna connectivity strategy.

Issue

The project traverses the Brigalow Belt South Interim, Darling Riverine Plains and South West Slopes Biogeographic Regionalisation for Australia (IBRA) bioregions. Seven IBRA subregions are intersected by the project including Pilliga, Pilliga Outwash, Castlereagh-Barwon, Bogan-Macquarie, Northern Basalts, Liverpool Plains, and Inland Slopes.

[1] References to sections of the EIS, Biodiversity Development Assessment Report – Revision F (8 December 2022), Technical Report 2 – Aquatic Ecology Assessment, and Submissions have been included in this section to satisfy the assessment requirements of the NSW and Australian Governments.

Past extensive clearance of native vegetation for agriculture and roads has occurred in the central and southern parts of the project area. Despite this, patches of remnant and regrowth native woodland, forest and grassland occur in these areas along rivers and creeks, travelling stock reserves, road reserves and on private properties. Extensive stands of the Pilliga Forest occur between Baradine and Bohena Creek near Narrabri. The Pilliga Forest has areas of high conservation value reflecting the presence of threatened species and regionally significant fauna corridors.

The terrestrial biodiversity values of the project area were assessed under the BC Act and in accordance with the requirements of the Biodiversity Assessment Method 2017 (BAM). The results of this assessment were reported in the Biodiversity Development Assessment Report (BDAR). The BDAR also assessed impacts to ecological entities outside the jurisdiction of the BC Act. These included EPBC Act-listed threatened species and threatened ecological communities, threatened fish species, key fish habitat, other aquatic habitat under the *Fisheries Management Act 1994* (the FM Act), and wetlands and groundwater dependent ecosystems. The BDAR was updated to BAM 2020 following additional targeted flora and fauna surveys undertaken during wetter conditions from September to November 2020 and which focused on the Pilliga Forest in July 2021 (drone-based Koala surveys), August 2021 (Koala and threatened raptors), and in March 2022 (threatened flora).

Bilateral agreement and biodiversity development assessment

The Bilateral Agreement (Amending Agreement No.1) between the NSW and Australian Governments for the assessment of environmental approvals under the EPBC Act endorsed the BC Act, including the BDAR and Biodiversity Offsets Scheme, for the assessment of impacts to MNES.

The Proponent has addressed the assessment requirements under the EPBC Act and assessed the impacts of the project on MNES in the BDAR. The sections of the EIS relevant to MNES include:

- Chapter A6 – Alternatives and options
- Chapter A7 – Proposal features and operation
- Chapter A8 – Construction of the project
- Chapter B1 – Biodiversity
- Chapter B2 – Water resources
- Chapter B3 – Flooding
- Chapter B5 – Water quality
- Chapter C3 – Assessment of borrow pits
- Chapter D1 – Cumulative impacts
- Chapter D4 – Climate change
- Technical Report 1 – Biodiversity development assessment report (BDAR)
- Technical Report 2 – Aquatic ecology assessment report
- Appendix A - SEARs
- Appendix E – Environmental risk assessment
- Appendix I – Outline CEMP.

The sections of the final Preferred Infrastructure/Amendment Report (PIAR) relevant to MNES include:

- Chapter 1.3 – The project (as amended)
- Chapter 4.2 – Updated biodiversity development assessment report
- Chapter 7.6.1 – Biodiversity impact assessment (construction and operational footprints)
- Chapter 7.7 – Cumulative impact assessment
- Chapter 8.2 – Updated mitigation measures
- Appendix C – Changes to mitigation measures compared to the EIS

- Appendix E – Drainage control areas – environmental constraints review
- Appendix F – Use impact assessment – Narrabri TSR
- Technical Report 01 - Biodiversity development assessment report – BAM 2020 Revision G.

EPBC Act-listed species and ecological communities will be impacted

On 5 November 2018 the Delegate of the then Commonwealth Minister for the Environment and Energy decided under section 75 of the EPBC Act the project was a controlled action under the EPBC Act and required an assessment under that Act (EPBC Number - 2018/8259).

The Commonwealth Department of the Environment and Energy (now the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW)) advised that the proposed action is likely to significant impact on the following controlling provisions of the EPBC Act:

- Listed threatened species and communities (section 18 and section 18A)

DCCEEW considered that the proposed action is likely to have a to significant impact on the following MNES:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland - critically endangered
- Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia – endangered
- Coolibah - Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregions – endangered
- Brigalow (*Acacia harpophylla* dominant and co-dominant) – endangered.
- Natural grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland – critically endangered.
- Weeping Myall Woodlands - endangered.

The project also has the potential to impact on 19 threatened terrestrial species directly or indirectly and that these impacts must be assessed. These include:

- Koala (*Phascolarctos cinereus*) (combined populations of Queensland, NSW and ACT) – vulnerable
- Corben's Long-eared Bat (*Nyctophilus corbeni*)– vulnerable
- Large-eared Pied Bat (*Chalinolobus dwyeri*)– vulnerable
- Pilliga Mouse (Pseudomys pilligaensis)– vulnerable
- Five-clawed Worm-skink (Anomalopus mackayi)– vulnerable
- Superb Parrot (Polytelis swainsonii) – vulnerable
- Australasian Bittern (Botaurus poiciloptilus) - endangered
- Australian Painted Snipe (Rostratula australis) – endangered
- Regent Honeyeater (Anthochaera phrygia) – critically endangered
- Painted Honeyeater (Grantiella picta) – vulnerable
- Swift Parrot (Lathamus discolor) – critically endangered
- White-throated Needletail (*Hirundapus caudacutus*) – vulnerable and migratory
- The shrub Commersonia procumbens – vulnerable
- The twining plant Tylophora linearis – endangered
- Winged Peppercress (Lepidium monoplocoides) - endangered
- Ingram's or Keith's Zieria (Zieria ingramii) – endangered
- Slender Darling Pea (Swainsona murrayana) - vulnerable
- Spiny Peppercress (Lepidium aschersonia) – vulnerable

- Bluegrass (Dichanthium setosum) – vulnerable.

Potential also exists for the project to impact on the habitat of three species listed as migratory under the EPBC Act. These include Fork-tailed Swift (Apus pacificus), Rufous Fantail (Rhipidura rufifrons), and Satin Flycatcher (Myiagra cyanoleuca).

Clearing of native vegetation will impact threatened ecological communities and habitat for threatened species

The project will clear 1,791 hectares of native vegetation including 654 hectares of forest, woodland and shrubland from the Pilliga Forest and 115.8 hectares of threatened ecological communities (TEC) listed under the EPBC Act and 43 hectares of TEC listed under the BC Act. It would also impact on 1,512 hectares of non-native vegetation comprising cropping, horticulture, exotic pastures or exotic grassland, and planted windbreaks.

Native vegetation clearing includes 1,211 hectares of remnant native forest, woodland and shrubland in good condition and 580 hectares of native grassland and derived native grassland (DNG). The impacts of the project on specific plant community types, TECs listed under the BC Act and TECs listed under the EPBC Act are shown in **Table 11**.

Eleven threatened fauna species listed under the BC Act would be impacted by the project. These include:

- Barking Owl - 258.4 ha of breeding habitat impacted
- Masked Owl (*Tyto novaehollandiae*) (Vulnerable) -186 ha of breeding habitat affected
- Glossy Black-Cockatoo — 324.7 ha of breeding habitat impacted based on the species expert report (BDAR Appendix N)
- Little Eagle (*Hieraaetus morphnoides*) (Vulnerable) — 465.4 ha of breeding habitat impacted based on the species expert report
- Square-tailed Kite (*Lophoictinia isura*) (Vulnerable) — 407.5 ha of breeding habitat affected
- Bush Stone-curlew (*Burhinus grallarius*) (Endangered) — 551 ha of potential habitat impacted
- Eastern Pygmy-possum (*Cercartetus nanus*) (Vulnerable) — 836.1 ha of potential habitat impacted
- Squirrel Glider - 651.6 ha of potential habitat impacted
- Rufous Bettong — 357.9 ha of potential habitat affected
- Koala — 269.2 ha of important habitat impacted based on the BDAR
- Pale-headed Snake — 286.8 ha of potential habitat affected.

The project would impact the known or potential habitat of at least 12 threatened fauna species and potentially impact migratory fauna species listed under the EPBC Act. These include:

- Koala — 269.2 ha of important habitat impacted based on the BDAR
- Corben's Long-eared Bat — 1,107.4 ha of potential habitat impacted
- Large-eared Pied Bat – impacted by the loss of hollow-bearing trees
- Pilliga Mouse (Vulnerable) — 647.1 ha of potential habitat impacted
- Glossy Black-cockatoo (Vulnerable) – 324.7 of potential breeding habitat
- Painted Honeyeater (Vulnerable) — 1,107.4 ha of potential habitat impacted
- Regent Honeyeater (Critically Endangered) — 286.8 ha of potential habitat impacted
- Swift Parrot (Critically Endangered) — 732.9 ha of potential habitat impacted containing preferred feed trees impacted
- Superb Parrot (Vulnerable) – impacted by the loss of hollow-bearing trees used for nesting
- Five-clawed Worm-skink (Vulnerable) – potential to occur in the Narrabri area, impacted by construction works removing refuge and breeding habitat.
- Australian Bittern (Endangered) – 5.8 ha of direct impact

- White-throated Needletail – (Vulnerable) – 1389.9 of direct impacts
- Fork-tailed Swift (Migratory)
- Rufous Fantail (Migratory)
- Satin Flycatcher (Migratory)

Table 11 | Impacts to native vegetation (Source: BDAR Rev G, January 2023)

Zone and Plant community type (PCT)	TEC under the BC Act	TEC under the EPBC Act	Condition class	Total area impacted (ha)
PCT 27 - Weeping Myall open woodland of the Darling Riverine Plains bioregion and Brigalow Belt South Bioregion	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Weeping Myall Woodlands	Good	6.5
PCT 35 Brigalow- Belah open forest/woodland on alluvial plains often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	Brigalow (Acacia harpophylla dominant and co-dominant)	Good DNG	7.3
PCT 36 River Red Gum tall to very tall open forest / woodland wetland on rivers on floodplains mainly in the Darling Riverine Plains Bioregion	Not listed	Not listed		5.8
PCT 49 Partly derived Windmill Grass - copperburr alluvial plains shrubby grassland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Not listed	Not listed	Good	330.1
PCT 55 Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Not listed	Not listed	Good	4.0
PCT 56 Poplar Box - Belah woodland on clay-loam soils on alluvial plains of northcentral NSW	Not listed	Poplar Box grassy woodlands on alluvial plains	Good DNG	38.2
PCT 78 River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Not listed	Not listed	Good DNG	30.6

Zone and Plant community type (PCT)	TEC under the BC Act	TEC under the EPBC Act	Condition class	Total area impacted (ha)
PCT 81 Western Grey Box – Cypress Pine grass shrub tall woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia		0.9
PCT 88 Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	Not listed	Not listed	Good DNG Low	402.1
PCT 141 Broombush - wattle very tall shrubland of the Pilliga to Goonoo regions, Brigalow Belt South Bioregion	Not listed	Not listed	Good	30.9
PCT145 Western Rosewood - Wilga - Wild Orange - Belah low woodland of the Brigalow Belt South Bioregion and eastern Darling Riverine Plains bioregion	Not listed	Not listed	Good DNG	70.9
PCT 148 Dirty Gum - Buloke - White Cypress Pine - ironbark shrubby woodland on deep sandy soils in the Liverpool Plains region of the Brigalow Belt South Bioregion	Not listed	Not listed	Good	141.6
PCT 168 Derived Copperburr shrubland of the NSW northern inland alluvial floodplains	Not listed	Not listed	Derived Good	7.3
PCT 185 Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland	Not listed	Not listed	Good DNG	13.5

Zone and Plant community type (PCT)	TEC under the BC Act	TEC under the EPBC Act	Condition class	Total area impacted (ha)
PCT 202 Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South Bioregion (including Pilliga) and Nandewar Bioregion	Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions		Good	3.6
PCT 206 Dirty Gum - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	Not listed	Not listed	Good	10.1
PCT 244 Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt).	Not listed	Poplar Box grassy woodlands on alluvial plains	Good	43.9
PCT 248 Mixed box eucalypt woodland on low sandy-loam rises on alluvial plains in central western NSW	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Good	16.3
PCT 255 Mugga Ironbark - Buloke - Pilliga Box - White Cypress Pine shrubby woodland on sandstone in the Dubbo region, south-western Brigalow Belt South Bioregion	Not listed	Not listed		12.2
PCT 256 Green Mallee tall mallee woodland on rises in the Pilliga - Goonoo regions, southern Brigalow Belt South Bioregion	Not listed	Not listed	Good	**0.3**
PCT 394 Narrow-leaved Ironbark - White Cypress Pine woodland on slopes and flats in the Coonabarabran - Pilliga Scrub regions	Not listed	Not listed	Good DNG	81.1

Zone and Plant community type (PCT)	TEC under the BC Act	TEC under the EPBC Act	Condition class	Total area impacted (ha)
			Good (fire affected)	
PCT 397 Poplar Box - White Cypress Pine shrub grass tall woodland of the PilligaWarialda region, Brigalow Belt South Bioregion	Not listed	Not listed	Good	17.8
PCT 398 Narrow-leaved Ironbark - White Cypress Pine - Buloke tall open forest on lower slopes and flats in the Pilliga Scrub and surrounding forests in the central north Brigalow Belt South Bioregion	Not listed	Not listed	Good Moderate	382.3
PCT 399 Red gum - Rough-barked Apple +/- tea tree sandy creek woodland (wetland) in the Pilliga - Goonoo sandstone forests, Brigalow Belt South Bioregion	Not listed	Not listed	Good	54.8
PCT 404 Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	Not listed	Not listed	Good	25.1
PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests	Not listed	Not listed	Good	2.4
PCT 409 Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion	Not listed	Not listed	Good	0.8
PCT 414 White Mallee - Dwyer's Red Gum mallee heath on sands in the Goonoo - Pilliga region, Brigalow Belt South Bioregion	Not listed	Not listed	Good	7.3

Zone and Plant community type (PCT)	TEC under the BC Act	TEC under the EPBC Act	Condition class	Total area impacted (ha)
PCT 435 White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South bioregion and Nandewar bioregion	White Box Yellow Box Blakely's Red Gum Woodland	This patch does not meet EPBC definition	Good DNG	5.4
PCT 444 Silver-leaved Ironbark grassy tall woodland on clay-loam soils on plains in the Brigalow Belt South Bioregion	Not listed	Not listed	Good	1.7
PCT 469 White Cypress Pine - Narrow-leaved Ironbark - Buloke grassy open forest of the Dubbo region, southern Brigalow Belt South Bioregion	Not listed	Not listed		1.0
PCT 473 Red gum - Rough-barked Apple - Narrow-leaved Ironbark - cypress pine grassy open forest on flats and drainage lines in the Goonoo and surrounding forests, southern Brigalow Belt South Bioregion	Not listed	Not listed	Good	20.1
PCT 589 White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion	This patch does not meet community definition	This patch does not meet EPBC definition	Good	1.0
PCT 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Good	3.0
PCT 746 Brown Bloodwood - cypress - ironbark heathy woodland in the Pilliga region of the Brigalow Belt South Bioregion	Not listed	Not listed		2.1

Zone and Plant community type (PCT)	TEC under the BC Act	TEC under the EPBC Act	Condition class	Total area impacted (ha)
PCT 1384 White Cypress Pine - Bulloak - ironbark woodland of the Pilliga area of the Brigalow Belt South Bioregion	Not listed	Not listed	Good	8.8
Total				1790.9

Table 12 | Impacts to threatened and migratory flora and fauna species (Source: BDAR Revision G and Table 6.2)

Species name	Common name	Status under the BC Act	Status under the EPBC Act	Credit type[2]	Significant impact (EPBC Act)	Area impacted (ha)
Commersonia *procumbens*		Vulnerable	Vulnerable	Species	Yes	575.9
Diuris tricolor	Pine Donkey Orchid	Vulnerable		Species		388.5
Pterostylis cobarensis	Cobar Greenhood	Vulnerable		Species		442.9
Swainsona murrayana	Slender Darling Pea	Vulnerable	Vulnerable	Species	No	53.1
Swainsona sericea	Silky Swainson-pea	Vulnerable		Species		78.9
Polygala linariifolia	Native Milkwort	Endangered		Species		263.2
Tylophora linearis		Vulnerable	Endangered	Species	Yes	37.9
Lepidium aschersonii	Spiny Peppercress	Vulnerable	Vulnerable	Species	Yes	338.8
Lepidium monoplocoides)	Winged Peppercress	Endangered	Endangered	Species	Yes	175.8
Bertya opponens	Coolabah Bertya	Vulnerable	Vulnerable	Species	No	N/A
Cyperus conicus		Endangered		Species		50.8
Dichanthium setosum	Bluegrass	Vulnerable	Vulnerable	Species	No	3.5

[2] Protected fauna species attract ecosystem or species credits. Ecosystem credit species are accounted for in impacts to the PCTs with which they are associated and those PCTs' credit requirements. Species credit species are individually accounted for in terms of habitat impact and credit requirements.

Species name	Common name	Status under the BC Act	Status under the EPBC Act	Credit type[2]	Significant impact (EPBC Act)	Area impacted (ha)
Pomaderris queenslandica	Scant Pomaderris	Endangered		Species		69.06
Zieria ingramii	Keiths/Ingram's Zieria	Endangered	Endangered	Species	No	
Fauna						
Barking Owl	*Ninox connivens*.	Vulnerable		Species (breeding)/ ecosystem		258.4
Black Falcon	Falco subniger	Vulnerable		Ecosystem		
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis*	Vulnerable		Ecosystem		
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	Vulnerable		Ecosystem		
Bush Stone-curlew	*Burhinus grallarius*	Endangered		Species		
Corben's Longeared Bat	*Nyctophilus Corbeni*	Vulnerable	Vulnerable	Ecosystem	Yes	1,107.4
Dusky Woodswallow	*Artamus Cyanopterus cyanopterus*	Vulnerable		Ecosystem		
Five-clawed Worm-skink	*Anomalopus mackayi*	Endangered	Vulnerable		No	336
Flame Robin	*Petroica phoenicea*	Vulnerable		Ecosystem		
Fork-tailed Swift	*Apus pacificus*		Migratory	N/A	No	

Species name	Common name	Status under the BC Act	Status under the EPBC Act	Credit type[2]	Significant impact (EPBC Act)	Area impacted (ha)
Glossy Black cockatoo	*Calyptorhynchus lathami*	Vulnerable	Vulnerable	Species (breeding)/ Ecosystem	No	324.7
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis*	Vulnerable		Ecosystem		
Koala	*Phascolarctos cinereus*	Endangered	Endangered	Species	Yes	269.2
Large Bentwinged Bat	*Miniopterus Orianae oceanensis*	Vulnerable		Species (breeding)/ Ecosystem		
Large-eared Pied Bat	*Chalinolobus dwyeri*	Vulnerable	Vulnerable	Ecosystem	No	
Little Eagle	*Hieraaetus morphnoides*	Vulnerable		Species (breeding)/ Ecosystem		465.4
Little Pied Bat	*Chalinolobus picatus*	Vulnerable		Ecosystem		
Masked Owl	*Tyto novaehollandiae*	Vulnerable		Species / Ecosystem		185.8
Pale-headed Snake	*Hoplocephalus bitorquatus*	Vulnerable		Species		286.8
Painted Honeyeater	*Grantiella picta*	Vulnerable	Vulnerable	Ecosystem	Yes	1,107.4
Pilliga Mouse	*Pseudomys pilligaensis*	Vulnerable	Vulnerable	Ecosystem	Yes	647.1

Species name	Common name	Status under the BC Act	Status under the EPBC Act	Credit type[2]	Significant impact (EPBC Act)	Area impacted (ha)
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered	Critically Endangered	Species / Ecosystem	Yes	286.8
Rufous Bettong	*Aepyprymnus rufescens*	Vulnerable		Species		357.9
Rufous Fantail	*Rhipidura rufifrons*		Migratory	N/A	N/A	
Speckled Warbler	*Chthonicola sagittata*	Vulnerable		Ecosystem		
Spotted Harrier	*Circus assimilis*	Vulnerable		Ecosystem		
Square-tailed Kite	*Lophoctinia isura*	Vulnerable		Species / Ecosystem		407.3
Squirrel Glider	*Petaurus norfolcensis*	Vulnerable		Species		651.6
Superb Parrot	*Polytelis swainsonii*	Vulnerable	Vulnerable	Species (breeding)/ Ecosystem	No	1,594.1
Swift Parrot	*Lathamus discolor*	Endangered	Critically Endangered	Species / Ecosystem	Possible	732.9
Turquoise Parrot	*Neophema pulchella*	Vulnerable		Ecosystem		
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable		Ecosystem		

Species name	Common name	Status under the BC Act	Status under the EPBC Act	Credit type[2]	Significant impact (EPBC Act)	Area impacted (ha)
White-throated Needletail	*Hirundapus caudacutus*		Vulnerable, Migratory	N/A	N/A	1,389.9
Yellow-bellied Sheathtail-Bat	*Saccolaimus flaviventris*	Vulnerable		Ecosystem		

The potential for a significant impact is due to the areas of habitat to be removed and potentially adverse impacts on habitat connectivity locally and at the landscape scale.

The project would have the following impacts on entities that have the potential for serious and irreversible impacts (SAII):

- Coolabah Bertya - previously recorded in the project site. Surveys conducted in March 2022 targeting the Pilliga Forest did not detect this species. No impacts are likely.
- 7.3 ha of Brigalow Woodland TEC (Plant Community Type [PCT] 35)
- 3.6 ha of Fuzzy Box Woodland TEC (PCT 202)
- 8.4 ha of White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland) TEC (PCTs 435 and 599).

Potential foraging and breeding habitat in the project area exists for a suite of EPBC Act-listed threatened species. This includes native grassland, woodland, forest, shrubland (particularly in the Pilliga and in travelling stock reserves), rocky outcrops, riparian areas and dams. DCCEEW's controlled action decision required the biodiversity assessment to assess the impact of the project on several threatened fauna species and their habitat.

Aquatic flora and fauna impacts will occur

The project site occurs in the Macquarie-Bogan, Castlereagh River and Namoi River catchments of the Murray-Darling Basin. The project alignment crosses 102 mapped watercourses and/or waterbodies. Thirty-six of these watercourses are identified as key fish habitat (KFH) with three being perennial: Narrabri Creek, Namoi River, and Macquarie River.

One aquatic endangered ecological community (EEC), two endangered populations and six threatened species, listed under the EPBC Act and/or Fisheries Management Act 1994 (FM Act), have been recorded or are predicted to occur in watercourses within the project construction footprint. These are:

- Natural Drainage System of the Darling River Catchment (Darling River EEC) – all watercourses in the project area are part of this EEC, listed under the FM Act
- Western population of the Olive Perchlet (*Ambassis agassizii*) and the Murray Darling Basin population of the Eel-tailed Catfish (*Tandanus tandanus*)
- Silver Perch (*Bidyanus bidyanus*) (Critically Endangered under EPBC Act and FM Act, with a NSW recovery plan), Murray Cod (*Maccullochella peelii*) (Vulnerable under EPBC Act, with a national recovery plan), Trout Cod (*M. macquariensis*) (Endangered under EPBC Act and FM Act, with national and NSW recovery plans), Flathead Galaxias (*Galaxias rostratus*) (Critically Endangered under FM Act, conservation actions under NSW DPI Priorities Action Statement), Southern Purple-spotted Gudgeon (*Mogurnda adspersa*) (Endangered under FM Act, actions under NSW DPI Priorities Action Statement) and Macquarie Perch (*Macquaria australasica*) (Endangered under EPBC Act and FM Act, with a national recovery plan). Macquarie Perch was not assessed under EPBC Act significant impact criteria because NSW DPI distribution modelling did not identify this species as occurring in the study area.

During construction, the project is likely to impact on the habitat of some of these species resulting from the replacement of existing bridges, culvert and pipes and the installation of new waterway crossing structures. This would disturb streambanks and their vegetation and cause localised disturbance of streambeds impacting on in-stream fish habitat.

The aquatic ecology assessment concluded that the project would not have a long-term adverse impact on threatened aquatic species or communities because proposed design, mitigation and rehabilitation measures will be implemented. Temporary impacts would occur during construction including obstruction of fish passage and increased stream sedimentation reducing local water quality. However, these would be minor and mitigated by the installation of fish-friendly crossing structures, soil erosion and sediment controls, and other measures.

Ramsar-listed wetlands will not be impacted

The nearest Ramsar-listed wetland is the Macquarie Marshes, situated about 80 kilometres downstream of the project site. Streamflow in the project area is unlikely to be adversely impacted given the inclusion of many bridges and culverts. The project therefore would not impact adversely on the Macquarie Marshes and no further assessment is required.

Impacts on Groundwater Dependent Ecosystems will be minor and temporary

Aquatic groundwater dependent ecosystems (GDEs) are associated with riparian vegetation in the project area. The project intersects 11 high priority GDE vegetation areas including rivers (Macquarie, Namoi and Castlereagh) and creeks (Narrabri, Bohena, Barradine, Gulargambone, Etoo, Rocky, and Goona). Fourteen other watercourses were mapped as having low or moderate GDE potential. Ten springs with high priority GDE potential have been mapped, with the closest located about 10 kilometres from the project site.

The aquatic ecology assessment concluded that impacts of the project on GDEs will be minor and temporary and mostly associated with the construction phase. The report stated that these impacts will be mitigated by measures targeting the protection of deep aquifers and therefore stream baseflows and minimising the amount of riparian vegetation needed to be cleared to protect the environmental condition of high and moderate potential GDEs. Also, the Proponent stated that proposed water extraction activities will be located at a sufficient distance from high potential and high priority GDEs to be unlikely to cause adverse impacts to these entities. On this basis, no further assessment of the project's impacts on aquatic GDEs is required.

Biosecurity risks – transfer of noxious weeds and pathogens

The existing and proposed new rail corridor and surrounding area are subject to noxious weed infestation which is harmful to agricultural and horticultural crops, natural habitats and ecosystems, as well as livestock. Potential exists for weeds and pathogens to be transferred between properties during construction by the movement of construction vehicles or machinery, or on construction crew clothing and footwear. The Proponent concluded that these risks can be managed through the implementation of priority weed management requirements under the Biosecurity Act 2015, Weeds of National Significance weed management guides and other guidelines.

Submissions

Public submissions

Key issues raised in the public submissions on the EIS included:

- Adequate rehabilitation plans and management required to cover ways to restore culturally significant plans such as lillies, orchids, rushes and other herbs.
- Species present are to be clearly identified as an assessment undertaken during severe drought is not reflective of the environment.
- Clarify time required for collection and surveying plants species before construction commences.

- The divide of the rail line will result in clearing and habitat fragmentation impacting critically endangered fauna and birds, including the Regent Honeyeater and Swift Parrot, Koalas, Black-striped Wallaby, the Spotted-tail Quoll and the endemic Pilliga Mouse.
- Interruption of known pathways between shelter, food and water leaving only feral animals to thrive in such an environment.
- Concern for the extent of clearing, loss of hollows, bimble boxes (hosting wedgetailed eagles), weeping myalls, fauna strikes/mortality, climate change, and recommendation of an alternate route avoiding the Pilliga.
- Clearing of vegetation and draw down of water will endanger many precious species including the iconic Koala. Drying out and fragmentation will lead to increased fire danger and weed infestation.
- Further detail and mitigation required for Biosecurity and spreading of noxious weeds (i.e. Hudson Pear, Tiger Pear) to the Pilliga.
- Impacts to Webbs Reserve (high cultural significance with scar trees and other Aboriginal artefacts, White Box trees) and conservation properties linked through connectivity (western boundary and the riparian corridor ecosystems of the Macquarie River), critically endangered vegetation communities ('White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland'; 'Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia'; 'Weeping Myall Woodlands' and 'Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions'), two registered conservation properties on High Park Rd that are protecting and restoring 18 hectares of 'Grey Box Grassy Woodlands' adjoining Webbs Reserve.
- Concern with misidentification of species (grassland and woodland communities) within the EIS, missing vegetation management plan, impacts to threatened flora and fauna and ecological communities within the Pilliga, further surveys required to reflect the existing environment, tree corridors should be mapped and studied, payment into the biodiversity conservation fund is no substitute to native animals, grassland and trees.
- Impacts on DAPPO a government funded wetland restoration project.
- Integrity and cumulative impacts to the Pilliga.
- Inadequate cumulative impact assessment and inability to achieve appropriate offsets.
- Concern for the lack of consideration in the ecological assessment with regard to the footprint identified.

Additional concerns raised by the public on the PIAR included:

- Further detail on measures to prevent weed invasion is required.
- Destruction of the Pilliga is not appropriate as a National Biodiversity hotspot.
- Cumulative fragmentation and habitat destruction will alter the behaviour of threatened and endangered species, as well as an increase in light and noise impacts, feral pests, and changes to forest hydrology.
- Concern for impacts to wetlands, lack of considerations to biodiversity, calculation of offsets, and achieving offsets.
- Inadequate EIS/BDAR/PIR as there was a failure to identify numerous EEC populations
- Inadequate vegetation mapping.

Interest group submissions

NSW Farmers and Country Women's' Association of NSW (NFCWA) were concerned that the project's ecological impacts have been inadequately assessed. These included confinement of the assessment to the study area only with lack of consideration of impacts beyond the immediate

construction footprint, site surveys undertaken during prolonged drought conditions, and lack of assessment of the impact of changes to surface hydrology on ecology.

NSW Farmers also provided comments on the PIAR raising concerns about additional clearing occurring outside the identified footprint not being assessed and the ecological assessment being inadequate as vegetation categories have been misidentified (*Eucalyptus microcarpa* has been misidentified as *Eucalyptus pilligaensis* and land has not been properly categorised as derived grasslands) and its deficient in identifying the impacts.

National Parks Association of NSW (NPA) opposed the location of the proposed route through the Pilliga Forest based on the irreplaceability of the Pilliga in a bioregional context and the significant loss of ecological integrity that would be caused by increased fragmentation and reduced connectivity. The NPA commented that Australia's obligations under the Convention on Biological Diversity (and therefore the EPBC Act) would be contravened due to environmental impacts associated with the project. The NPA expressed concern that the EIS and PIR reduced ecological integrity to the offset costs of the direct construction footprint and ignored the broader impacts of ecosystem damage caused by fragmentation, barriers and loss of landscape connectivity.

Friends of the Pilliga commented that the proposed alignment should avoid the Pilliga Forest because of its high biodiversity values and NSW and national conservation significance. The group stated that there has been an inadequate assessment of the cumulative impacts of the project, particularly those associated with the Narrabri Gas Project, APA Western Slopes Pipeline, Silverleaf Solar Farm, and potential re-activation of petroleum exploration licences. Other issues raised were the difficulty of securing like-for-like biodiversity credits to offset impacts on the Pilliga, potentially high level of mortality from fauna colliding with long freight trains, and lack of consideration of alternative options for the railway alignment to avoid the Pilliga by using the existing Binnaway-Gwabegar line.

Knitting Nannas of New England North West commented that the project will adversely impact on biodiversity in the Pilliga Forest by increasing habitat fragmentation and loss caused by existing natural gas exploration and extraction activities. They suggested the use of an alternative route to the west of the Pilliga that follows an existing rail corridor through Gwabegar.

North West Protection Advocacy (NWPA) was also concerned about the serious impacts on biodiversity of routing the project through Pilliga East State Forest and recommended re-location of the proposed railway further west to use the existing Gwabegar rail corridor.

Australian Plants Society (APS) opposed the removal of intact bushland through the Pilliga noting the United Nations goals for sustainability and Australia's commitment to biodiversity protection and the projects impacts to habitat loss, vegetation clearing, soil degradation and adding to the impacts of climate change through vegetation removal. They recommend that the rail route be altered to the west utilising already cleared land and reduce the clearing of bushland in a National Biodiversity Hotspot.

Koala Action Inc. commented that the route through the Pilliga Forest will have an unacceptable impact on native vegetation patches and vegetation along the riparian corridors. Alternate routes are recommended to result in a better outcome for native flora and fauna. They also identified the Preliminary Fauna Connectivity Strategy (PFCS) gaps would cause barriers for large terrestrial mammals and that pre-clearing/construction and post development monitoring is required for movement patterns to identify baselines, without such the goals of the PFCS are compromised. Concern is also raised in regard to connectivity outcomes and current mitigation measures not minimising impacts, however they support dedicated fauna crossing facilities and the installation of fauna furniture with ongoing maintenance.

Wando Conservation and Cultural Centre Inc (WCCC) raised strong objection to the projects selected route through the Pilliga due to its rich diversity of native flora and fauna, communities and ecosystems. WCCC also raised concern that the EIS didn't account for cumulative impacts with Narrabri Gas Project, expired PELs, the APA Western Slopes Pipeline, the Silverleaf Solar Farm and the fencing of the Australian Wildlife Conservancy Saving Our Species on the Forest.

Council submissions

Narrabri Shire Council commented that proposed clearing of native vegetation to construct the project was excessive with the loss of hollow-bearing trees a key concern. Council stated that there is lack of justification provided in the EIS to support this approach, there is a need for a vegetation management plan, and recommended the Proponent undertake adequate consultation with all stakeholders prior to vegetation removal. Council requested appropriate safeguards for monitoring and managing biodiversity impacts and requested the opportunity to provide feedback on the Biodiversity Management Plan.

Narromine Shire Council supported the Proponent's approaches to local landholders to register their interest in establishing biodiversity stewardship sites to help offset impacts associated with the project. Council was concerned that the project will affect the availability of biodiversity credits in the Narromine region and therefore pose a significant risk for Council and local developers. Council also raised concerns about biosecurity in a farming landscape.

Coonamble Shire Council was concerned that the EIS did not adequately implement the avoidance of the project's impacts on biodiversity values. Concerned that the EIS did not adequately justify impacts of the project on biodiversity values in the Pilliga Forest and close to the Warrumbungle Range, the Council recommended that areas of high biodiversity value should be avoided wherever possible. Council was also concerned about the project's potential to introduce priority and high-threat weeds, pests and pathogens particularly during construction.

Warrumbungle Shire Council supported the preparation and implementation of a biosecurity management plan to reduce the threat of pest plant and animal invasion particularly during the project's construction.

Gilgandra Shire Council recommended that biodiversity credits generated under the Biodiversity Offsets Scheme should preferentially benefit landholders closest to the proposed alignment. Council stated that this would allow for increased financial returns to affected adjacent communities and benefit local biodiversity. Council was concerned that the project will further reduce the availability of biodiversity credits presenting a risk for Council and local developers. Council requested early involvement in the development of a biosecurity management plan to prevent and manage pest plant and animal outbreaks along the proposed alignment.

Government agency advice

BCS has liaised with the Department and the Proponent regarding the BDAR and has advised that there are no residual biodiversity matters in the updated BDAR, the BDAR conforms to BAM 2020 and the credit obligations have been appropriately identified.

DPI Fisheries commented that adequate provision for fish passage in waterways impacted by the project be provided. They recommended that the design of bridges, culverts, and other waterway crossings be in accordance with relevant guidelines, that the Proponent must minimise impacts on riparian and aquatic habitat, and felled trees should be reused to rehabilitate aquatic habitat.

Forestry Corporation of NSW Western Region (FCNSW) requested further consultation with the Proponent regarding fauna management measures and physical structures during construction.

North West Local Land Services requested the inclusion of pest animal and weed control measures in a biosecurity management plan.

Consideration

Survey and assessment methods are satisfactory

In previous reviews of the BDAR and the PIAR, the Department raised the need for the Proponent to conduct additional surveys and assessment in the project site. These were to undertake survey of flora and fauna during non-drought conditions, increase survey access to the proposed alignment, improve sampling of biodiversity and habitat present in the Pilliga Forest and other areas, and assess project footprint changes such as the addition of new drainage control areas. The Proponent completed additional targeted fauna and flora surveys and further assessment in spring 2020, July-August 2021 and March 2022.

Survey access to parts of the project site occurring on private property remained a constraint of the field surveys and habitat assessment. About 30% of the project area was unable to be surveyed. To counter this, the presence of eight threatened plant and 11 threatened animal species was assumed, based on suitable mapped habitat within or near the project site, the species' known distributional range, and accepted data sources including BioNet and the TBDC. The additional surveys did not detect Coolabah Bertya, thus eliminating it from further assessment.

The Department is satisfied with the biodiversity survey and assessment methods used in the project and for the areas not previously surveyed and accessed including the Pilliga Forest, and updates to these in the final BDAR. The additional field surveys completed have helped to better identify the impacts the project will have on biodiversity values in the project site.

The assessment adequately considers Matters of National Environmental Significance

The BDAR considered all potential MNES under sections 18 and 18A of the EPBC Act known to or potentially occurring in the project area. In addition, the BDAR assessed impacts to other EPBC listed communities and species identified in the desktop analysis and through site surveys.

Five listed TECs were recorded in the project site and identified within the BDAR as being impacted by the project. Assessments of significance were undertaken for Weeping Myall Woodlands, Brigalow (*Acacia harpophylla dominant and co-dominant*), Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and derived native grassland of South-eastern Australia, Poplar Box grassy woodland on alluvial plains, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. The assessments determined that based on the potential impacts from the project that a significant impact is unlikely.

The other two TECs listed in the referral decision, Coolibah – Black Box Woodlands of the Darling Riverine Plains and Natural Grasslands on basalt and fine-textured alluvial plains of northern NSW and southern QLD were assessed as not occurring within the project area, although listed as being significantly impacted.

Further assessment was undertaken for five listed TECs. The habitat requirements for these TECs and the extent in the project area are summarised in **Table 13**.

Table 13 | EPBC Act TECs identified in the project area

TEC name	Extent impacted within the project area
Brigalow (*Acacia harpophylla* dominant and co-dominant)	7.3 ha to be removed including 5.9 ha of derived native grassland and 1.4 ha of woodland.
Grey Box (Eucalyptus macrocarpa) Grassy Woodlands and derived native grasslands of South-eastern Australia	17.2 ha to be removed including 1.1 ha of paddock trees.
Poplar Box grassy woodland on alluvial plains	76.4 ha removed from scattered and isolated smaller patches across the mid sections of the alignment and includes 18.4 ha of derived native grassland.
Weeping Myall Woodlands	6.5 ha to be removed. Patch to be fragmented with two smaller patches retained each side of alignment.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	8.4 ha to be removed from two patches more than 200km apart.

The Department disagrees with the BDAR regarding the significance of impacts to EPBC Act TECs. The project would have a significant impact on these TECs as per the *EPBC Act Significant Impact Guidelines 1.1* (Commonwealth of Australia, 2013) as there is a real chance or possibility it would:

Brigalow: fragment or increase fragmentation of the community and cause a reduction in quality through potential establishment of invasive species

Grey Box (Eucalyptus macrocarpa) Grassy Woodlands and derived native grasslands of South-eastern Australia: reduce extent and fragment or increase fragmentation of the community and interfere with the recovery of the community.

Poplar Box grassy woodland on alluvial plains: reduce extent and fragment or increase fragmentation of the community.**Weeping Myall Woodlands:** fragment or increase fragmentation of the community and cause a reduction in quality through potential establishment of invasive species

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland: reduce extent and fragment or increase fragmentation of the community and interfere with the recovery of the community.

Seven EPBC threatened flora species were recorded during surveys or considered likely to occur within the project area of which four species are expected to have significant impacts. The four impacted threatened flora species are *Commersonia procumbens*, *Tylophora linearis*, *Lepidium monoplocoides*, and *Lepidium aschersonii*.

The Department considers the project is likely to have a significant impact on these threatened flora species, however, the Proponent states such impacts would be offset by the provision of species credits.

The assessment of EPBC listed threatened flora species is summarised in **Table 14**.

Table 14 | Assessment of EPBC Act threatened flora species

Common name	Species name	Likelihood of occurrence	Extent of impact	Significant impact
Coolabah Bertya	*Bertya opponens*	**Multi-function compound sites, Borrow Pits and Segments 1 – 7** Unlikely – no habitat or PCTs associated with, or likely to support this species. **Alignment and Segments 8 – 11** Unlikely – species not recorded during surveys	N/A	No
	Commersonia procumbens	**Multi-function compound sites, Borrow Pits and Segments 1 – 7** Unlikely – no habitat or PCTs associated with, or likely to support this species. **Alignment and Segments 8 – 11** Possible – species previously recorded and assumed to occur.	573.1 ha of assumed habitat	Yes
Bluegrass	*Dichanthium setosum*	**Multi-function compound sites, Borrow Pits, Alignment and Segments 1 – 11** Unlikely – no habitat or PCTs associated with, or likely to support this species.	3.5 ha of assumed habitat	No
Spiny Peppercress	*Lepidium aschersonii*	**Multi-function compound sites, Borrow Pits and Segments 1 – 7** Unlikely – no habitat or PCTs associated with, or likely to support this species. **Alignment and Segments 8 – 11** Possible – species previously recorded and is assumed to occur based on suitable habitat and PCTs.	338.8 ha of assumed habitat	Yes
Winged Peppercress	*Lepidium monoplocoides*	**Multi-function compound sites, Borrow Pits and Segments 1 – 7** Unlikely – no habitat or PCTs associated with, or likely to support this species. **Alignment and Segments 8 – 11** Possible – species previously recorded and assumed to occur where access was not possible. Species not recorded during surveys	175.8 ha of assumed habitat	Yes
Slender Darling-pea	*Swainsona murrayana*	**Multi-function compound sites, Borrow Pits and Segments 1 – 7** Unlikely – no habitat or PCTs associated with, or likely to support this species.	50.1 ha of assumed habitat	No

		Alignment and Segments 8 – 11 Possible – species not recorded during surveys		
	Tylophora linearis	**Multi-function compound sites, Borrow Pits and Segments 1 – 7** Unlikely – no habitat or PCTs associated with, or likely to support this species. **Alignment and Segments 8 – 11** Known – species previously recorded and recorded during surveys in spring 2020.	37.9 ha (16 ha of known habitat and 21.9 ha of assumed habitat)	Yes
Keiths Zieria	*Zieria ingramii*	**Multi-function compound sites, Borrow Pits, Alignment and Segments 1 – 11** Unlikely – no habitat or PCTs associated with, or likely to support this species, but assumed presence as unsurveyed sites are within potential range of this species	48.6 ha on assumed habitat	Yes

Twenty-four threatened fauna species and two migratory fauna species were identified during surveys. Five threatened fauna species and three migratory fauna species listed under the EPBC Act were recorded during surveys, consisting of: Koala, Corben's Long-eared Bat, Glossy-Black Cockatoo, Superb Parrot, White-throated Needletail, Fork-tailed Swift, Rufous Fantail and Satin Flycatcher. The consideration of threatened fauna species is summarised in **Table 15**.

Although the Glossy Black-cockatoo was recorded in the project area, an MNES assessment is not required as the species was listed as vulnerable under the EPBC Act on 10 August 2022, after the controlled action declaration was made. Offsets have not been calculated for threatened entities that were listed under the EPBC Act after the controlled action declaration was made (Glossy Black-cockatoo).

Table 15 | Assessment of EPBC Act threatened fauna species

Common name	Species name	Likelihood of occurrence	Impact significance
Koala	*Phascolarctos cinereus*	**Compound and borrow pit sites (Segments 1 – 7)** **Segment 1** – Likely – within 10 km of a record in roadside vegetation **Segment 2 and 3** – Unlikely – no/limited native vegetation present. **Borrow Pits A – D (segments 4 – 7)** Likely - Within 10 km of a record in roadside vegetation near Narromine. May occur in native woodland vegetation on occasion. **Segment 8**	260.4 hectares of occupied habitat impacted **Significant impact likely**

Common name	Species name	Likelihood of occurrence	Impact significance
		Likely – one local record south of Narromine. May occur on occasion in roadside remnants and riparian vegetation. **Segment 9** Possible – may occur on occasion in roadside remnants and riparian vegetation. **Segment 10** Known – recorded at two locations during surveys. Large areas of habitat present. **Segment 11** Likely – would occur in larger remnants, connected to the Pilliga Forest.	
Pilliga Mouse	*Pseudomys pilligaensis*	**Segment 8 and 9** Unlikely – no suitable habitat and outside known range. **Segment 10** Likely – many records and large amounts of habitat present. **Segment 11** Unlikely – may occur on rare occasion.	647.1 hectares of potential habitat impacted (29 ha of Broombush habitat and 466.7 ha of PCTs that contain *Acacia burrowii* and *Corymbia trachphyloia* **Significant impact likely**
Corben's Long-eared Bat	*Nyctophilus corbeni*	**Segments 8, 9 and 11** Likely – could forage and breed in woodland remnants. **Segment 10** Known – recorded at Trap Site 1 (Coolangala Creek) Large areas of foraging and breeding habitat present.	1,107.4 hectares of assumed potential habitat impacted **Significant impact likely**
Large-eared Pied Bat	*Chalinolobus dwyeri*	**Compound and borrow pit sites (Segments 1 – 7)** Unlikely – outside known range and no breeding habitat nearby. Limited native vegetation present. **Segments 8, 9 and 11** Unlikely – no suitable breeding habitat and no preferred foraging habitat present. **Segment 10** Likely – probable call recorded in the Pilliga. No breeding habitat present within 2km and no preferred foraging habitat present.	
Five-clawed Worm-skink	*Anomalopus mackayi*	**Segments 8 – 10** Unlikely – outside known range. **Segment 11**	3,366 ha of potential habitat **Significant impact likely**

Common name	Species name	Likelihood of occurrence	Impact significance
		Moderate - potential habitat present in red gum and white box communities along the northern side of the Pilliga.	
Superb Parrot	*Polytelis swainsonii*	**Compound and borrow pit sites (Segments 1 – 7)** Unlikely – Non-breeding vagrant species to the area **Segments 8 and 11** Likely – may occur as non-breeding flocks in remnant vegetation outside the breeding season. **Segment 9** Known – recorded in roadside remnant (likely non-breeding visitors) **Segment 10** Unlikely – preferred grassy woodland habitat not present.	1,594.1 ha of potential non-breeding habitat **Significant impact likely**
Painted Honeyeater	*Grantiella picta*	**Segments 8 - 9** Possible – may occur in larger remnants where mistletoe is present. **Segments 10** Likely – Pilliga is important for this species **Segment 11** Likely – potential foraging and breeding habitat	1,107.4 hectares of potential breeding and foraging habitat **Significant impact likely**
White-throated Needletail	*Hirundapus caudacutus*	**Segments 8 – 11** Possible – may occur on occasion.	1,389.9 ha of potential but irregular habitat
Australian Painted Snipe	*Rostratula australis*	**Segments 8 – 11** Unlikely – no suitable wetland areas present. Small patches of emergent reeds are present in the Macquarie River. Dense areas of emergent reeds are present in the Castlereagh River and Namoi River.	366.5 ha of direct impact
Australian Bittern	*Botaurus poiciloptilus*	**Segments 8 – 11** Unlikely – no suitable wetland areas present. Small patches of emergent reeds are present in the Macquarie River. Dense areas of emergent reeds are present in the Castlereagh River and Namoi River.	5.8 ha of direct impact
Regent Honeyeater	*Anthochaera phyrygia*	**Compound and borrow pit sites (Segments 1 – 7)** Unlikely – no important habitat present **Segments 8 – 9** Unlikely – no important foraging habitat present. **Segments 10-11**	286.8 ha containing preferred feed trees (PCTs 27, 244, 397 and 398) **Significant impact likely**

Common name	Species name	Likelihood of occurrence	Impact significance
		Possible – may occur in larger remnants on occasion while on migration from Barraba.	
Swift Parrot	*Lathamus discolor*	**Compound and borrow pit sites (Segments 1 – 7)** Unlikely – no important habitat present **Segments 8, 9 and 11** Unlikely – may occur on rare occasion. **Segment 10** Unlikely – may occur on rare occasion, only one record occurs within 20km of the alignment.	732.9 ha containing preferred feed trees (PCTs 88, 397, 398 and 399)

The BDAR concludes that six threatened fauna species/migratory fauna species would experience a significant impact due to the large area of habitat being removed and impacts on connectivity as well as substantial numbers of hollow-bearing trees being removed. The Department considers that eight species would experience a significant impact.

The BDAR identified that 260.4 ha of occupied Koala habitat would be removed, the majority of which would be from within the Pilliga Forest, which is regionally significant to the species. This extent of species was confirmed in the expert report in Appendix N of the BDAR, which analysed koala records to indicate long term persistence. The Department notes the project would also affect 1,422.6 ha of potential foraging habitat.

The project is expected to further fragment habitat and create a barrier to movement as well as increased risk through train strike. Mitigation measures such as bridges and culverts have been recommended to reduce impacts to the Koala species. The removal of Koala use trees in an already fragmented landscape will further fragment the availability of habitat to individuals and would have a significant impact on the species. The BDAR has proposed the provision of species credits to offset impacts to the Koala from the loss of potential breeding habitat. Impacts to potential foraging habitat would be offset by the provision of ecosystem credits for the relevant PCTs.

The project will remove a total of 647.1 hectares of woodland and shrubland from within the Pilliga Forest, which is potential habitat for the Pilliga Mouse. The removal of this vegetation will also impact connectivity for this species adding to the already fragmented environment. This fragmentation may bring predators and isolated breeding and foraging. Significant impacts are expected to the Pilliga Mouse, culverts and bridges may provide some connectivity however gene flow is expected to decrease. Impacts to the Pilliga Mouse would be offset through ecosystem credits, including additional credits for prescribed impacts.

Significant impacts are likely for the Corben's Long-eared Bat due to the removal of 1,107.4 ha of eucalypt woodland and forest habitat and hollow bearing trees. BCS identified that although large area of habitat would be removed, it is only a small portion of available habitat in the Pilliga area. Impacts to the species will be offset by the provision of ecosystem credits including additional credits for prescribed impacts.

The Department notes a discrepancy in assessed impacts to Five-clawed work-skink habitat. The EPBC Act Assessment of Significance in Appendix M of the BDAR considers soil types and land uses

that provide or prevent potential habitat and finds the project would directly affect 2.03 ha of potential habitat. The BAM calculator took a precautionary approach and attributed ecosystem credits for the Five-clawed worm-skink to all PCTs associated with the species, for a total impact of 336 ha. The Department considers this precautionary approach appropriate given the ephemeral nature of the species and the substantial unexpected finds during construction of the adjoining Inland Rail Narromine to Narrabri project.

The BDAR included an assessment of significance, which concluded the project will not have a significant impact on important habitat for the species. The Department disagrees and considers that the precautionary 336 ha would have a significant impact on the species due to removing habitat. The Department has recommended a condition of approval requiring the Proponent to prepare a management plan to manage construction and operational impacts on the species. The management plan would identify potential construction impacts, provide details of management and mitigation measures, procedures for the relocation of recovered individuals, goals and performance indicators for mitigation measures and ongoing monitoring.

The project would impact 1,594 ha of non-breeding habitat for the Superb Parrot. While the project is north of this species' breeding habitat, it does provide a significant amount of foraging habitat. Removal of this habitat would have a significant impact on the Superb Parrot given its impact on foraging habitat.

Habitat for the Painted Honeyeater exists throughout the project area, particularly within the Pilliga Forest. This species forages predominately on mistletoe. The project would result in the loss of extensive areas of vegetation containing mistletoe which is critical for this species. Species credits would be obtained to offset impacts to the habitat of this species. Removal of 286.8 ha of habitat containing preferred feed species may result in a significant impact on the Regent Honeyeater, although no breeding habitat or important foraging habitat would be removed. Ecosystem credits would be obtained to offset potential impacts to this species.

The Department is satisfied with the updated BDAR's assessment of potential impacts to MNES, and recommends the Commonwealth Minister for the Environment and Water:

- notes the Department's assessment of MNES in this report,
- considers the Bilateral assessment in **Appendix G**
- considers additional EPBC Act considerations, including the Commonwealth's international obligations and the consideration of relevant approved conservation advices, recovery plans, and threat abatement plans in Appendix H**;** and
- adopt biodiversity conditions in the recommended approval (**Appendix K**).

Impacts on threatened ecological communities are unavoidable within the limitations of the proposed route and measures would be implemented to minimise the degree of impact

Construction of the project will remove 115.8 hectares of threatened ecological communities (TECs) in the project area. This will result in the permanent and irreversible loss of ground, shrub and tree strata and contribute to the operation of land clearing as a key threatening process in the project area, particularly in the Pilliga Forest where the loss of hollow-bearing trees will be significant.

The Proponent proposed a range of measures to avoid these impacts. These included the selection of routes to avoid or minimise impact on threatened ecological communities and species based on field survey results and reviews of regional vegetation mapping, and location of workforce compounds and borrow pits in existing cleared areas. However, limited scope exists for the project to further avoid

impacts on TECs and other biodiversity values in the project area because of environmental constraints imposed by location of the preferred route through the Pilliga Forest and that bisect travelling stock reserves comprising significant tracts of remnant native vegetation.

A range of specific measures were proposed by the Proponent to mitigate direct, indirect and prescribed impacts of the project on TECs in the project area. These will be expanded upon in the Construction Environment Management Plan (CEMP) and comprises:

- Mapping and fencing of sensitive areas to minimise additional vegetation clearing
- Preparation of fauna management plans, including protocols for the removal of habitat features and rescue and relocation of fauna from areas of disturbance
- Staged rehabilitation and revegetation of disturbed areas after construction.

The Department is satisfied with the proposed avoidance and mitigation measures to reduce impacts on TECs prior to and during construction.

Impacts on threatened flora and fauna species cannot be avoided but would be managed and offset

The project will impact on threatened flora and fauna species and their habitat, particularly in the Pilliga Forest and at least two travelling stock reserves. The removal of 1,791 hectares of native vegetation will include 1,173 hectares of woodland and forest in good condition with mature, hollow-bearing trees and 580 hectares of derived native grassland. These provide foraging, breeding and refuge microhabitats for 14 threatened plant species and 20 threatened animal species listed under the BC Act and/or EPBC Act. The project will also remove 1,638 hectares of exotic grassland or cropland which provides important cover and foraging habitat for reptiles, macropods, some microchiropteran bats and birds. A total of 39 hectares of shrubland that provides habitat for small mammals, birds and reptiles would also be removed.

The Department acknowledges that these impacts cannot be avoided given that the proposed rail alignment will traverse significant tracts of native vegetation particularly in the Pilliga Forest.

A total of 24 species credit species (13 flora and 11 fauna) were recorded during surveys in the project area. The project area provides breeding, foraging and shelter habitat for these species. A total of 11 ecosystem credit species and 36 ecosystem credit PCTs were also recorded or predicted to occur in the project area. The Proponent has committed to offsetting the impacts of the project on these species credit and ecosystem credit species and their habitat in the project area.

The Proponent proposed design measures to **minimise** the direct impacts of the project on threatened flora and fauna species and their habitat. These included:

- Preparation of a Fauna Connectivity Strategy to mitigate connectivity impacts in the Pilliga Forest and other localities where fauna connectivity has been impacted by the alignment, The Strategy includes implementation of fauna underpasses, furniture and crossing structures, maintenance of structures and supporting vegetation, and ongoing maintenance and adaptive management. The Department is satisfied the strategy provided by the Proponent is appropriate but has recommended a condition requiring an updated Fauna Connectivity Strategy is approved by the Planning Secretary to giving greater certainty over implemented measures.
- Design of bridges along the proposed rail alignment to facilitate fauna movement under these structures, with retention of groundcover, shrubs and riparian vegetation wherever possible

- Design and implementation of dedicated fauna culverts in the Pilliga Forest and at Bohena Creek targeting Koala, Pilliga Mouse, Rufous Bettong, Black-striped Wallaby and Eastern Pygmy-possum
- Further refinement during the project's detailed design and prior to construction including surveys of previously unassessed properties to improve quantification of impacts and identify site-specific mitigation measures and reducing the width of the construction impact zone where possible in higher biodiversity value areas.
- Additional threatened species surveys to confirm the extent of impacts and provide specific mitigation measures during construction and operation.
- Design and implementation of threatened species management plans for *Tylophora linearis*, *Commersonia procumbens*, Pine Donkey Orchid, Cobar Greenhood, Native Milkwort, Slender Darling Pea, Spiny Peppercress, Winged Peppercress, Bluegrass, Ingram's (Keith's) Zieria, Scant Pomaderris, Koala, Rufous Bettong, Pilliga Mouse, Squirrel Glider, Black-striped Wallaby, Five-clawed Worm-skink, hollow-dependent birds (Superb Parrot, Turquoise Parrot) and bats, and small woodland birds – Speckled Warbler, Hooded Robin, Flame Robin, Varied Sittella, Grey-crowned Babbler, Brown Treecreeper, Dusky Woodswallow and Diamond Firetail. These plans should be prepared in consultation with available Commonwealth and State conservation advices, recovery plans and threat abatement plans.

The Department considers the Proponent's commitment to address construction impacts on threatened flora and fauna to be appropriate for the project. Additional information is however for Koala and mitigation of impacts on Koala habitat and connectivity at the local and regional scales. The Department has reinforced these commitments in the recommended conditions of approval, which require the Proponent to describe in detail these measures in threatened species management plans and the CEMP and OEMP for the project.

The project is not expected to cause serious and irreversible impacts on relevant entities

The project affects three TECs at risk of serious and irreversible impacts (SAII): the removal of 8.4 ha of White Box Yellow Box Blakely's Red Gum Woodland (Box Gum Woodland), 3.6 ha of Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions (Fuzzy Box Woodland), and 7.3 ha of Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions (Brigalow). An assessment for each of these SAII entities was included in the BDAR.

Impacts to Box-Gum Woodland were anticipated based on SAII Principles 1 and 2: that the TEC has experienced a reduction in geographic extent and population size. The Department notes that the project would impact on approximately 0.00003 per cent of the community in NSW, that the TEC is likely to respond to management measures, and that the impact would be offset by ecosystem credits.

Impacts to Fuzzy Box Woodland were anticipated based on SAII Principles 1, 2 and 3: that the TEC has experienced a reduction in geographic extent and population size and has a very limited geographic distribution. The Department notes that the project would impact on 0.9 per cent of the community in NSW, that the TEC is likely to respond to management measures, and that the impact would be offset by ecosystem credits.

Impacts to Brigalow were anticipated based on SAII Principles 1: that the TEC has experienced a reduction in geographic extent. The Department notes that the project would impact on approximately 0.05 per cent of the community in NSW, that the TEC may respond to management measures, and that the impact would be offset by ecosystem credits.

The Department is satisfied that the impacts to the Box-Gum Woodland and Brigalow affect a very small proportion of these communities' extent and the impacts would be offset, which would likely involve management measures to protect occurrences of these species at offset sites. The proposal does not represent a serious and irreversible impact to these communities that would require additional measures to minimise impacts.

The 3.6 ha of Fuzzy Box Woodland proposed to be cleared represents 0.9 % of the TEC's extent in NSW. The extent and vegetation integrity of this community in the BDAR are based on assumed presence as the Proponent did not have access to survey the site. This is an appropriately precautionary approach, but it may overstate the actual impacts as it is unlikely that the assumed extent and quality of this TEC is actually present. The BDAR also notes that a key impact on this TEC is the reduced connectivity caused by the indicative 80 m width of the construction works in this area.

Given the impacts outlined in the BDAR represent a worst case scenario, the Department considers it is unlikely that the project would have a serious and irreversible impact on the Fuzzy Box Woodland. However, the Department acknowledges that there is some uncertainty over the extent of actual impact to this TEC and recommends a condition of approval requiring the Proponent to avoid the Fuzzy Box Woodland to the greatest extent possible, reduce impacts to this community and provide compensatory measures to retain and improve the condition of this community elsewhere.

One flora species identified as a SAII entity, the Coolabah Bertya (*Bertya opponens)* was also assessed in the BDAR due to a previous record of the species within the project's footprint. Multiple targeted surveys were conducted in the previously known and potential locations for this species, but it was not found. The SAII assessment therefore concludes that the project will not have any impact on this species. The Department concurs with that view.

Impacts will be offset in accordance with the Biodiversity Conservation Act

The direct impacts of the project on threatened species and TECs would require offsetting, through the securing of ecosystem credits to address impacts on PCTs and species credits for impacts on threatened flora and fauna species. The BDAR calculated credits in accordance with the BAM and included prescribed impact credits. These credits are calculated by factoring up ecosystem and species credits to account for impacts of fauna connectivity through the Pilliga and the expected efficacy of fauna connectivity mitigation measures. A total of 50,852 ecosystem credits will be required, of which 11,425 are for prescribed impact credits. A total of 268,400 species credits will be required, of which 83,596 are for prescribed impacts on species credit fauna species.

The BDAR segmented the project into 11 separate construction segments, with the ecosystem and species credit obligations determined for each segment. This was designed to allow for the staged retirement of credits prior to the commencement of construction of each segment of the project, thus reducing the risk of delays to the construction schedule.

Table 16 | Offset credit requirements per project segment

Project segment	Native vegetation impacted (ha)	PCTs impacted	Ecosystem credits	Species credits
Segment 1 (Narromine multi-function compound)	15.3	49, 88	503	0
Segment 2 (Curban multi-function compound)	1.5	88	37	0

Project segment	Native vegetation impacted (ha)	PCTs impacted	Ecosystem credits	Species credits
Segment 3 (Narrabri multi-function compound)	93.2	78, 148	1530	7,241
Segment 4 (Borrow pit A and haul road)	1.4	185	50	0
Segment 5 (Borrow pit B and haul road)	4.3	255	99	132
Segment 6 (Borrow pit C and haul road)	8.3	88, 255	134	302
Segment 7 (Borrow pit D and haul road)	4.7	398, 746	97	281
Segment 8 Alignment (Narromine to Curban)	426.6	36, 49, 55, 56, 78, 81, 86, 88, 202, 206, 244, 248, 394, 469, 599	9,449	21,693
Segment 9 Alignment (Curban to Pilliga)	386.4	27, 49, 78, 88, 145, 244, 397, 435, 444, 589	9,457	11,511
Segment 10 Alignment (Pilliga)	652.9	49, 88, 141, 256, 394, 397, 398, 399, 404, 406, 409, 414, 589, 1384	25,489	213,635
Segment 11 Alignment (Pilliga to Narrabri)	182.3	35, 49, 55, 78, 88, 148, 168, 399, 473	4,007	13,605
Total	**1776.9**		**50,852**	**268,400**

The Proponent proposes to meet the ecosystem and species credit obligation through the establishment of biodiversity stewardship sites under the BC Act. In assessing the suitability of a site for the provision of biodiversity credits, Biodiversity Stewardship Site Assessment Reports (BSSARs) must be prepared. Any residual credit obligation is proposed to be met through purchase of existing credits or payment into the Biodiversity Conservation Fund.

The Department considers that project will impact threatened flora and fauna species and communities however will be appropriately managed through the offset strategy and mitigation measures. The offset requirements of the project within the BDAR are recommended to be conditioned to ensure offsets are appropriately managed.

Aquatic flora and fauna impacts can be managed

The main impacts to aquatic ecological systems would occur from the removal and construction of new watercourse crossing structures and access over watercourses for the movement of construction equipment and personnel. This may be in the form of causeways, culvert/pipes or bridging structures.

The Department considers the project is unlikely to have a significant, lasting impact on aquatic communities, threatened species and endangered populations. The implementation of appropriately designed fish-friendly crossing structures, standard construction mitigation measures such as erosion and sediment control would minimise the potential for adverse impacts to watercourses and/or aquatic species.

Impacts on groundwater dependent ecosystems are temporary and manageable

The Department considers that potential impacts on GDEs are likely to be relatively minor and temporary being mainly associated with the project's construction phase. The Proponent has proposed a mitigation strategy that includes protecting deep aquifers by extracting water supplies from the upper and middle groundwater strata, minimising the amount of riparian vegetation required to be cleared, and rehabilitating areas disturbed by construction activities. The Proponent has also committed to targeting groundwater extraction for construction purposes from areas located away from high potential and high priority GDEs. On this basis, the Department considers that the project is unlikely to have any long-term impact on groundwater dependent ecosystems in the project area and that any impact would be localised.

Biosecurity risks will need to be managed

The Proponent will be required to manage weeds, feral animals and pathogens in accordance with the Biosecurity Act 2015 during the construction and operation of the project. To ensure the risks of transmitting Weeds of National Significance and other priority weeds and feral animals is minimised, the Department has recommended the proponent implement biosecurity management measures and hygiene protocol as part of the Biodiversity Management Sub-plan.

6.3 Noise and vibration

The project will cause noise and vibration impacts during construction and operation due to extended construction hours and proximity to the proposed rail alignment.

Construction noise is expected to impact around 3,000 sensitive receivers along the alignment, with impacts above the noise management levels during both standard construction hours, proposed additional hours between 6:00am and 7:00am, and during weekends. The intensity of impacts varies for activities that progress along the alignment. The worst-case impacts presented in the EIS are likely to be experienced only for a limited period.

Operation of the project will introduce a new source of rail noise and vibration for most receivers. Noise from locomotives, wagons, track and train features, level crossing warnings, and train horns, is likely to be audible at many receivers both day and night. There are expected to be 53 receivers with noise levels above the *Rail Infrastructure Noise Guideline* (RING) (EPA 2013) trigger levels for new rail lines, when the project is at its proposed capacity in 2040.

41 receivers are expected to be impacted above the trigger levels when operations begin. These receivers must be considered for mitigation and, dependent on the situation, mitigation can take the form of noise barriers in the rail corridor, architectural treatment, relocation of dwellings, upgraded fencing, local screens, other measures, or a combination.

To assist in considering and assessing flooding and hydrology impacts, the Department engaged an independent noise and vibration expert (White Noise Consulting Pty Ltd) to undertake a specialist review (**Appendix J**).

Issue

Out of Hours Works (OOHW) are proposed, with limited mitigation specified

Recommended standard working hours in the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) are Monday to Friday 7 am to 6 pm, Saturday 8 am to 1 pm, with no work on Sundays or public holidays. The Proponent seeks to undertake construction activities (excluding blasting) outside the recommended standard hours, during proposed daytime construction hours of 6 am to 6 pm Monday to Sunday, excluding public holidays, with no work to between 1 pm Saturday and 7 am Monday every second week. While the EIS uses "Out of Hours" to define work outside proposed construction hours, proposed construction hours include time defined as Out of Hours Works in the ICNG.

Mitigation was assigned based on the proposed work hours (6 am to 6 pm), instead of providing specific measures for work done during proposed hours, but outside ICNG standard hours. While noise management levels used in the assessment reflected the ICNG definition of out of hours work, only generic noise mitigation was included for this out of hours work.

Work proposed to occur outside proposed hours includes:

- Large concrete pours for the Macquarie River, Castlereagh River, and Narrabri Creek/Namoi River bridges, could be completed in one pour and avoid high temperatures during the daytime (to minimise the risk of structural issues with multiple separate concrete pours)
- Girder/bridge deck installation at bridges on selected public roads (outside peak travel periods to minimise traffic and safety impacts)
- Utility works (such as connections) undertaken outside peak periods to minimise disruption to customers.

The Proponent argues for primary project construction hours (including out of hours works) at this stage of the design process, and that constructing the project during these hours reduces the overall construction duration by up to six months. This reduces the length of time sensitive receivers are exposed to construction noise and traffic-related issues.

The Proponent seeks to minimise impacts through developing specific mitigation measures during detailed planning, agreements, or alternative mitigation measures and respite developed in consultation with affected receivers. A complaints management system will be developed and work practices and opportunities for mitigation would be reviewed if complaints are received.

Construction works will exceed multiple noise management levels

Construction activities that exceed the project's $L_{eq,15min}$ noise management level, being background noise level plus 10 dB during daytime construction hours, and background plus 5 dB during out of hours work, will cause noise disturbances to residences and other sensitive receivers.

The highly affected noise management level ($L_{eq,15min}$ 75 dBA) is predicted to be exceeded at 17 residential receivers.

Noise levels generated by rail construction activities undertaken during recommended standard working hours may exceed the relevant construction noise management level (45 dBA) at up to 987

residential receivers, five passive recreation receivers, one active recreation receiver, and 31 commercial/industrial receivers.

Noise levels during out-of-hours work are predicted to exceed the 35 dBA construction noise management level at up to 2,894 residential receivers across all construction scenarios. Maximum exceedances by as much as 63 dB have been identified as a worst-case scenario during construction. The construction scenarios with the highest number of predicted impacts are stripping topsoil (with impacts at up to 2,246 residential receivers), main earthworks, and landscaping. The duration of potential impacts for an individual receiver, for any given construction scenario, is estimated to range from two to four weeks for landscaping, to about 12 weeks for main earthworks.

Stripping topsoil, road earthworks, and landscaping are predicted to have the largest impact on sleep disturbance. These activities are predicted to generate noise levels that exceed the external L_{max} 52 dBA *Noise Policy for Industry* (NPfI) (EPA, 2017) sleep disturbance criteria at up to 1,024 residential receivers. On average, the duration of impacts at any individual receiver is estimated to be between one day and eight weeks for stripping topsoil, and one day to seven weeks for landscaping.

The construction noise assessment focused on a worst-case scenario, where the loudest equipment is at its closest point to receivers, likely to only represent a relatively short period, with most impacts likely to be lower than this. Therefore, construction noise and vibration management plans must consider not only the noise level, but also the time of day and duration of impacts, when determining appropriate mitigation measures.

The largest impacts from ground-borne noise for rail infrastructure construction scenarios occurs when using dozers, vibratory rollers and piling, which in some cases exceed noise management levels. Extensive use of vibration generating equipment, and generic information used in the EIS, indicates validation of vibration generation at distance from different equipment must be carried out by the Proponent at the start of construction.

Prior to construction, the Proponent would prepare location and activity specific construction noise and vibration impact statements based on a more detailed understanding of the construction methods, including the size and type of construction equipment, duration and timing of works, and detailed reviews of local receivers. The statements must confirm predicted impacts at relevant receivers and determine appropriate and specific mitigation and management measures for each activity. The statements would also confirm noise and vibration auditing and monitoring requirements.

Blasting is proposed for borrow sites and air-blast overpressure levels can be controlled to meet limits

Blasting may be required at borrow pits C and D if hard rock is encountered at depth. Most blasting details, such as explosive charge mass or local ground properties, are not known at this stage. Blasting would not be required for the construction of the proposed rail and road infrastructure.

Blasting vibration impacts would be re-assessed once specific locations and depths are confirmed. However, the Proponent's blasting assessment found that ground vibration impacts are not expected, due to the sufficient distance from proposed blasting locations to the nearest receivers. The assessment shows that recommended air-blast overpressure limit levels of 115dB up to a maximum of 120dB can be met by using the appropriate maximum blast charge in each borrow pit. The Proponent has committed to preparing a blast management strategy in accordance with relevant guidelines and in consultation with the EPA.

Noise impacts from compounds are predicted to have significant impacts at receivers, particularly outside of standard hours

The Proposal includes three multi-function compounds at Narromine South, Curban, and Narrabri West. Other compounds include structural compounds near bridge construction areas, general and minor compounds located along the alignment.

The multi-function compounds will be used continuously for a variety of uses. Other compounds are expected to be used periodically and therefore impacts are expected to be transient.

The Narrabri multi-function compound is expected to affect up to 135 receivers up to 29 dB above the night noise management level. A structure compound adjacent to the Narrabri multi-function compound is also predicted to impact up to 18 receivers by up to 28 dB above the night noise management level. This represents a significant impact from these fixed facilities in Narrabri over an expected duration of 4 years. The other multi-function compounds are expected to impact fewer than 10 receivers combined.

Other types of compounds such as structural, general, and minor compounds, are expected to impact up to 17 receivers during standard hours, and up to 135 receivers outside of standard hours. These compounds are dispersed along the alignment, so unlike the multi-function compounds, these receivers will not be impacted at the same time for the duration of construction.

Impacts are anticipated from use of five temporary accommodation facilities, with some mitigation proposed

Five temporary accommodation facilities are proposed:

- within the Narromine South multi-function compound, about 7 km south of Narromine and directly adjacent to the Narwonah Materials Distribution Centre
- Narromine North, about 9 km north-east of Narromine
- Gilgandra, about 1.5 km from the Gilgandra town centre
- Baradine, within the former Baradine Racecourse
- within the Narrabri West multi-function compound.

Each temporary workforce accommodation facility is proposed to operate for the duration of construction (approximately 48 months) and accommodate up to 500 people. It would include operation of supporting infrastructure such as generators, air conditioners, and pumping stations.

Up to 71 residential receivers are predicted to receive noise levels exceeding the NPfI evening and night trigger levels of $L_{eq,15min}$ 35 dBA. 25 receivers are predicted to receive noise levels exceeding the NPfI daytime trigger level of $L_{eq,15min}$ 40 dBA, due to activities across all accommodation sites. Four non-residential receivers classified as ‘passive recreation’ are predicted to receive noise levels exceeding the NPfI trigger level of $L_{eq,15min}$ 48 dBA. All passive recreation receivers are situated in Baradine. No exceedances are predicted at other non-residential sensitive receiver types or locations.

The camp at Gilgandra is predicted to affect the most receivers, with up to 55 receivers predicted to experience noise levels up to 23 dB above the night trigger level. Up to 35 residential receivers are predicted to receive noise levels exceeding the NPfI sleep disturbance trigger level of L_{max} 52 dBA, due to activities across all accommodation sites.

The Proponent has proposed mitigation including a temporary workforce accommodation plan that would guide the design and provision of temporary accommodation. The plan will outline the

arrangement and layout of facilities, and operational management measures to minimise noise impacts on surrounding receivers, including air-conditioner and other noise source placement, procurement of quieter plant and equipment, limiting deliveries and heavy vehicle movements to daytime, and communicating/enforcing noise controls/mitigations to users of the sites.

Operational noise levels will exceed guideline levels at residential receivers near the alignment

Operational airborne noise from train engine noise, wheel-rail noise, track and train features, train horns, and level crossing alarms will impact up to 53 residential receivers above the RING trigger level by 2040, with an estimated 14 trains per day, most of them occurring at night. When the project opens, impacts above the RING trigger levels are also expected at 41 receivers, with the largest impacts occurring at night.

Most exceedances are at night. The extent of the exceedances is between 1 dB and up to 12 dB, with the worst affected receiver being Receiver 331634 (1115 Eumungerie Road Burroway) having a 12 dB exceedance of the $L_{eq,9hour}$ trigger level, 11 dB exceedance of the L_{max} trigger level, and predicted level of L_{max} 91 dBA. The RING requires that where the noise trigger levels are exceeded, all feasible and reasonable mitigation is implemented to reduce impacts. The EIS does not provide an indication of what type of mitigation is being considered for each receiver.

Department's independent expert review

The independent peer review by Pulse White Noise Acoustics raised matters relating to construction noise and vibration including extended work hours, sleep disturbance criteria, construction noise assessment methodology, construction traffic assessment, and apparent lack of information on mitigation measures proposed to address noise levels significantly over the noise management levels, particularly outside of standard hours and long duration impacts from fixed facilities like compounds.

Operational rail noise matters raised by the review were primarily issues relating to assumptions and inputs used for noise modelling, including the validation methodology and corrections made for different track and rail features. The review commented on the level of mitigation proposed, including the suitability of at-property treatments for specific housing and ventilation types.

Submissions

Community submissions

Issues raised in community submissions include:

- the adequacy of the noise assessment, including that noise monitoring was inaccurate as it was conducted during summer and not representative of quieter winter conditions
- no consideration was given to the existing low levels of noise that are experienced in the predominant rural environment
- concerns with operational noise impacts on residents, business, livestock, and native wildlife
- vibration impacts on water bores and quicksand
- lack of detail about types of operational noise mitigation, procedures if mitigation is unsuccessful, and challenges of treating residences constructed of weatherboard and timber,
- use of evaporative air conditioning systems may not be suitable for acoustic at property treatment
- need for the Proponent to commit to specific mitigation measures prior to determination
- a community submission highlighted that a property was missed from the assessment. This assessment was included in the PIAR

- request for clarification of how operational noise impacts on residents located about 900 m from the project would be mitigated.

Special interest group submissions

North West Protection Advocacy (NWPA) asserts no cumulative noise and vibration impact has been conducted to assess the potential cumulative impacts from the project and the Leewood Facility.

NSW Farmers claims that the noise and vibration assessments for both construction and operation of the project have not adequately considered the impacts on sleep disturbance, and that mitigation proposed is inadequate for some landholders.

NSW Farmers request conditions limiting construction hours, requiring mitigation and management strategies, requiring Proponent site visits with sensitive receivers, completion of noise attenuation treatments before operation, requiring sleep disturbance impact assessment in accordance with WHO night noise guidelines for Europe, appointment of an independent acoustic advisor, specifying operational noise and vibration criteria for the sensitive rural environment, undertaking operational noise validation, requiring preparation of an operational report, and specifying what type of rollingstock can be used on the line.

Council submissions

Narrabri Shire Council objected to construction outside of standard construction hours, particularly where households would be affected.

Council raised concerns with the noise mitigation measures, including an inadequate consideration of noise and vibration sensitive receiver types, and a lack of noise respite for affected communities, and noise impacts on residents from the temporary workforce accommodation.

Council queried why no acoustic analysis was undertaken for noise catchment areas 1 and 2, and requested ongoing and effective noise monitoring, with data available to the public.

Council requested compensation through the provision of noise/acoustic barriers, double glazing, and other measures, for households adversely impacted during the operation of the rail line.

Government agency advice

EPA raised noise and vibration matters including a lack of specific out-of-hours work mitigation, lack of justification or evidence of community support (apart from convenience) for out-of-hours work, request for conditions to require early implementation of mitigation and respite periods and sought clarification on two terms – ‘rail earthworks green zone’ and ‘rail earthworks red zone’ (clarification which the Proponent has provided).

EPA raised assessment methodology issues, such as the incorrect policy being applied to construction accommodation camps. The PIAR provided updated assessments which addressed the matters raised.

Transport for NSW sought clarification on the curve L_{Amax} source noise level in Table 23 of updated operational noise and vibration report and noted this is inconsistent with other Inland Rail EISs.

The Proponent acknowledges that the correction factors for the L_{Amax} source noise at curves are variable between construction scenarios. Higher levels of correction were applied in earlier models; however, later models were informed by monitoring data made available in completed sections. Using these, a more detailed review brought down the correction factors.

Consideration

Construction noise exceedances reflects the project's setting and can be appropriately managed.

The Department notes many construction noise exceedances identified in the assessment reflect low background noise levels. Noise management levels for residences are $L_{eq,15min}$ 45 dBA during the day and 35 dBA at night. These levels are low and relatively easy to exceed with typical construction activity. This suggests that most of the noise exceedances are a function of the project's predominately rural setting, rather than the construction activities being noisier than typical for construction of linear infrastructure projects. **Figure 95** shows the number of receivers subject to construction noise impacts in 5 dBA bands.

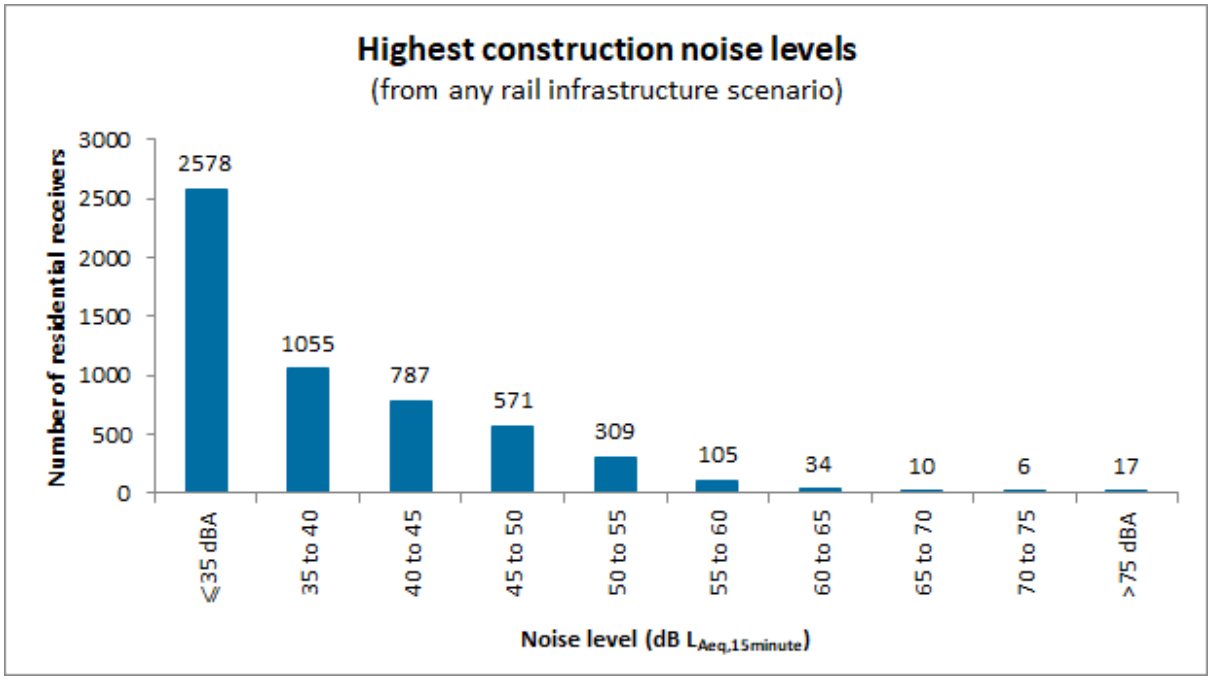


Figure 95 | Highest construction noise level experienced at residental receivers (Source: PIAR)

Most residential receivers subject to higher noise levels exceeding the out of hours noise management levels will experience exceedances that are unlikely to cause significant impacts. Of these 2,894 receivers, 1,842 will experience noise levels lower than 45 dBA, and 2,722 will experience noise levels lower than 55 dBA.

The Department acknowledges these noise levels are unlikely to be experienced for the entirety of the construction period, as the activities that generate the most noise, such as dozers and other earth moving machinery, are transient as the project progresses along the alignment. The Department considers that the EIS assessment results represent an unlikely worst 15-minute period of construction activity and does not indicate the ongoing noise impact over an extended period.

Where construction work will be stationary, such as at bridge footing sites and compounds, this requires a different approach to mitigation, due to potential for ongoing, instead of transient, impacts.

The Department accepts that noise and vibration impacts cannot be completely avoided in the construction of a major infrastructure project, but these impacts are more acceptable to receivers if well managed and mitigated. The Proponent has committed to managing construction noise through

its Construction Noise and Vibration Management Sub-plan, which sets out how outcomes will be achieved through mitigation and management measures. Some of these measures include scheduling activities to reduce impacts, use of quieter machinery and methods, siting of machinery, the use of shielding around noise generating activities, and at-receiver noise treatment for those receivers who are impacted by both operation and construction of the project. The Department is supportive of these measures which provide appropriate management of construction noise impacts and recommended a condition requiring a Construction Noise and Vibration Management Sub-plan.

In recognition of the number of receivers affected by construction noise, the Department has recommended a condition requiring the Proponent engage an independent Acoustics Advisor to advise the Proponent on measures to avoid or mitigate impacts, including for night works, assist the Proponent in addressing noise-related complaints, and prepare reports to the Planning Secretary about the project's noise and vibration performance.

Reduced extended construction hours balance construction efficiency and residential amenity

The proposed seven days a week 6:00 am to 6:00 pm Monday to Sunday construction schedule could accelerate the construction of the project, which may reduce the total construction noise impact on rural residents and the multiple communities along the alignment. It could also allow for efficient rostering of the construction workforce, many of whom will be drive-in drive-out workers.

However, the potential time saving is offset by increased impacts of continuous exposure to construction noise. An alternative to this is regular respite provided over a longer overall duration of construction.

The Department has considered concerns raised by the EPA and the Department's independent reviewer regarding justification and consultation with the community about extended hours, and notes most of the alignment is on rural land where agricultural activities do not usually align with standard working hours.

As such, the Department considers regular respite necessary for extended construction hours, in the interest of balancing construction efficiency with residential amenity. The Department has recommended allowing construction hours of 6:30 am to 6:00 pm Monday to Sunday in three-month periods, with construction ceasing every second Sunday. A regular respite period would then be determined in consultation with the affected residents at three monthly intervals.

These extended hours would not be applicable to works at certain fixed sites (i.e. compounds near Narrabri and borrow sites) and for heavy vehicle movements through towns, as the Department considers the construction efficiencies of allowing extended hours for these activities is outweighed by the amenity impacts they cause due to the potential to impact sensitive receivers for much longer periods. In particular, the multi-function and adjacent structure compounds at Narrabri are predicted to have high impacts across a large number of receivers in Narrabri outside of standard hours, with little information provided about how noise impacts would be minimised and managed for potentially continuous impacts at these receivers. The Department recommends these activities operate between 7:00 am to 6:00 pm Monday to Saturday, and at no time on Sundays or public holidays. Importantly, this does not limit the requirement for noise mitigation to reduce impacts at those residents.

The Department also recommends a condition limiting highly noise intensive construction activities, such as use of power saws, drilling, jackhammering and impact piling, to standard construction hours (8:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday) that would exceed the noise

management level at any receiver to standard construction hours. This would prevent these noisy works from occurring at sensitive times for receivers.

The Proponent has proposed to carry out some concrete pouring and impact piling works as out of hours work (OOHW). OOHW are often required for large infrastructure projects to perform critical works, oversized deliveries, and utility works. For this project, the Proponent has justified OOHW due to the need to pour concrete in favourable climatic conditions, which may be at night during summer.

The Department acknowledges the Proponent's justification but notes that the construction noise assessment identified around 1000 receivers would be impacted above the sleep disturbance trigger level for infrastructure works, and around 2000 receivers from the cumulative impact of rail earthworks, bridgeworks, and construction infrastructure. Consistent with conditions for other linear infrastructure projects, the Department's recommended conditions allow for OOHW to be conducted in accordance with an environment protection licence (EPL) approved by the EPA, or an OOHW Protocol for works not subject to an EPL. The OOHW Protocol must identify the process for consideration, management, and approval of work which outside the project's standard hours of construction.

Working hours restrictions for specific compounds and vehicle routes will minimise impacts in the absence of specific effective mitigation measures.

The Department considers that the compounds in Narrabri (Narrabri West Multi-Function Compound, Structure Compound and the compound located on the Namoi/Narrabri flood plain) require specific restrictions, due to the high impacts at a large number of receivers over a four year period, outside standard hours and in the absence of general or specific mitigation and management proposed in the EIS for the compounds. The Department considers the most effective controls are controls on working hours, and this is reflected in the conditions to limit operation of these compounds to 7 am to 6 pm Monday to Saturday, with no work on Sundays and Public Holidays.

The traffic created by work on Namoi River / Narrabri Creek flood plain, accessed via The Island Road and Gibbons Street, may impact sensitive receivers on Gibbons Street including a hospital, aged care facility, child care centre and pre-school, plus residential receivers. The EIS did not assess road traffic noise impacts and mitigation on Gibbons Street at these receivers or impacts at night (10 pm to 7 am). As a result, the Department considers it appropriate that no traffic movements are permitted at night on Gibbons Street, Narrabri.

The Department recognises there are limited options to eliminate noise from temporary increases in road traffic, however measures to reduce impacts include the recommended Construction Noise and Vibration Management Plan which requires the Proponent consider traffic noise reductions.

Temporary accommodation facilities will impact receivers and require mitigation

The temporary accommodation facilities were predicted in the PIAR to cause impacts significantly above the NPfI Project Noise Trigger Levels during day and night from the Gilgandra camp, and during the night at Baradine. The PIAR did not provide sufficient detail on the proposed mitigation measures for these camps. As a result, the Department has recommended conditions including a specific requirement for mitigation to be applied to the camps where the noise levels are above the NPfI trigger levels. The Temporary Accommodation Facilities Management Plan also includes conditions for minimising noise impacts.

Operational noise impacts are expected and require mitigation

Operational noise impacts are expected from the Proposal, with 53 receivers expected to be above the RING trigger levels from rail traffic predicted in 2040. These receivers are to be investigated for reasonable and feasible mitigation measures in accordance with the RING.

The Department recognises noise from the proposal will be audible and impacts may be experienced by receivers which are predicted to experience noise levels below the RING trigger levels. The RING balances the need for infrastructure to be operated for the overall benefit of the State, with minimising local impacts experienced near the infrastructure. However, rail noise is audible, and subject to further assessment, mitigation investigation and compliance audits set out in the conditions, the Department is satisfied that the project can be operated to meet the requirements of the RING.

The Department notes that during additional mitigation investigation, careful consideration of appropriate mitigation is required. This should consider equitable outcomes for similar impacts, as is standard for other large scale infrastructure projects. For example, if a group of receivers with predicted noise levels within a few decibels each other do not all qualify for mitigation, consideration should be given to providing mitigation for the group as they experience a similar level of impact.

The Department does not consider the PIAR provided sufficient detail to understand which mitigation measures are being considered for which receiver or group of receivers and recommends a condition requiring an Operational Noise and Vibration Review (ONVR). The ONVR requires the Proponent to confirm the operational noise predictions based on detailed design and confirm the mitigation measures that will be employed where noise exceeds RING guideline levels. These include alternative at-property measures where the existing condition of a building would make standard architectural treatment ineffective.

The assumptions and inputs used to predict the operational noise levels at receivers were raised by several submissions, including the Department's independent technical review. The level of uncertainty regarding unresolved assumptions, including the number of locomotives and the corrections applied to certain track and train features, meant the Department included additional requirements in the Operational Noise and Vibration Review. Subsequent compliance audits will minimise the potential for underestimation of mitigation requirements.

The Department considers that practical measures to reduce operational noise impacts can be implemented and supports further detailed assessment to determine the appropriate measures for each specific affected receiver or group of receivers.

Highly impacted receivers require specific consideration for operational noise

The PIAR identified two receivers predicted to experience very high levels of noise impact, with Receiver IDs 245517 (10 Bohena Lane, Narrabri), and 331634 (1115 Eumungerie Road, Burroway) predicted to experience noise levels of L_{max} 90 dBA or above. The PIAR states dwelling relocation is a mitigation measure considered on a case-by-case basis. The Department is supportive of the consideration of dwelling relocation, in addition to other measures in the case of these two highly impacted receivers.

Small changes in noise levels could cause significant changes in operational noise outcomes

The predicted operational noise levels in the PIAR show 69 receivers between 1-2 dB below the operational noise trigger levels. This means that the assessment is very sensitive to small changes in

noise emissions, causing potentially significant changes in mitigation requirements including using noise barriers where they may have been previously dismissed.

This sensitivity to changes in impacts and mitigation was not accounted for in the predictions and assessment. The Department considers it appropriate to require additional detailed assessment during the detailed design process, and verification by an independent expert to ensure that noise impacts for receivers identified in the PIAR as marginally higher or lower than the trigger levels are accurately verified, and noise impacts mitigated. The Department does not consider a marginal exceedance of the trigger level is a justification for not mitigating impacted receivers.

The Department also recommended a condition requiring additional detail and scrutiny to be applied during compliance assessment, with a requirement to consult the Department on the noise compliance monitoring plan for appropriate locations, and for compliance measurements and methodologies to ensure the appropriate mitigation has been / can be applied to affected receivers.

Vibration impacts from construction and operation can be appropriately managed

The Department recognises the number of submissions that raised concerns about the impact from vibration from both construction and operation.

Vibration from construction will be managed using a noise and vibration management sub-plan and include measures to meet the thresholds in the EPA's *Assessing Vibration: A Technical Guideline* (2006). Measuring on site to verify vibration levels at distance will determine site specific vibration impacts, in addition to pre-construction inspections as required. The Department is satisfied that construction vibration can be appropriately managed.

Vibration from operational rail movements is not expected to generate impacts above threshold levels, based on the predictions in the PIAR. However, a review of impacts during detailed design and a compliance audit are included as conditions.

Matters raised by the expert review can be addressed through conditions

The expert review identified concerns relating to the assessment and management of impacts in the PIAR. The Department is satisfied that these matters can be appropriately resolved through conditions including conditions for hours of work, management plans for construction noise and vibration, traffic, borrow sites and accommodation camps, operational noise and vibration review, and compliance requirements.

6.4 Land use and property

Issue

The impacts to property, land use and access associated with construction and operation of the project include changes in access to local roads and properties, property acquisition, land fragmentation and severance and will impact farm operations. The project would require the use of public and private land during construction and operation, on both a permanent and temporary basis, resulting in partial or total acquisition of property. The project may impact access to private and public properties from the rail corridor passing through properties and impeding access to operational parts of the land.

Temporary and permanent land will be required for the construction and operation of the project

The project area consists of public and private freehold titles, Crown land including reserves, waterways, and public roads. Approximately 80 % of the total land area near the project is used for agricultural purposes including grazing (42 %), dryland cropping (54 %) and irrigated cropping (4 %).

The project would require the use of land both temporarily for construction and permanently for operation. The permanent land requirements are long term and project the impacts would commence from the construction phase.

Table 17 summarises the temporary and permanent land requirements for the project.

Table 17 | Temporary and permanent land requirements (Source: PIAR)

	Temporary	Permanent
Hectares	**1,732**	**1,986**
No. of properties	**417**	**310**

Land permanently acquired for the project reduces the total amount of available agricultural land. This land equates to 0.04 % of the total agricultural land in the study area. The Proponent has modelled the annual economic impact on agricultural land during construction as approximately $4.25 million, and approximately $1.54 million during operation. This equates to 0.43 % and 0.16 % of the annual value of agricultural production across the study area.

The permanent and temporary land requirements would be subject to acquisitions or lease negotiations, respectively, between the Proponent and landholder. A lease agreement or memorandum of understanding would be negotiated with the relevant government agency or private landholder for land required during construction. Compensation for land acquired would be assessed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. The Proponent has commenced discussions with some landholders regarding the process to acquire whole or parts of landholdings.

Construction of the project will affect agricultural operations

The project is expected to impact 141 private properties (approximately 228 lots) through fragmentation or severance (when the project bisects a property, rather than acquiring land on a boundary line). The project will require the permanent acquisition of approximately 1,200 hectares of privately held land, and result in about 5,000 hectares of privately held land being separated from about 60,000 hectares of private land holdings.

Construction of the rail corridor through private landholdings may impact all or parts of properties, through them being landlocked or partially inaccessible. The project may impede access between multiple lots and paddocks that constitute an individual farm and could affect farm operations and the viability of paddocks to support existing uses. Additional time and resources will be required by the farmer to transfer stock and machinery safely and efficiently through level crossings across the corridor. Potential property impacts also include restricted access to internal roads and farming

infrastructure such as stock yards, dams and bores. The project could also affect connectivity between multiple properties, which may be run as family farms or community enterprises with different ownership.

Due to the temporary and permanent land requirements for the construction and operation of the project, soil and/or surface/groundwater resources are expected to be affected. Paddocks established for controlled farming systems (i.e. irrigated cropping) would be affected as a result of land realignment and severance. Existing farming systems are built using permanent wheel tracks which use specific lanes for long continuous runs. If new wheel tracks have to be established as a result of realignment and/or severance of land, new crops may not achieve previous yields, and could impact the ability of livestock to obtain adequate quantity and quality of water. Damaged or removed water supply may reduce livestock production, unless repaired or relocated appropriately.

The realignment of paddocks could result in cuts and gaps in existing fences, which could cause livestock to mix and disrupt planned breeding programs. Fences that are not repaired or reinstated could cause a safety issue with livestock straying into the rail corridor and/or public roads. This would add costs to manage livestock and reduce future efficiency of scheduled livestock and cropping activities. Indirect impacts of the project include landholders' time and energy away from day-to-day farm operations to establish new ways to operate the farm.

The project includes 30 private level crossings to address property access impacts. While private level crossings have been identified as a solution to potential property access impacts, the exact number and location of the level crossings has not been determined, due to potential changes as a result of consultation with impacted landowners during the property acquisition stage. The Proponent has committed to establishing private access roads to service landholdings that may be severed or impacted by the corridor.

The project will interrupt travelling stock reserve continuity

Travelling stock reserves (TSRs) provide a connection point to facilitate the movement of livestock within the region. The TSRs impacted by the project and a description of the proposed stock underpasses to be provided as an alternative passage are summarised in **Table 18** below.

Table 18 | Travelling stock reserves alternative crossings (Source: PIAR)

Chainage	TSR	Location	Description
563	TSR R34248	Narromine	Access beneath the project is provided by the Macquarie River bridge
595	TSR R3420	Kickabil	Access is provided at the adjacent level crossing at the intersection with Collie Road
642	TSR 43452	Gilgandra	Access across the alignment not required
652.4	TSR R48903 and R23332	Curban	Access beneath the project is provided by the Castlereagh River bridge
652.5	TSR R23332 (northern portion)	Curban	Access beneath the project is provided by the Castlereagh River bridge

828.5 to 836	TSR R44590 and R941	Bohena Creek	Access beneath the project is provided by a bridge over Bohena Creek at chainage 828.9
849	TSR R27999	Narrabri	Access beneath the project is provided via an existing underpass under the Newell Highway, and a corresponding new bridge under the alignment.

The proposed rail corridor passing through TSRs may impact the agricultural industry by potentially compromising the safe movement of livestock along these reserves. Alternative passages that are inappropriately designed for livestock could impact the safety of stock managers and workers when crossing to safely avoid passing trains.

Submissions and advice

Community and special interest group submissions

Key issues raised in submissions include:

- impacts to land during construction
- concerns that private land holdings will be land locked
- the project will create increased operating costs to move stock through level crossings
- the need to reinstate level crossings to property
- property acquisition/land fragmentation/severance will cause detrimental impacts to landowners/agricultural businesses
- compensation and property values
- concerns regarding the acquisition of land and private access roads that landowners cannot access as a result of the project
- whether acquisition would be undertaken before detailed design was complete
- objection regarding the alignment's proximity to the Arrow TSR (R27999) adjacent to a wastewater treatment plant, due to the safety risk of a reduced TSR width.

Council submissions

Coonamble Shire Council expressed concerns regarding acquisition related impacts on farming businesses, including loss of viable farming land, and access limitations for livestock movement. Council requested the Proponent minimise amount of land required.

Gilgandra Shire Council raised concerns regarding the assessment of economic impacts on agricultural land in comparison to the regional analysis.

Narrabri Shire Council noted it has not been consulted in its role as a landowner.

Narromine Shire Council raised concerns regarding the assessment of economic impacts on agricultural land in comparison to the regional analysis.

Agency advice

DPI Agriculture encourages the proponent to have ongoing consultation with impacted agricultural operators to deal with immediate and ongoing operational impacts.

Crown Lands advised that affected Crown land will require a licence to be in place prior to works commencing and may possibly require acquisition.

Forestry Corporation of NSW expressed concerns regarding the lack of investigation into the effects of severance upon State Forest and FCNSWs business and customers. FCNSW requested a direct impacts table similar to that published for agriculture.

Consideration

Temporary use of land for construction and acquisition are unavoidable impacts of the project

The project requires construction of a new rail corridor from Narromine to Narrabri, mostly undertaken on land not currently used for rail purposes. The Proponent has committed to managing disturbed land during construction by implementing a rehabilitation strategy covering approximately 1,732 hectares of land. The rehabilitation strategy includes measures to restore and rehabilitate disturbed sites that are not required for operation, to pre-construction condition or better, in agreement with landholders. The Department acknowledges this commitment and expects rehabilitation to be addressed in the Proponent's lease agreements. The Department has reinforced this commitment with a recommended condition requiring land rehabilitation, to ensure land is restored to a satisfactory condition in a timely and efficient manner and allow landholders to resume activities on the land prior to the operation of the project.

The Department accepts that land acquisition is an unavoidable outcome of linear transport projects. The Proponent has committed to managing impacts through ongoing consultation with landowners and undertaking acquisitions/adjustments in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. Other measures include minimising property impacts, particularly to agricultural operations, alternative access solutions to ensure severed parcels are usable, parcel adjustments, and potential property amalgamation.

Alternative access to properties would be provided through access roads and/or private level crossings

The project would alter the public road network and private access roads, which are used for day-to-day farming activities. The Department notes the project impedes existing access arrangements to private landholdings and has potential for permanent disruption to property access. The Proponent has committed to providing alternative access to and from a public road for properties impacted by the project, generally in the form of access road and/or private level crossings. Where alternative access cannot be provided, and a property (or part of a property) is left with no access to a public road, the Proponent has committed to considering acquisition of the property or part of the property under the *Land Acquisition (Just Terms Compensation) Act 1991.*

The Department notes the Proponent's commitment to manage private property access impacts through construction of private level crossings. Community submissions raised concerns with the safety and amenity aspects of this approach, as well as the lack of consultation with landowners as to the location of private level crossings and the safety standard to which they would be constructed.

To ensure that private level crossings are suitably located to service the intended properties, the Department recommends level crossing details are included in a Private Level Crossing Treatment Report. The report will ensure that appropriate landowner consultation, and evidence of decision making, is provided to document the ongoing process of negotiating beneficial access arrangements for those affected by the new corridor. Recommended conditions of approval also require that ARTC must accommodate all reasonable landowner requests that meet relevant legislation and design standards for crossings.

The report will detail the location of the level crossing, and detail whether the level crossing would be required to maintain access within a private property, or between a private property and a public road, in consultation with the landowner, business owner, council(s) and any public authority. The Department is satisfied that the recommended conditions of approval would reduce and manage impacts from private level crossings to an acceptable level in most circumstances and would ensure property owners have a transparent and documented process for decisions regarding safety standards and placement of level crossings on private land.

Impacts on agricultural land activities will be managed in a property specific manner

While the project's impacts on agricultural activities is not significant on a regional scale, it could have significant impacts on individual properties and agricultural enterprises. Due to the nature of the construction and operation of the project being predominantly on privately owned agricultural land, impacts to everyday farming activities and infrastructure are anticipated. The Department acknowledges that changes to access to and within farms, isolation of farm infrastructure, and severance can impact farm operations and viability.

The Proponent has committed to reinstating access where possible or providing alternative access to parcels through existing road realignment, providing an alternative access road and/or level crossing. The Proponent has also committed to reinstating or replacing farm water pipelines, dams and drainage channels, prior to removal of existing impacted infrastructure.

The Proponent has also committed to identifying and implementing property-specific measures in consultation with landowners. These measures would address impacts to properties located on or immediately adjacent to private properties, and which would affect farm operational activities. Severance impacts from operation of the project have been considered by the Proponent, and appropriate mitigation measures have been proposed. The Proponent has committed to managing severance impacts through amalgamation opportunities, providing alternative access to severed parcels, and property adjustments. The Proponent has indicated that measures to address severance impacts must be considered on a property-by-property basis as part of the land acquisition process, consistent with the *Land Acquisition (Just Terms Compensation) Act 1991.*

The Department acknowledges the Proponent's commitments to managing property severance. While these commitments reduce severance impacts, and land acquisition in some cases will provide redress for farm severance and operational impacts, the Department considers individual property plans are required to document agreements between landholders and the Proponent. The Department has recommended a condition requiring the Proponent consult landholders to mitigate impacts relating to access, stock and machinery movement, and relocation of farm infrastructure. These agreements must be documented in Individual Property Management Plans that are provided to the landholder and the Planning Secretary. Recommended conditions also provide for mediation should the need arise.

Stock movement and travelling stock reserve treatments require further consideration

The Proponent has proposed dual-purpose culverts, designed for drainage as well as allowing livestock and other fauna to cross the corridor. However, dual purpose culverts or combined drainage culverts are not considered appropriate for livestock and stock managers, as there may be no permanent dry passage, and whose dimensions are reduced over time by blockage and sedimentation, which poses a risk for users. Accordingly, the Department has recommended a condition to ensure that permanent passage for stock and stock managers is constructed and maintained to ensure stock and stock workers can cross safely.

The Proponent has acknowledged concerns raised by North West Local Land Services (NWLLS) regarding the reduced width of TSR R27999. This TSR is located at a constrained point north of Narrabri, with current access under the Newell Highway adjacent to agricultural properties less than 100 m to the west. The alignment will be located within this corridor, parallel to the road, reducing the TSR to a width of 25m and up to 1 km in length at a busy location that may spook stock animals, potentially causing harm to them and to stock handlers. The TSR is strategically important as it provides the only stock access to the north of Narrabri.

The Proponent has provided a veterinarian report that reviewed the safety of the changed dimensions which provided recommendations to improve the safety of animals, adjacent farm workers and stock workers for this TSR. It has also committed to installing stock fencing, holding pens and barriers between the Narrabri North TSR and the rail corridor, to assist in managing safety risks to TSR users.

The Department understands that these commitments have not fully resolved NWLLS or community concerns about the narrowed width of this TSR. The Department accepts that relocating the rail corridor is not a viable or a proportionate response to this issue and has recommended a condition requiring the Proponent to work with NWLLS, TfNSW and TSR users to redesign and/or relocate access to this TSR's rail and road crossing.

To avoid and minimise impacts to users of the TSR, the Department recommends further consultation with NWLLS and users of the TSR to ensure that all options are considered to improve its safety and function. Options include the acquisition of additional land required to maintain the existing width of the TSR or an alternative approach to the rail and road underpasses, fencing and barrier types that will protect livestock, and implementation of a communication system for the advanced real-time tracking and warning of train movements for landowners and stock operators for safe passage. The alternate crossing and/or design must be peer reviewed by an independent veterinarian livestock behaviourist, and submitted to the Secretary for approval.

6.5 Traffic and transport

The road network in the study area comprises national, State, and local roads, and private and property access roads. Rural and agricultural land uses dominate the project footprint with existing traffic volumes increasing during harvest season from October to January. There will be 49 new public level crossings and approximately 30 private level crossings installed, and some existing level crossings upgraded. These installations will affect public and private access, land use, and safety however the Proponent will continue to consult property owners to maintain access to properties during construction and operation of the project. The Proponent has committed to eight grade separations along the project where rail bridges over road, due to none of the existing roads being elevated relative to the rail line.

Issue

Construction activities will generate additional traffic movements and traffic volume

During construction, the road network will be impacted by the operation of construction sites, three multi-function compound sites, and four borrow pits. The Proponent intends to move materials and construction personnel along construction access routes it will establish within the rail corridor, in order to reduce the volume of construction traffic using public roads. Construction vehicles will use public roads to access the nearest rail corridor access route, generating additional light and heavy vehicle movements on local and classified roads. The Proponent will use a range of public roads in town centres and rural areas to access construction sites. Light vehicles will transport construction workers to and from the work areas, and heavy vehicles movements include material delivery, spoil haulage from borrow sites, and buses transporting workers to and from temporary accommodation facilities.

The daily traffic generation for the entire 306 km alignment is approximately 1,000 vehicle movements (two-way), 670 of those being heavy vehicle movements. The main construction stage will be undertaken concurrently in four construction areas over a 39-month period. Most traffic will be generated during the main construction activities at these four construction areas (**Table 19**), with haulage vehicles making up a large proportion of the heavy vehicle movements.

Table 19 | Daily total light and heavy vehicle movements in main construction areas during the main construction stage (Source: EIS)

Construction area	Total light vehicle *(two way movement)*	Total heavy vehicles *(two way movement)*	Haulage vehicles *(two way movement)*
Narromine	98	326	260
Gilgandra	150	379	198
Baradine	46	55	11
Narrabri	82	336	229

A large proportion of anticipated heavy vehicle movements are from the four borrow sites, to obtain fill material to construct the project. Use of borrow sites reduces the need to transport material over long distances, with access roads being constructed to connect the borrow pits to the nearest public road leading to the project site, then along the construction haul road to their destination. The four borrow sites are identified as Borrow Pit A (located off Tantitha Road, Narromine), Borrow Pit B (off Tomingley Road, Narromine), Borrow Pit C (off Euromedah Road, Burroway), and Borrow Pit D (off Newell Highway, Narrabri). Each borrow site has a varying level of impact to the road networks, with Borrow Pit D contributing the greatest traffic impacts due to its 18-month duration of use (**Table 20**).

Table 20 | Borrow site access routes, movements and duration of movements (Source: EIS)

Borrow site	Primary access route	Estimated daily worst-case number of movements	Estimated duration of traffic movements (months)
A	• Tantitha Road • Pinedean Road	227	3
B	• Tomingley Road	270	6

C	• Euromedah Road • Eumungerie Road	294	6
D	• Newell Highway • Yarrie Lake Road • Pilliga Forest Way	225	18

The increased heavy vehicle activity during construction may affect road safety and emergency vehicle movement, given increased vehicle numbers and routes through populated areas. Construction vehicles could damage roads, making them dangerous or impassable to other road users. The Proponent has committed to preparing a Traffic, Transport, and Access Management Plan to manage impacts of construction traffic and conducting dilapidation surveys of local roads to making good any damage at the conclusion of construction.

The project requires additional grade separated and level crossings, and realigns and closes roads

The project includes eight grade-separated crossings, and 49 new public level crossings. Grade separated crossings are all rail over road bridges, including Mitchell Highway, Kamilaroi Highway, Webbs Siding Road, Old Mill Road, Kickabil Road, Cains Crossing Road, Yarrie Lake Road, and The Island Road. All grade separations are co-located with a bridge over a waterway. The 49 new level crossings include 12 active level crossings and 37 passive level crossings. Passive crossings will have ARTC standard signage to warn of potential oncoming trains; active crossings will have boom gates and bells which alert passenger vehicles of a passive train.

The project includes the realignment of 51 of public roads require minor realignment to avoid the new rail corridor and the closure of all or part of four roads: Dappo Road, Brooks Road, Nalders Access Road, and Munns Road. Road users will be required to use nearby alternative roads.

Operational impacts include increased road travel time and safety impacts due to level crossings

There are 12 public roads that have active level crossings. The Castlereagh Highway is the busiest and therefore will be impacted the most. The assessment modelled the impacts from an 1,800 metre train length during peak periods in the year 2026 (reflecting Inland Rail's opening) and one in 2040 (reflecting peak forecast operation). The maximum delay at the Castlereagh Highway crossing in both years was 96 seconds, with 6-7 vehicles queuing on average. These delays will occur approximately 20 times a day at Inland Rail opening.

The introduction of rail level crossings to roads that do not currently have them provides a road safety risk. Motorists may be unfamiliar with changes to driving conditions brought about by level crossings and/or engage in risky driving behaviour to pass through crossings ahead of oncoming trains. The Proponent selected the level crossing types following an assessment of safety risks against the Australian Level Crossing Assessment Model (ALCAM) and has committed to reviewing safety incidents during operation for use in adaptively managing level crossing safety.

Submissions

Community submissions

The key issues raised included:

- inadequacy of the traffic and transport assessment
- safety and design of level crossings and their operation (wait times, speed limits, passing lanes)

- access to private roads
- disruption to daily life as a result of construction traffic
- dilapidation to local roads and access tracks during construction
- traffic congestion during operation
- traffic impacts on Gibbons Street and the total construction vehicle movements in Narrabri
- potential for hazards from construction traffic.

Special interest group submissions

Regional Quarries Australia Pty Ltd raised concern that the Narromine to Narrabri project had not considered the most likely haulage routes for quarry materials from Dubbo and suggest this is revised to assess construction traffic impacts on Mitchell Highway, Tantitha Road, Webbs Siding Road, Wallaby Road and Bootles Road, including intersections. Other issues raised include the existing level crossing at Tantitha Road, and they believe that heavy vehicles from Borrow pits will likely use additional local roads for the project.

GrainCorp Operation Pty Ltd submitted concerns about the approval process for increased train lengths, degradation of existing rail lines, the operational costs of inefficient connections, and stated further assessment of impacts to Council roads were required.

GrainCorp requests that the EIS demonstrate why there is minimal connectivity to Inland Rail, that a Rail Possession Strategy and Traffic Plan is prepared with stakeholders, and a Level Crossing Report (LCR) is developed.

Council submissions

Narromine Shire Council raises concerns regarding the approval process for increased train lengths, and requests that the Proponent details the approval process. Council further raised concerns with the degradation of existing rail lines due to poor connectivity with Inland Rail and requested further information on operational costs of inefficient connections. Additionally, Council requested further assessment of the impacts to Council roads during construction and operation.

Council made a number of requests regarding level crossings, including that a level crossing report is prepared and made public, that certain level crossings be at grade separation with Inland Rail, and upgrade the active level crossing (i.e. with lights and/or boom gates) at Dandaloo Road.

Other traffic and transport issues raised included:

- unintended consequential impacts for road traffic
- vehicle stacking and storage at level crossings
- provision in design for passage of agricultural machinery.

Gilgandra Shire Council made similar comments to Narromine and Warrumbungle Shire Councils, raising concerns about the approval process for increased train lengths, degradation of existing rail lines, operational costs of inefficient connections, and stated further assessment of impacts to Council roads were required.

Council had similar requests to Narromine Shire Council regarding level crossings, provision of fencing, and provision in design for passage of agricultural machinery.

Warrumbungle Shire Council made similar comments to Narromine and Gilgandra Shire Councils, raising concerns about the approval process for increased train lengths, degradation of existing rail

lines, the operational costs of inefficient connections, and stated further assessment of impacts to Council roads were required.

Council had similar requests to Narromine and Gilgandra Shire Councils regarding level crossings, additionally requesting that rural landholders who suffer from property severance have the option of a private level crossing for machinery and livestock movement.

Narrabri Shire Council raised concerns with the increase in traffic, specifically heavy vehicles on the network, and requested pavement testing is conducted on local roads that are proposed as a construction route. Council noted maintenance and repair of these roads / pavements should be funded by the Proponent. Council raised concerns on the EIS such as missing information, unclear information, and insufficient assessment and analysis on traffic and transport impacts.

Coonamble Shire Council raised concerns with the delays caused to local traffic from train movement, in addition to concern for the level crossings, and that no specific design details had been included in the EIS. Council requested a meeting with the Proponent, TfNSW, and local road authorities to investigate the road-related issues and agree on an approach to improve the road network where required.

Government agency advice

Transport for New South Wales (TfNSW) stated its position that all new Inland Rail crossings of classified roads are to be grade separated and objects to proposed level crossings on classified roads. TfNSW requested further information on level crossings, TSR, delay times and queue lengths, access, and road safety. TfNSW requested risk assessments and review of intersection upgrade designs.

In addition, TfNSW provided comments on the PIAR, maintaining its objection to the use of at grade level crossings on the project, and requesting the Proponent considers and recognises TfNSW future connections, ensuring any further design amendments do not preclude their projects.

Forestry Corporation of NSW (FCNSW) queried whether operational access roads are proposed to be constructed in State Forest and requested copies of the spatial data to consider these designs. They further requested to know if Proponent will retain the haul roads used for construction for FCNSWs ongoing use.

FCNSW requested details on traffic volumes and impacts to road surfaces and requested to meet with the Proponent to discuss future harvest areas and the road network, before establishing closure points and detours.

Further concerns regarding traffic and transport impacts include:

- haulage routes from existing quarries needing to be revised to include construction traffic
- heavy vehicles used for haulage travelling through Mitchell Highway into Narromine before heading south onto Dandaloo Street, Derribong Avenue, Tomingley Road and Webs Siding Road
- assessment of level crossings at Tanthita Road
- impacts on all roads used by heavy vehicles to travel from borrow pits, and ensuring any damage is covered by dilapidation surveys
- alignment traversing active TSRs and impacts to TSR users and livestock
- inadequate assessment and justification on access to fragmented properties as a result of alignment.

Consideration

Construction activities will generate additional traffic, however there is sufficient network capacity

Construction is expected to generate approximately 1000 vehicle movements (two-way) per day, with 670 being heavy vehicles. While this is a significant and noticeable addition to the road network, the movements will be spread across the day and the 306 km length of the project, which allow for the impacts to be manageable. The Department accepts the Proponent's analysis of impacts to traffic volumes on the public road network, which shows additional traffic generated from construction activities can be absorbed by affected roads as these roads maintain their current Level of Service of A or B.

The Department notes traffic volumes vary seasonally, and year on year, due to harvest vehicles. Due to the nature of harvest seasons being impacted by external factors (such as rainfall and drought), volumes of traffic generated during harvest periods can be inconsistent between the years and hard to quantify. However, the anticipated Levels of Service including construction traffic demonstrate that there is spare network capacity, even with a high level of harvest related traffic.

Safety and amenity impacts can be mitigated through careful construction traffic management

Construction traffic will also have noise, amenity, and safety impacts, particularly where they travel through populated areas. The Department notes the anticipated vehicle routes travel through the centre of Narromine, Gilgandra and Narrabri. This has potential noise impacts on sensitive receivers and safety impacts through conflicts with other road users. A notable impact is at Gibbons Street, Narrabri, which will be used to access the construction site of a large viaduct bridge that traverses the Namoi River, Narrabri Creek, floodplains west of Narrabri, and the Kamilaroi Highway. Gibbons St and The Island Road are proposed to be used to access the eastern construction site. The large concrete pours for the construction of bridges are proposed to be undertaken outside standard construction hours, however out of hours works are not expected to exceed 48 hours at any one location. There are sensitive receivers along the Gibbons St/The Island Road route, including Narrabri Hospital, two aged care facilities, a childcare centre, and ninety-four residences. Narrabri Shire Council, TfNSW, and the community all raised concerns regarding the increase in traffic along this route.

The Department accepts construction traffic impacts and risks cannot be eliminated in the construction of any large infrastructure project. However, the impacts and risks can be reduced through careful planning and management of construction vehicle movements. The Proponent has committed to preparing a Traffic, Transport, and Access Management Plan (TTAMP) to be implemented before the commencement of construction. The TTAMP will confirm the haul routes and access points for resource delivery across the project. The TTAMP will be prepared in consultation with TfNSW and relevant councils, and work towards mitigating construction impacts. The Department has recommended a condition with further requirements for the TTAMP, including informing road users of changed conditions, consideration of impacts on harvest vehicles, and minimising noise emissions. Dilapidation surveys will be undertaken on public roads, and potential for pavement auditing to identify construction impacts and repairs. In response to concerns raised by councils about the current condition of local roads to accommodate heavy vehicles, the Department recommended a condition requiring the Proponent to upgrade those roads prior to construction, where required.

Rail crossings will be augmented separately to this project, and level crossing safety and network performance will be reviewed during operation

Council and community submissions, and advice from TfNSW, raised concerns with the safety, design, and location of public level crossings. The Department acknowledges that, given the greenfield nature of the project, new road and rail crossings are unavoidable which has safety, access and connectivity concerns for residents and road users. The Proponent has committed to managing the placement and crossing status of level crossings in accordance with National Safety regulations that prescribe the level of treatment applied to each crossing. To ensure the risks of these impacts are appropriately managed, the Department has identified additional mitigation measures and strengthened the Proponent's commitment to prepare a public level crossing treatment report by requiring the report to be prepared in consultation and with the approval of TfNSW or the relevant road authority, prior to commencing construction of that crossing.

TfNSW raised concerns about the proposed use of level crossings, noting its position that all new crossings of classified roads should be grade separated. The Mitchell Highway and the Kamilaroi Highway will be grade separated. As these have the highest traffic volumes of the roads affected by the project, this reduces potential accidents and safety delays. The Department notes TfNSW is planning for grade separations of the Castlereagh Highway and Tomingley Road crossings. While separate to the project, those grade separations would remove two level crossings at key classified roads. The Department acknowledges that the project has not met TfNSW's position that all classified roads should be grade separated. However, the project and the separate grade separation led by TfNSW ensure the busiest classified roads are grade separated. The Department recommends a condition requiring the Proponent to consult with TfNSW about the design of the project's interface with these grade separated crossings.

6.6 Groundwater and surface water

The project will extract groundwater for non-potable and potable use during the construction phase. There is potential for construction and operation of the project to impact on groundwater and surface water quality and quantity through contamination, sediment and erosion, and increased flows/disbursement, as well as groundwater drawdown and groundwater inflow.

Issue

Groundwater take and potential impact to drawdown and reduction in water resources

The estimated total take of groundwater for non-potable construction use is approximately 4,635 megalitres (ML) over the entire four year construction program. This equates to approximately 1,400 ML of non-potable water per year, and 118 ML a year for potable water, which will require a maximum of approximately 500 days of bore field pumping. This has potential to drawdown deep aquifers, reduce surface water resources, and generate cumulative and residual impacts on other land users.

Options for sourcing construction water investigated were:

- local potable water supply networks
- existing watercourses
- shallow groundwater aquifer systems
- deep groundwater aquifer systems.

The Proponent identified pumping from deep aquifers as the most feasible option, due to the availability of groundwater licenses for these sources and their limited use by landholders. An estimated 4,635 megalitres (ML) of groundwater from 12 proposed bore fields (88 bores) will be required over at least 3 years of construction works (see **Figure 10 6**). Extraction will target aquifers

below the Great Artesian Basin since shallow groundwater reserves are allocated to existing land users. Licensing by DPE Water under the *Water Management Act 2000* is required prior to works that may intercept or extract groundwater or surface water.

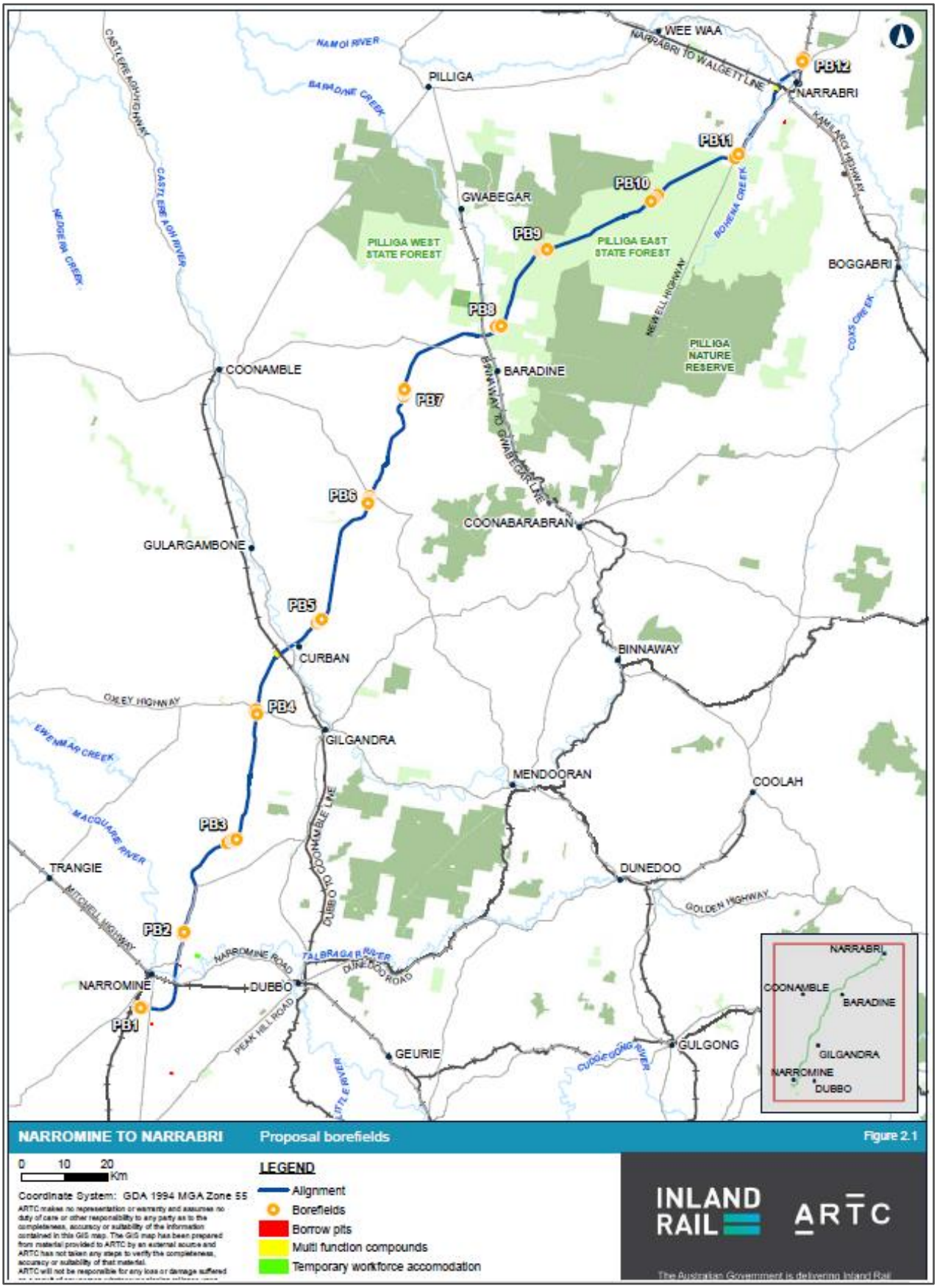


Figure 10 6 | Proposed bore fields (Source: EIS)

The Proponent considered the re-use of groundwater from the Narrabri Gas Project. However, contamination of this source is a risk, as is the process for testing, treating, and disposing of waste associated with this water. The assessment has not provided additional quantitative information or the statutory framework around re-use of this water.

Impact evaluation has been based on modelling in the absence of field data

The Proponent relied on groundwater modelling to assess the potential impact of artesian basin drawdown in the absence of field data, particularly for PB1 (where minimal drawdown was modelled) and PB2 bore fields. Modelling identified drawdown within one existing bore of about 1.5m (430m from PB1) and another of 4m (650m from PB2). The existing bore within 650m of bore field PB2 exceeds the *NSW Aquifer Interference Policy* (DPI Office of Water 2012) (NAIP) minimal impact considerations. Evaluation of the potential impact of groundwater pumping on rivers and creeks around the temporary accommodation sites at Narromine North and Baradine is also modelling-dependent and required prior to construction of these facilities. The Proponent has committed to groundwater monitoring during construction that would be used to adapt pumping rates if required.

Mitigation measures requiring make good provisions are proposed by the Proponent where drawdown exceedances of the NAIP minimal impact considerations are experienced at existing bores.

Borrow sites may impact groundwater levels

Bored piling will be used for bridge constructions which will intersect shallow groundwater reserves. This may lead to minimal groundwater inflows occurring.

While the EIS states the impact of the construction of Borrow Site A on the groundwater table is minor (less than 0.3 ML/year), the extent of groundwater intrusion is uncertain due to inaccurate impact calculations and validation using sensitivity analysis data not presented in the EIS or Technical Report 4. There also remains potential for exceedance of minimal impact considerations (i.e. more than a 2m decline in groundwater levels) under the NAIP at Borrow Pit A.

The Proponent advises that minimal drawdown may occur at Borrow Site A during construction of the project with the potential for groundwater inflow. If groundwater inflow rates at Borrow Site A are higher than estimated, inflow rates would be assessed by a hydrogeologist and adaptive measures applied.

Existing surface water quality is poor and will require careful management during construction

Existing surface water quality is poor in the Macquarie-Bogan, Castlereagh River and Namoi River catchments, due to elevated total phosphorus and nitrogen concentrations exceeding the recommended trigger values. The project may impact on environmental water flows and flow regimes through aquifer drawdown. Downstream water quality may be reduced from key construction sites along the alignment, such as bridges over rivers and creeks and drainage culverts which may lead to impacts of aquatic and riparian flora, breeding and spawning conditions, water temperature changes, increased turbidity, and reduced visibility in recreation areas. Proponent's proposed measures to mitigate these impacts include erosion and scour protection, preparation of a soil and water management plan, mitigation measures guided by the *Managing Urban Stormwater: Soils and construction* (Landcom 2004) (the "Blue Book"), sediment basins to reduce sediment-laden run off, a monitoring program to assess water quality during construction, and a rehabilitation management plan.

Submissions

Community submissions

Key issues raised in the community submissions included:

- Groundwater
    - interconnectivity and interference with aquifers
    - contamination and subsequent impacts on use
    - water table impacts, drawdown, validity, and details
    - Borrow Pit A specialist groundwater impact assessment required
    - extraction must comply with relevant water management plans ensuring property rights are maintained
    - water supply loss and effects on stock and domestic water
    - bore impacts and inaccurate/inadequate information (existing bores, quantities, energy impacts, four bores on Old Mill Road, alternatives to deep bores)
    - cumulative water issues with Narrabri Gas Project.
- Surface water
    - access, disbursement/diversion, increase, debris, erosion, and vegetation impacts
    - loss and impacts on existing dams resulting in the requirement of infrastructure to obtain water sources
    - inaccurate/inadequate information – current and future water flows, waterways and scouring erosion.

Additional concerns raised following the PIAR exhibition include:

- construction water and potential water transport mitigation
- bore impacts and confirming the maximum groundwater extraction, mandated depths, metering to monitor water use, inflow, baseline measurements, ongoing monitoring, and appropriate triggers, existing bore compensation, Curban and Box Ridge bore details (located in Gilgandra Council LGA)
- promise of bore licenses after construction
- surface water flow impacts
- groundwater quality under the Great Artesian Basin (GAB).

Special interest group submissions

NSW Farmers Association and Country Women's Association of NSW identified a risk of unacceptable groundwater drawdown impacts posed by the project. Their concern was that the impact assessment analysis was insufficiently rigorous. These groups questioned the viability of any proposed re-use of bores following completion of construction. In addition, both organisations stated there would be significant risk to soil and erosion resulting from construction works, particularly where culvert banks are proposed.

Friends of the Piliga identified that the Proponent's statement that water drawdown as "within the bounds of natural variability" is incorrect, as water is lost to the system and actually on top of natural variability.

Council submissions

Narrabri Shire Council suggested that bores should be positioned to allow organisations such as NSW RFS access for fire-fighting purposes.

Coonamble Shire Council raised concerns with stormwater concerns, aquifer drawdown, potential water table and surface water contamination, and salinity concerns.

Gilgandra and **Narromine Shire Councils** identified:

- concern with construction water demand uncertainty, risk to existing local access water license holders, and more transparency is needed over construction water demand considering drought impacts (Gilgandra and Narromine Councils)
- an agreement has been reached in investigating four bores to supply water for construction subject to being available for Council and community post construction (Gilgandra Shire Council)
- stormwater management for construction and operation and that any upgrades to Council assets for discharge would be the responsibility of the Proponent (Narromine Shire Council).

In response to the PIAR, three councils potentially impacted by the project raised concerns including:

- the lack of rigor regarding sediment-laden surface water disposal and treatment (Gilgandra and Narromine Councils)
- an explanation of the 80 % drainage control threshold be provided, and the footprint of drainage control areas at 100 % capture of quantitative design limits scour/erosion potential should be made public (Gilgandra, Narromine and Warrumbungle Councils)
- a Borefield Management Plan be prepared as part of the Soil and Water Management Plan identifying aquifer interference (Gilgandra, Narromine and Warrumbungle Councils)
- concern with mitigation measure WR14, as no hydrogeological evidence has been provided confirming viable groundwater flow rates exist to satisfy the estimated 1,400ML/a construction requirement (Narromine Shire Council).

Government agency advice

Environment Protection Authority (EPA) noted that an environment protection licence (EPL) is required for railway infrastructure construction under the *Protection of the Environment Operations Act 1997* and a soil and water management plan and water quality monitoring program are required as part of the CEMP. All water retained on site will require treatment to appropriate levels prior to discharge. EPA recommended an unexpected finds protocol be included as a condition of approval.

DPE Water identified the following issues:

- Water take and licensing:
    - inconsistencies in non-potable groundwater requirements for construction and groundwater data for borrow pits
    - lack of security of groundwater supply for construction given drought conditions and potential bore field access issues. There is also a need to identify alternative water sources and consider approval requirements
    - proposed groundwater take at Borrow Pit A – intersection of groundwater table and groundwater inflow
    - lack of consideration in the proposed groundwater monitoring program of potential incidental take from connected sources
    - water management plan and bore field extraction plan required post-approval and prior to construction.
- Groundwater impacts:

- lack of direct assessment of groundwater impacts against minimal impact considerations of the *NSW Aquifer Interference Policy* (2012)
- proposed groundwater bores should not have been assessed under the *NSW Aquifer Interference Policy* but rather as a water supply dealing
- additional justification and consideration of modelling for project bore fields PB1 and PB2 is needed
- lack of commitment to specific make-good provisions for impacts to neighbouring groundwater users impacted by drawdown
- decommissioning of 10 existing bores and addressing compensation or provision of alternative water supplies prior to approval.
- monitoring of groundwater extraction from bores needs to be accurately recorded and reported
- construction of all groundwater bores in accordance with *Minimum Construction Requirements for Water Bores in Australia* (4th edition) and additional construction requirements may be required for individual bores.

- Monitoring: Proposed soil and water management plan should consider groundwater impacts, water licensing and compliance with water licensing requirements and managing groundwater impacts.
- Surface water impacts:
  - inadequacy of assessment of potential impacts to waterways due to changes in flows and velocities, with detailed hydraulic assessment recommended to occur during the detailed design phase
  - construction work within watercourses – CEMP and Soil and Water Management Plan need to include adequate buffers and controls to minimise watercourse impacts.

DPE Water reviewed the PIAR and recommended the Proponent be required to replace any government monitoring bores decommissioned due to the project within 18 months, and include post-construction geomorphology monitoring of watercourses, to ensure mitigation measures are achieving the desired outcomes.

Forestry Corporation queried whether the Proponent could quantify surface flow changes and impacts of culverts on access roads and access for fire fighting vehicles. In response to the PIAR, Forestry Corporation sought clarification of whether additional land would be necessary to install drainage control areas.

Consideration

Construction water take and groundwater demand is suitable

The Proponent seeks to extract 4,635 ML of groundwater for construction from deep aquifers, which equates to 4.3 ML per day over the length of the project. Of this, 4,165 ML of non-potable water for construction and approximately 470ML provided for potable water.

The Proponent confirmed there is sufficient water available under a controlled allocation for the extraction of groundwater for construction water within the Lachlan Fold Belt Murray Darling Basin Groundwater Source and the Gunnedah–Oxley Basin Murray Darling Basin Groundwater Source. The Department notes current water allocations from these water sources is 58% of the long term average annual extraction limits for the Lachlan Fold Belt Murray Darling Basin Groundwater Source, and 23% for the Gunnedah–Oxley Basin Murray Darling Basin Groundwater Source. Each source has approximately 100,000 ML of unallocated water. The Department is satisfied that there is sufficient

available water for the project to not significantly impact on water availability for other uses or for environmental water.

Potable water for temporary workforce accommodation facilities and compounds would be provided through the existing potable water supply network or through extraction and treatment of groundwater. Total volumes are subject to further design and appropriate approvals from DPE Water. It is likely that a combination of water supply options would be used to achieve the water demand.

The following mitigation measures would be applied to manage construction water take from groundwater, and the impacts this might have on existing groundwater bores and overall water take, including:

- a Borefield Management Plan, prepared as part of the Soil and Water Management Plan, identifying water take per year and source, confirm compliance with water sharing rules, and including details of the extraction of water and measures to minimise impacts
- extracted construction water and potable water volumes confirmed, and appropriate approvals obtained prior to construction commencing
- meters installed, and groundwater extraction recorded and reported to Natural Resources Access Regulator.

The Department is satisfied that the water requirements for the project can be obtained through deep aquifers, and that alternate arrangements can accommodate any other water needs. The Department recommends conditions requiring construction water be managed through a monitoring program, to ensure predicted impacts on quality and quantity are met, and adaptively managed if they are not.

Groundwater modelling is suitable for assessment

The Proponent relies significantly on analytical element groundwater modelling to assess the potential impact of artesian basin drawdown in the absence of field data, particularly for PB1 (where minimal drawdown was modelled) and PB2 bore fields. The Proponent responded to concerns over the modelling selected for PB1 and PB2 and confirmed:

- Borefield PB1's alluvium is not very productive, therefore weathered material and alluvium were grouped for the purpose of the depth calculation and modelling
- PB2 groundwater model was assigned identical hydrological parameter values for all three layers, as alluvium is not mapped near PB2 and the closest mapped alluvium is greater than 500 m to the east.

Drawdown expected by the project is expected to be managed through recommended conditions requiring drawdown not exceed the NAIP. If during further investigations it is identified to exceed this, then appropriate mitigation measures, such as reduced pumping and other measures prescribed by the NAIP are to be implemented.

No comments were received from DPE Water in response to these clarifications from the Proponent. The Department is satisfied that the modelling undertaken for groundwater, and the potential impacts on drawdown, are accurately reflective of the environment and expected outcomes of the development, with recommended conditions monitoring and managing impacts.

Groundwater drawdown and aquifer interference will be managed and mitigated

Groundwater drawdown associated with shallow project features (with potential to cause drawdown, i.e. earthworks and borrow pits) is not anticipated. Most of the proposed bore fields would target deep aquifers beneath the GAB with significant vertical separation (except bore fields PB1 and PB2 located

outside the GAB), limiting interference and impacts. Extraction of groundwater does have potential to reduce water availability within aquifers, and decrease groundwater available for other groundwater users, groundwater dependant ecosystems, and surface water baseflows. There is also potential that extraction may change groundwater flow direction, altering type and concentrations of nutrients.

One existing bore outside the GAB was predicted to have drawdown of about 4 metres (650 metres from bore field PB2), which is higher than the NAIP allowance. Recommended conditions require that impacts on this bore are monitored, and impacts remediated. This drawdown is unlikely to impact on groundwater dependent ecosystems.

The Proponent identified a number of mitigation measures which would be applied to the project to manage groundwater drawdown and interference concerns, including test bores during detailed design and further investigation by a qualified hydrogeologist confirming depth and location of proposed bore fields ensuring extraction impacts are minimised.

The Department acknowledges there is a risk that drawdown may exceed the NAIP allowance, and recommends conditions requiring further groundwater modelling and monitoring, with adaptive management measures, to ensure groundwater drawdown and potential for aquifer interference is appropriately managed and any affected users accordingly compensated.

Borrow Site A may impact shallow groundwater

Shallow groundwater reserves have the potential to be impacted by Borrow Site A and groundwater inflows. The Proponent identified that a direct assessment against the NAIP minimal impact considerations was not provided, as there are no high-priority groundwater dependant ecosystems located close to Borrow Pit A. Additionally, none of the analysed uncertainty scenarios result in groundwater inflow rate of greater than 3 ML per year – meaning the risk of groundwater inflow triggering the need to obtain a controlled allocation is low. However, the Proponent has suggested that if the inflow rate has potential to exceed 3ML per year, sufficient entitlement would be obtained prior to any groundwater extraction or interception. If the inflow rate is in excess of 1 ML/year, the implications and rate of flow would be assessed by a hydrogeologist and additional mitigation measures implemented.

The Department is satisfied that groundwater inflows to Borrow Site A are unlikely to cause significant drawdown, and notes that licencing will be required from DPE Water if inflows reach relevant trigger levels.

The Proponent must monitor groundwater quality

Groundwater samples collected identified exceedances in copper, nickel, zinc, mercury, and ammonia. All other concentrations were below the relevant criteria. Groundwater obtained from proposed bore fields would be assessed for the suitability of its intended use, and treatment systems would be designed in accordance with relevant guidelines, to ensure appropriate water quality. A groundwater monitoring program would be developed in consultation with DPE Water, prior to construction and implemented as part of the soil and water management plan. The groundwater monitoring plan would identify the baseline data throughout construction and on completion of construction, ensuring groundwater quality is monitored and maintained throughout the project, with adequate measures imposed if any impacts to quality occur. Monitoring will continue following the completion of groundwater pumping and extraction until water levels recover to baseline conditions with a review to be undertaken six months and one year after completion to determine if further mitigation is required. As the monitoring program would be prepared in consultation with DPE Water,

the Department accepts appropriate quality measures can be achieved in accordance with the relevant guidelines.

The Department is satisfied that the groundwater monitoring program will suitably monitor and manage groundwater quality being extracted. The Department therefore recommends a condition that the monitoring program be reviewed every six months for two years after groundwater pumping is complete, to identify if further mitigation measures are required. The Department also recommends construction groundwater management and monitoring programs, inclusive of appropriate treatment systems, to ensure that water extracted for construction is of an appropriate quality for the proposed use, and water access impacts to surrounding users are managed and mitigated accordingly.

Bore decommissioning and compensation

Gilgandra Council has sought agreement from ARTC to keep bore fields created and used for construction of the project, however impacts to existing bores (damage and loss of water source) raised concern from the public and NSW Farmers.

The Proponent confirmed 10 existing groundwater bores within the construction footprint would be decommissioned, and access to groundwater from existing bores would not be restricted. DPE Water requested that existing government bores proposed for decommissioning are replaced within 18 months.

The PIR RtS confirmed that the potential for retaining facilities installed for construction (such as bores) would be investigated, and negotiated in consultation with relevant stakeholders. The four bores subject to the agreement with Gilgandra Shire Council are identified as being approved and licensed through Council as part of a legacy program. If water extraction is viable from these bores, they would be commissioned by the Proponent on a cost recovery/full operational cost basis during construction. The Proponent has also confirmed that decommissioned bores would be compensated, or alternative water supply arrangements made in consultation with the landowner/landholder.

The Department recommends evidence in the bore field management plan that decommissioned government bores would be replaced within 18 months. The Department has recommended a condition requiring impacts to existing bores as a result of the project are adequately compensated, through monetary payment, alternate water supply, or appropriate water sourcing infrastructure.

Re-use of Narrabri Gas Project water, cumulative impacts and alternate water sourcing

Water required for construction activities may include recycled/treated water from Narrabri Gas Project, or purchase of existing water access licenses from surrounding landholders. Such waters pose a contamination risk if not adequately treated. Detailed information wasn't provided in the EIS in relation to the Narrabri Gas Project water reuse, however it was confirmed within the PIR that sourcing water from the Narrabri Gas Project would ensure consistency with the principles contained in the *Waste Avoidance and Resource Recovery Act 2001* and includes treated and recycled wastewater.

The PIR identified that by the time the project is expected to start construction, several projects are likely to have completed construction, reducing any cumulative impacts (including Inland Rail Parkes to Narromine, Silverleaf Solar Far, Narromine Solar Farm, and Gilgandra Solar Farm). The Department has recommended a condition requiring the Proponent ensure the quality of recycled water used during construction is such that will not pose a risk to human health or the receiving environment.

Surface water quality and cumulative impacts will be monitored

Surface water quality and associated impacts, such as scour erosion, movement/flow, vegetation impacts and debris, are of concern to the Department. If construction is not adequately managed through mitigation measures, there is potential to impact water quality in receiving watercourses. The project will also potentially increase cumulative impacts on surface water quality generated by 7 existing projects in the study area. These include, for example, APA Western Slopes Pipeline, Silverleaf Solar Farm, and reactivation of Petroleum Exploration Licences.

DPE Water recommended a detailed hydraulic assessment during detailed design to assess impacts to changes in flow and velocity. To mitigate the potential impacts of water quality from the construction and operation of the project (based on the *NSW River Styles Framework,* Brierley and Fryirs, 2003), the Proponent has committed to:

- discharge to surface water undertaken in accordance with the EPL for construction, considering hydrological attributes of the receiving waterbody
- road infrastructure and associated drainage requirements (roadside drainage, culverts and scour protection) positioned to minimise changes to natural flow patterns
- surface water monitoring framework developed and implemented as part of the soil and water management plan in the CEMP to monitor quality at discharge locations, and frequency and duration of monitoring and parameters
- dam watering protocol as part of the soil and water management plan.

The Department recommends a condition requiring the Proponent to prepare a Soil and Water Management Plan that would detail the proposed erosion, sedimentation, and water quality management measures implemented during construction, inclusive of a rehabilitation strategy to manage watercourse impacts progressively throughout construction, and a groundwater and surface water monitoring program to manage cumulative/ongoing impacts. This requirement is in addition to the Operational Erosion Monitoring and Management Plan discussed in **Section 6.1**.

6.7 Aboriginal cultural heritage

The project lies within Wiradjuri, Gomeroi, Ngemba, Ngiyampaa, Wangaaypuwan and Wayilwan land., and the administrative boundaries of eight Local Aboriginal Land Councils (LALCs). Aboriginal cultural heritage sites and items of significance were identified throughout the project site, mainly adjacent to creeks, floodplains and waterways where family groups would congregate to exploit food and other natural resources. Items include campsites, cultural crossings, modified trees, culturally significant plants and animals, burial sites, artefact scatters and ceremonial sites.

Issue

Limited field surveys have occurred

Assessment methods included the use of desktop analysis, Aboriginal Heritage Information Management System (AHIMS) searches, consultation with both statutory and non-affiliated Aboriginal groups to develop a predictive model, and, for the areas where access was available, conducted a site walk-over. 152 Aboriginal heritage sites, and 13 areas of Potential Archaeological Deposits (PADs) were identified within the 2 km investigation corridor. All sites were identified as having high social significance, particularly an area around the Macquarie River, which was identified by knowledge holders as a significant traditional and historic camping ground.

The Proponent has had limited access to private land, which restricted field surveys to approximately 30 % of the study area. Ten further areas were identified through predictive modelling to have moderate-to-high cultural sensitivity. These areas were not physically accessed during survey and noted as requiring further survey. These areas are Wallaby Creek, Ewenmar Creek, Marthaguy Creek, Castlereagh River, Gulargambone Creek, Tenandra Creek, Baradine Creek, Namoi River, Mungery Creek, and Caleriwi Creek. The Proponent has committed to undertaking this further survey work prior to construction.

Construction activities will impact Aboriginal cultural sites

The Proponent's Aboriginal Cultural Heritage Assessment Report (ACHAR) identified Aboriginal cultural sites and items that will be directly impacted by construction activities of the project, including vegetation clearing, excavation for installation of bridge piles, culverts and utilities, and vehicle movements. Twenty-five Aboriginal sites and items will be impacted, five of these with moderate to high overall significance. These include three modified trees, one modified canoe tree, and one artefact scatter. Six PADs may be impacted.

There are 23 further sites and items adjacent to the project site that are vulnerable to impacts during construction. Eight of these are located within 10 m of the project. Of these, four modified trees have been identified as having moderate to high overall cultural significance. The Proponent has proposed measures such as avoidance zones, fencing, protective coverings, and cultural heritage training, to minimise and manage the risk of these sites being impacted.

The PIAR identified a change of impacts to two scarred trees and two artefact scatters that fall within the amended construction and operation footprint. Both scarred trees (Boothaguy Creek ST6 and Berida Road ST1) were to be indirectly impacted by the project for a potential loss of value, and the two artefact scatters (AHIMS ID 28-1-0059 and ID 28-1-0095) were to have direct impacts to the entire extent of their sites. The impact to all four sites has been reduced due to the amended footprint, and new proposed mitigations that will be put in place.

Impacts to cultural heritage values are expected

In addition to archaeological features, the project landscape features interconnected physical, social, and spiritual places and stories important to Aboriginal people, that are expressed as Aboriginal cultural values. The project will have expected impacts on these values, from impacts to water sources (water courses, waterholes, or springs), plants and animals, sacred sites, pathways, and both tangible and intangible relations with Aboriginal culture and dreaming. Contemporary sites,, such as pathways and post-contact localities, will also be impacted by the project. The potential loss of Aboriginal heritage sites is the principal impact to cultural values by the project, with these sites bridging a deep cultural connection with Aboriginal people to the region.

Submissions

Community submissions

Key Aboriginal cultural heritage issues raised in submissions included:

- impacts to culturally sensitive areas identified within the project site
- rehabilitation of culturally significant plants that are impacted.

Interest groups submissions

NTSCORP raised concerns that the methodology under the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010c) does not serve to protect Aboriginal cultural heritage, promote meaningful engagement with the Traditional Owners of the land and objects that Proponent's impact, with no right of recourse or compensation for Traditional Owners. They had concerns with the acquisition of Crown land, particularly how this interacts with outcome 15 of *Closing the Gap* (By 2030, a 15 per cent increase in Australia's landmass and sea subject to Aboriginal and Torres Strait Islander people's legal rights or interests), and the treatment of native title applicants in the cultural heritage assessment process.

Friends of the Pilliga commented on the consultation process with Aboriginal groups, stating that Indigenous culture should be treated with a more holistic viewpoint of the significant of the landscape, rather than on the basis of individual sites.

North West Protection Advocacy requested the current alignment is reverted back to an alternative proposed route that does not traverse the Pilliga East State Forest and threaten surrounding Aboriginal cultural heritage. They also raised concerns regarding the cumulative impact of the project and the Narrabri Gas Project on Aboriginal cultural heritage.

Singleton Shire Healthy Environment Group suggested that the impact assessment undertaken should have included the colonial Landscape Colonial Eras and additional archived records, allowing for a more holistic approach to Aboriginal cultural heritage assessment.

Wando Conservation and Cultural Centre Inc commented that they feel the Aboriginal cultural heritage assessment has been inadequate, and doesn't completely encapsulate the significance of the landscape in a holistic view.

Council submissions

Narrabri Shire Council expressed concern with its reliance on desktop analysis for its heritage assessments, and requested that Council's Heritage Advisor is engaged throughout the construction phase. Council would like the opportunity to provide feedback on any heritage management plans.

Coonamble Shire Council requested that adequate consultation with the Coonamble Local Aboriginal Land Council (LALC) is undertaken, including any other traditional landowners or community groups recommended by the LALC.

Narromine Shire Council requested assurance that the project site had been effectively surveyed for Aboriginal cultural heritage, and that all appropriate Narromine LGA Aboriginal groups were consulted with.

Gilgandra Shire Council provided a similar response to Narromine Shire Council, requesting assurance that all appropriate Gilgandra LGA Aboriginal groups were consulted.

Gilgandra, Warrumbungle, and Narromine Shire Councils commented positively about the inclusion of a detailed Aboriginal Community and Stakeholder Engagement Strategy in the PIAR, and stated their preference to be involved in the strategy's implementation.

Government agency advice

Heritage Council of NSW commended the Proponent on the consultation process, noting that RAPs had positive comments on the approach to consultation and general approach to the assessment. Heritage Council of NSW noted that there is ongoing investigations of archaeological potential in

areas previously not surveyed, and raised concerns on the potential increase of Aboriginal cultural heritage impact on the project.

Heritage NSW recommended actions to strengthen the management of Aboriginal cultural heritage on the project, and requested more certainty on the approach of managing Aboriginal scarred trees. These recommendations included establishing precautions to minimise harm to traditional burials, implementation of sediment control measures, a cultural plant survey in partnership with RAPs and willing landowners, further field surveys, and further identification of scarred trees using more conventional methods.

TfNSW requested a mechanism to ensure all workers understand how to care for Aboriginal cultural heritage, and what to do if unexpected finds occur, and to develop a toolbox video to inform workers of the importance of Aboriginal cultural heritage sites. They consider there to be a lack of detail about how to maximise outcomes for Aboriginal communities; with no evidence of shared decision making with local Aboriginal communities. They also consider that some registered Aboriginal parties do not appear to be Traditional Owners and that the Proponent should ensure that in future site surveys RAPs are knowledge holders from Country.

Consideration

Further survey work is required to confirm impacts on Aboriginal heritage items

The Department accepts that the Proponent has not had access to the entire project alignment, and further survey work will be conducted when the Proponent obtains property access following determination of this CSSI application. The Proponent has appropriately acknowledged the risk this may have to continued harm of sites and objects, as well as to the construction timetable should work cease due to unexpected finds. Additional survey work consistent with the archaeological methodologies will be undertaken in areas that have already been surveyed. The Department supports this approach and reinforced it in a recommended condition requiring a test excavation and salvage methodology to be approved by the Planning Secretary.

The Department acknowledges there is a risk further surveys would uncover significant items and recommends conditions requiring test excavation and salvage methodology is developed, and subsequent reporting about items found through excavation, in consultation with RAPs.

The Proponent's mitigation measures include further detailed site surveys and test excavation, salvage in accordance with an approved methodology, appropriate agreements for the long-term care of salvaged items, protective fencing for items adjoining construction sites, and an unexpected finds procedure. These measures would be further detailed in a Construction Heritage Management Plan. The Department supports these measures in principle and has recommended conditions requiring this plan is approved by the Planning Secretary.

Construction impacts to tangible and intangible Aboriginal cultural heritage will be managed

The Department notes that direct impacts to tangible Aboriginal cultural heritage items have been partially avoided by the Proponent's design decisions, including:

- avoiding grinding grooves at Cumbil Creek, by relocating the alignment
- extending bridges beyond watercourses and creek banks to avoid sensitive heritage areas
- locating the proposed bridge over Macquarie River to avoid Aboriginal heritage sites.

Of the 152 heritage items and 13 PADs within the study area, 25 items and two PADs will be partially or completely impacted, and 23 will potentially be impacted due to their proximity to the rail corridor.

Five items within the corridor are classified as having a medium to high significance, based on their social, historical, scientific, and aesthetic significance. The Department recognises that this is a relatively low proportion of the items within the study area but requires robust mitigation measures to further investigate and manage these items.

The Department also acknowledges the Proponent's consideration of impacts to intangible Aboriginal cultural heritage, such as impacts to cultural values and cultural loss, through the development of an Aboriginal Community and Stakeholder Engagement Strategy. The Strategy includes culturally appropriate ways to further stakeholder engagement activities with local Aboriginal communities, to provide information on job opportunities, and to leverage business opportunities with local Aboriginal people and organisations.

While creating a strategy to formalise the engagement is a positive step, given broader government commitments to Aboriginal outcomes and the recognition of cultural values and ongoing cultural loss, the Department requires the preparation of an Aboriginal Cultural Values Plan, to ensure local stories, images and values are told and represented in the design of the project. The Plan will leverage the Strategy, ensuring consultation efforts are maximised and that consultation fatigue, a known issue for Aboriginal communities is minimised. The Plan will ensure the project minimises its footprint on impacts to cultural values and cultural loss and will promote local Aboriginal community values through locally important design inputs, and guide integration of the spiritual, intangible, linguistic and cultural values into the broader design of the project.

All Aboriginal sites were assessed as having high significance, and the project will impact on significant places including campsites, resources gathering locations, scarred trees, plants and animals, and ceremony and dreaming locations. The Department recognises that the project's impact on Aboriginal cultural heritage extends beyond tangible objects to these intangible places and concepts of significance, and these stories must be represented through local community input.

The Plan must be prepared in consultation with Heritage NSW, RAPs, and relevant councils. Given the importance the Department places on this plan, the Aboriginal Cultural Values Plan must be submitted for the approval of the Planning Secretary a minimum of one month prior to commencing construction. The Department has included parameters but not prescriptive requirements for the plan, as the scope is best determined in consultation with Aboriginal stakeholders.

Processes for Aboriginal participation are essential to delivering positive outcomes

The Department recognises that Aboriginal participation is vital to managing the project's impacts, ensuring the design responds to cultural values, and encourages Aboriginal participation in employment and other economic benefits presented by the project.

Submissions noted the assessment lacked detail regarding shared decision making with Aboriginal communities; a key priority for governments of all jurisdictions. They also raised concerns regarding how opportunities would be leveraged to maximise outcomes for Aboriginal people in the region. Further, the NSW Governments' key Aboriginal Policy for the improvement of education, employment and service delivery – *OCHRE* (Opportunity, Choice Healing Responsibility, Empowerment, (NSW 2011), promotes the goal of…"revitalising and promoting language and culture, creating opportunities, increasing people's capacity…".These policies, and others such as *Connecting with Country* (Government Architect NSW 2020a) and *Designing with Country* (Government Architect NSW 2020b), provide a mandate for Aboriginal participation in project delivery, through both employment and other ways to participate economically, and through co-design activities that include art, language, and story, to promote cultural values important to the people of the locality.

The Department expects that Aboriginal communities will be meaningfully involved throughout all stages of the project, including local community participation in long-term employment participation. Ongoing Aboriginal participation in decision making means local Aboriginal involvement in project design and finishes, landscaping, creation of places, and to tell their story using local language of how the infrastructure will interact with their landscapes through visual elements.

The Department notes the Proponent's efforts to engage and involve local Aboriginal community, to understand cultural values important to the community, and to plan for future engagement activities involving information sessions on employment as the project progresses.

The PIAR included an Aboriginal Community and Stakeholder Engagement Preliminary Framework, to provide an overarching document to guide engagement with Aboriginal groups and communities throughout the upcoming phases of the project. The Framework guides the provision of an Aboriginal Engagement Strategy prepared by the Proponent prior to the commencement of construction. The Strategy will detail the opportunities for Aboriginal stakeholders, knowledge holders, traditional owners, RAPs, and LALCs. The Department considers a centralised strategy document for Aboriginal consultation benefits all stakeholders through a considered and consistent approach to consultation. The aim of the Strategy is to facilitate Aboriginal participation in the project, including management of impacts, involvement in design, and inclusion in the Inland Rail workforce. The Strategy will inform Aboriginal participation in further survey and salvage work, the Aboriginal Cultural Values Plan, and the Social Impact Management Plan (see **Section 6.8**). The Department recommends a condition requiring the Proponent to devise the strategy prior to construction.

6.8 Social impacts

The construction and operation of the project will have a direct and indirect impact on public and private land, residents, and community groups along the rail alignment. Landholders are concerned with the impacts to their day-to-day activities, access to their properties, and farming operations. There is a level of anxiety due to the lack of certainty of what the impacts to landholdings are and how they will be managed.

Issue

The project provides economic and employment opportunities for local communities

The project would require approximately 2,000 workers during peak construction. This presents direct employment opportunities, as well as indirect economic participation potential for residents, including Aboriginal and young people. The Proponent has committed to providing training for local people through its *Inland Rail Skills Academy*, to create opportunities for education, training, skills development, and employment along the alignment. The program would provide information to communities about the skills required on Inland Rail projects and prepare prospective employees to be job ready. The skills academy facilitates local training approximately six to twelve months prior to the commencement of construction and would include training in civil construction and plant operation competencies.

The Proponent will require its construction contractor to prepare a project specific workforce management plan in the tendering and contractual process. The workforce management plan would include goals for local workforce, youth employment, Indigenous employment, and female employment, with regard to the State and Federal targets and the *National Standards Framework*.

Property and land requirements for the project would cause social impacts

The project would require removal of two houses on rural properties, and the use of land both temporarily for construction and permanently for operation of the project. Relocation of the residents of the two properties will be negotiated between the Proponent and landowners, during the land acquisition phase.

Throughout consultation with the impacted landholders, the Proponent's Social Impact Assessment (SIA) identified concerns about potential land and access requirements for the project. Landholders expressed frustrations about the location of the alignment and are experiencing stress about impacts to their properties. The uncertainty about the project's alignment given the long planning stage and its potential impacts to properties, lifestyle, and farming operations, has caused stress for some property owners over an extended period of time.

Landholders expressed concerns about the potential disruptions to services such as internet, learning and education, and water usage, due to utility changes. Water usage, and the potential for flooding impacts, caused concern and stress as water used for construction may be impacted by prolonged drought conditions. Flooding and water impacts are assessed in **Section 6.1** and **6.6** of this report.

The construction of the project will impact on local recreation sites and community facilities

The project may impact the local tourism industry, and activities on local recreational sites due to construction activities such as changes to access and amenity, increased noise, and visual impacts from construction compounds, machinery, and equipment.

The SIA identified that Camp Cypress, a not-for-profit tourist accommodation facility offering tourist accommodation including powered and unpowered camp sites, is likely to experience impacts during construction. The camp site's proximity to the proposed temporary workforce accommodation facility in Baradine means it could experience impacts from noise, dust, traffic, and access to the camp site, as there is a single driveway providing access in and out of the showground site. Similarly, residents of the Jack Towney Hostel, and students and staff from the Aussie Kindies Early Learning Centre in Gilgandra would experience impacts from noise and visual changes from the establishment of the proposed temporary workforce accommodation facility.

Increased noise and vibration as a result of construction are also likely to impact the Narrabri Dirt Bike Club located at Newtown Park on the Kamilaroi Highway (Wee Waa Road) about two km north-west of Narrabri. The proposed temporary road closures, and/or diversions during bridge works over the Kamilaroi Highway and access road reconfiguration, would impact access to the club. However, the Proponent will negotiate alternative access with the club during the detailed design phase of the project. Narromine Golf Course will experience similar noise and vibration impacts from construction activities.

The project will impact on the recreational use of Pilliga East State Forest

The northern section of the project will pass through the Pilliga forest located between Baradine and Narrabri. Construction activities would impact social activities undertaken at the Pilliga Forest, such as bushwalking, birdwatching, and Indigenous cultural activities and values. Construction of a new bridge over the Macquarie River adjacent to Three Mile Reserve would create impacts from noise, vibration, and dust, and create visual impacts to users, potentially deterring users who frequent the river.

The SIA identified that the forests have natural and cultural significance valued by community, particularly the Aboriginal community. The social assessment consultation identified that places of

Aboriginal cultural significance (such as the sandstone caves) are located within the forests, and there are Aboriginal people who frequently use parts of the Pilliga forests. Construction activities have the potential to affect Aboriginal heritage and may affect places of historical significance, due to land acquisition, amenity, and access changes.

Construction of the project will impact on the tourism industry within the study area. Increased noise and visual impacts associated with construction activities at recreational sites within the Pilliga forests could deter potential visitors from using these areas. The SIA found visitors value the tranquil setting offered in the local tourist destinations, which would be disrupted due to increased noise and vibration, dust, access and amenity changes and obstructed views from construction compounds and machinery.

The project will impact on Aboriginal cultural values

Throughout consultation with Aboriginal stakeholders and understanding the cultural landscape as an interconnecting network of physical, social and spiritual places, the Proponent identified sites considered to be of significance for Aboriginal people. These sites include:

- campsites
- resource gathering locations
- modified (scarred) trees
- pathways through the landscape
- water courses, water holes, or springs
- plants and animals
- burial sites
- Aboriginal ceremony and dreaming
- post-contact sites.

The construction and operation of the project will impact on cultural values, social cohesion, and connectivity for the Aboriginal groups. The Department's assessment of the project's impacts on Aboriginal cultural values is discussed in **Section 6.7**.

Construction of the project may impact the social cohesion, values and wellbeing of the community

The SIA considered the existing population and demographic characteristics of the local government areas (LGAs) in the study area. Residents in the study area value a strong sense of community, rural lifestyle, proximity to regional centres and community and medical facilities, clean air, and peaceful amenity. Residents expressed a strong sense of community and commitment to town, outdoor activities, events, and the natural environment.

The presence of temporary workforce during construction may have an impact on social cohesion within the locality. This includes actual (or perceived) impacts on rental accommodation availability, and safety and community participation implications of an influx of temporary residents. The SIA considered private rental by the workforce, who may choose to rent homes within host towns in the study area rather than live in temporary workforce accommodation. The SIA considered this to be possible, however due to considerable cost and lack of housing supply, would be the least preferred option.

The project will provide temporary workforce accommodation for the construction workforce

The project includes establishment of temporary workforce accommodation facilities for the construction workforce for the duration of construction. Workforce accommodation will include

accommodation, catering, and shuttle buses to transport workers to and from the construction sites. They will be located within the Narromine South and Narrabri West, multi-function compound and at:

- Narromine North
- Gilgandra; and
- Baradine.

The location of temporary workforce accommodation close to town centres will have both positive and negative impacts on the local communities. The establishment and operation of these facilities may impact nearby residences, community facilities, privacy, create potential noise and traffic impacts, and perceived safety issues, as well as placing strain on healthcare and emergency services.

Councils and the community are generally supportive of the worker camps, particularly if there are economic benefits for local businesses. There is potential for the local services and businesses to service the temporary workforce accommodation, to increase local economic benefits and sustainable employment opportunities from the project. Early information about procurement opportunities available will enable local services and businesses to prepare and coordinate any additional resources required.

Submissions

Community submissions

Key issues raised in submissions from community and special interest groups include:

- inadequate engagement process with the community
- strong objection to the impacts on the Pilliga Forest as a result of the project
- social impacts to landholding and property requirements
- EIS lacks detailed assessment of:
    - effects on health and mental health
    - community cohesion, character, and culture
    - personal and property rights
    - benefits and costs for rural areas, particularly where there are no planned rail stops
    - impact of transit times and accident costs
- frustration due to lack of certainty on what landholders would be able to do with severed/fragmented lots
- decrease in property value as a result of the rail corridor passing through properties
- impacts on housing market as a result of 2,000 construction workers over four year construction period
- adequacy of socio-economic assessment.

Council submissions

Coonamble Shire Council suggested an alternative railway route via Coonamble and requested that social and economic benefits be broken down by LGA to determine positive and negative impacts from the project.

Narromine, Gilgandra, and Warrumbungle Shire Councils submitted separate, but similar, submissions raising concerns regarding social issues related to the project:

- suggest that social risk rating is incorrect and not reflective of potential severity

- concerns regarding use and validity of socio-economic data and assumptions
- impacts on local housing availability and affordability
- impacts to social infrastructure, emergency and health services
- expressed support of proposed SIMP and social issues to be addressed by the Proponent
- requested to be a key stakeholder in the review and reporting of the social targets in the Social Impact Management Plan (SIMP).

Government agency advice

Transport for NSW noted potential social impacts and requested consultation as part of the SIMP, so emergency service providers are informed about the locations of level crossings, and changes to access routes and road conditions.

Consideration

Social impact assessment is adequate and will be augmented by a Social Impact Management Plan

The Department reviewed the Proponent's SIA, and as supplemented in the PIAR. Submissions raised concerns about the completeness of social impacts assessed and the residual risk ratings attributed to the project. The Department shares some of these concerns and considers that the residual risk ratings in some cases overstate the potential benefits and understate potential impacts. In particular, the SIA relies on underdeveloped mitigation measures to achieve significant reductions between unmitigated and residual risks.

The Department considers the SIA provides an adequate assessment of the project's social impacts, and that it is sufficiently consistent with the Department's *Social Impact Assessment Guideline* (2021) subject to implementation of a Social Impact Management Plan (SIMP).

The Proponent has committed to preparing a SIMP to manage the specific management actions and targets in response to the measures to manage the socio-economic impacts of the project. The SIMP would refine the social impacts of the project, proposed mitigation and management measures to address the impacts, proposed actions to address social issues, and the monitoring and reporting framework to ensure the prescribed targets are met. To achieve its desired outcomes for industry participation, workforce, community health and wellbeing, and housing and accommodation, the Proponent will require contractors prepare and submit Social Delivery Plans (SDP) as part of the tender process. The SDPs are identified in the SIMP and would contain expected procurement, employment, and health and wellbeing initiatives, and how these would be managed throughout construction. The SDP would be developed in consultation with the relevant Council, agencies and stakeholders identified in the Proponent's mitigation measures. The Department is satisfied that the Proponent's commitment to ensure SDPs are prepared, and identified in the SIMP, would address social delivery targets.

The Department acknowledges that a SIMP is necessary to manage the social impacts, particularly through construction of the project. As such, the Department recommends a condition requiring the Proponent to prepare a SIMP for the approval of the Planning Secretary. The condition requires the SIMP include detailed and tangible measures to promote positive and reduce negative social impacts of the project. The outcomes of SIMP actions will be periodically monitored and reported, on a quarterly basis, to the Planning Secretary, with adaptive management measures to be implemented if social performance measures are not met. The Department has also recommended a condition requiring the Proponent engage an independent Social Advisor to review the SIMP and report on its

implementation. The Department is satisfied that any adverse social impacts can be appropriately monitored and managed through the SIMP.

Employment and economic participation opportunities can have positive social benefits

The project presents significant employment and economic development opportunities for local people which may have positive social benefits. Realising these benefits depends on the extent to which employment and economic development opportunities are distributed within and between communities. The Department supports the Proponent's commitment to require its contractor(s) to engage local staff where they have relevant skills, and the Proponent's training initiatives to upskill local people to work on Inland Rail and develop transferable skills.

The Department considers the methods of achieving these outcomes currently lack detail, and has included a requirement to provide details and report on employment diversity and local business participation through the SIMP.

Environmental impacts during construction will be managed by Construction Environmental Management Plans (CEMP)

The Department acknowledges there are environmental impacts from construction of the project. As discussed above, these impacts will disproportionately affect certain members of the community. Management of environmental impacts will primarily be undertaken through the Construction Environmental Management Plan (CEMP) and its subplans. The SIMP requires these management plans are informed by the SIMP, to ensure the needs of particular groups are considered in the project's environmental management.

The use of accommodation camps to service the temporary workforce would be managed through a temporary workforce accommodation management plan

The Department acknowledges the introduction of temporary workforce accommodation facilities to accommodate the construction workforce during construction would have both positive and negative impacts to local communities, community facilities, and services. An influx in the workforce may provide economic benefits to local businesses and increase indirect employment opportunities from the project. However, an increase in the workforce could potentially increase demand on healthcare and emergency services.

To ensure impacts on the existing communities, healthcare and emergency services are reduced and managed appropriately, the Department has recommended a condition requiring that Temporary Workforce Accommodation Facility Management Plan is prepared, in consultation with the relevant council and agencies, reviewed by the Social Advisor, and approved by the Planning Secretary. This plan would include measures to manage the physical layout, operations, and activities of the facilities. The Department is satisfied that temporary workforce accommodation facilities have an acceptable impact on the existing community, and healthcare and emergency services facilities.

6.9 Other issues

Other issues are those that are not considered key issues but were either raised in the EIS or in submissions.

Table 21 | Other assessment issues

Issue	Findings	Recommendations
Waste management	The Proponent advises the project would result in a range of waste streams and excess spoil material. Excess spoil would be re-used, where possible, to fill bore holes created for the development of the rail line, and for site stabilisation and rehabilitation purposes. The Proponent has advised that there would be excess general fill along the length of the project, which would be managed in accordance with the construction waste management plan to be prepared and implemented as part of the CEMP. The Proponent has indicated that detailed design and construction planning would assist with reducing required earthworks and the associated amount of excess spoil generated. Surplus spoil would be stockpiled onsite for further reuse where possible, potentially in backfilling voids in the borrow pits. The details and specific locations of spoil mounds would be addressed in the detailed design phase; however, the Proponent has indicated the location of spoil mounds would be carefully selected to minimise environmental and community impacts, while meeting the requirements for safe construction of the project. Waste management for the project will follow the waste hierarchy approach of avoidance and re-use before consideration of waste disposal, in accordance with the *Waste Avoidance and Resource Recovery Act 2001*. The Department considers the impact of waste management activities can be managed subject to conditions of approval. These include standard waste conditions, including the classification and lawful disposal of waste. Excess spoil would be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) and disposed at appropriately licensed facilities. The facilities used are to be confirmed by the construction contractor, based on the suitability of waste and available capacity at relevant facilities.	The Department has recommended conditions which require the Proponent to provide advance notice to waste facilities, to assist them in managing demand. The Department has recommended conditions regulating the size and location of spoil mounds, and appropriate handling, reuse, disposal and tracking of waste. The Department considers that the identified waste management strategy, the Proponent's mitigation measures, and the recommended conditions of approval, would appropriately address and mitigate potential waste impacts from the project.
	The Department agrees with the outlined approach and recognises potential impacts associated with the formation and placement of spoil mounds, including the degree of uncertainty regarding their size, location, visual impact. *Wastewater and water run off impacts* The project would involve works within and around perennial and non-perennial watercourses, which, if inadequately managed, contribute to erosion,	The Department has set locational criteria and recommended conditions to ensure that any excess spoil is managed appropriately and would not contribute to any impacts beyond those considered as part of this project.

	sediment, and water quality impacts. Potential surface water runoff from construction activities would be managed by standard erosion and sediment controls. The project includes design features to minimise the extent of disturbance to watercourses, including silt curtains to be installed in the Macquarie River and Narrabri Creek/Namoi River, to prevent sediment transport. The project would likely require the discharge of water from sedimentation basins, which could alter surface water flows and cause localised scouring of sediments. If discharge is required, the exact volume of discharge water and discharge points would be identified prior to construction. Any discharge would be undertaken prior to, or immediately following, forecast rainfall events. Discharge points would consider the hydrological attributes of the receiving watercourse, including whether there is sufficient flow volume and velocity to incorporate the discharge volumes. These matters would likely be regulated through an EPL. The Proponent has indicated that wastewater created from site amenities would be contained on site, then removed via vacuum trucks on a regular basis, and treated and disposed of in accordance with relevant regulatory requirements. The Department agrees with this approach and recognises potential impacts associated with undertaking works nearby recognised waterbodies. Overall, the Department considers that waste generation and management can be adequately managed through the Proponent's proposed mitigation measures and recommended conditions.	The Department has recommended conditions to ensure any works undertaken near the identified waterbodies are managed appropriately and would not contribute to any impacts beyond those considered as part of this project
Soil and contamination	The Proponent's assessment indicates that it is unlikely that saline or acid sulfate soils would be encountered during construction or operation of the project. However, the project has the potential to result in increased soil erosion and sedimentation, disturbance of contaminated soils, and contamination of soils and surface water due to accidents. As such,	The Department has recommended conditions that require the Proponent to establish an Unexpected Finds Protocol in the event that unexcepted contaminated materials are found.

the Proponent has committed to preparing a contamination and hazardous materials plan, and soil and water management sub-plan, as part of the CEMP. This will detail measures that would be implemented to minimise any potential soil impacts including erosion control practices, stockpiling, and topsoil management.

The geotechnical investigations indicate that the project transverses an area of predominantly vertosols and moderate to high erosion and dispersion hazard. The project site does not contain naturally occurring asbestos containing soils. Erosion impacts on black soils in the region, have been considered as part of the flooding and hydrology assessment above.

Soil erosion, salinity and soil structure decline have been considered

Soil types along the project site include:

- Narromine to the Oxley Highway - red brown earths, red earths and solodic soils
- Oxley Highway to Baradine - cracking clays (vertosols), red and red brown earths and non-calcic brown soils (duplex soils)
- Baradine to Narrabri - duplex soils and non-cracking clay
- Narrabri - duplex soils south of Narrabri and vertosols close to Narrabri.

Construction activities can create soil and contamination risks due to erosion from soil disturbance, disruption of contaminated soils, and contamination of soils and groundwater. The Proponent proposes to manage soils to limit salinity and erosion impacts during construction through soil conservation practices, including the use of progressive erosion and sediment controls, and covering any potentially saline areas exposed during construction with stripped topsoil prior to re-establishing vegetation.

There is generally a low risk of contamination within the project site, however areas of high soil contamination are present within the project area

Most of the project site has been identified as having a low risk of soil contamination. However, existing railways, rail infrastructure and the Santos Narrabri

In the event that contaminated material is found, the Proponent is required to undertake further investigations to determine the type and extent of any contamination in accordance with guidelines made or approved under the *Contaminated Land Management Act 1997*. Where unacceptable contamination risks are found, the Proponent would be required to prepare a Remediation Action Plan.

	Operations Centre were identified as having a high risk of contamination. Construction can contaminate soil and groundwater due to spills and leaks of fuel, oil, and other hazardous materials, and the exposure or disturbance of contaminants. To mitigate these impacts, the Proponent has indicated further investigation and testing would be undertaken, to determine the likely risk of contamination, and appropriate management protocols, prior to the disturbance of areas identified to have high potential for contamination, and for activities that may cause contamination The Department recognises that soil erosion and contamination impacts can be reduced through the management measures, in accordance with relevant legislative and policy requirements, and minimising the area of disturbance. The Proponent has formulated mitigation measures to manage the risk of soil erosion and contamination during construction, operation, and maintenance of the project. Further, the Department notes that management and rehabilitation plans required as part of the CEMP would also assist in managing contamination and erosion risks.	
Non-Aboriginal heritage	The non-Aboriginal heritage assessment identified six locally listed heritage sites/items in the study area, with two sites/items located partially within the project site. The two items are the Woodvale Park Private Cemetery (Gilgandra LEP heritage -listed item) and Curban Inn site (Gilgandra LEP archaeological-site listed). The Proponent identified a number of measures to mitigate associated impacts, including implementation of a heritage management plan, an unexpected finds protocol, fencing and marking of identified items and areas of non-Aboriginal heritage significance, archival recording, and detailed design and construction planning initiatives. Following preliminary investigations to locate graves in the Woodvale Park Private Cemetery, the Proponent in the PIAR refined the proposed location of an access road to a compound site to minimise direct impacts to the heritage item. While there are no remaining built elements on the Curban Inn Site, the location of the inn is presumed to be beneath a large stand of aloe plants. The site	The Department acknowledges the Proponent's intent to avoid heritage items where possible. Following submission of the PIAR, the Department considers the revised impacts of the project would be minor, but recommends the Proponent commits to undertaking further survey work. The Proponent will excavate items if detailed design identifies the potential for disturbance below the depth of existing disturbance. The Department considers this measure appropriate. The Department is satisfied with the Proponent's identified mitigation measures, including the commitment to review the location of access roads to compounds to prevent impacts to identified heritage items, and the commitment to prepare a Heritage Impact Statement to guide the

	may contain archaeological artefacts including Aboriginal artefacts. The Proponent's assessment has identified that realignment works of East Coonamble Road could potentially extend into the northern boundary of the Curban Inn Site. The non-Aboriginal heritage assessment indicates that the overall impact on potential archaeological remains associated with the Curban Inn Site is minor, subject to removal of any archaeological items located in the area of disturbance prior to works that would impact the site. The Proponent's PIAR states that an archaeological assessment would be prepared in consultation with relevant stakeholders, council and Heritage NSW, in concurrence with the preparation of research design and methodology. Other areas impacted along the alignment generally comprise sites outside of the project area, which contained isolated finds and artefact scatters of low archaeological potential, or buildings that would not be disturbed by the project. The assessment found that the project may result in impacts to areas of moderate or higher archaeological potential, including: • the former Drinane Public School (demolition of two buildings) • the corrugated iron hut with chimney (to be demolished) • a two storey barn/shed at Bohena Creek (to be demolished). The Proponent has committed to ensuring works are undertaken respectfully and in accordance with management plans and guidelines. Prior to the demolition of structures, archival photographic recording of all sites identified to be demolished would be carried out in accordance with the guidelines *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Council of NSW, 2006). The Department considers that this measure and recommended conditions are appropriate to achieve desired outcomes.	removal or excavation of archaeological salvage, if required. The Proponent's commitment to undertaking archival recording is also supported by the Department and had been reinforced through recommended conditions. The Department has recommended the preparation of a heritage management plan as part of the CEMP, to minimise impacts on non-Aboriginal heritage items during construction. The Department considers that the Proponent's identified mitigation measures and the recommended conditions are appropriate, and a proportionate response to the nature of the items and potential impact of the project. The Department is satisfied the impacts of the project would be negligible, subject to compliance with the proposed mitigation measures and recommended conditions.
Visual impacts	The Proponent has identified sensitive receivers of visual impacts predominantly as residents of rural properties and residential areas of the outer edges of Narromine and Narrabri. During construction, there will be temporary changes to visual amenity from machinery and equipment for construction works, site	The Department considers that the project will change the landscape in which it is located; some visual impacts are inevitable. However, the visual impact assessment underestimated the scale of

	fencing, compounds, storage areas, stockpiles, and waste materials. The greatest of these impacts would occur during construction of compounds and bridge structures, where works will be undertaken over a period of time, and partially built structures will be visible. There will be visual impact from removal of vegetation, however once construction works are complete, these areas will be rehabilitated. The Proponent identified that the main operational visual impacts of the project is that of the double stacked trains with a height of 6.5m and up to 1,800m in length, bridges over rivers, floodplains and roads, and the 306km long cleared rail corridor and associated rail infrastructure. The Proponent assessed the impact of the project on the landscape as having a moderate – low significance of impact. Proposed mitigation measures include locating and configuring construction sites to minimise visual impacts, and preparation of an urban design and landscape plan to guide the project's design and revegetation.	change, and the Department has recommended a condition requiring the Proponent consult nearby residents about the Visual and Landscape Impact Mitigation Plan.
Air quality	Construction works will produce dust impacts due to construction activities, operation of concrete batching plants and borrow sites, and use of unsealed tracks by construction vehicles. Receivers would experience air quality impacts above project criteria (based on relevant air quality guidelines) for the PM_{10} criteria within 50m of general construction sites, 375m of fixed concrete batching plants, 125m of mobile batching plants, 500m from borrow sites, and 375m of multi-function compounds. Impacts are above the $PM_{2.5}$ project criteria at shorter distances from these facilities. 25 sensitive receivers would be affected by dust from general construction sites, 24 from the establishment of temporary accommodation facilities, and 6 from other activities. The Department notes a relatively small number of receivers would be affected by construction impacts; most of these would be affected for a limited period of time (i.e. while construction activities pass by their property and during establishment of accommodation). The Proponent has committed to prepare and implement an Air Quality Management Plan that will identify processes, responsibilities, and management measures for impact mitigation. Dust mitigation includes spraying liquid to capture dust particles on haul roads and construction areas with earthworks. However, to minimise water use,	The Department recommends a condition requiring an Air Quality Management Plan during construction, to outline measures to reduce dust impacts during construction. The Department is satisfied that the project would not have significant operational air quality impacts, and notes rolling stock will require an Environment Protection Licence that would include air quality requirements.

	alternative methods will be investigated during detailed design. Operation of the project results in new sources of vehicle emissions from locomotives. The Proponent used the assessment conducted for the Northern Sydney Freight Line, which has more daily freight movements than the project, to conclude that the project would meet operational air quality criteria for all receivers more than 50m from the project rail line. The Proponent also assessed the nitrous oxide impacts of trains idling at crossing loops, and found that the project would meet the hourly criteria for all receivers more than 20m from the rail line.	
Climate change and sustainability	The Department considered climate change impacts on rainfall and flood impacts, and is satisfied the project has adequately addressed changing rainfall due to climate change. Flooding impacts are discussed in **Section 6.1**. The Department is also satisfied that waste will be minimised and reused where possible and that construction water use would retain sufficient water for environmental purposes.	The Department notes the Proponent's commitment to include appropriate sustainability practices, and recommends a condition requiring the project meets a minimum 'excellent' rating for both 'Design' and 'As built' in accordance with the *Infrastructure Sustainability Council of Australia* infrastructure rating tool. The Department notes the Proponent's commitment to addressing climate change impacts as part of the CEMP, and has reinforced this commitment in recommended conditions.

7 Evaluation

The Department has reviewed the EIS, RtS and PIAR, and assessed the key issues arising from the construction and operation of the project. This was undertaken with advice from relevant government agencies, submissions from councils and the public, and in consideration of key strategic government policies and plans. The Department considered all relevant matters, objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and principles of ecological sustainable development. The project is in the public interest by improving freight rail capacity and reliability, and encouraging a freight mode shift from road to rail. It provides benefits for rural and regional NSW by providing enabling infrastructure for economic development, including the Narrabri Special Activation Precinct. The Department considers the project should be approved, subject to conditions.

The project is consistent with the *NSW State Infrastructure Strategy 2018-2038*, *Future Transport Strategy 2056*, *Regional NSW Service and Infrastructure Plan,* and *NSW Freight and Ports Plan 2018-2032* as it would:

- improve intercity and intracity general and freight transport connections
- improve freight travel times and increase network capacity
- increase freight access across the rail network, and ensure safe, efficient, and sustainable freight access along the alignment
- provide economic development opportunity in the region.

The Department was informed by issues raised in submissions to the EIS and PIAR as outlined in **Section 5** and **Appendix F**. Key issues associated with the project are:

- flooding and hydrology
- biodiversity
- noise and vibration
- traffic and transport
- land use and property access
- surface and groundwater impacts
- Aboriginal cultural heritage
- social impacts.

The Proponent has identified environmental management measures that it has committed to applying. Residual impacts are acceptable when managed through recommended conditions and the Proponent's commitments, so there is no long term and irreversible impact. The Department recommends conditions aimed at improving environmental management and reducing potential impacts. Subject to conditions, the project would ensure that impacts to native vegetation and threatened species habitat are minimised and offset in accordance with applicable legislation.

The project limits changes to existing watercourses, and additional flooding impacts are limited under the Department's stringent conditions. The impact of construction and operational noise would be effectively managed through controls on construction hours and requirements for operational noise treatment. Impacts on property access and agricultural business operations would be managed through individual property management plans.

8 Recommendation

It is recommended that the Minister for Planning:

- **considers** the findings and recommendations of this report
- **accepts and adopts** the findings and recommendations in this report as the reasons for making the decision to approve to the application
- **considers** any advice provided by the Minister having portfolio responsibility for the project
- **agrees** with the key reasons for approval listed in the notice of decision
- **grants approval** for the application in respect of SSI 9487 as amended, subject to the conditions in the attached project approval
- **signs** the attached project approval and recommended conditions of approval.

Recommended by:

Mick Fallon
Team Leader
Freight Assessment and Management

Recommended by:

Alexander Scott
Director
Freight Assessment and Management

9 Determination

The recommendation is **Adopted / Not adopted** by:

The Hon. Anthony Roberts MP
Minister for Planning

Appendices

Appendix A List of referenced documents

Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW, 2010c)

Assessing Vibration: A Technical Guideline (DEC, 2006)

Biodiversity Assessment Method (BCD, 2020)

Future Transport Strategy 2056 (TfNSW, 2018)

Independent Review of Hydrology (Bewsher, March 2021)

Independent Review of Updated Flooding & Hydrology Assessment Preferred Infrastructure / Amendment Report (PIAR) (Bewsher, May 2022)

Inland Rail – Narromine to Narrabri Environmental Impact Statement, Parts A-E (ARTC / JacobsGHD IR Joint Venture, November 2020)

Inland Rail – Narromine to Narrabri Response to Submissions (ARTC / JacobsGHD IR Joint Venture, August 2022)

Inland Rail – Narromine to Narrabri Preferred Infrastructure Amendment Report (JacobsGHD IR Joint Venture, August 2022)

Inland Rail – Narromine to Narrabri Preferred Infrastructure Amendment Report - Response to Submissions (JacobsGHD IR Joint Venture, November 2022)

Inland Rail Rail-Road Crossing Strategy (ARTC IR, July 2016)

Interim Construction Noise Guideline (ICNG) (DECC, 2009)

Managing Urban Stormwater: Soils and construction (the “Blue Book”) (Landcom, 2004)

Narromine to Narrabri Project Noise and Vibration Advice Statement (Pulse White Noise Acoustics, November 2022)

Noise Policy for Industry (NPfI) (EPA, 2017)

NSW Aquifer Interference Policy (NAIP) (DPI Office of Water 2012)

NSW Freight and Ports Plan 2018-2032 (TfNSW, 2018)

NSW State Infrastructure Strategy 2018-2038

Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013).

Rail Infrastructure Noise Guideline (EPA, 2013)

Regional NSW Service and Infrastructure Plan (TfNSW, 2018)

Waste Classification Guidelines (EPA, 2014)

Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003)

Appendix B Environmental Impact Statement

https://www.planningportal.nsw.gov.au/major-projects/projects/inland-rail-narromine-narrabri

Appendix C Submissions

https://www.planningportal.nsw.gov.au/major-projects/projects/inland-rail-narromine-narrabri

Appendix D Submissions Report

https://www.planningportal.nsw.gov.au/major-projects/projects/inland-rail-narromine-narrabri

Appendix E Preferred Infrastructure and Amendment Report

https://www.planningportal.nsw.gov.au/major-projects/projects/inland-rail-narromine-narrabri

Appendix F Community views for Draft Notice of Decision

The key issues raised by the community and considered in the Planning Secretary's Assessment Report and by the decision maker include flooding and hydrology; biodiversity; noise and vibration; traffic, transport and access; Aboriginal cultural heritage; visual impacts; soils, agriculture and land use and social impact.

Issue	Consideration
Route Selection • The project does not align with the original project intent of supporting the economic development and export potential of rural areas • The alignment through the Pilliga is in the private interest and not the public interest • Concern for the lack of connectivity with existing rail lines • The route should not go through the Pilliga and existing rail lines should be considered to avoid impacts to both the unique and diverse environment, and to landholders • Concern for the rail alignment through travelling stock reserves • Concern for the restricted future development of rural towns • Lack of benefits to regional communities under the proposed alignment and lack of accessibility for regional produce • Concern that the project is not justified, has inappropriate impacts, an inadequate assessment and does not demonstrate regard for the objects of the EP&A Act and the precautionary principle • Concern for property severance and impacts to agricultural land, adequate	• The Proponent's route selection process is discussed in **Section 3.2**. • The Department acknowledges community concerns regarding the route selection. • It is not the Department's role to comparatively assess the proposed route against other potential routes or variations to the proposed route. Route selection is a matter for the Proponent, and the Department must assess the environmental impacts route as proposed. The Department has assessed these impacts. • The merits or otherwise of the project's business case are not a matter for the Department. The Department notes concerns raised about a lack of benefits to regional communities through connections to the project. While the project does not include rail sidings or intermodal facilities, the project does not preclude development and rail network access of such facilities by others. • The Department notes concerns about impacts on future development of rural towns. If the project is approved, future development near the rail line would need to incorporate appropriate noise mitigation and respond to any changes to flood levels and hazards. • The Department has assessed the impacts of the selected route. Submissions raising concerns the proposed use included concerns about property and land use impacts, particularly those related to agriculture, biodiversity impacts in the Pilliga, and benefits to communities. These are assessed in **Section 6.4, 6.2** and **6.8** of the report. *Recommended conditions* • See conditions relating to land use, biodiversity and social impacts.

Issue	Consideration
compensation, and loss of access to private property • Concern for a thorough cost/benefit analysis for the project, as well as a proper economic analysis • Inadequate environmental risk assessment and underestimation of direct and indirect impacts • Concern that the project does not achieve compliance with legislative and planning requirements • Need to consider an electric train to reduce climate impact, as well as construction of an asset that does not rely on diesel, to remain competitive (eg. electric trucks).	
Alternate route • The need to consider the alternative alignment to the west of Narrabri • Concern for the lack of consideration of the alternate route option using the existing track at Coonamble • Concerns with the eastern alignment of Narromine • Concerns for the route selection process and necessity for an independent review and evaluation.	• The Proponent's route selection process is discussed in **Section 3.2**. • The Department acknowledges the extent to which Narrabri community members have sought an alternative alignment, as well as concerns raised over property impacts caused by the greenfield alignment rather than using existing rail corridor. • It is not the Department's role to comparatively assess the proposed route against other potential routes or variations to the proposed route; route selection is a matter for the Proponent. • The Department must assess the environmental impacts of the proposed route, and has conducted a thorough assessment of these impacts. • Submissions requesting an alternative route raised concerns about flooding and property and land use impacts of the proposed route. These are assessed in **Sections 6.1** and **6.4**. *Recommended conditions* See conditions relating to flooding and land use impacts of the project.
Traffic and transport • Inadequate traffic and transport assessment and absence of traffic and access management plans • Impacts to local roads during construction and operation	*Assessment* • The Department's has assessed traffic and transport impacts at **Section 6.5**. The Department is satisfied the Proponent's traffic assessment is adequate. • There will be approximately 1000 construction vehicle movements per day along the alignment, two-thirds of which are heavy vehicles.

Issue	Consideration
• Inadequate consideration of level crossing impacts • Insufficient grade separation • Concern for increased traffic during construction of the project • Potential road safety impacts during construction.	• Construction traffic will affect the Narromine, Gilgandra and Narrabri town centres, as well as rural roads. Considered management of construction traffic is required to mitigate traffic and safety impacts. • The project includes eight grade separated crossings, 49 new public level crossings and approximately 30 private level crossings. • These installations will affect public and private access, land use, travel times and road safety during the project's operation. • The Department considers delays at levels crossings are acceptable but acknowledges their road safety risks. • Grade separated crossings are proposed at the two busiest roads affected by the project (the Mitchell Highway and Kamilaroi Highway). In addition, Transport for NSW is planning grade separations at the Castlereagh Highway and Tomingley Road, the next busiest crossings. *Recommended conditions* • A Traffic, Transport and Access Management Plan developed in consultation with councils and TfNSW. This plan must consider seasonal traffic variations, inform road users of changes to traffic conditions and reduce noise of construction vehicles. • A Road Dilapidation Report to record existing conditions of roads, informing a requirement for the Proponent to make good damage to roads following construction, as well as repairing road damage affecting safety or trafficability as soon as practicable. • A Level Crossing Treatment Report that justifies level crossing treatments in terms of road safety. This report must be endorsed by the relevant roads authority. • A Level Crossing Performance Report once the project is operational that reviews level crossings' traffic and road safety performance.
Noise • Concern for operational noise and vibration impacts to business, livestock, sleep disturbance, noise impacts during construction and inadequate criteria to assess actual noise impacts experienced by receivers • Concern for the assessment of noise and vibration impacts and the subsequent acoustic treatments, as well as the commitment to deliver noise treatments for sensitive receivers • Adequacy of the noise assessment and	*Assessment* • The Department's noise and vibration assessment in provided in **Section 6.3**. • Construction noise will exceed guideline levels at 2,894 residential receivers. This number reflects low background noise levels in the project's largely rural environment, and the majority of receivers will not experience construction noise that will significantly affect their day to day life. • 17 receivers will experience construction noise above the highly affected level of 75 dBA, which typically triggers more intensive mitigation, such as respite and alternative accommodation. • Operational noise will exceed guideline noise levels at up to 53 residential receivers. These receivers will be investigated for noise mitigation. The Department acknowledges community concerns that mitigation types has yet not been adequately resolved and considers that mitigation must consider buildings of construction types, building conditions and cooling types that limit typical architectural treatment.

Issue	Consideration
consideration of low levels of background noise • Need for more detailed identification of construction and operational noise mitigation measures, including where the construction and condition of buildings limits architectural treatment • Concern for vibration impacts on neighbouring buildings and infrastructure.	• The Department is satisfied vibration impacts during construction and operation can be appropriately managed • A Construction Noise and Vibration Management Sub-Plan would outline measures to mitigate noise impacts during construction, and include measures such as machine shielding, and at-receiver noise treatment for those impacted by both construction and operational noise. • The Proponent seeks to minimise impacts through developing specific mitigation measures during detailed construction planning, agreements, or alternative mitigation measures and respite developed in consultation with affected receivers. • The proponent responded that the potential risks for liquefaction at foundations from train-induced vibration would be considered as part of the detailed design. *Recommended conditions* • A Construction Noise and Vibration Plan that details construction practices to reduce noise and vibration impacts and mitigation impacts when noise exceeds guidelines. • An independent Acoustic Advisor to review the Proponent's construction noise management processes, particularly in relation to out of hours work, and assist the Proponent and Planning Secretary in responding to noise related complaints. • Limits on hours and duration of highly intensive noise. • An Operational Noise and Vibration Review that confirms modelled operational noise and vibration impacts (including additional technical requirements for modelling), the receivers eligible for noise mitigation and the types of noise mitigation. Noise mitigation must consider building conditions, cooling devices and all feasible barrier options. • An Operational Noise Compliance Report once the project is operational that compares modelled and actual impacts and informs any additional mitigation.
Amenity • Concern for air quality impact and visual impacts • Inadequate visual impact assessment in consideration of the high visual amenity of the project area • Inadequate air quality impact assessment and the scope of consideration of emissions.	• The Department's assessment of air quality and visual impacts is provided in **Section 6.9**. • The Department is satisfied the Proponent's air quality impact assessment adequately considers construction and operational impacts. • Construction impacts are within air quality guideline levels at nearly all receivers and acceptable subject to mitigation. • Operational impacts are within guideline levels and are acceptable. • While the visual impact assessment identifies the aspects of the project that will cause impacts, the Department considers that it understates the level of impact and requires the Proponent to consult with neighbouring residents about landscaping and screening. Recommended conditions

Issue	Consideration
	• A Visual and Landscape Impact Management Plan to mitigate impacts is required to be prepared, in consultation with landowners and residents within 500 m of the project in rural areas and 100 m in towns. • Preparation and implementation of an Air Quality Management Plan as part of the CEMP.
Flooding • Concern for the flooding assessment at Narromine regarding the unusual hydraulic characteristics of the area • Concern for the flooding impact at Narrabri and the modelling and assessment undertaken • An alternative route to the west of Narrabri would improve flood outcomes • Flood modelling is inconsistent with council modelling • Increased flood risks and impacts, including impacts on flood evacuation routes • Inadequate flood mapping, flood modelling, lack of clarity on input data/omission of data in the EIS, as well as the lack of information in the EIS to enable an independent review of the modelling assumptions and for individual property owners to determine impacts to properties • Flood modelling underestimates Warrumbungles runoff • Insufficient number of drainage structures • Flood impacts on soil erosion • Concern for construction in flood prone areas and increased flood risk	• The Department thoroughly assessed flooding impacts in **Section 6.1**. • The project traverses three significant floodplains and is expected to increase flooding in its vicinity. • The Department required remodelling of flooding and hydrology impacts through a PIAR. • The Department has engaged in a detailed and incremental review of the Proponent's flooding assessment through a Hydrology Working Group, including the Department's independent hydrology expert, relevant Government agencies, and the Proponent. • The Department is satisfied that the flood modelling and presentation of its results in the PIAR is adequate to allow the project's determination. • The project will result in flooding exceeding the afflux (increased flood height) Quantitative Design Limit (QDL) at 51 buildings, compared to the 6,198 buildings currently at risk of above flood flooding in a 1% AEP flood event. Afflux will also exceed the QDL at 2,196 hectares of non-urban land (1.8% of the land area currently flooded in a 1% AEP event), and 52 km of roads (11% of current flooding). • Linear transport infrastructure projects rarely meet flood performance criteria at all locations. For this project, QDL non-compliance would trigger a requirement for the Proponent to reach agreement with the landholder about the non-compliance, including mitigation measures. • The Department does not consider the Proponent's assessment of velocity increases and potential soil erosion demonstrates the project's expected impacts and need for mitigation with necessary precision. • Maintenance of culverts during operation would form part of the required Operational Environmental Management Plan. *Recommended conditions* • The Department has set stringent requirements for the project's flood impacts and detailed conditions to manage the project's flood impacts. • The Department requires and has nominated specifications for further flood modelling to determine the project's QDL compliance based on detailed design. This includes finer grained modelling to show velocity impacts with further precision than provided in the PIAR. • The Department requires that the revised flood modelling of the final design of the CSSI be independently peer reviewed by a suitably qualified and experienced hydrologist.

Issue	Consideration
• Proposal does not comply with Quantitative Design Limits • Maintenance of culverts during operation.	• The Department recommends a condition requiring the Proponent to prepare a Flood Design Verification Report (FDVR) for the Planning Secretary's approval prior to the commencement of construction. The FDVR documents the project's QDL compliance. • In the event of QDL non-compliance, the Proponent must make reasonable endeavours to redesign drainage structures to ensure compliance. If that is not practical, the Proponent must obtain landholder agreement to non-compliances, including any mitigation measures located outside the rail corridor. • If agreement is not reached, either party can refer the disagreement to an Independent Flood Impact Assessment Panel (IFIAP), comprised of a hydrologist, agronomist and professional mediator. The IFIAP will determine the material impact of QDL non-compliance on affected properties and appropriate mitigation. If the Proponent does not act on the IFIAP's recommendation, it must acquire land (or an interest in it) to the extent of the non-compliance. • The Department has recommended that a Flood Design Consultation Protocol be prepared and made publicly available, to outline the steps the Proponent will take where there are expected to be non-compliances with the QDLs regarding consultation with landowners and road authorities. • The Department has also recommended that an Erosion Threshold Velocity Report (ETVR) is prepared to determine flow velocities likely to cause soil erosion. This Report must be prepared by a suitably qualified geomorphologist or scour/erosion specialist with experience in calculating ETV of erosive floodplain soils. • The stringent velocity QDL, finer grained modelling required in the Proponent's further modelling, and the ETVR, will manage uncertainties about the project's velocities, potential for erosion, and land required to mitigate impacts by setting an expected outcome and detailing how the Proponent must demonstrate this. • To provide a further safeguard against erosion impacts, the Department has required ongoing operational monitoring against baseline conditions through the Operational Erosion Mitigation and Monitoring Program. • The Department has recommended conditions requiring a Flood Emergency Response Plan and collaboration with emergency services regarding their flood response plans.
Biodiversity • The potential mortality impact for fauna along The Pilliga alignment • Concern for biosecurity and weed impacts to The Pilliga • Concern for the impact to threatened flora and fauna and ecological communities through The Pilliga	• The Department's assessment of biodiversity impacts is provided in **Section 6.2**. • The project also affects Matters of National Environmental Significance and therefore requires assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The Department has assessed the project against this legislation in accordance with the Bilateral Agreement between the NSW and Australian Governments. • The Department notes concerns about the weighting of biodiversity impacts on the Proponent's route selection. While that is ultimately a matter for the Proponent, the Department notes a direct route

Issue	Consideration
• The need for adequate rehabilitation plans and management • Inadequate cumulative impact assessment and inability to achieve appropriate offsets • Concern for the lack of consideration in the ecological assessment with regard to the footprint identified	through the Pilliga was preferred as it provided reduced transit times, property impacts and construction costs. • The Department is satisfied that the Biodiversity Development Assessment Report accurately assesses biodiversity impacts in accordance with the *Biodiversity Conservation Act 2016* and the Biodiversity Assessment Method, and the EPBC Act. *Recommended conditions* • The Department has recommended conditions that specify the ecosystem credits and species credits required to offset the project's impact on relevant entities, the preparation and implementation of a Biodiversity Management Plan to manage impacts on biodiversity values during the construction and operation of the project, and implementation of a fauna connectivity strategy.
Property and land use • Proposal negatively affects existing property access • Negative impacts on farm operations • Insufficient rail crossing points within properties • Impacts on travelling stock route access • Suggestion to use Baradine Showground as an accommodation camp site • Impact on current and potential future rural-residential developments • Proposed fencing is not appropriate for agricultural uses • Property access during construction • Impacts on property values.	• The Department's assessment of property and land use impacts is provided in **Section 6.4**. • The project will acquire all or part of 310 properties. Acquisitions will reduce the size of properties and in some cases bisect them. This will affect access to and within properties, including the ability to move livestock and specialised agricultural equipment across the rail line. The Department acknowledges this may impact on the efficiency or viability of farm operations. • Property impacts would be considered through the acquisition process under the *Land Acquisition (Just Terms) Compensation Act 1991*. • Property impacts are inevitable for a project of this scale. The Department considers that the Proponent should make all reasonable accommodations for landholder preferences for access and fencing. • The project will affect nine travelling stock routes (TSRs). TSR 27999 (north of Narrabri) will be particularly affected as its width will be reduced by the rail corridor. • The location of proposed temporary accommodation facilities is a matter for the Proponent. • Impacts on existing rural-residential development has been considered in this assessment and any future such development would need to respond to the project. • Impacts on property values are not a planning consideration, although matters that affect values, such as amenity and the productive capacity of land have been considered in this assessment. *Recommended conditions* • The Proponent must consult with affected landholders, make reasonable accommodations and document agreements in Individual Property Management Plans to complement the property acquisition process. • The Proponent must provide alternative convenient property access where access is temporarily changed during construction.

Issue	Consideration
	• The Proponent must work with North West Local Land Services and TSR users to relocate or appropriately redesign TSR R27999 to ensure safe operation for stock and stock managers.
Water supply for construction and groundwater bores • Lack of clarity on the number of bores required, location of bores, and the construction water supply/volume and sources, and if water would be sourced from the Great Artesian Basin • Concern for the lowering of the water table and the subsequent operation of existing bores • Concern for the assessment and impacts of construction water use on water drawdown and groundwater • The need to mitigate impacts on the local groundwater supply • Concern in relation to operational vibration impacts on existing bores and the potential need for new bores and compliance requirements that would be less productive.	• The Department's assessment of groundwater impacts is provided in **Section 6.6**. • The project will use approximately 4,635 megalitres of water for construction and will likely source this from deep aquifers. There is sufficient unallocated capacity in these aquifers to service construction while maintaining water availability for other users and environmental purposes. • The Proponent's assessment indicates drawdown of up to four metres at an existing bore near bore field PB2. This may affect water availability for users of that bore. • The Proponent would be required to obtain licences to use groundwater, which would require further consideration of impacts. *Recommended conditions* • The Department requires further modelling to confirm groundwater impacts and document mitigation and management measures. • The Department has conditioned a Soil and Water Management Plan, which includes a Construction Groundwater Management Plan and a Borefield Management Plan, to confirm bore locations and water take and quality and minimise impacts. • Other conditions require further groundwater monitoring and if necessarily changes to extraction rates to minimise impacts, and provision of alterative water supply or compensation to users of licensed bores affected by the proposed groundwater use.
Heritage • Inadequate assessment of Aboriginal heritage with regard to the significance of the landscape as opposed to individual sites. • Concern for the cumulative impact to Aboriginal cultural heritage • Concern for the impact to non-Aboriginal heritage.	• The Department's assessment of Aboriginal cultural heritage is provided in **Section 6.7** and non-Aboriginal heritage in **Section 6.9**. • The project will impact or potentially impact on 48 Aboriginal heritage items and six Potential Archaeological Deposits. Of these, five items are considered by the Proponent to be of medium to high overall significance. It will also impact upon cultural values embedded in waterways, plants and animals, pathways and tangible and intangible relations within Aboriginal culture and dreaming. • The Proponent has not had access all the project's alignment. Further investigation post-determination may find more items. The Proponent's predictive model has targeted ten locations for further investigation. • Registered Aboriginal Parties (RAPs) have been involved in reviewing the Aboriginal Cultural Heritage Assessment Report and informing the cultural values assessment and will be involved in further investigation and salvage.

Issue	Consideration
	• The Department acknowledges the Proponent's collaboration with Aboriginal stakeholders and considers this an essential component of management of impacts to Aboriginal cultural heritage. • The project will partially impact two non-Aboriginal items of local significance. The Proponent has committed to avoiding these impacts in its detailed design where feasible. *Recommended conditions* • A Construction Heritage Management Plan will provide for salvage of impacted items and their long term care, protection of sensitive areas and an unexpected finds protocol. • An Aboriginal Cultural Values Plan to minimise impacts on cultural values and reflect these values in the project. • An Aboriginal Engagement Strategy that guides Aboriginal engagement about cultural and heritage management and social and economic impacts and opportunities of the project. • The Department considers a holistic strategy is important to ensure effective involvement of Aboriginal people in impact mitigation.
Community and stakeholder consultation • Superficial consultation, lack of meaningful engagement and consideration of local knowledge • Concern for lack of transparency and discussion of potential issues with the public • Concern for lack of transparency from the Proponent and the involvement of the Community Consultative Committee in meaningful discussions • Inadequate communication of the route selection and discussion with the community • Concern for the disregard of community suggestions and the ability to have an open discussion and ask questions • Concern for the lack of involvement and consultation in selecting appropriate mitigation measures.	• The Department's community and stakeholder consultation is discussed in **Section 5**. • The Department acknowledges community concerns about the Proponent's engagement and provision of information about the project's impacts. • The Department acknowledges the Proponent's program of community consultation before and during the EIS and PIAR exhibitions and through the Community Consultative Committee (CCC), notwithstanding community concerns about information presented at these forums. • The Department exhibited the EIS in accordance with legislative requirements, and extended the minimum exhibition timeframe to account for the Christmas and New Year holiday period. • The Department exhibited the PIAR given the significant community interest in the additional flooding assessment flooding impacts and route selection justification. • Departmental staff attended the Proponent's exhibition consultation sessions and some CCC meetings to provide advice on the Department's assessment process and how to make submissions. *Recommended conditions* • While the Department cannot change consultation that has occurred to date, it has recommended a comprehensive suite of conditions to ensure meaningful community consultation about construction and environmental impacts. • A Communication Strategy that details who will be consulted about the construction and initial operation of the project and how they will be consulted, including mediation of unresolved complaints. • A Complaints Management System, including mediation of unresolved complaints through a Community Complaints Mediator.

Issue	Consideration
	• A Flood Design Consultation Protocol for negotiating agreements and mitigation measures where there are QDL non-compliances. • Individual Property Management Plans to record agreements about mitigation for property access or productive use. • An Aboriginal Community and Stakeholder Engagement Strategy to guide the consultation process for managing impacts to Aboriginal cultural heritage.
Construction impacts • Need to clarify location for temporary workers accommodation and reach an agreement with affected stakeholders • Inadequate consideration of the impact on housing and accommodation in consideration of the anticipated four years of construction, and the availability of workers for other local employment • Concern for the impacts on local emergency and health services with additional construction workers • Concern for the operation of temporary workforce accommodation sites and the rehabilitation of construction areas.	*Assessment* • Impacts of temporary and permanent accommodation of the project's workforce is discussed in **Section 6.8**. • Temporary accommodation facilities would provide an attractive alternative to the local rental market for construction workers. • The operation of mechanical plant at the accommodation and vehicle travel between the accommodation and construction sites has potential noise and traffic impacts. • The construction workforce would include appropriately skilled local workers, which would reduce housing pressures. *Recommended conditions* • A Temporary Accommodation Facility Management Plan will finalise the layout of facilities, shield noisy plant from neighbouring land uses, outline health and security provision on-site in consultation with emergency services, limitation on hours of use of outdoor recreation areas, and waste and water servicing. • A requirement for construction areas to be rehabilitated as soon as practicable following cessation of use.

Appendix G Bilateral Assessment

Appendix H Matters of National Environmental Significance

In accordance with the bilateral agreement (Amending Agreement No.1) between the Australian and NSW Governments, the Department provides the following additional information required by the Commonwealth Minister for the Environment and Water (the Minister), in deciding whether or not to approve a controlled activity under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Department considers that all threatened species and ecological communities protected under Part 3 of the EPBC Act have been adequately assessed and documented in the *Inland Rail – Narromine to Narrabri Environmental Impact Statement* (EIS) (November 2020), Narromine to Narrabri Project – Response to Submissions (August 2022), *Narromine to Narrabri – Preferred Infrastructure/ Amendment Report (2022), Narromine to Narrabri – Preferred Infrastructure/ Amendment Report – Response to Submissions* (November 2022) and *Narromine to Narrabri – Biodiversity development assessment report – BAM 2020 Revision F (8-12-2022)*.

This assessment has been prepared based on the information contained in the following sections of the Environmental Impact Statement (EIS) which address matters of national environmental significance (MNES):

- Chapter B1 – Biodiversity
- Biodiversity Development Assessment Report (BDAR)
- *Aquatic Biodiversity?*
- *EMP EIS section and revised measures in PIR*

The relevant section of the Preferred Infrastructure / Amendment Report (PIAR) that addresses MNES is Tech Report 1 – *Biodiversity development assessment report – BAM 2020* Revision F (BDAR). In addition, advice has been provided by the Biodiversity, Conservation and Science Division (BCS) of the Department of Planning and Environment

This Appendix is supplementary to and should be read in conjunction with the Department's consideration of impacts to listed threatened species and communities, mitigation and offsetting measures for threatened ecological communities and threatened species, including MNES in Section 6.2 of the assessment report.

Potential Impact on MNES

The Proponent's revised BDAR considered MNES under sections 18 and 18A of the EPBC Act that are known to occur or potentially occur in the proposal area. A summary of MNES assessed as potentially occurring in the proposal area is shown in **Table 22**. Threatened species and communities that were listed or uplisted after the declaration of the controlled action do not require assessment under the EPBC Act. However, assessment of these species and communities is required under the *Biodiversity Conservation Act 2016* (BC Act).

Table 22 | Summary of MNES potentially occurring in the proposal area

MNES under the EPBC Act	Number recorded or likely to occur within the proposal area	EPBC Act status	Significant impacts identified
Threatened Ecological Communities (TECs)	Five TECs	Four endangered One critically endangered	No significant impacts are considered likely considering the relatively small areas to be removed compared to other surrounding vegetation
Threatened flora	Eight species	Five vulnerable Three endangered	Significant impacts are considered likely for two vulnerable species (*Commersonia procumbens* and *Lepidium aschersonii*), and two endangered species (*Lepidium monoplocoides* and *Tylophora linearis*)

MNES under the EPBC Act	Number recorded or likely to occur within the proposal area	EPBC Act status	Significant impacts identified
Threatened fauna	Twelve species	Nine vulnerable One endangered Two critically endangered	Significant impacts are considered likely to one endangered species (Koala[3]), three vulnerable species (Corben's Long-eared Bat, Pilliga Mouse and Painted Honeyeater), as well as both critically endangered species (Regent Honeyeater and Swift Parrot)

The assessment considered impacts to five threatened ecological communities (TEC) in the proposal area and concluded the proposal is unlikely to have a significant impact on the relatively small areas that would be removed. These TECs are listed in **Table 23**. One TEC, Poplar Box Grassy Woodland on Alluvial Plains was listed in July 2019 after the controlled action declaration therefore the community is not required to be assessed as a MNES. Impacts to the community would be assessed under the BC Act.

Table 23 | EPBC Threatened Ecological Communities with a likely significant impact in the proposal area

Threatened ecological community and PCT ID	EPBC Act status	Extent in proposal area
Weeping Myall woodlands (PCT 27)	Endangered	6.5 hectares
Brigalow (Acacia harpophylla dominant and co-dominant) (PCT 35)	Endangered	7.3 hectares
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (PCT 81 and 248)	Endangered	17.2 hectares
Poplar Box grassy woodland on alluvial plains (PCT 56 and 244)	Endangered	76.4 hectares
White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland (PCT 435 and 599)	Critically endangered	8.4 hectares

The BDAR assessed impacts to eight threatened flora species that were recorded or likely to occur in the proposal area. The field surveys recorded one species, *Tylophora linearis* and 60 individual *Commersonia procumbens* plants adjacent to the proposal area in the Pilliga Forest. The assessment considered the proposal would have a significant impact on four species (listed in **Table 24**). Although the Spiny Peppercress and Winged Peppercress were not recorded during surveys, these species are assumed to be present because of existing records in the surrounding area.

Table 24 **|** EPBC Threatened flora with a likely significant impact occurring in the proposal area

[3] At the time the proposal was declared a controlled action, the Koala was listed as Vulnerable under the EPBC Act

Threatened flora	EPBC Act status	Potential impacts
Commersonia procumbens	Vulnerable	573.1 hectares of potential habitat to be removed
Lepidium aschersonii (Spiny Peppercress)	Vulnerable	338.7 hectares of assumed presence potential habitat to be removed.
Lepidium monoplocoides (Winged Peppercress)	Endangered	175.8 hectares of assumed presence potential habitat to be removed.
Tylophora linearis	Endangered	16 hectares of known habitat and 21.9 hectares of assumed presence potential habitat to be removed.

An assessment of potential impacts to twelve threatened fauna species that were recorded or likely to occur in the proposal area was undertaken. The BDAR considered the proposal would have a significant impact on five species (listed in **Table 25**). The Pilliga Mouse was not recorded in fauna surveys but it is known to occur in the Pilliga Forest. Similarly the Painted Honeyeater, Regent Honeyeater and Swift Parrot were not recorded in surveys, however these species may forage in the proposal area.

Table 25 | EPBC Threatened fauna with a likely significant impact occurring in the proposal area

Threatened fauna	EPBC Act status	Potential impacts
Koala	Endangered (listed as Vulnerable when the controlled action declaration was made)	1,173 hectares of woodland and forest to be removed along a 306 kilometre linear alignment generally about 50 metres wide. Of this, 260.4 hectares has been identified as occupied habitat, of which 257.5 ha located in the Pilliga and Bohena Creek areas. Impacts on connectivity have been identified, however the provision of dedicated culverts and various bridges in the area of occupied habitat would maintain connectivity.
Corben's Long-eared Bat	Vulnerable	1,107.4 hectares of suitable woodland and forest containing hollow-bearing trees to be removed along a 300 kilometre linear alignment. Of this, 615 hectares would be removed in the Pilliga forests. Between 14,503 and 41,103 hollow-bearing trees estimated to be removed.
Pilliga Mouse	Vulnerable	647.1 hectares of potential habitat in the Pilliga Forest to be removed along a 73 kilometres linear alignment generally about 50 metres wide. This includes 31 hectares of PCT 141 which is preferred breeding habitat and 466.7 hectares of PCTs that contain Acacia burrowii and Corymbia trachyphloia, also identified as habitat for this species. Impacts on connectivity have been identified, however the provision of dedicated culverts in potential breeding habitat and elsewhere in the Pilliga are proposed to maintain connectivity.
Painted Honeyeater	Vulnerable	1,107.4 hectares of suitable woodland and forest to be removed along a 300 kilometres linear alignment generally about 50 metres wide. Of this, 615 hectares would be removed in the Pilliga Forest, including a large number of mistletoe (considered to be key foraging and breeding habitat).

Threatened fauna	EPBC Act status	Potential impacts
Regent Honeyeater	Critically endangered	286.8 hectares of woodland and forest habitat containing preferred feed species to be removed from relevant IBRA subregions along the 300 kilometres linear alignment that may provide foraging habitat for this species (critical foraging habitat). No impact on breeding habitat. No impact on important foraging areas identified by Birdlife Australia in the south of the Pilliga Forest.
Swift Parrot	Critically endangered	732.9 hectares of woodland and forest containing preferred feed trees to be removed from relevant IBRA subregions along the 300 kilometre linear alignment. No impact on important foraging areas identified in the east of the Pilliga Forest. No impact on breeding habitat.

M.1 REQUIREMENTS FOR DECISIONS ABOUT THREATENED SPECIES AND ENDANGERED ECOLOGICAL COMMUNITIES

In accordance with Section 136 of the EPBC Act, in deciding whether or not to approve the taking of an action and what conditions to attach to an approval, the Minister must consider matters relevant to any matter protected by a provision of Part 3 that the Minister has decided is a controlling provision for the action. These matters are addressed above (as shown in **Table 1**).

In accordance with Section 139 of the EPBC Act, in deciding whether or not to approve, for the purposes of Section 18 or Section 18A of the EPBC Act, the taking of an action and what conditions to attach to such an approval, the Minister must not act inconsistently with certain international environmental obligations, Recovery Plans or Threat Abatement Plans. The Minister must also have regard to relevant approved Conservation Advices.

Australia's International Obligations

Australia's obligations under the *Convention on Biological Diversity* (Biodiversity Convention) include the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

The Department considers that the recommendations of the Biodiversity Development Assessment Report (BDAR) (as updated by the BDAR – Revision F dated December 2022) and this assessment report are not inconsistent with the Biodiversity Convention, which promotes environmental impact assessment (such as this process) to avoid and minimise adverse impacts on biological diversity. The recommended approval requires avoidance, mitigation and management measures, and offsetting for the listed threatened species and communities. In addition, all information related to the proposed action is required to be publicly available to ensure equitable sharing of information and improved knowledge relating to biodiversity.

Australia's obligations under the *Convention on Conservation of Nature in the South Pacific* (APIA Convention) include encouraging the creation of protected areas which together with existing protected areas will safeguard representative samples of the natural ecosystems occurring therein (particular attention being given to endangered species), as well as superlative scenery, striking geological formations and regions. Additional obligations include using their best endeavours to protect such fauna and flora (special attention being given to migratory species) so as to safeguard them from unwise exploitation and other threats that may lead to their extinction. The APIA Convention was suspended with effect from 13 September 2006. While this Convention has been suspended, Australia's obligations under the Convention have been taken into consideration. The recommendations are not inconsistent with the Convention which has the general aims of conservation of biodiversity.

The *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) is an international agreement between governments which seeks to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The recommendations are not

inconsistent with CITES as the proposed action does not involve international trade in specimens of wild animals and plants.

Recovery Plans and Approved Conservation Advices

There are approved Conservation Advices for the following communities and species:

- Weeping Myall Woodlands
- Brigalow (Acacia harpophylla dominant and co-dominant)
- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- *Tylophora linearis*
- Corben's Long-eared Bat, South-eastern Long-eared Bat (*Nyctophilus corbeni*)

There are approved Conservation Advices and Recovery Plans for the following species:

- Koala (*Phascolarctos cinereus* (combined population of Queensland, New South Wales and the Australian Capital Territory))
- Painted Honeyeater (*Grantiella picta*)
- Regent Honeyeater
- Swift Parrot

There are no approved Conservation Advices but there are Recovery Plans for the following communities and species:

- White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- *Lepidium aschersonii* (Spiny Peppercress)
- *Lepidium monoplocoides* (Winged Peppercress)

Conservation Advices

TECs

Weeping Myall Woodlands - Endangered

The Conservation Advice was approved on 17 December 2008. This plant community is found in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South Brigalow Belt South North, Murray-Darling Depression, Nandewar and Cobar Peneplain IBRA Bioregions. Its main threats are clearing and ongoing degradation as it occurs on highly fertile and arable soils which are sought after for cropping. Other threats include overgrazing, weed invasion and herbivory by caterpillars of the Bag-shelter moth. The proposal would remove 6.5 hectares, fragmenting the existing patch of vegetation with two smaller patches to be retained on each side of the alignment. The Proponent has committed to provide ecosystem credits to offset the impacts. The Department considers the residual impacts will be acceptable as they will be offset.

Brigalow (Acacia harpophylla dominant and co-dominant) - Endangered

The Conservation Advice was approved on 17 December 2013. Brigalow woodlands are found mostly west of the Great Dividing Range, stretching north almost to Townsville in Qld and south to Narrabri in NSW, and west to Bourke on the Darling River. The most important threats are clearing, fire, weeds, feral animals and inappropriate grazing. Climate change is also emerging as a threat which requires consideration. The proposal would remove 7.3 hectares of the community, comprising 5.9 hectares of derived native grassland and 1.4 hectares of woodland. The Proponent has committed to provide ecosystem credits to offset the impacts. The Department considers the residual impacts will be acceptable as they will be offset.

Grey box (Eucalyptus macrocarpa) Grassy Woodlands and derived native grasslands of South-eastern Australia - Endangered

The Conservation Advice was approved on 19 March 2010. The Grey Box (Eucalyptus macrocarpa) Grassy Woodlands and derived native grasslands of South-eastern Australia predominantly occurs on the drier edge of the temperate grassy eucalypt woodland belt. It ranges from the Narrabri district in central NSW through to northern Victoria and South Australia.

The ecological community has experienced significant land clearing in the past. Its primary ongoing threats are incremental land clearance, inappropriate grazing practices, vegetation fragmentation, decline of mature trees, lack of natural regeneration, invasion by exotic plants, use of fertilisers and herbicides, firewood collection and salinity. The main potential threats are proposals for changing travelling stock routes in NSW and climate change. The proposal would remove 17.2 hectares of the community, including 1.1 hectares of paddock trees. The Proponent has committed to provide ecosystem credits to offset the impacts. The Department considers the residual impacts will be acceptable as they will be offset.

Threatened fauna

Phascolarctos cinereus (Koala) combined population of Queensland, New South Wales and the Australian Capital Territory - Endangered

The Conservation Advice was approved on 12 February 2022. The Koala's distribution includes Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia. The listed population of the Koala has a wide but patchy distribution that spans the coastal and inland areas of Queensland north to the Herberton area and westward to Central Queensland, New South Wales and the Australian Capital Territory. The northern NSW distribution includes the Mulga Lands, Darling Riverine Plains, Brigalow Belt South, Nandewar, New England Tablelands, and South East Queensland (NSW Section) bioregions, within Pilliga forest, low woodland and forested areas.

The decline in Koala distribution is associated with habitat loss, temperature increase and drought. The threat of extinction risk is greater in western NSW under scenarios of climate and land use change. Koala populations are also impacted by disease and mortality from vehicle strike and dog attacks.

The proposal would require the removal of 260.4 hectares of Koala habitat, comprising 257.5 hectares in the Pilliga Forest and 2.9 hectares north-west of Gilgandra. The Pilliga Forest is regionally significant for the species and is an area where the Koala is in decline due to fire and drought. The proposal would create a barrier to movement, although the Proponent states there would be opportunities for movement through bridge underpasses along riparian areas and through dedicated and drainage culverts. The BDAR concluded there would be a significant impact to the species, which would be offset through the provision of species credits. The Department considers the residual impacts will be acceptable as they will be offset.

Corben's long eared bat (nycrophilus corbeni) - Vulnerable

The Conservation Advice was approved on 1 October 2015. This species is located across the Murray Darling Basin, with concentrations in the Pilliga Forest, Nandewar Range and the Brigalow Belt South IBRA bioregion. Its main threats are habitat loss, habitat degradation and habitat fragmentation due to agricultural activities and extractive industries. Other threats include fire, reduced hollow availability, exposure to agrichemicals, grazing and potentially predation by feral animals.

The proposal would require the clearing of approximately 1,107.4 hectares of eucalypt woodland and forest habitat, of which 615 hectares is located in the Pillaga Forest. Between 14,503 to 41,103 hollow-bearing trees would be removed. Hollow-bearing trees are a limited resource which is essential for breeding, and fire and logging have affected their density in the Pillaga Forest. The Proponent has committed to provide ecosystem credits to offsets impacts to the species. The Department considers the residual impacts will be acceptable as they will be offset.

Painted honeyeater - Vulnerable

The Conservation Advice was approved on 25 June 2015. This species is sparsely distributed between south-eastern Australia and the Northern Territory, with concentrations between the Grampians, Victoria and Roma, Queensland. Its main threat is habitat loss; other threats include grazing, competition with and predation by other species. The proposal would require the clearing of approximately 1,107.4 hectares of eucalypt woodland and forest habitat, of which 615 hectares is located in the Pillaga Forest. The Painted Honeyeater is highly specialised and predominantly feeds on mistletoe. The proposal would result in the loss of extensive areas of vegetation containing

mistletoe. The Proponent has committed to provide ecosystem credits to offsets impacts to the species. The Department considers the residual impacts will be acceptable as they will be offset.

Pilliga Mouse - Vulnerable

The Conservation Advice was approved on 26 March 2008. The Pilliga Mouse inhabits the Pilliga Forest of NSW. Its main threats are loss or degradation of habitat through inappropriate fire regimes, forestry operations and broombrush harvesting; predation by feral cats and foxes; and competition from the common house mouse. The proposal impacts 647.1 hectares of potential habitat in the Pillaga Forest. The vegetation includes 29 hectares of broonbrush and 466.7 hectares of PCTs that contain *acacia burrowii* and *Corymbia*. The Proponent has committed to provide ecosystem credits to offset impacts to the species. The Department considers the residual impacts will be acceptable as they will be offset.

Regent Honeyeater – Critically Endangered

The Conservation Advice was approved on 25 June 2015 and the species was transferred from the Endangered to the Critically Endangered category effective from 8 July 2015. The Regent Honeyeater is endemic to mainland south-eastern Australia, with three of its four known key breeding locations in New South Wales. Its main threats are clearing, fragmentation and degradation of its habitat, being particularly vulnerable to the removal of large mature trees. Other threats include competition with other bird species for resources and territory, and predation by native birds. The proposal would remove 286.8 hectares of the species habitat containing preferred food trees, much of which is in the Pillaga Forest. The Proponent has committed to provide ecosystem credits to offset impacts to the species. The Department considers the residual impacts will be acceptable as they will be offset.

Swift Parrot – Critically Endangered

The Conservation Advice was approved on 5 May 2016. The Swift Parrot (Lathamus discolor) breeds in Tasmania during the summer and migrates to south-east Australia for the winter. In NSW Swift Parrots typically forage in forests and woodlands in the coastal and western slopes regions each year. Its main threats are predation by sugar gliders and habitat loss and alteration. Other threats include collision mortality, competition for resources and territory, psittacine beak and feather disease (PBFD) and illegal capture and trade. The proposal impacts 732.9 hectares of habitat containing the species preferred feed trees. Much of the habitat is within the Pillaga Forest. The Proponent has committed to provide ecosystem credits to offset impacts to the species. The Department considers the residual impacts will be acceptable as they will be offset.

Threatened Flora

Tylophora linearis - endangered

The Conservation Advice was approved on 1 October 2008. Tylophora linearis is known to occur at eight localities around Dubbo, Mt Crow near Barraba in NSW and Myall Park near Glenmorgan in Queensland. The species is conserved at Goobang National Park, Eura State Forest, Goonoo State Forest, Pilliga West State Forest and Coolbaggie Nature Reserve. Its primary threats are forestry activities, grazing, fire and invasive weeds. The proposal directly impacts 16 hectares of known habitat and 21.9 hectares of potential habitat where the species is assumed to be present. The Proponent has committed to provide species credits to offset impacts to the species. The Department considers the residual impacts will be acceptable as they will be offset.

Commersonia procumbens - Vulnerable

The Conservation Advice was approved on 1 October 2008. Commsersonia procumbens, also known as Rulingia procumbens, is typically found in the Dubbo-Medooran-Gilgandra region, the Cobar region and the upper Hunter Valley. The primary threats to the species are clearing of native vegetation on roadsides, competition from woody shrubs and inappropriate or frequent fire regimes. The proposal would remove 573.0 hectares of potential habitat for the species in the Pillaga Forest. The Proponent has committed to provide species credits to offset impacts to the species. The Department considers the residual impacts will be acceptable as they will be offset.

Recovery plans

National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically endangered

The Recovery Plan for the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland came into effect on 22 March 2013. The community occurs along the western slopes and tablelands of the Great Dividing range from southern Queensland through NSW and the ACT to Victoria. Its main threats are land use and management change (agriculture, mining and public infrastructure), inappropriate management practices (grazing, firewood collection, mowing and slashing) and landscape degradation (weed invasion).

The Recovery Plan's objective is to promote the recovery and minimise the risk of extinction of the TEC. These include achieving no net loss in extent and condition of the community and increasing protection of sites in good condition. The Proponent has committed to the provision of ecosystem credits to offset impacts. The Department considers that the approval of the proposal would not affect the recovery of the species nor interfere with the objectives of the Recovery Plan.

National Recovery Plan for Koala (combined population of Queensland, New South Wales and the Australian Capital Territory)

The Recovery Plan for the combined population of the Koala came into effect on 8 April 2022 and sets out an approach for a national integrated recovery effort. The Recovery Plan notes that land use change (habitat loss, fragmentation and degradation) and climate change present overarching threats to the Koala. Other direct threats include disease, dogs and vehicles.

The Recovery Plan's objectives for 2032 are to stabilise and then increase the area of occupancy and estimated populations and maintain or improve the health of Koalas (genetics and disease) and their ecosystems.

The proposal would clear 260 hectares of Koala habitat in the Pilliga Forest and potentially create a barrier to movement across the rail alignment. The Pilliga Forest is regionally significant for the Koala although there has been a decline in Koala numbers from both fire and drought conditions.

To address connectivity the Proponent states that bridge underpasses along riparian areas and the provision of dedicated fauna culverts in key movement corridors and incidental use of drainage culverts would provide opportunities for Koalas to move across the alignment.

The Department notes that the provision of biodiversity offset credits would address the residual impacts of the proposal and is not inconsistent with nor would it inhibit the achievement of the Recovery Plan's objectives.

National Recovery Plan for Painted honeyeater (Grantiella picta) – Vulnerable

The Recovery Plan for the Painted Honeyeater came into effect on 16 June 2022. The Plan notes that threats to the species already fragmented habitat are not abating with habitat continually being cleared for agriculture and degraded by over-grazing, as identified in the approved Conservation Advice.

The long term vision of the Recovery Plan is for the population of the Painted Honeyeater to have increased in size to such an extent that the species no longer qualifies for listing as threatened under the EPBC Act. The Recovery Plan objectives are that by 2031 to sustain a positive population trend (compared to 2020 baseline) in the number of mature individuals, and to maintain or improve the extent, condition and connectivity of the habitat. The Recovery Plan identifies six strategies to achieve these objectives, of which one "to protect, manage and restore Painted Honeyeater breeding and foraging habitat" is potentially relevant to the proposal.

The Key Biodiversity Area (KBA) program is an international initiative to identify, map, monitor and conserve critical sites for global biodiversity. The global KBA partnership recognises seven KBAs as important for the Painted Honeyeater. The proposal does not impact the Painted Honeyeater's KBA in the Pilliga Forest, which is located north-west of the proposed alignment.

The proposal would remove a significant area of habitat for the species, the Pilliga Forest being important habitat for woodland birds. The Painted Honeyeater habitat generally comprise creek lines possibly due to the higher number of mature trees that host mistletoe. The creation of a linear gap through the Pilliga Forest is unlikely to fragment an important population as the species is highly mobile.

The Department considers that the provision of ecosystem credits for the species habitat is consistent with the Recovery Plan's strategic action of protecting, managing and restoring foraging habitat for the species.

National Recovery Plan for Regent Honeyeater (Anthochaera Phrygia) – Critically Endangered

The National Recovery Plan for the Regent Honeyeater came into effect on 4 May 2016. The primary threats to the species are its small population size, habitat loss and fragmentation, competition and degradation of remnant habitat.

The Recovery Plan's objectives are to:

- Reverse the long-term population decline and increase its population numbers to the extent there is a viable wild breeding population even in poor breeding years
- Improve the condition of its habitat across its geographical range to maximise probability of survival and reproductive success and provide refugia during periods of extreme environmental fluctuation.

One of the actions to achieve these objectives is improve the extent and quality of Regent Honeyeater habitat.

The Recovery Plan notes the Pillaga Forests are important for the species and maps the habitat area as located in the central Pillaga (Baradine/Yearinan Creek) which is to the south-east of the proposal. The habitat area would not be affected by the proposal.

The proposal would remove 286.6 hectares of vegetation containing preferred foraging species. While individuals may forage along the alignment the habitat to be removed has not been identified as important. The habitat loss will decrease the availability of winter foraging for individual honeyeaters that disperse nomadically throughout the region during winter.

The Department considers that the provision of ecosystem credits to offset impacts is not inconsistent with the Recovery Plan and that approval of the proposal would not interfere with the recovery of the species.

National Recovery Plan for Swift Parrot (Lathamus discolor) – Critically Endangered

The Recovery Plan for the Swift Parrot came into effect on 10 February 2012. It identified the primary threats to the species as habitat loss and alteration, climate change, collision mortality, competition, psittacine beak and feather disease illegal capture and trading.

The Recovery Plan's objectives are to:

- Prevent further decline in the Swift Parrot population
- Achieve a sustained improvement in the habitat conditions of Swift Parrots to enable increased carrying capacity

The recovery actions include the identification and prioritisation of habitats and sites used by the species across its range and to implement management strategies to protect and improve habitats and sites.

The Recovery Plan notes important foraging habitats within mainland Australia for the species, however, there is no important habitat in the proposal are. The eastern Pillaga is identified as being important for the Swift Parrot, however no clearing for the proposal would occur in this area. Although the BDAR noted that individuals may forage along the alignment on occasions, the habitat to be removed is not likely to be important habitat for the species.

The Proponent would offset impacts to 732.9 hectares of potential foraging habitat by providing ecosystem credits. The Department considers that this is not inconsistent with the Recovery Plan's

objective of protecting and improving the species habitat and that approval of the proposal would not interfere with the recovery of the species.

National Recovery Plan for Lepidium aschersonii (Spiny Peppercress) - Vulnerable

The Recovery Plan for the Spiny Peppercress came into effect on 13 August 2010. The species is known to occur within the Pillaga and Pillaga Outwash IBRA subregions within the central western slopes and north western plains regions of NSW. Important populations are found within the Brigalow Nature Reserve and the Brigalow, Leard and Bobbiwaa State Conservation Ares.

The current main threats are invasive weeds, grazing, altered hydrology, habitat destruction and roadside clearance. The Recovery Plan's overall objectives are to minimise the risk of extinction and increase the probability of populations becoming self-sustaining in the long term.

To achieve these objectives the Recovery Plan has specific actions to identify and manage threats to populations by protecting populations on public and private land and controlling threats from livestock and pest plants and animals.

In areas surrounding Narrabri (segment 11 of the proposal) records for the species occurs within 200 metres of the proposal, however, most known populations are restricted to the Brigalow Nature Reserve and Brigalow State Conservation Area in Bohena Creek about 6 kms west of the proposal. The Proponent has committed to provide species credits to offset impacts to the species. The Department considers the proposal is not inconsistent with the Recovery Plan's objective of protecting habitat for the species.

National Recovery Plan for Lepidium monoplocoides (Winged Peppercress) - Endangered

The National Recovery Plan for the Winged Peppercress came into effect on 13 August 2010. The species is widely distributed on the inland plains of south-eastern Australia from northern NSW to western Victoria. The Recovery Plan identifies the current major threats as being altered hydrology, increasing salinity, invasive weeds, grazing, physical damage, drought and climate change.

The overall objective of recovery of the species is to minimise the probability of extinction of the Winged Peppercress in the wild and to increase the probability of populations becoming self-sustaining in the long term. To achieve these objectives the Recovery Plan has specific actions to identify and manage threats to populations by protecting populations on public and private land and controlling threats from livestock and pest plants and animals.

The management practices required to conserve the Winged Peppercress includes the implementation of covenants or other conservation agreements to protect significant private land sites through negotiations with landowners. The Proponent has committed to secure species credits to offset impacts to the species. The Department considers that the approval of the proposal would not impede the actions to implement the objectives of the Recovery Plan to secure the recovery of the species.

Threat abatement plans

The Threat Abatement Plans (TAPs) relevant to this action are discussed below and are available at http://www.environment.gov.au/biodiversity/threatened/threat-abatement-plans/approved.

- **Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (relevant to Brigalow, Weeping Myall Woodlands and the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland)**

The TAP notes that cane toads may have a direct or indirect impact on native species and potentially the ecological communities in which these species occur. There are eight threatened ecological communities listed under the EPBC Act that fall within the current geographic range of the cane toad. Three of these TECs are in the proposal area:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland

- Weeping Myall Woodlands
- Brigalow (*Acacia harpophylla* dominant and co-dominant)

Currently none of the listing advices for these TECs indicate that cane toads are a threat.

The BDAR considered that the proposal would not interfere with the TAP which provides a national strategy to guide investment and effort in abating the impacts of cane toads across their known and anticipated range.

Construction of linear infrastructure through large patches of intact vegetation can result in the establishment of pest species into areas where they are currently absent or in low numbers. Measures to control pest animals can be addressed through construction and operational management plans. The recommended conditions of approval require a Biodiversity Management Plan to manage construction impacts on the biodiversity values of the proposal area, including measures to manage and mitigate biosecurity risks.

Therefore the Department does not consider the approval of the proposal would be inconsistent with the TAP for biological effects, including lethal toxic ingestion, by cane toads.

- **Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (relevant to White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Lepidium Aschersonii, Lepidium Monoplocoides and the Pilliga Mouse)**

Feral pigs are usually associated with wetlands and river systems. The ecological parameters affected by feral pigs include plant species composition and succession, nutrient and water cycles and water quality. The TAP noted that Impacts can be direct such as digging and destruction of plants and indirectly through long term changes in species composition such as reduced or failed recruitment of new plants, changing the composition of plant comm and will consume unities and aeration of soil structure through digging and rooting, and spread of weed seeds. Feral pigs are opportunistic omnivores and will feed on small mammals, birds, reptiles and frogs.

Within the proposal area the feral pig is a threat to Box-Gum Grassy Woodland TEC, Winged Peppercress and Spiny Peppercress and the Pillaga Mouse.

The TAP aims to manage feral pigs within existing policy, legislative and planning frameworks, reduce their spread to new areas, manage feral pigs and build the capacity to address feral pig problems and raise awareness and motivation to act on feral pig problems.

Construction of linear infrastructure through large patches of intact vegetation can result in the establishment of pest species into areas where they are currently absent or in low numbers. Measures to control pest animals can be addressed through construction and operational management plans. The recommended conditions of approval require a Biodiversity Management Plan to manage construction impacts on the biodiversity values of the proposal area, including measures to manage and mitigate biosecurity risks.

Therefore the Department does not consider the approval of the proposal would be inconsistent with the TAP to manage feral pigs.

- **Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi 2018 (relevant to White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland)**

Phytophthora cinnamomic (P. cinnamomi) is a microscopic soil-borne organism that has the ability to cause plant disease and plant death. It is within a group currently referred to as water mould and interferes with the movement of water and nutrients within the roots of plants. It can be spread in water, soil or plant material that contains pathogen and dispersal is favoured by moist or wet conditions. It can be carried in both overland and subsurface water flows and spread by native and feral animals. Humans, however, have the capacity to disturb and transport more soil than any other vector. Most of the large centres of infestation that exist today in southern temperate Australia

occurred as a result of human activity, often as a direct result of the introduction of infected soil or road-building materials to vulnerable un-infected areas.

The disease is a risk to Box-Gum Grassy woodland vegetation.

Infection of native plants by P. cinnamomi can be mitigated through the development and implementation of suitable control measures for vehicle and plant hygiene and is unlikely to have a significant impact. The recommended conditions of approval require a Biodiversity Management Plan to manage construction impacts on the biodiversity values of the proposal area, including measures to manage and mitigate biosecurity risks.

The Department considers that the approval of the proposal would not be inconsistent with the TAP to manage P. cinnamomic.

- **Threat abatement plan for predation by European red fox (relevant to the Pilliga Mouse) and Threat abatement plan for predation by feral cats (relevant to the Pilliga Mouse and Swift Parrot)**

Foxes and feral cats are significant predators in Australia that interact with native fauna in various ways, including predation, competition of resources and transmission of disease. The TAPs for both predators aim to minimise their impacts on biodiversity by protecting affected threatened species and preventing further species and ecological communities becoming threatened. Construction of linear infrastructure through large patches of intact vegetation can result in the establishment of pest species (particularly predators such as foxes and cats) into areas where they are currently absent or in low numbers.

Measures to control feral animals can be addressed through construction and operational management plans. Therefore, the Department considers the approval of the action would not be inconsistent with the TAPs for predation by feral foxes and cats.

- **Threat abatement plan for competition and land degradation by rabbits (relevant to the Regent Honeyeater, Lepidium Aschersonii and Lepidium Monoplocoides)**

Direct impacts of rabbits include competition with native wildlife for resources (food and shelter); preventing plant regeneration; overgrazing and general damage to plant species; reversing the normal processes of plant succession; altering ecological communities and changing soil structure and nutrient cycling, leading to significant erosion; and removal of critical habitat for arboreal mammals and birds, leading to increased predation and reduced reproduction. Rabbits also have indirect impacts on native flora and fauna, including supporting elevated population densities of pest predators such as foxes and feral cats. They can also support wild dogs (wild dogs are not a problem across all parts of Australia, and can play an important ecological role), and promoting growth of introduced and unpalatable species such as weeds.

Construction of linear infrastructure through large patches of intact vegetation can result in the establishment of pest species into areas where they are currently absent or in low numbers. Measures to control pest animals can be addressed through construction and operational management plans. Therefore the Department does not consider the approval of the proposal would be inconsistent with the TAP to address land degradation by rabbits.

M.2 REQUIREMENTS FOR DECISIONS ABOUT WORLD HERITAGE PROPERTIES

The Commonwealth determined that the action is not a controlled action for the controlling provision of World Heritage (Section 12 and Section 15A of the PBC Act) and therefore further consideration is not required.

M.3 REQUIREMENTS FOR DECISIONS ABOUT NATIONAL HERITAGE PLACES

The Commonwealth determined that the action is not a controlled action for the controlling provision of National Heritage (Section 15B and Section 15C of the EPBC Act) and therefore further consideration is not required.

M.4 ADDITIONAL EPBC ACT CONSIDERATIONS

Table 26 contains the additional mandatory considerations, factors to be taken into account and factors to have regard under the EPBC Act, additional to those already discussed, which the Commonwealth Minister must consider in determining the proposed action.

Table 26 | Additional considerations for the Commonwealth Minister under the EPBC Act

EPBC Act section	Considerations	Conclusion
Mandatory considerations		
136(1)(b)	Social and economic matters are discussed in Section 6.5 of the assessment report.	The Department considers that the proposal would result in a range of benefits to State and regional economy through improvements in the efficiency of the inter- and intra-state road freight network.
Factors to be taken into account		
3A, 391(2)	Principles of ecologically sustainable development (ESD), including the precautionary principle, have been taken into account, particularly: • the long-term and short-term economic, environmental, social and equitable considerations that are relevant to this decision; • conditions that restrict environmental impacts and impose monitoring and adaptive management reduce any lack of certainty related to the potential impacts of the proposal; • conditions requiring the proposal to be delivered and operate in a sustainable way to protect the environment for future generations and conserving the relevant matters of national environmental significance; • advice provided within this report reflects the importance of conserving biological diversity and ecological integrity in relation to the controlling provisions for the proposal; and • mitigation measures to be implemented which minimise potential impacts of the proposal on biodiversity within the proposal area.	The Department considers that the proposal, if undertaken in accordance with the recommended conditions of approval, would be consistent with the principles of ESD. **Section 4.4.2** of the assessment report addresses the proposal in regard to ESD principles.
136(2)(e)	Other information on the relevant impacts of the proposed action – the Department is not aware of any relevant information not addressed in this assessment report.	The Department considers that all information relevant to the impacts of the project have been taken into account in this assessment. The Department's consideration on key issues is presented in Section 6 of the assessment report.
Factors to have regard to		
176(5)	Bioregional plans	There is no relevant bioregional plan.
Considerations on deciding on conditions		
134(4)	Must consider: • information provided by the person proposing to take the action or by the designated proponent of the action; and	All project related documentation is available at the Department's website www.majorprojects.planning.nsw.gov.au.

	• the desirability of ensuring as far as practicable that the condition(s) is a cost-effective means for the Commonwealth and a person taking the action to achieve the object of the condition.	The Department considers that the recommended conditions at **Appendix K** are a cost-effective means of achieving their purpose.

M.5 CONCLUSIONS ON CONTROLLING PROVISIONS

Threatened species (Sections 18 and 18A of the Act)

For the reasons set out in **Section 6.2** and this Appendix, the Department recommends that the impacts of the action on threatened species and communities will be acceptable, subject to the implementation of the avoidance and mitigation measures described in the EIS, PIAR Amendment Report, and Submissions Report and the requirements of the recommended conditions.

M.6 OTHER PROTECTED MATTERS

The Commonwealth DCCEEW determined that other matters under the EPBC Act are not controlling provisions with respect to the proposed action. These include listed migratory species, RAMSAR wetlands, Commonwealth marine environment, world heritage properties, national heritage places, nuclear action, Great Barrier Reef Marine Park and a water resource associated with a large coal mining or coal seam development.

Appendix I Hydrology Independent Review

Appendix J Noise and Vibration Independent Review

Appendix K Recommended Instrument of Approval