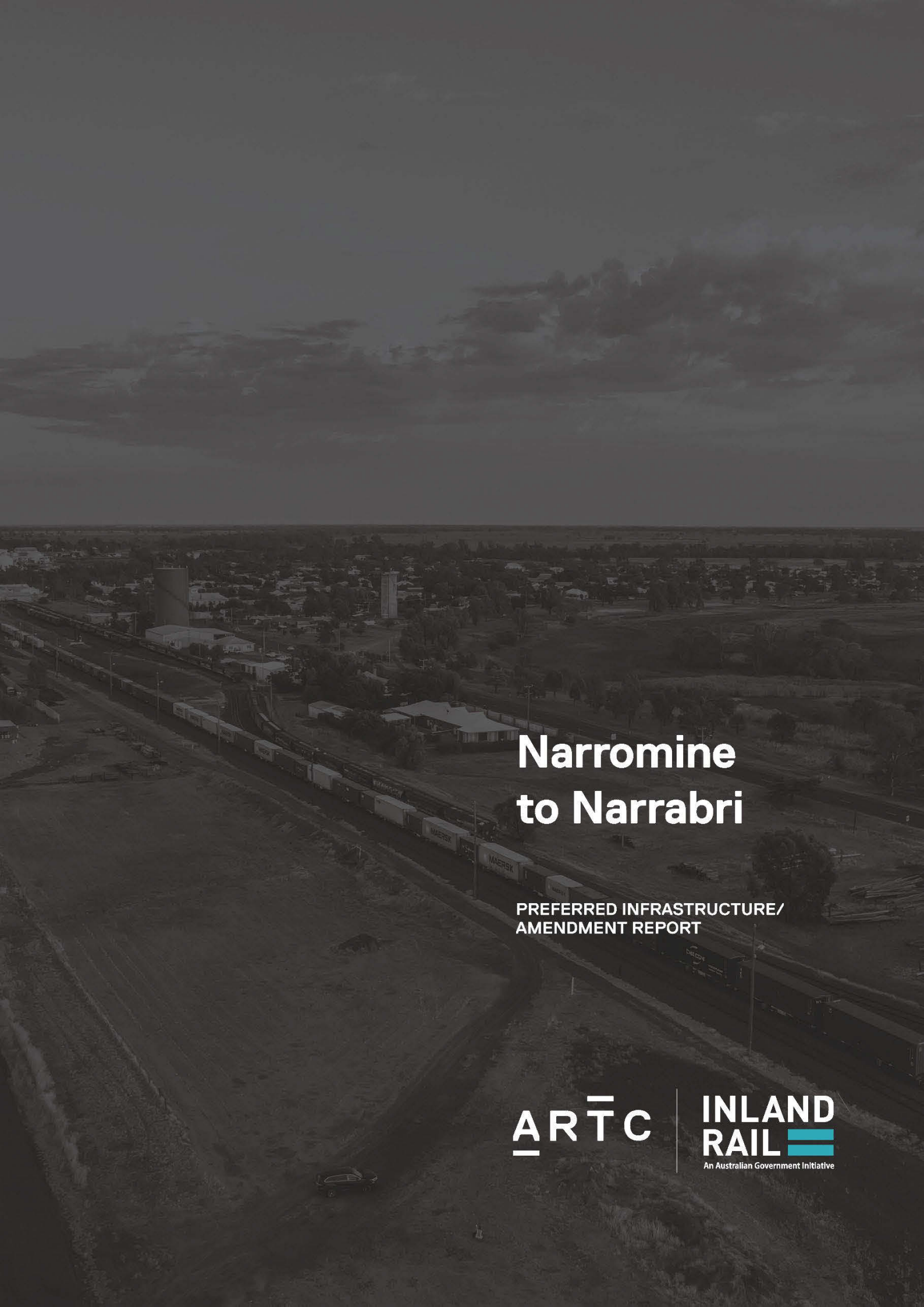

Narromine to Narrabri

PREFERRED INFRASTRUCTURE/ AMENDMENT REPORT

ARTC | INLAND RAIL
An Australian Government Initiative

COVER IMAGE
Existing Walgett rail branch.

ACKNOWLEDGEMENT OF COUNTRY

Inland Rail acknowledges the Traditional Custodians of the land on which we work, and pay our respect to their Elders past, present and emerging.

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Executive summary

Overview

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

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

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

The Inland Rail program has been divided into 13 sections, seven of which are located in NSW.

ARTC is seeking approval to construct and operate the Narromine to Narrabri section of Inland Rail ('the proposal'). The proposal consists of about 306 km of new single-track standard-gauge railway with crossing loops. The proposal would link the Parkes to Narromine section of Inland Rail located in central-west NSW with the Narrabri to North Star section of Inland Rail, located in north-west NSW. The proposal also includes changes to some roads to facilitate construction and operation of the new section of railway, and ancillary infrastructure to support the proposal.

Approval process and EIS

The proposal is declared State significant infrastructure and critical State significant infrastructure under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposal is permissible without development consent and is subject to assessment and approval by the Minister for Planning. The proposal is also a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) (referral reference 2018/8259) and requires approval from the Australian Government Minister for the Environment.

An environmental impact statement (EIS) was prepared to support ARTC's application for approval of the proposal in accordance with the requirements of Division 5.2 of the EP&A Act and the environmental assessment requirements of the Secretary of the (then) Department of Planning, Industry and Environment (DPIE) ('the SEARs') (now the Department of Planning and Environment (DPE)).

The EIS was placed on public exhibition by DPIE for a period of 62 days, commencing on 8 December 2020 and concluding on 7 February 2021. During the exhibition period, interested stakeholders and members of the community were able to review the EIS online or at display locations, participate in consultation and engagement activities, and make a written submission to the DPIE for consideration in its assessment of the proposal.

Amendments to the proposal

Concurrent with public exhibition of the EIS, ARTC has undertaken further investigations and is proposing a number of amendments to the proposal. The aim of these amendments is to minimise the potential impacts of the proposal, where practicable, particularly in respect of land use and property, flooding and hydrology, and traffic and access, and to take into account further design development. The amendments have been developed taking into account consultation with the community and key stakeholders, and submissions made.

It is proposed to amend the following features of the proposal:

- Crossing loops
- Public level crossings
- Public road closures
- Public road realignments
- Temporary workforce accommodation
- Construction and operation footprints.

Purpose of this report

On 30 April 2021 the Planning Secretary directed ARTC, in accordance with section 5.17(b) of the EP&A Act, to prepare a preferred infrastructure report to:

- Address the hydrology and flooding impacts of the project, as raised in submissions and by the independent review of hydrology undertaken by Bewsher Consulting in March 2021.
- Provide appropriate justification and information on the design of the project and alternative rail alignments considered, particularly near the towns of Narromine and Narrabri, and how these alternatives were analysed to inform the selection of the preferred route.

The report has been prepared as a combined Preferred Infrastructure Report and Amendment Report. The report addresses the Planning Secretary's direction to prepare a Preferred Infrastructure Report. It also describes and assesses the amendments to the proposal in accordance with the requirements of Division 5.2 of the EP&A Act and clause 192(3) of the Environmental Planning and Assessment Regulation 2000. The report considers whether the proposed amendments would result in any changes to the impacts described by the EIS, and whether any changes to the mitigation measures are required.

A separate Response to Submissions Report has been prepared, which includes consideration of the issues raised by the community, agencies and other stakeholders in their submissions.

Additional environmental assessment

Additional biodiversity, flooding and hydrology, noise and vibration, social, Aboriginal cultural heritage, and traffic assessments have been undertaken since exhibition. The assessments have been undertaken to:

- Assist with considering and responding to issues raised in submissions and during consultation with stakeholders
- Assist with assessing the impacts of the proposed amendments
- Further progress commitments made in the EIS
- Respond to the request of the Planning Secretary in relation to flooding and hydrology—the updated flooding and hydrology report (available separately) has been prepared to provide additional information on the hydrology and flooding impacts of the proposal.

A summary of the scope of the updated assessments is provided in this report. The findings of the updated assessments have been incorporated (where relevant) into the assessment of the proposed amendments.

Additional information on route selection and alternatives

A route selection summary report has been prepared to respond to the Secretary's direction to provide additional information on alternative rail alignments considered and how these alternatives were analysed to inform the selection of the preferred route. The route selection summary report is provided in Appendix B to this report.

The route selection summary report provides a summary of key route option development, and assessment processes and outcomes, for the Narromine to Narrabri section of Inland Rail. It describes the decisions that shaped the development of the proposal from 2006, with a focus on the assessment of options for the proposal between 2016 and 2020, including the key locational decisions made. The report describes the process of confirming the study area for the route between Narromine and Narrabri, and the route options considered during the main route option assessment phases for the proposal.

A summary of the findings of the route selection summary report and a justification for the preferred route option is provided in this report.

Summary of findings

The changes in potential impacts associated with the proposed amendments compared to those described in the EIS are considered in the report. These mainly include changes to biodiversity, flooding, noise, air quality, land use and property, socio-economic, and traffic and transport impacts. The assessments undertaken indicate that the amendments would not result in an increase in the potential impacts of the proposal overall.

This report, supported by the updated flooding and hydrology assessment report and route selection summary report, provided further assessment to respond to the Planning Secretary's preferred infrastructure report request.

The updated flooding and hydrology assessment report has identified that there are no predicted significant residual impacts associated with the proposal and, as such, the preferred alignment is appropriate and justified.

The proposal (as amended) would continue to incorporate environmental management and design features to ensure that potential impacts are managed and mitigated as far as practicable. The majority of the potential construction-related impacts would be effectively mitigated by the implementation of best-practice construction management, including implementation of the environmental management approaches described in section D5.2 of the EIS and the updated mitigation measures provided in this report.

Mitigation measures

The EIS identified the proposed approach to environmental management and the mitigation measures that would be implemented to avoid or minimise the potential impacts of the proposal.

After consideration of the issues raised in the submissions and additional work undertaken since exhibition, the mitigation measures have been 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
- Respond to the findings of further assessments and the amendments described in this report.

Some new measures have been added, and the wording of some measures has been amended. The full set of updated mitigation measures is provided in section 8.2 of this report. These measures supersede the measures presented in the EIS.

The next steps

Approval process

The NSW Department of Planning and Environment (DPE) will, on behalf of the NSW Minister for Planning, review the EIS, this Preferred Infrastructure/Amendment Report and the separate Response to Submissions Report. Once DPE has completed its assessment, DPE will prepare a draft Environmental Assessment Report for the Planning Secretary, which may include recommended conditions of approval in accordance with the EP&A Act.

The Planning Secretary's Environmental Assessment Report will be provided to the NSW Minister for Planning, who will then approve the proposal (with any conditions considered appropriate) or refuse to give approval to the proposal.

The Minister for Planning's determination, including any conditions of approval and the Environmental Assessment Report, will be published on the DPE Major Projects website following determination.

The detailed design would be developed with the objective of minimising potential impacts on the local and regional environment and the community. The design and construction methodology would continue to be developed with this objective in mind, taking into account the input of stakeholders and the local community, and the conditions of approval.

Consultation during design and delivery

ARTC and the construction contractor/s would continue to engage with stakeholders and the community in the lead up to, and during, construction. The consultation activities, defined by the communication management plan for the proposal, will aim to ensure that:

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

Consultation would continue on a regular basis, as guided by this plan. A full list of the activities proposed is provided in section 3.5 of this report. Consultation will include updates on the planned construction activities and program, and notifications to affected residents and landowners/landholders. Enquiries and concerns will be addressed in a timely manner through a complaints handling system.

Abbreviations

Abbreviation	Definition
AEP	Annual exceedance probability. The chance of a flood of a nominated size being exceeded in any one year. The chance of the flood occurring is expressed as a percentage and, for large floods, is the reciprocal of the average recurrence interval (ARI). For example, the 1% AEP flood event is equivalent to the 100-year ARI flood event.
BC Act	*Biodiversity Conservation Act 2016* (NSW)
CEMP	construction environmental management plan
Cth	Commonwealth
dB(A)	decibels (A-weighted)
DPE	NSW Department of Planning and Environment (previously DPIE)
DPIE	NSW Department of Planning, Industry and Environment (now DPE)
EEC	endangered ecological community
EIS	environmental impact statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	Environmental Planning and Assessment Regulation 2000 (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
Infrastructure SEPP	State Environmental Planning Policy (Infrastructure) 2007
km	kilometres
m	metres
m3	cubic metres
PM10	Airborne particulate matter with an aerodynamic diameter of less than 10 micrometre (µm).
PM2.5	Airborne particulate matter with an aerodynamic diameter of less than 2.5 micrometre (µm).
SEARs	Secretary's Environmental Assessment Requirements (for the EIS)
SEPP	State environmental planning policy

Definitions

Term	Definition
Aboriginal site	A place where physical remains or modification of the natural environment indicate past and 'traditional' activities by Aboriginal people. Site types include artefact scatters, isolated artefacts, burials, shell middens, scarred trees, quarries and contact sites. Includes sites listed on the Aboriginal Heritage Information Management System (AHIMS). Also known as Aboriginal objects, which is defined by the *National Parks and Wildlife Act 1974* (NSW) as '*any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains*'.
Active control (level crossings)	Where the movement of vehicular or pedestrian traffic across a railway crossing is controlled using devices, such as flashing signals, warning sounds, gates and/or boom barriers (or a combination of these), with the device/s activated prior to, and during, the passage of a train through the crossing.
Amended proposal	The proposal incorporating the amendments described in this report.
Ballast	Crushed rock, stone etc. used to provide a foundation for a railway track. Ballast usually provides the bed on which railway sleepers are laid, transmits the load from train movements and restrains the track from movement.
Biodiversity	The variety of plant and animal life in the world or in a particular habitat.
Biodiversity offsets	Measures that benefit biodiversity by compensating for the adverse impacts elsewhere of an action, such as clearing for development. Biodiversity offsets work by protecting and managing biodiversity values in one area in exchange for impacts on biodiversity values in another.
Borrow pit	An area where material (such as sand, gravel or rock) has been dug for construction use at another location.
Construction compound	An area used as the base for construction activities, usually for the storage of plant, equipment and materials, and/or construction site offices and worker facilities.
Construction environmental management plan	A site-specific plan developed for the construction phase of a project, to ensure that all contractors and sub-contractors comply with the environmental conditions of approval for the project, and that the environmental risks are properly managed.
Construction footprint	Land that would be required to construct the proposal, including land that would be disturbed during construction and the location of construction infrastructure.
Crossing loop	A section of track off to the side of the main track/s that allows a train to move to the side so that another train can pass.
Crown land	Land that is owned by the NSW Government.
Culvert	A structure that allows water to flow under a road, railway, track, or similar obstruction.
Ecosystem credit	A credit that relates to a vegetation type and threatened fauna species that are reliably predicted by that vegetation type (as a habitat surrogate).
Emission	A substance discharged into the air.
Exhibited proposal	The proposal described in the EIS.
Fauna	Animal life
Flora	Plant life
Flood	Relatively high stream flow, which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flow associated with major drainage before entering a watercourse.
Freight	Goods transported by truck, train, ship, or aircraft.
Freight task	The amount of freight transport, usually measured in tonnes or tonne-kilometres.
Groundwater	Water that is held in rocks and soil beneath the earth's surface.
Heritage listed	An item, building or place included on statutory heritage lists maintained by local, state and/or the Australian Government.
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
Inland Rail program (Inland Rail)	The Inland Rail program comprises the design and construction of a new inland rail connection between Melbourne and Brisbane, via Wagga, Parkes, Moree and Toowoomba. The route for Inland Rail is about 1,700 km long. Inland Rail will involve a combination of upgrades of existing rail track and the provision of new track.

Term	Definition
$L_{A90(period)}$	The sound pressure level exceeded for 90 per cent of the measurement period.
$L_{Aeq(time)}$	The equivalent continuous sound level for a defined time period.
L_{Amax}	The maximum sound level recorded during the measurement period.
Level crossing	A place where rail lines and a road cross at the same elevation.
Made road	A road that has been graded but may or may not be sealed.
Multi-function compound	Large construction compounds proposed for use during construction that would provide a variety of construction-related support services, including storage, assembly, concrete batching and workforce facilities.
Mobile accommodation facility	Temporary self-contained accommodation built on wheels or skids and used at some compounds for workforce accommodation for up to about 30 people.
Non-bulk freight	Non-bulk freight is generally characterised as any containerised, packaged or other unitised freight, such as: pallets; motor vehicles and trailers; laden transported vehicles and live animals. It is generally placed or lifted onto or into transport vehicles or holds. It often involves heterogeneous goods being moved between dispersed locations. Non-bulk freight varies in density, perishability and fragility.
Operation footprint	The land that would be permanently required for the proposal's functional and operational infrastructure.
Paper road	A road or street that appears on maps but has not been built.
Permanent land requirements	The indicative amount of land that needs to be acquired for the proposal's functional and operational infrastructure, subject to the outcome of the land acquisition process.
PM_{10}	Particles in this size range make up a large proportion of dust that can be drawn deep into the lungs. This is a classification of particles by size rather than chemical properties.
PMF	Probable maximum flood is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation coupled with the worst flood-producing catchment conditions.
Proposal	The construction and operation of the Narromine to Narrabri section of Inland Rail.
Proposal site	The area that would be directly affected by construction works (also known as the construction footprint). It includes the location of proposal infrastructure, the area that would be directly disturbed by the movement of construction plant and machinery, and the location of the storage areas/compounds sites etc. that would be used to construct that infrastructure.
Rail alignment	The exact positioning of the track, accurately defined both horizontally and vertically, along which the rail vehicles operate.
Rail corridor	The corridor within which the rail tracks and associated infrastructure are located.
Reference design	An initial functional layout of a project. Used to facilitate understanding of a project, establish feasibility, provide basis for estimating, and determine further investigations needed for detailed design.
Risk	Chance of something happening that will potentially have an undesirable effect. It is measured in terms of consequence and likelihood.
Road reserve	A legally defined area of land within which facilities such as roads, footpaths and associated features may be constructed for public travel.
Species credit	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the threatened species profile database.
Sensitive receivers	Land uses that are sensitive to potential noise, air and visual impacts, such as residential dwellings, schools and hospitals.
State significant infrastructure	Major transport and services infrastructure considered to have state significance as a result of size, economic value or potential impacts.
Study area	The study area is defined as the wider area including and surrounding the proposal site, with the potential to be directly or indirectly affected by the proposal (e.g. by noise and vibration, visual or traffic impacts). The actual size and extent of the study area varies according to the nature and requirements of each impact assessment technical report.
Temporary land requirements	The land that would be required during construction only, additional to the indicative permanent land requirements.
Temporary workforce accommodation facility	A facility used to accommodate the construction workforce for the proposal and provide a range of facilities for the workforce, including accommodation and catering.
Track	The structure consisting of the rails, fasteners, sleepers and ballast, which sits on the formation.

Term	Definition
Travelling stock reserves	Travelling stock reserves are parcels of Crown land reserved under the *Crown Land Management Act 2016* (NSW) for use by travelling stock.
Visual amenity	The value of a particular area or view in terms of what is seen.
Viewpoint	The specific location of a view, typically used for assessment purposes.
Waste	Includes any matter (whether liquid, solid, gaseous or radioactive) that is discharged, emitted or deposited in the environment in such volume, constituency, or manner as to cause an alteration to the environment.
Watercourse	The path of the main flow of surface water along its extent, variously referred to as streams or rivers (as relevant).

1. Introduction

1.1 Background

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

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

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

The Inland Rail program has been divided into 13 sections, 7 of which are located in NSW. Each of these projects can be delivered and operated independently, with tie-in points on the existing railway.

Australian Rail Track Corporation Ltd (ARTC) ('the proponent') has developed a program to deliver Inland Rail. ARTC was created after the Australian and state governments agreed in 1997 to the formation of a 'one stop shop' for all operators seeking access to the national interstate rail network.

Across its network, ARTC is responsible for:

- Selling access to train operators
- Developing new business
- Capital investment in the corridors
- Managing the network
- Infrastructure maintenance.

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

The proponent is seeking approval to construct and operate the Narromine to Narrabri section of Inland Rail ('the proposal'). The proposal consists of about 306 km of new single-track standard-gauge railway with crossing loops. The proposal also includes changes to some roads to facilitate construction and operation of the new section of railway, and ancillary infrastructure to support the proposal.

The proposal would be constructed to accommodate double-stacked freight trains up to 1,800 metres (m) long and 6.5 m high. It would include infrastructure to accommodate possible future augmentation and upgrades of the track, including a possible future requirement for 3,600 m long trains.

The land requirements for the proposal would include a new rail corridor with a minimum width of 40 m, with some variation to accommodate particular infrastructure and to cater for local topography. The corridor would be wide enough to accommodate the infrastructure currently proposed for construction, as well as possible future expansion of crossing loops for 3,600 m long trains. Clearing of the proposal site would occur to allow for construction and to maintain the safe operation of the railway.

1.2 Approval and assessment requirements

The proposal is declared State significant infrastructure (SSI) and critical State significant infrastructure (CSSI) under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). The proposal is permissible without development consent and is subject to assessment and approval by the NSW Minister for Planning. The proposal is also a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) (referral reference 2018/8259) and requires approval from the Australian Minister for the Environment.

An environmental impact statement (EIS) was prepared to support ARTC's application for approval of the proposal in accordance with the requirements of Division 5.2 of the EP&A Act. The EIS addressed the environmental assessment requirements of the Secretary of the Department of Planning, Industry and Environment ('the SEARs'), dated 9 September 2020.

The EIS was placed on public exhibition by the (then) Department of Planning, Industry and Environment (DPIE) (now the Department of Planning and Environment (DPE)) for a period of 62 days, commencing on 8 December 2020, and concluding on 7 February 2021.

The EIS was also prepared to support ARTC's application for approval of the proposal under the EPBC Act.

During the exhibition period, interested stakeholders and members of the community were able to review the EIS online or at display locations (see section 3 of this report), participate in consultation and engagement activities (also described in section 3), and make a written submission to the DPIE for consideration in its assessment of the proposal.

1.2.1 Proposed amendments

In accordance with clause 192(2) of the Environmental Planning and Assessment Regulation 2000 (the EP&A Regulation), an application may, with the approval of the Planning Secretary, be amended at any time before the application is determined. Concurrent with public exhibition of the EIS, ARTC has undertaken further investigations and is proposing a number of amendments to the proposal. The aim of these amendments is to minimise the potential impacts of the proposal, where practicable, particularly in respect of land use and property, and traffic and access, and to take into account further design development. The amendments have been developed, taking into account consultation with the community and key stakeholders, and submissions made.

A summary of the proposed amendments is provided in Table 1-1. Further information, including a comparison of the amendments to the proposal described in the EIS ('the exhibited proposal'), is provided in section 4 of this report.

TABLE 1-1: SUMMARY OF AMENDMENTS

Proposal feature	Proposed amendment
Crossing loops	Relocation of the seven crossing loops to new locations to minimise overall impacts.
Public level crossings	Changes to public level 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, mainly 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 locations of the Narromine North and Baradine temporary workforce accommodation facilities based on consultation with key stakeholders. Mobile accommodation facilities are now proposed be provided within some of the general compounds for improved flexibility on the workforce approach.
Construction and operation footprints	Adjustments to the construction and operational footprints to accommodate the above amendments and other proposed design refinements, and to minimise the amount of disturbance where possible. In addition, drainage control areas have been added at a number of drainage structures to provide additional space outside the rail corridor in which to manage exceedances of the quantitative design limits during detailed design and construction.

1.3 The proposal (as amended)

1.3.1 Location

The proposal would be located between the towns of Narromine and Narrabri in NSW. The proposal would link the Parkes to Narromine section of Inland Rail, located in central west NSW, with the Narrabri to North Star section of Inland Rail, located in north-west NSW.

The location of the proposal is shown in Figure 1-1. Further information on the location, study area and proposal site is provided in chapter A2 of the EIS.

FIGURE 1-1: LOCATION OF THE PROPOSAL

1.3.2 Key design features

The key features of the proposal (as amended) include:

1.3.2.1 Rail infrastructure

- A new 306-km long rail corridor between Narromine and Narrabri
- A single-track standard-gauge railway and track formation within the new rail 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
- Level crossings
- 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 existing Narromine to Cobar Line (the Narromine West connection).

1.3.2.2 Road infrastructure

- Road realignments at various locations, including realignment of the Pilliga Forest Way for a distance of 6.7 km
- Limited road closures.

The key features of the proposal are shown in Figure 1-2 and Figure 1-3.

Ancillary infrastructure to support the proposal would include signalling and communications, drainage, drainage control areas, signage and fencing, and services and utilities.

Further information on the proposal's key features is provided in the updated proposal description, which is included in Appendix A of this report.

1.3.3 Key construction infrastructure

The following key infrastructure is proposed to support construction of the proposal:

- Borrow pits:
  - Borrow pit A—Tantitha Road, Narromine
  - Borrow pit B—Tomingley Road, Narromine
  - Borrow pit C—Euromedah Road, Narromine
  - Borrow pit D—Perimeter Road, Narrabri
- Three main compounds, which would include a range of facilities to support construction ('multi-function compounds'), located at:
  - Narromine South
  - Curban
  - Narrabri West
- Temporary workforce accommodation for the construction workforce:
  - Within the Narromine South multi-function compound
  - Narromine North
  - Gilgandra
  - Baradine
  - Within the Narrabri West multi-function compound.

The key construction infrastructure is shown in Figure 1-4 and Figure 1-5.

Other construction infrastructure would include a number of smaller compounds of various sizes located along the proposal site, concrete batching plants, laydown areas, welding yards, a concrete pre-cast facility and groundwater bores for construction water supply.

Further information on the indicative construction methodology and the infrastructure required to support construction is provided in Appendix A of this report.

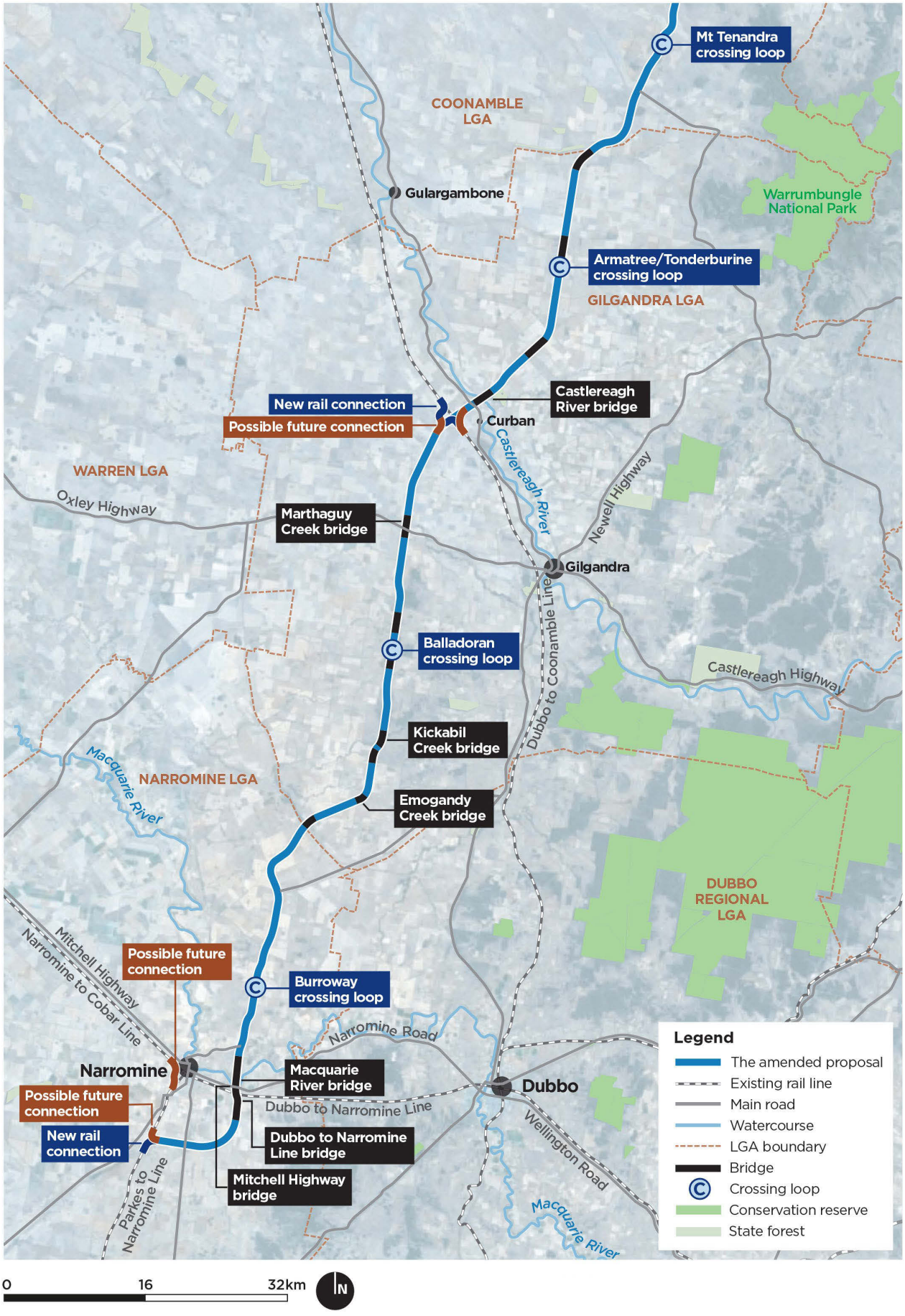

FIGURE 1-2: KEY FEATURES OF THE PROPOSAL (MAP 1 OF 2)

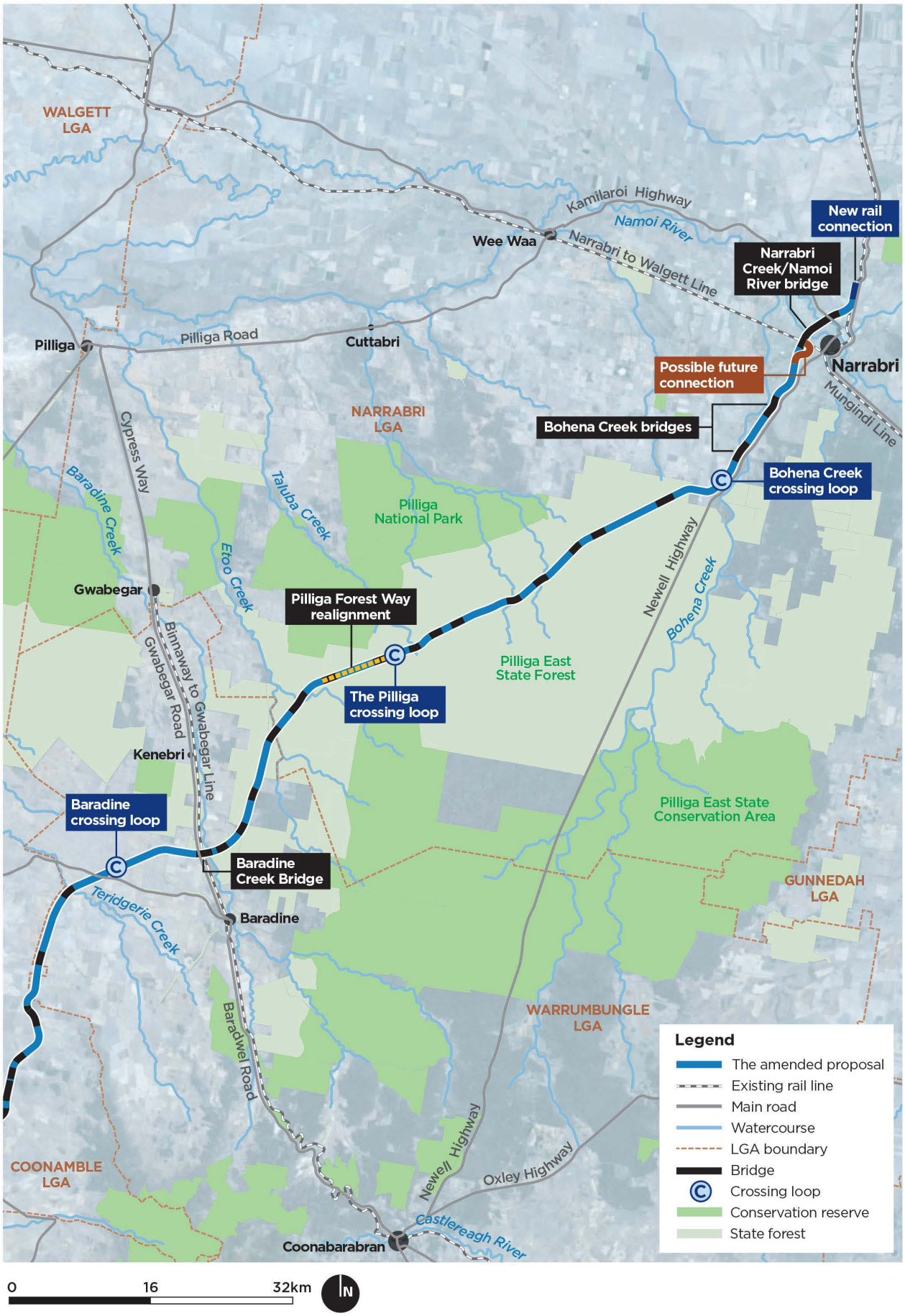

FIGURE 1-3: KEY FEATURES OF THE PROPOSAL (MAP 2 OF 2)

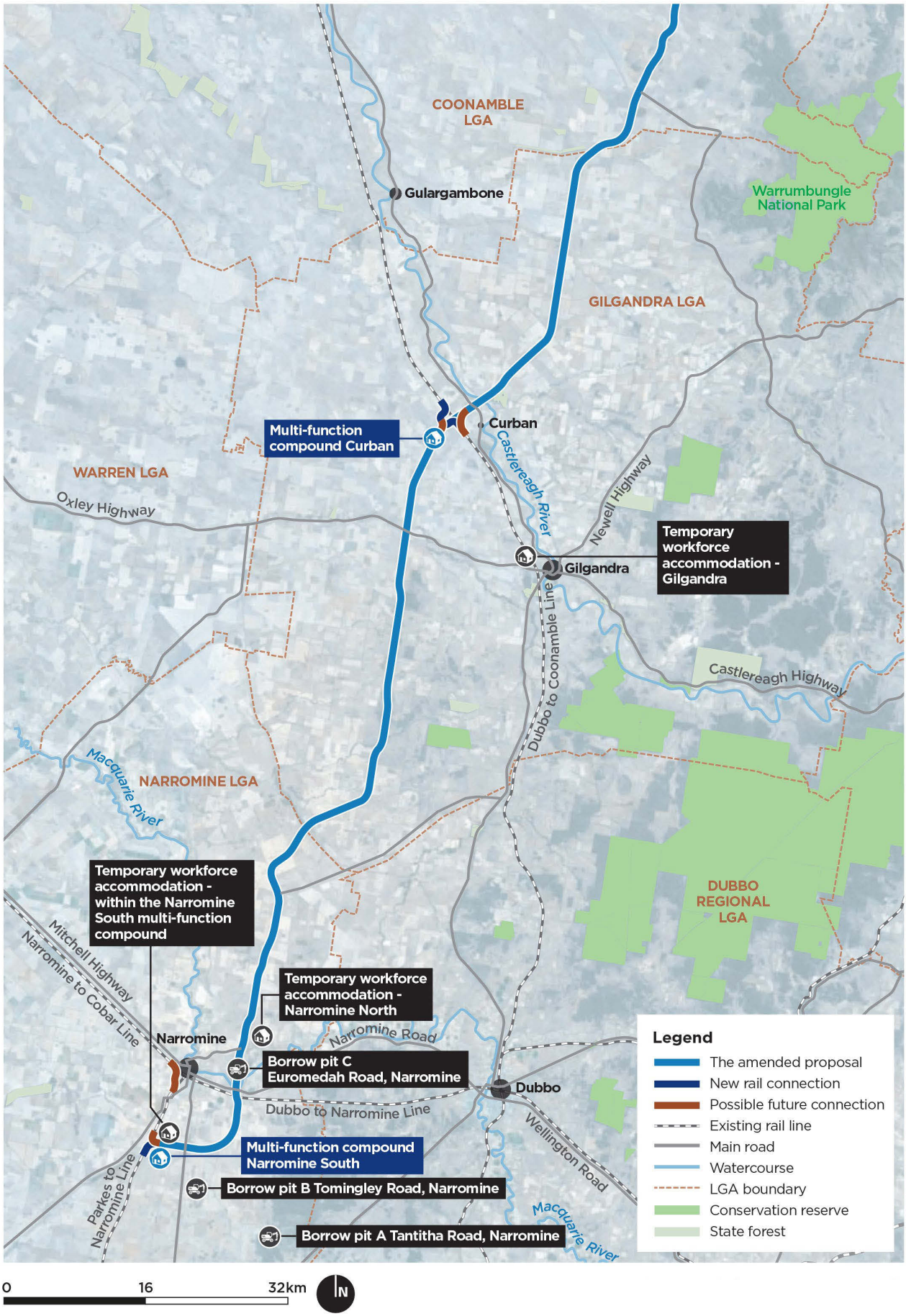

FIGURE 1-4: KEY CONSTRUCTION INFRASTRUCTURE (MAP 1 OF 2)

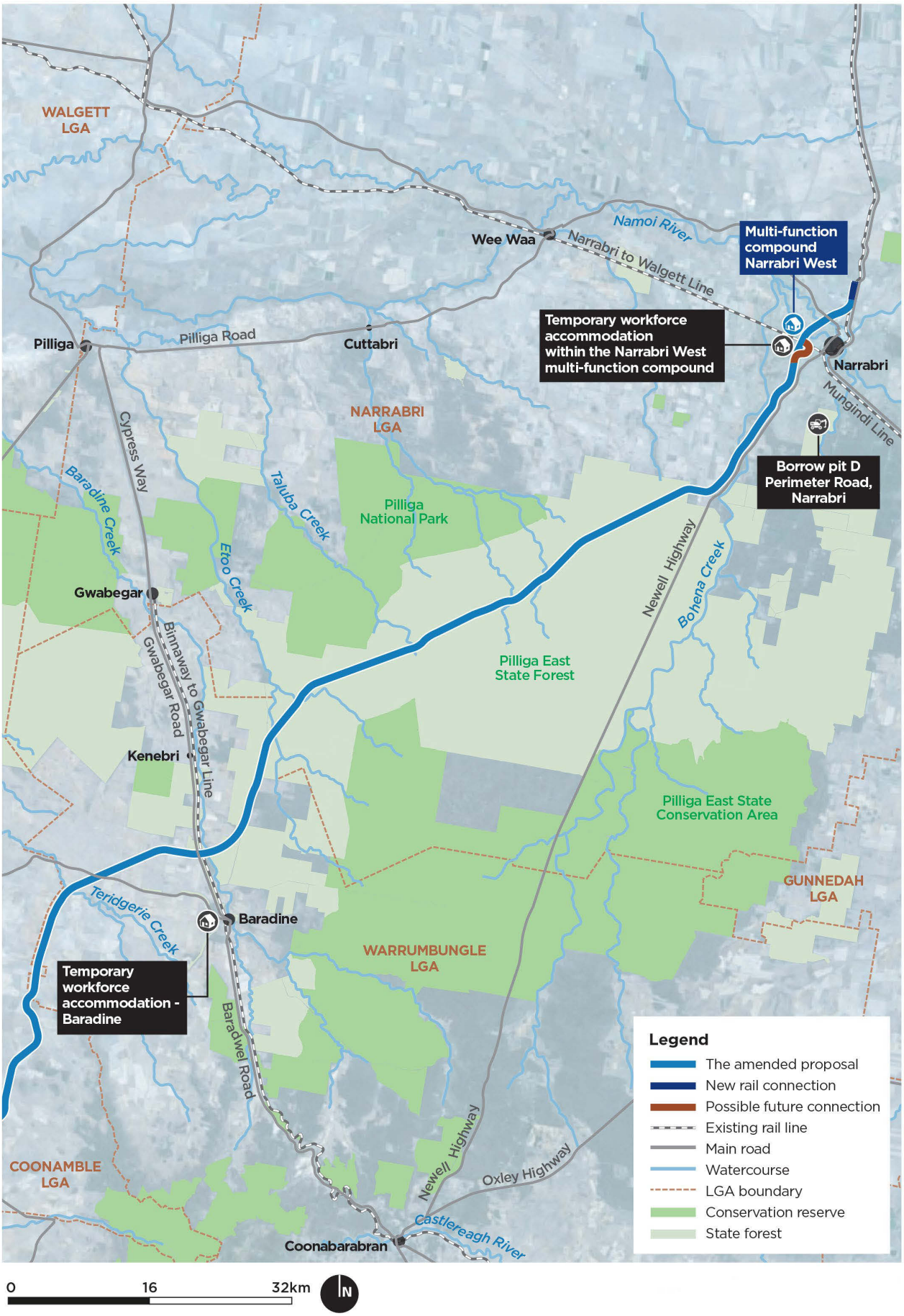

FIGURE 1-5: KEY CONSTRUCTION INFRASTRUCTURE (MAP 2 OF 2)

1.3.4 Operation

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

It is estimated that the proposal would be trafficked by an average of 10 trains per day (both directions) in 2026, increasing to about 14 trains per day (both directions) in 2040. This rail traffic would be in addition to the existing rail traffic using other lines that the proposal interacts with.

The trains for Inland Rail as a whole would be a mix of grain, bulk freight, and other general transport trains. Total annual freight tonnages would be about 10 million tonnes (t) in 2027, increasing to about 17.5 million t in 2040.

Train speeds would vary according to axle loads and range from 80 to 115 km per hour (km/hr).

1.3.5 Timing

Subject to approval, the first phase of construction is anticipated to start in late 2022 and is expected to take about four years to complete. The proposal is expected to be operational in 2026. Inland Rail as a whole would be operational once all 13 sections are complete, which is estimated to be in 2027.

1.4 Purpose and scope of this report

1.4.1 Purpose

This report has been prepared to consider the amendments to the exhibited proposal. It has been prepared in accordance with the requirements for State significant infrastructure (SSI) under Division 5.2 and, more specifically, the requirements of clause 192(3) of the EP&A Regulation, which specifies that '*The Planning Secretary is not to approve any such amendment unless satisfied that written particulars have been provided that sufficiently identify the nature of any proposed amendments to the State significant infrastructure'*. This report considers the amendments to the exhibited proposal.

In addition, section 5.17(b) of the EP&A Act provides that the Planning Secretary may require the proponent to submit to the Secretary '*a preferred infrastructure report that outlines any proposed changes to the State significant infrastructure to minimise its environmental impact or to deal with any other issue raised during the assessment of the application concerned*'.

On 30 April 2021 the Planning Secretary directed ARTC to prepare a preferred infrastructure report to:

- Address the hydrology and flooding impacts of the project, as raised in submissions and by the independent review of hydrology undertaken by Bewsher Consulting in March 2021.
- Provide appropriate justification and information on the design of the project and alternative rail alignments considered, particularly near the towns of Narromine and Narrabri, and how these alternatives were analysed to inform the selection of the preferred route.
- Provide design alternatives to demonstrate how residual flooding impacts can be reduced.

The request to provide additional information on the route options near the towns of Narromine and Narrabri is a result of the concern in relation to potential flooding impacts at these locations.

This report, supported by the updated flooding and hydrology assessment report and the route selection summary report (see sections 1.4.2 and 1.4.3), provide this information.

1.4.2 Scope and structure

1.4.2.1 Scope

The report has been prepared as a combined Preferred Infrastructure Report and Amendment Report. It addresses the direction made by the Planning Secretary in accordance with section 5.17(b) of the EP&A Act and describes and assesses the proposed amendments. The report has been prepared with regard to the SSI guidelines: *Preparing an amendment report* (DPIE, 2020a) and *Preparing a preferred infrastructure report* (DPIE, 2021b).

In accordance with *Preparing an amendment report*, the purpose of an amendment report is to:

> *… assess the economic, environmental and social impacts of the amended project and to help the community, local councils, agencies and the approval authority to get a better understanding of the proposed amendments and their impacts so they can make informed submissions (if the report is exhibited) or decisions on the merits of the amended project.*

The EIS provides an assessment of the potential impacts of constructing and operating the exhibited proposal. This report considers whether the proposed amendments would result in any changes to the impacts described by the EIS, and whether any changes to the mitigation measures are required. It has been prepared by undertaking a screening-level environmental impact assessment supported by additional impact assessments for key issues where potential changes to impacts have been identified (mainly in relation to noise, biodiversity and flooding).

In accordance with *Preparing a preferred infrastructure report*, the purpose of a preferred infrastructure report is to:

> *… to describe changes to the SSI and assess the economic, environmental and social impacts of the preferred infrastructure. This will help the community, councils, government agencies and the approval authority to get a better understanding of the preferred infrastructure and its impacts so they can make informed submissions (if the report is exhibited) or decisions on the merits of the preferred infrastructure.*

This report provides additional information on the route selection (alternative rail alignments). It also provides a summary of the findings of the updated flooding and hydrology assessment, in accordance with the Secretary's direction described in section 1.4.1.

1.4.2.2 Structure

The report provides the following information:

- Introduction (section 1)
- Summary of the statutory and strategic context of the proposal and this report (section 2)
- Summary of the engagement activities undertaken during and following public exhibition, including those relevant to the proposed amendments (section 3)
- Summary of the further environmental assessment undertaken, including the additional flooding and hydrology assessment (section 4)
- An overview of the additional information on route selection and alternatives provided in the route selection summary report (section 5)
- A description of the proposed amendments, including the differences between the key design features and construction methodology for the amended proposal compared to that of the exhibited proposal, and a justification for the proposed amendments (section 6)
- Consideration of the potential changes to the environmental impacts of the proposal and additional environmental assessment where required (section 7)
- Evaluation and conclusion (section 6).

The proposal description chapters provided in the EIS (chapters A7 and A8) have been updated, taking into account the amendments described in this report. The updated proposal description is provided in Appendix A to this report.

A route selection summary report has been prepared to respond to the Secretary's direction to provide additional information on alternative rail alignments considered and how these alternatives were analysed to inform the selection of the preferred route. The route selection summary report is provided in Appendix B to this report.

Other appendices to this report provide a full set of updated mitigation measures showing the changes made compared to the measures provided in the EIS (Appendix C) and the updated preliminary land requirements for the proposal (Appendix D).

1.4.3 Other relevant reports and additional information

1.4.3.1 Response to Submissions Report

A separate Response to Submissions Report has been prepared to document and provide a response to the issues raised in community, government agency, organisation and other submissions received by DPIE in accordance with section 5.17(6)(a) of the EP&A Act. The report also provides further information on the responses to submissions received, about how the proposal has been developed and how the potential impacts would be managed.

1.4.3.2 Updated assessment reports

Additional biodiversity, flooding and hydrology, construction noise and vibration, and operational noise and vibration assessments have been undertaken since exhibition. The assessments have been undertaken to assist with assessing the impacts of the proposed amendments, considering and responding to issues raised in submissions and during consultation with stakeholders, and to further progress commitments made in the EIS. The technical reports for these issue areas that were prepared to support the EIS (Technical Reports 1, 3, 8 and 9) have been updated based on the additional assessments undertaken, and the following reports are available separately:

- Updated biodiversity development assessment report
- Updated flooding and hydrology assessment report
- Updated noise and vibration assessment—construction and other operations report
- Updated noise and vibration assessment—operational rail report.

Further information about the updated assessment reports and other additional assessments undertaken is provided in section 4 of this report.

1.4.3.3 Updated map book

The EIS included a map book (in Part E), which provided detailed mapping information for the proposal site and proposal features, including:

- Environmental baseline—maps displaying a range of environmental data and existing environmental information, including topography, biodiversity, heritage, watercourses, sensitive receivers and community infrastructure.
- Construction phase—maps showing the land required during construction (the construction footprint), access requirements, and infrastructure required to construct the proposal, including the key construction infrastructure and other construction features (such as compounds and work areas).
- The proposal (design features)—maps showing the permanent operational footprint, design features and infrastructure proposed.

The map book has been updated based on the proposed amendments and additional assessment results. The updated map book is available separately.

2. Statutory and strategic context

2.1 Summary of statutory requirements

As described in chapter A3 of the EIS, the proposal is State significant infrastructure (SSI) by operation of Part 5, Division 5.2 of the EP&A Act, State Environmental Planning Policy (State and Regional Development) 2011 (the State and Regional Development SEPP) and State Environment Planning Policy (Infrastructure) 2007 (the Infrastructure SEPP). The relevant statutory requirements described in chapter A3 are summarised below.

2.1.1 Permissibility of the proposal and role of ARTC

Clause 79(1) of the Infrastructure SEPP permits development for the purpose of a railway or rail infrastructure facilities to be carried out by or on behalf of a public authority without consent. Clause 277 of the EP&A Regulation essentially provides that ARTC is a public authority for the purposes of making it a determining authority for development that would be permissible without consent, enabling Part 5 of the EP&A Act to apply. Clause 5(2) of the Infrastructure SEPP provides that the definition of public authority, in respect of development connected with rail corridors or railway infrastructure facilities, includes ARTC.

2.1.2 State significant infrastructure

Section 5.12 of the EP&A Act relevantly provides that a state environmental planning policy may declare any development, or any class or description of development that is permissible without consent to be SSI.

Clause 14(1) of the State and Regional Development SEPP provides that development is SSI if it is permissible without development consent by virtue of the operation of a state environmental planning policy, and it is specified in the categories of development in Schedule 3 of the State and Regional Development SEPP.

Schedule 3 (clause 3) of the State and Regional Development SEPP specifies as SSI '*Development for the purpose of rail infrastructure by or on behalf of the Australian Rail Track Corporation that has a capital investment value of more than $50 million*.'

As the proposal is permissible without development consent by virtue of the Infrastructure SEPP, has a capital investment value of more than $50 million and it is being undertaken by ARTC, it meets the requirements of clause 14(1) of the State and Regional Development SEPP. On this basis, the proposal is SSI.

2.1.3 Critical State significant infrastructure

In accordance with section 5.13 of the EP&A Act, SSI may also be declared to be critical State significant infrastructure (CSSI) if it is of a category that, in the opinion of the Minister, is essential to the state for economic, environmental or social reasons. Subsequent to public exhibition, the (then) Minister for Planning and Public Spaces declared by Order made on 3 March 2021 that the proposal is CSSI.

As CSSI, the proposal is permissible without consent under clause 16(a) of the State and Regional Development SEPP. It would remain subject to assessment and approval under Division 5.2 of the EP&A Act.

2.1.4 Approval authority

The approval requirements for SSI (including CSSI) are defined by Part 5, Division 5.2 of the EP&A Act. Under section 5.14, the approval of the NSW Minister for Planning is required for SSI. As the proposal is SSI, the Minister for Planning is the approval authority for the proposal.

2.2 Statutory compliance of the proposed amendments

The proposed amendments do not change the permissibility of the proposal or its declaration as CSSI. As CSSI, the proposal remains subject to approval by the NSW Minister for Planning. The assessment and approval requirements under the EP&A Act, including relevant environmental planning instruments, are described in section A3.2 of the EIS.

Sections A3.4 and A3.5 of the EIS identified that, in addition to approval under Part 5, Division 5.2 of the EP&A Act, the proposal would also require/potentially require the following environmental approvals, permits and/or licences, which remain relevant to the amended proposal:

- An environment protection licence (EPL) under Chapter 3 of the *Protection of the Environment Operations Act 1997* (NSW) to construct and operate the proposal
- Consent under section 138 of the *Roads Act 1993* (NSW) to disturb, erect a structure, or carry out a work in, on or over a classified public roads and Crown roads
- A licence under Part 5 of the *Water Act 1912* (NSW) (if required) to extract groundwater during construction.
- A water access licence (WAL) for dewatering and other taking of water from any water source that is covered by a water sharing plan under the *Water Management Act 2000* (NSW)
- Approval as a controlled action in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

2.3 Strategic context and need for the proposal

2.3.1 Strategic context summary

The strategic context of, and need for, the proposal is described in chapter A5 of the EIS. The strategic context of Inland Rail (including the proposal) is influenced by the outcomes of a number of strategic plans for transport, development and freight that have been prepared at the national, state and regional levels. The proposal, as part of Inland Rail, is consistent with the strategies listed in section A5.1.2 of the EIS. For example:

- Inland Rail is included as a priority project (national) on the *Infrastructure Priority List* (Infrastructure Australia, 2020) in the 'national connectivity' category. It is identified for delivery in the medium term (5 to 10 years).
- The *National Land Freight Strategy Discussion Paper* (Infrastructure Australia, 2011) provides a case and priorities for a national land freight network strategy, and an indicative list of projects and programs that Infrastructure Australia has already flagged for inclusion in a long-term national land freight network plan. This includes Inland Rail.
- The *Future Transport Strategy 2056* (Transport for NSW, 2018a) includes reference to Inland Rail as a '*regional NSW committed initiative (0–10 years)*'.
- The *NSW Freight and Ports Plan 2018-2023* (Transport for NSW, 2018b) notes that in May 2018 the NSW and Australian Governments signed a bilateral agreement to progress the Inland Rail program in NSW. The plan includes goal 2-5: Improve rail freight access and flows, with the initiative being to 'support delivery of Inland Rail'.

Further information on these strategies and their relationship to Inland Rail and the proposal is provided in Appendix E of the EIS.

2.3.1.1 Growth in freight demand

As described in chapter A5 of the EIS, there is no direct continuous inland rail link between Melbourne and Brisbane. Interstate rail freight currently travels between Melbourne and Sydney via Albury, and then between Sydney and Brisbane, generally along the coast. About 70 per cent of the freight between Melbourne and Brisbane is carried by road, principally the Newell Highway in NSW, and connecting highways in Victoria and Queensland.

The Melbourne to Brisbane corridor is one of the most important general freight routes in Australia, supporting key population and employment precincts along the east coast and inland NSW. It is estimated that 21 million tonnes of non-bulk and complementary freight moves along this corridor each year. This is expected to grow to over 40 million tonnes per year by 2050.

With the population of the eastern states forecast to increase by 60 per cent over the next 40 years, the need for efficient and effective freight transport will continue to increase. Strong forecast population growth, accompanied by comparable growth in employment, is likely to place significant pressure on existing infrastructure and services.

2.3.1.2 Existing freight capacity and infrastructure issues

Without the increased use of rail, the growth in freight demand is likely to result in increasing pressure on the road network, and associated safety and environmental issues, increased freight costs and a loss of economic opportunity. The current national infrastructure network cannot support this projected growth, with increasing pressure on already congested roads through Sydney, and increasing use of heavy trucks such as B-doubles and, potentially, B-triples along the Hume-Pacific and Newell Highway corridors.

Rail is generally the most productive and efficient mode for freight travelling from regional areas to export ports and urban destinations. Freight trains travelling along the Melbourne to Brisbane corridor currently travel through the Sydney metropolitan rail network, often experiencing significant delays. Travel time reliability is poor, as a result of the priority given to passenger services, freight transit curfews in the Sydney metropolitan area, and substandard rail alignments elsewhere. Limited capacity during morning and afternoon passenger peaks restricts freight movements at these times.

2.3.2 Summary of the need for Inland Rail and the proposal

Australia's freight task is set to experience significant growth over the coming decades. The existing freight infrastructure cannot support this projected growth, with increasing pressure on already congested roads and rail lines through Sydney, and increasing use of heavy trucks such as B-doubles and, potentially, B-triples along the Hume-Pacific and Newell highway corridors.

Inland Rail will address the growing freight task by helping to move freight off the congested road network and moving interstate freight off the congested Sydney suburban rail network. It provides a reliable road-competitive solution to the freight task and enables the commercial and social benefits of rail to be leveraged to meet Australia's long-term freight challenge.

Inland Rail will connect key production areas in Queensland, NSW and Victoria with export ports in Brisbane and Melbourne, and provide linkages between Melbourne, Brisbane, Sydney, Adelaide and Perth. It will reduce freight transit times, reduce congestion on rail and road networks, and enable the movement of larger freight volumes via rail by making the movement of longer and double-stacked trains possible.

Inland Rail will provide the backbone infrastructure necessary to significantly upgrade the performance of the east coast rail freight network to better serve future freight demands, while also diverting demand from the constrained road freight and rail passenger network.

Inland Rail is fundamental to the continued growth of rail freight. It is estimated that Inland Rail will shift the share of freight moved by rail between Melbourne and Brisbane from 26 to 62 per cent so that, by 2050, about 7.9 million tonnes (t) of inter-capital freight will be moved by rail between the two cities (ARTC, 2015). Inter-capital freight includes products such as hardware, steel, groceries and other consumer goods. It travels between major ports and capital cities before being distributed to retailers.

Inland Rail will also travel through some of Australia’s richest farming regions and mining regions. It is expected to draw significant volumes of grain, cotton, chilled beef, coal and other commodities onto rail. During construction, Inland Rail is expected to be a major economic enabler in the regions, as ARTC will aim to use local procurement and employment as much as possible.

In summary, Inland Rail is needed to respond to the growth in demand for freight transport, and address existing freight capacity and infrastructure issues. The analysis of demands undertaken by ARTC indicated that there would be sufficient demand for Inland Rail.

The proposal is a critical component of Inland Rail and is required to enable its operation. Further information is provided in chapter A5 of the EIS.

The proposed amendments would result in relatively minor changes to the proposal and its features. The amended proposal remains consistent with strategic context and need described in the EIS and summarised above.

3. Community and stakeholder engagement

3.1 Approach

ARTC's values commit the organisation to active engagement with stakeholders and the community. For Inland Rail, effective communication and stakeholder engagement are fundamental to reducing risk and minimising the potential for social and environmental impacts as far as possible. ARTC believes that identifying, engaging and effectively communicating with stakeholders is critical to the successful delivery of Inland Rail.

ARTC's approach to consultation for the proposal is described in chapter A4 of the EIS. The consultation activities undertaken prior to exhibition of the EIS are described in Appendix C of the EIS. As described in the EIS, engagement activities were carried out during the following key periods:

- Inland Rail announcement and preliminary consultation—2015 to end 2017
- route option assessment—February 2018 to July 2019
- preliminary design development and environmental assessment—July 2019 to October 2020.

Further information about the engagement activities undertaken as part of the above stages is provided in chapter A4 and Appendix C of the EIS.

The following sections describe the consultation undertaken just prior to public exhibition of the EIS, consultation undertaken in conjunction with public exhibition, and the consultation that would be undertaken during future stages of the proposal.

3.2 Consultation prior to exhibition

Subsequent to the activities described in the EIS, and prior to public exhibition, additional consultation was undertaken. As the EIS was being finalised at this time, these activities were not described in the EIS. Table 3-1 lists the engagement activities undertaken in November 2020, prior to exhibition of the EIS.

TABLE 3-1: CONSULTATION UNDERTAKEN IN NOVEMBER 2020 PRIOR TO PUBLIC EXHIBITION

Activity	Detail
Inland Rail program website (inlandrail.artc.com.au/where-we-go/projects/narromine-to-narrabri)	▸ The project website was updated advising of the public release of the EIS for review and welcoming of submissions. This update included links to the EIS (hosted on DPIE's Major Projects NSW Planning Portal website), the process for formal submission, and information related to planned consultation activities.
Toll-free community information line (1800 732 761) and Inland Rail program email (inlandrailnsw@artc.com.au)	▸ Requests for information were responded to by the ARTC stakeholder engagement team.
Briefings	▸ Meetings with the community consultative committee for the proposal (the Narromine to Narrabri Community Consultative Committee). ▸ Meetings were held with interested community members to inform them of the approaching EIS public exhibition period.
Advertisements	▸ Advertisements were placed in the following local papers to provide information about the upcoming exhibition of EIS, display locations and information sessions: ▸ Coonabarabran Times ▸ Coonamble Times ▸ The Courier Narrabri ▸ The Gilgandra Weekly ▸ The Narromine News ▸ Dubbo Photo News ▸ Wee Waa News (The Courier).
Letters to landowners	▸ Registered postal letters were sent to 197 directly and indirectly impacted landowners. These letters were distributed two weeks prior to the public exhibition period and notified stakeholders of the upcoming public exhibition, ongoing consultation activities and the formal submission process.
Letters to key stakeholders	▸ Registered postal letters were sent to 51 key stakeholders. These letters were distributed two weeks prior to the public exhibition period and notified stakeholders of the upcoming public exhibition, ongoing consultation activities and the formal submission process.

Activity	Detail
Ongoing email and telephone contact with stakeholders	▸ Regular communication was undertaken with Narromine Shire Council, Gilgandra Shire Council, Warrumbungle Shire Council, Coonamble Shire Council and Narrabri Shire Council. ▸ Ongoing engagement was undertaken with the elected representatives as required. ▸ Landowner enquiries were responded to as required. ▸ A community e-newsletter was sent to the Narromine to Narrabri stakeholder mailing list. This comprehensive database includes contact details of affected landowners, interested community members and business groups. The email blast notified stakeholders of the upcoming EIS public exhibition period.
Community Consultative Committee	▸ All Community Consultative Committee members were notified via email two weeks in advance of the public exhibition period to assist representatives remain informed and engaged.

3.3 Consultation during exhibition

The EIS was placed on public exhibition for a period of 62 days between 8 December 2020 and 7 February 2021. During the exhibition period, government agencies, key stakeholders (including interest groups and organisations), and the community were invited to make written submissions. A summary of the engagement activities and tools used to encourage community and stakeholder participation during the exhibition period is provided in Table 3-2.

TABLE 3-2: CONSULTATION DURING THE EIS EXHIBITION PERIOD

Activity	Detail
Website updates	▸ The Inland Rail program website (inlandrail.artc.com.au/where-we-go/projects/narromine-to-narrabri) was updated advising of the public release of the EIS for review and welcoming of submissions. This update included links to the EIS (hosted on the Major Projects website), the process for formal submission, and information related to planned consultation activities.
Emails to key stakeholders	▸ An email was sent to key stakeholders, elected representatives and local councils advising of the EIS exhibition, ongoing consultation activities and formal submission process. These stakeholders were offered a one-on-one EIS briefing.

Briefings	▸ Briefings were offered to a range of key stakeholders, including government agencies, local councils, Traditional Owners and Local Aboriginal Land Councils (LALCs).
	▸ Briefings occurred with the following key stakeholders:
	  ▸ Transport for NSW (TfNSW)
	  ▸ Australian Department of Infrastructure, Transport, Regional Development and Communications (DITRDC)
	  ▸ Gilgandra Shire Council
	  ▸ Narromine Shire Council
	  ▸ Warrumbungle Shire Council
	  ▸ Coonamble Shire Council
	  ▸ NSW Environment Protection Authority (EPA)
	  ▸ Forestry Corporation of NSW
	  ▸ NTS Corp
	  ▸ North West Local Land Services.

Community e-news	▸ A community e-newsletter was sent to the stakeholder mailing list. This comprehensive database includes contact details of affected landowners, interested community members, and business groups. The e-newsletter provided an overview of the EIS exhibition process, where to find more information, and the process on how to make a formal submission.
Community drop-in sessions	▸ Seven community drop-in sessions were held during the public exhibition period in mid-December 2020. The sessions were held across the five local government areas (LGAs) (Narromine, Gilgandra, Warrumbungle, Coonamble and Narrabri) to introduce the EIS and provide information on the content, submission process and timelines. ▸ There was a total of 86 attendees across these sessions.

Activity	Detail
Additional EIS community support/drop-in sessions	▸ Six EIS community support/drop-in sessions were held during the public exhibition period in January and February 2021. The sessions were held at Narrabri, Narromine and Gilgandra. These additional sessions were to support the community in understanding the EIS and the submissions process. ▸ A further four of these sessions were held online during the public exhibition period. ▸ There was a total of 88 attendees across these sessions.
Static displays	▸ The EIS (via USBs) and the EIS 'Summary of Findings' document were made available to the public at the following locations: ▸ Narromine Shire Council—124 Dandaloo Street, Narromine ▸ Gilgandra Library—1 Warren Road, Gilgandra ▸ 'The Gil' Information Centre—30–32 Miller Street, Gilgandra ▸ Baradine Library—13–15 Wellington Street, Baradine ▸ Coonamble Library—82 Castlereagh Street, Coonamble ▸ Coonamble Shire Council—80 Castlereagh Street, Coonamble ▸ Coonabarabran Library—50 John Street, Coonabarabran ▸ Warrumbungle Shire Council—14–22 John Street, Coonabarabran ▸ Gulargambone Rural Transaction Centre—39 Bourbah Street, Gulargambone ▸ Narrabri Library—8 Doyle Street, Narrabri ▸ Narrabri Shire Council—46–48 Maitland Street, Narrabri.
Distribution of EIS and 'Summary of Findings' document to landowners	▸ The EIS (on USB) and the EIS 'Summary of Findings' document (hard copy) were sent to 197 landowners.
Advertisements	▸ Advertisements were placed in the following local papers to provide information about exhibition of the EIS, display locations and information sessions: ▸ Coonabarabran Times ▸ Coonamble Times ▸ The Courier Narrabri ▸ The Gilgandra Weekly ▸ The Narromine News ▸ Daily Liberal ▸ Dubbo Photo News ▸ Wee Waa News (The Courier).
Summary of Findings	▸ A condensed version of the EIS, known as the Summary of Findings, was produced to aid in communicating the main topics addressed in the EIS to members of the public. This was distributed to 197 landowners and about 700 copies were given out to the broader community and other stakeholders.
USBs containing the EIS	▸ USBs with the EIS were delivered to all affected landowners, and provided to local councils and libraries for use at the static displays. ▸ The USBs were also given out during the community drop-in sessions and support sessions.
Fact sheet	▸ A fact sheet on the assessment process for major projects in NSW, which included information on how to make a submission, was made available on the Inland Rail program website; provided to landowners; included at public exhibition locations and emailed, as requested, to interested community members.
Social media	▸ Social media channels (such as Facebook, Twitter and LinkedIn) provided an effective means to engage in a targeted manner with key stakeholders. Social media channels were used to advise of the public release of the EIS, including the process for formal submissions, and provide information on planned consultation activities.
Community Consultative Committee	▸ Meetings of the Community Consultative Committee occurred in early December 2020. DPIE was invited to present on the EIS public exhibition and submissions process. The meetings were held at: ▸ Narromine ▸ Gilgandra ▸ Narrabri.
Phone and email	▸ Community engagement contact details (phone and email) were published on all advertising. This included the community engagement hotline (1800 732 761) and email inlandrailnsw@artc.com.au.

Activity	Detail
Alignment fly-through	▸ An alignment fly-through was created and assisted in visually communicating the proposal alignment and reference design. This interactive tool was provided at the community drop-in sessions and on the project website.

3.4 Consultation on proposed amendments

The proposed amendments were developed in consultation with potentially affected landholders and other relevant stakeholders as described below. Additionally, briefings with the community consultative committees were held in late March 2022 to provide a project update and an overview of the proposed amendments.

3.4.1 Crossing loops

The new crossing loop locations have been proposed, based on consultation with affected landholders and other relevant stakeholders, to minimise the potential impacts of constructing and operating the loops, including proximity to sensitive receivers, and impacts on traffic and access. Further information is provided in section 6.2.

ARTC contacted landowners regarding the proposed changes to crossing loops between April 2021 and May 2021. This involved first advising the landowner via telephone, with an option to meet to discuss the impacts and proposed management approaches further. The meetings were supported by information on the changes, including updated mapping showing the proposed new locations of the crossing loop and potential impacts.

Landowners who were no longer impacted by the crossing loops were informed of this via telephone and, where possible, during a meeting with ARTC. In many cases these changes reduced impacts on these landowners, including minimising access and operational noise impacts.

3.4.2 Public level crossings

Amendments to public level crossings have been proposed, taking into account further design development, and consultation with affected landholders and other relevant stakeholders. Further information is provided in section 6.3.

ARTC has communicated these changes in ongoing consultation with the relevant landowners and road users who are generally supportive of the changes.

3.4.3 Public road closures and realignments

Concerns about increased travel time and access changes as a result of the proposal have been frequently raised during consultation with the community and key stakeholders. The proposed amendments attempt to address some of the issues raised as far as practicable. One of the key drivers for the crossing loop relocations was to minimise access (including road changes) and travel impacts. Other amendments to the proposed road changes have been developed to minimise the potential impacts on property, access and travel time. Further information is provided in section 6.4.

Feedback from stakeholders and landholders was generally supportive of the proposed amendments; although some landholders raised concerns regarding new crossing loop locations and associated potential property access impacts.

ARTC has consulted with the landowners impacted by the Bardens Road change. No concerns were raised during this consultation.

3.4.4 Temporary workforce accommodation

3.4.4.1 Narromine North

During consultation with the landowner at the Narromine North camp location, the landowner suggested a different site under their ownership as more appropriate. Following further investigations, the amended camp location provided closer access to the alignment with no adverse impacts. Further information is provided in section 6.6.

3.4.4.2 Baradine

Further consultation with Baradine Showground Trust, Warrumbungle Shire Council and NSW Crown lands identified an opportunity to move the temporary workforce accommodation facility to minimise its potential impacts on existing land uses and biodiversity. Further information is provided in section 6.6.

Detailed discussions regarding compensation and approaches to minimising potential impacts on Baradine Central School's use of the area of the racecourse that they currently lease would continue to occur prior to establishing the temporary workforce accommodation at the new location within the former Baradine Racecourse.

3.4.5 Construction and operation footprints

Changes to the footprints have been proposed, based on consultation with affected landholders and other relevant stakeholders, to respond to the amendments noted above and minimise the potential impacts on land use and properties where possible. Further information is provided in section 6.7.

Between April 2021 and May 2021, ARTC contacted all directly affected landowners along the alignment to request a meeting. The meeting agenda included consultation on the modified footprints and the changes that had occurred since the previous meeting with ARTC. In addition, ARTC offered to start the voluntary acquisition process for the proposal's land requirements.

At each of these meetings, a map showing the updated operational and construction footprints was provided to landowners. Where changes to the footprint had occurred, ARTC consulted with the landowner to determine what measures could be considered to minimise potential impacts.

Where a landowner expressed interest in commencing voluntary land acquisition negotiations, ARTC started these negotiations in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW). This allowed commercial discussions to commence regarding purchasing and/or leasing the landowners land, and ARTC provided more detail around proposed mitigations and compensation.

In a few cases, some of the changes to the footprint have resulted in a landowner no longer being directly affected by the proposal's land requirements. In these cases, the landowner was contacted via phone and formally notified via letter.

Due to the complex nature of land acquisition, key issues raised regarding changes to the construction and operational footprint varied significantly from landowner to landowner. In cases where the construction footprint was relocated or reduced, the feedback from landowners was generally positive. In some cases, where ARTC was unable to meet landowners' requests to relocate the construction or operational footprint, a negative sentiment was expressed by landowners.

In consultation with DPE, ARTC has proposed drainage control areas to provide additional space outside the rail corridor in which to manage exceedances of the quantitative design limits during detailed design and construction. A total of 200 drainage control areas are proposed outside the rail corridor—typically, they will be 50 m wide downstream, 15 m wide upstream and variable length along the corridor to suit the various drainage structure configurations. ARTC has attempted telephone contact with all landowners with drainage control areas on their properties and provided maps with identified drainage control areas via email and post between March and May 2022. The key issue for landowners is the additional land take, rather than the predicted exceedances. ARTC notes this and would, wherever practicable, reduce the size of, or eliminate the need for, drainage control areas. This would be undertaken by assessing erosion potential, undertaking geomorphological studies and considering cost-effective engineering solutions.

3.5 Future engagement

3.5.1 Consultation and community feedback

Consultation with the community and key stakeholders will be ongoing in the lead up to and during detailed design and construction of the proposal. The consultation activities will aim to ensure that:

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

The 1800 phone number and email address will continue to be available during construction, along with a 24-hour construction response line.

Targeted consultation methods, such as letters, notifications, signage and face-to-face communications, will continue to be implemented. The Inland Rail website and social media platforms will include updates on the progress of the proposal. The following communication tools and activities will be used during the construction phase:

- Email address
- 1800 phone number
- Updates to the Inland Rail program website
- Targeted consultation and notifications as required, including letters, notifications, and face-to-face communication
- Construction signage.

3.5.2 Communication management plan

As described in the chapter A4 and Appendix C of the EIS, subject to approval, ARTC will develop a communication management plan to guide future engagement with the local community and other key stakeholders. As defined by the plan, consultation will continue to be undertaken over the next three phases of the proposal:

- Construction
- Commissioning and handover
- Operation.

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

- Meetings and briefings
- Workshops
- Community information sessions
- Telephone, email and written correspondence
- Updates to the Inland Rail project website
- Distribution of information, including mail outs.

Consultation would continue on a regular basis as guided by this plan. A full list of the activities proposed is provided in Table 3-3.

TABLE 3-3: PROPOSED CONSULTATION ACTIVITIES

Activity	Timing	Design	Construction	Operation
Advertisements	Relevant milestones	✓	✓	✓
Stakeholder engagement team—locally based	Ongoing	✓	✓	
Community events including sponsorship	Ongoing	✓	✓	✓
Community information sessions	Ongoing	✓	✓	
Construction complaints management system	Prior to construction	✓	✓	
Construction notifications	As required	✓	✓	
Operations complaints management system	As required			✓
Email and newsletter updates	Relevant milestones and proposal information/updates	✓	✓	✓
Engagement with landowners	Ongoing	✓	✓	✓
Enquiries hotline and email	Ongoing	✓	✓	✓
Engagement with stakeholders including government, peak bodies, emergency services, suppliers	Ongoing	✓	✓	✓
Fact sheets	Relevant milestones	✓	✓	✓
Project briefings and presentations	Relevant milestones	✓	✓	
Website	Ongoing	✓	✓	✓
Interactive map updates	As required	✓	✓	

Activity	Timing	Design	Construction	Operation
Social media	Ongoing	✓	✓	✓
Community Consultative Committee	Ongoing	✓		

3.5.3 Complaints management

The construction contractor engaged to construct the preferred infrastructure will be required to implement a complaints management system during construction. This system will be incorporated within the construction environmental management plan (CEMP), which the contractor will be required to prepare and have approved by ARTC prior to construction commencing. The complaints management procedure will include, at a minimum:

- Contact details for a 24-hour response line and email address, for ongoing stakeholder contact throughout construction
- Provision of accurate public information signs while construction work is in progress
- Staging of works, developed in consultation with relevant stakeholder groups, to minimise disruption and impacts on community activities and functions
- Management of operational complaints in accordance with ARTC's stakeholder engagement procedure and NSW environment protection licence (EPL), specifically:
  - Details of all complaints received will be recorded
  - Verbal and written responses will be provided within defined time limit.

4. Additional environmental assessment

4.1 Overview

4.1.1 Updated assessment reports

Additional biodiversity, flooding and hydrology, and noise and vibration assessments have been undertaken since exhibition. The assessments have been undertaken to:

- Assist with considering and responding to issues raised in submissions and during consultation with stakeholders
- Assist with assessing the impacts of the proposed amendments
- Further progress commitments made in the EIS
- Respond to the request of the Planning Secretary in relation to flooding and hydrology.

The technical reports for these issue areas that were prepared to support the EIS have been updated based on the additional assessments undertaken, and the following reports are provided separately:

- Updated biodiversity development assessment report
- Updated flooding and hydrology assessment report
- Updated noise and vibration assessment—construction and other operations report
- Updated noise and vibration assessment—operational rail report.

A summary of the scope of the updated assessments is provided in sections 4.2 to 4.5 below.

4.1.2 Other assessments undertaken

Additional social, Aboriginal cultural heritage, and traffic assessments have also been undertaken since exhibition to assist with considering and responding to issues raised in submissions and during consultation with stakeholders; assist with assessing the impacts of the proposed amendments; and/or further progress commitments made in the EIS. A summary of the scope of the additional assessments is provided in section 4.6.

The findings of the updated and additional assessments have been incorporated (where relevant) into the assessment of the proposed amendments provided in section 7 of this report, and into the responses to submissions provided in the Response to Submissions report.

4.2 Updated biodiversity development assessment report

The biodiversity development assessment report, which formed Technical Report 1 for the EIS, has been updated in consultation with DPE (Biodiversity, Conservation and Science Directorate) (BCS), taking into account the comments provided in the BCS submission during public exhibition (see section 5.3 of the Submissions Report) as well as discussions with BCS representatives regarding the agreed approach to various matters raised. A key focus of the updated assessment has been revising the vegetation mapping and fauna habitat mapping, extending the vegetation mapping to accommodate the amended construction and operational footprints, and recalculating the offset obligations for the proposal. The biodiversity development assessment report has also been updated to meet the requirements of the *Biodiversity Assessment Method 2020* (DPIE, 2020b), which came into effect in October 2020.

ARTC held an online community briefing on 8 February 2022 to explain the inputs to the updated biodiversity development assessment report. The briefing covered key design refinements (including drainage control areas), additional field surveys and changes to the offset obligations since exhibition of the EIS. The briefing was attended by representatives from Narromine Regional LandCare, Tamworth Regional LandCare and North West Protection Advocacy. No issues or concerns were raised.

Further information on the updated biodiversity development assessment report is provided below. More detailed information is provided in the assessment in section 7 of this report.

4.2.1 Revised native vegetation and fauna habitat mapping

Technical Report 1 noted that additional targeted surveys would be undertaken in spring 2020 to provide a better understanding of the presence of potential habitat for the following key species:

- Winged peppercress (*Lepidium monoplocoides*)
- Spiny peppercress (*Lepidium aschersonii*)
- *Commersonia procumbens*
- *Tylophora linearis*
- Slender darling pea (*Swainsona murrayana*)
- Native milkwort (*Polygala linariifolia*)
- Coolabah bertya (*Bertya opponens*.

Targeted surveys were undertaken in September, October and November 2020, August 2021 and March 2022 to capture all required survey months for candidate threatened flora species and provide increased opportunity to undertake surveys in favourable conditions. A number of other threatened flora species were also surveyed at the same time where the survey timing was suitable.

Thermal drone surveys were conducted in July 2021 to provide a supplementary search for koala presence in the Pilliga. Independent specialist experts in koala, little eagle and square-tailed kite were engaged to provide a supplementary assessment of the likely extent of occupied habitat for these three key species, which are difficult to confirm the presence of from field survey alone.

The way that some plant community types (PCTs) (derived grasslands and paddock trees) have been classified and the species polygons (fauna habitat) developed in the assessment have also been revised in response to BCS comments, the drone survey and expert reports.

The vegetation mapping has been updated, taking into account the additional surveys, changes to vegetation zones, and the proposed amendments summarised in this report.

The revised native vegetation mapping was used to reassess the potential impacts of the proposal on biodiversity. The updated biodiversity development assessment report includes a comparison of the changes as a result of the revisions to the vegetation mapping. One of the changes is that it is estimated that up to about 1,791 hectares (ha) of native vegetation would need to be removed for the proposal (taking into account the amendments assessed in this report), compared to 1,732 ha for the exhibited proposal. Further information about the impacts of the proposal incorporating the proposed amendments is provided in section 7 of this report.

4.2.2 Recalculation of offset obligations

The Biodiversity Assessment Method calculator, which is used to calculate the offset obligations for the proposal, was re-run to adopt a revised methodology requested by BCS. This involved providing the impact areas and associated credit obligations at a sub-regional level to allow for greater detail. The recalculations took into account the revised vegetation zone mapping, updated habitat assessments and PCT associations for candidate threatened species.

The recalculations identified that a total of 49,052 ecosystem credits are now required, compared with 34,820 ecosystem credits noted in the EIS and Technical Report 1. This includes 9,625 credits for prescribed impacts on ecosystem credit fauna species.

The proposal site is known to support 11 species credit species. An additional 13 species are assumed to be present due to site access limitations in certain areas and poor survey conditions due to prolonged drought. These species would now require a total of 271,971 species credits, compared to the 160,421 species credits noted in the EIS and Technical Report 1. This includes 87,501 credits for prescribed impacts on species credit fauna species.

The difference in ecosystem and species credits between the exhibited proposal and the proposal incorporating the amendments described in this report is a result of:

- Incorporating the survey findings from spring 2020, August 2021 and March 2022
- Improved conditions resulting in increased vegetation integrity scores for some vegetation zones
- Changed requirements for vegetation mapping

- Revised requirements for candidate species credit calculations requested by BCS
- Revised method for calculation of prescribed impacts on ecosystem credit fauna species and species credit fauna species.

It should be noted that the ecosystem and species credits are not calculated as a result of a direct ratio with area.

The revised credit obligations have been included in the updated biodiversity development assessment report.

Update to meet new guidelines

The biodiversity development assessment report that was exhibited with the EIS was prepared in accordance with *Biodiversity Assessment Method 2017* (OEH, 2017), which were the applicable guidelines at the time the biodiversity assessment was undertaken and the report was prepared. The biodiversity assessment report been updated to meet the requirements of the *Biodiversity Assessment Method 2020* (DPIE, 2020b). Key changes include:

- Revised requirements for native vegetation mapping and classification
- Revised requirements for the assessment of prescribed impacts, including direct and indirect impacts
- Clarification of requirements for offsetting any residual prescribed impacts
- Stronger impact assessment and reporting requirements for serious and irreversible impacts
- Adjustments to terminology, definitions and minimum assessment requirements.

The updated biodiversity development assessment report has been restructured and revised to address the requirements of the new guidelines. A checklist of the minimum requirements is included in Appendix B of the updated biodiversity development assessment report, and a summary of the changes between the exhibited report and the updated report is included in Appendix O of the updated report.

4.3 Updated flooding and hydrology assessment report

4.3.1 Scope of updated report

The flooding and hydrology assessment report, which formed Technical Report 3 for the EIS, has been updated in consultation with DPE (formerly DPIE), taking into account comments provided in submissions and the independent review undertaken on behalf of DPIE. The updated assessment included consideration of:

- The amendments and other proposed design refinements as described in this report (including the addition of drainage control areas at drainage structures as required)
- Addition and modification of culverts to the east of Narromine to assist with managing flood flows
- Culvert blockage factors in accordance with *Australian Rainfall and Runoff* (Ball et al., 2019)
- Additional floodplain management plans and studies
- Local flooding impacts associated with Mulgate Creek
- Refinements to flood models to address minor issues identified in the independent review undertaken by BMT
- Issues raised during additional stakeholder, community and landholder consultation since exhibition of the EIS including:
  - Telephone meetings with 18 individual landowners in Narrabri, Bohena Creek, Curban and Narromine regarding afflux and duration increases at their properties
  - A total of 13 meetings with the Hydrology Working Group (attended by DPE's independent hydrologist and representatives from DPE and ARTC).

The assessment also provided/involved:

- Clarifications regarding the flood planning level for the proposal
- Additional information regarding modelling parameters
- Additional modelling for overtopping of the proposal and the unlikely event of formation failure
- Assessment against revised quantitative design limits (formerly referred to as flood management objectives in the EIS) for afflux, velocity, flood hazard and duration, which have been established based on consultation with DPE as discussed further below.

The updated predictions have been taken into account in the assessment provided in section 7 of this report and the responses provided in the Response to Submissions Report.

Further information about the impacts of the proposal incorporating the proposed amendments is provided in section 7.

4.3.1.1 Assessment approach

The flooding and hydrology assessment for the EIS (Technical Report 3) involved assessing potential operational impacts against flood management objectives. For the updated flooding and hydrology assessment, the flood management objectives have been replaced by quantitative design limits that apply to all events up to and including the 1% annual exceedance probability (AEP) event. As a result, the potential impacts identified by Technical Report 3 are not directly comparable with the potential impacts considered by the updated flooding and hydrology assessment. For events larger than the 1% AEP event, the operational assessment approach is similar and the results can, to an extent, be compared between the updated assessment and Technical Report 3.

The quantitative design limits that have been established (in consultation with DPE) consider changes in afflux, velocity, flood hazard and duration. The limits are based on relevant policies, planning controls and guidelines, other Inland Rail projects, and similar infrastructure projects in NSW. Adoption of these limits minimises the risk to public safety, buildings, existing highways and roads, existing rail lines, and land uses.

Section 3.2.2 of the updated flooding and hydrology assessment report provides further information about the quantitative design limits.

In addition to the amendments as described in section 6 of this report, there have been a number of other changes since exhibition of the EIS that have resulted in different impacts being reported in the updated flooding and hydrology assessment report. These include:

- The quantitative design limits use different criteria to assess potential impacts to buildings and land areas
- Buildings are now grouped as being habitable or non-habitable (in accordance with the quantitative design limits). In the EIS they were grouped as being sensitive or other.
- Addition and modification of culverts to the east of Narromine to assist with managing flood flows
- Changes to peak flood flows near Narromine to account for local conditions
- Changes to modelling parameters to address minor comments raised in the independent review undertaken by WBM.

Refer to the updated flooding and hydrology assessment report for further information about these changes.

The amended proposal includes changes to the operational footprint to incorporate drainage control areas at 200 locations along the proposal site. The drainage control areas are proposed to provide additional space outside the rail corridor in which to manage exceedances of the quantitative design limits during detailed design and construction. Further information about the proposed drainage control areas is provided in section 6.7.

The process for identifying the proposed locations for the drainage control areas is detailed in the updated flooding and hydrology assessment report. The proposed drainage control areas represent a conservative scenario in terms of additional land requirements. The proposed drainage control areas were subject to an environmental constraints review to identify opportunities to reduce or avoid property and environmental impacts (e.g. biodiversity, cultural heritage) (refer to Appendix E). Following this review, the drainage control areas have been included within the construction and operational footprints for the proposal and are included in the assessments in section 7. During detailed design, the drainage control areas will be further refined with the aim of minimising property impacts as far as practicable, when further flood modelling is undertaken and the extent of works within each drainage area is confirmed.

4.3.2 Potential impacts

A summary of the key findings of the updated assessment is provided below. Detailed results are provided in the report, which is available separately. ARTC will continue to undertake consultation with a broad range of stakeholders including landowners. This consultation would include property acquisition discussions and ongoing consultation during detailed design. Any individual landowners, including those not affected by property acquisition, can request information regarding the project that is specific to their property. Where the request relates to flooding impacts ARTC would provide property specific information and mapping as required. Web based mapping of existing flood extents and afflux for the 1% AEP event is also available on ARTC's Inland Rail web site at **https://inlandrail.artc.com.au/where-we-go/projects/narromine-to-narrabri/consultation/**

Under existing conditions (i.e. without the proposal), within the study area for the updated flooding and hydrology assessment report, in the 1% AEP event, there are:

- Habitable buildings—2,570 subject to above floor flooding under existing conditions
- Non-habitable buildings—3,628 subject to above floor flooding under existing conditions
- Land areas—about 125,000 ha of land subject to inundation
- Highways and other roads—about 475 km of highways and roads subject to inundation.

4.3.2.1 Assessment against the quantitative design limits

The results of the assessment against the quantitative design limits for events up to and including the 1% AEP event are summarised in Table 4-1.

TABLE 4-1: SUMMARY OF FLOODING ASSESSMENT AGAINST THE QUANTITATIVE DESIGN LIMITS

Parameter	Land use or setting/scenario	Exceedances
Afflux	Habitable buildings	23 habitable buildings
	Non-habitable buildings	28 non-habitable 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 >80 km/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 non-habitable buildings
	Urban and infrastructure land	4.2 ha
	Classified roads managed by TfNSW	1,420 m
	Sealed roads	3,958 m
	Elsewhere (other land)	713.9 ha
Flood duration	Habitable buildings	13 habitable buildings
	Classified roads managed by TfNSW	501 m
	Highways and sealed roads >80 km/hr	1,969 m
	Sealed roads < 80 km/hr and all unsealed public roads	19.3 km
	Elsewhere (other land)	1036 ha

Overall there are no widespread departures from the quantitative design limits. When looking at the departures within the study area the following key conclusions are made:

- Habitable buildings—23 are predicted to be impacted by afflux. This represents about 1 per cent of habitable buildings subject to above-floor flooding under existing conditions in the 1% AEP event. Of the impacted habitable buildings, one is newly flooded above floor by 4 millimetres (mm) (afflux of 11 mm) in the 1% AEP event. All other impacted habitable buildings are subject to above-floor flooding from 40 mm to 1.48 m under existing conditions and would experience afflux varying from 11 to 58 mm.
- Non-habitable buildings—28 are predicted to be impacted by afflux. This represents less than 1 per cent of non-habitable buildings subject to above-floor flooding under existing conditions in the 1% AEP event. Of the impacted non-habitable buildings, one is newly flooded above floor by 21 mm (afflux of 27 mm) in the 1% AEP event. All other impacted non-habitable buildings are subject to above-floor flooding from 85 mm to 1.51 m under existing conditions and would experience afflux varying from 21 to 181 mm.
- Land areas—in total, 2,196 ha of land is predicted to be impacted. This represents about 1.8 per cent of the land areas within the study area subject to flooding under existing conditions in the 1% AEP event.

- Highways and other roads—in total about 52 km of highways and roads are predicted to be impacted. This represents about 11 per cent of highways and roads subject to flooding under existing conditions in the 1% AEP event.

4.3.2.2 Rare flood event assessment

The updated assessment of the proposal against larger flood events (1% AEP with climate change event up to the probable maximum flood (PMF) event) identified the following key findings:

- A total of 5,267 habitable buildings are subject to above-floor flooding under existing conditions. With the proposal, 3,147 would experience an afflux of greater than 10 mm and the majority are already flooded above floor under existing conditions.
- A total of 7,177 non-habitable buildings are subject to above floor-flooding under existing conditions. With the proposal, 3,408 would experience an afflux of greater than 20 mm and the majority are already flooded above floor under existing conditions.
- The average duration of inundation for impacted habitable and non-habitable buildings would be similar to those experienced under existing conditions.
- There are only minor to negligible changes in flooding impacts to highways and roads, and existing rail lines.
- There are only minor to negligible changes in areas of major land uses (forestry, cropping and grazing areas) subject to flooding.

4.3.3 Residual flooding impacts in Narromine and Narrabri

The flooding impacts (residual impacts) in Narromine and Narrabri are discussed in more detail below. These impacts are not additional to those discussed above and are provided to enable more detailed discussion for these towns.

4.3.3.1 Assessment against the quantitative design limits

In relation to potential residual impacts to buildings in Narromine and Narrabri the updated assessment made the following key findings:

- Narromine—four habitable buildings and 11 non-habitable buildings are predicted to be impacted by afflux. Five habitable buildings are predicted to be impacted by duration. These represent less than 1 per cent of buildings subject to above-floor flooding under existing conditions in the 1% AEP event.
- Narrabri—14 habitable buildings and three non-habitable buildings are predicted to be impacted by afflux. Eight habitable buildings are predicted to be impacted by duration. These represent less than 1 per cent of buildings subject to above-floor flooding under existing conditions in the 1% AEP event.

As a result, there are no predicted significant residual impacts associated with the proposal.

4.3.3.2 Rare flood event assessment

The updated assessment against larger flood events in Narromine and Narrabri predicts that there are no predicted significant residual impacts as follows:

- Narromine—as shown in Figure 4-1, in the PMF event under existing conditions there are 1,949 habitable buildings that experience above-floor flooding. This is not expected to significantly change with the proposal.
- Narrabri—as shown in Figure 4-2, in the PMF event under existing conditions there are 3,036 habitable buildings that experience above-floor flooding. This is not expected to significantly change with the proposal.

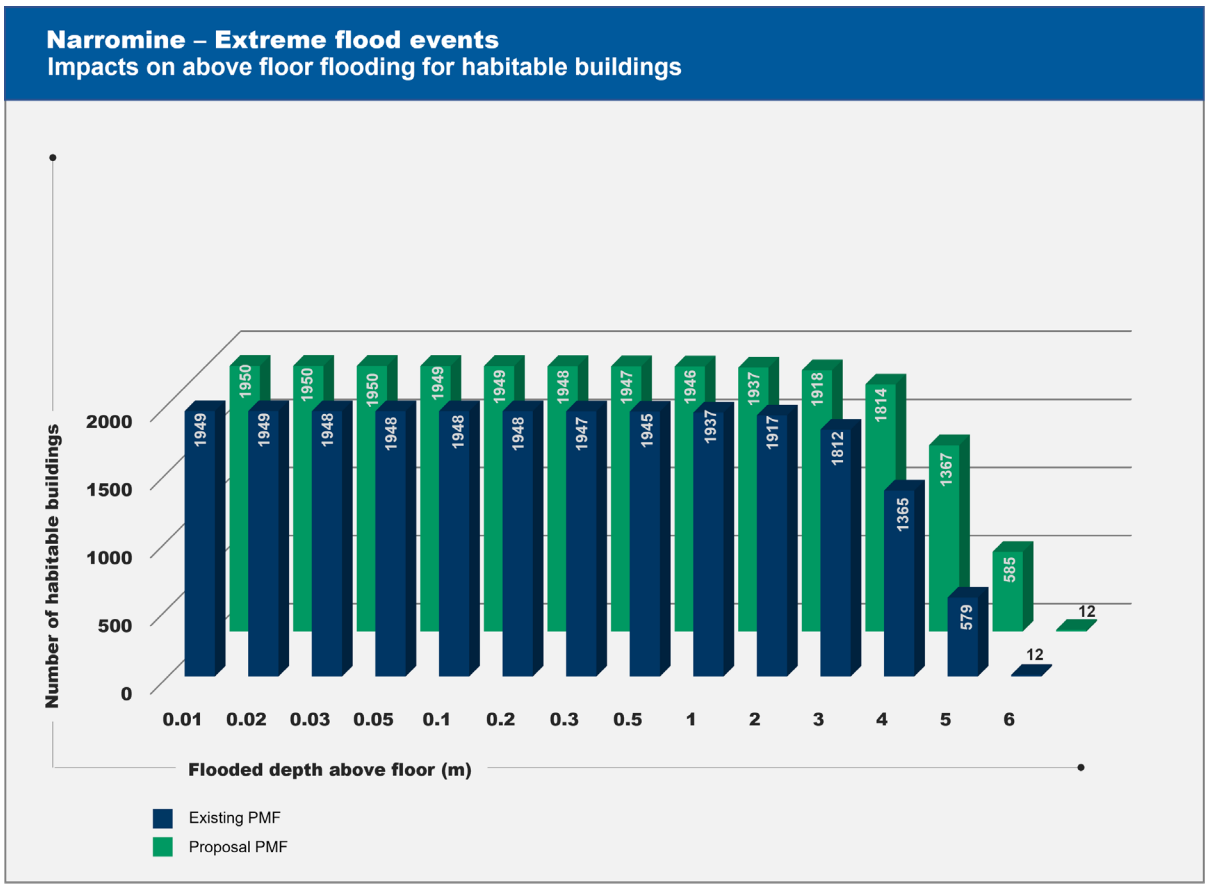

FIGURE 4-1: NAR ROMINE—CUMULATIVE NUMBER OF HABITABLE BUILDINGS SUBJECT TO ABOVE-FLOOR FLOODING IN THE PMF EVENT

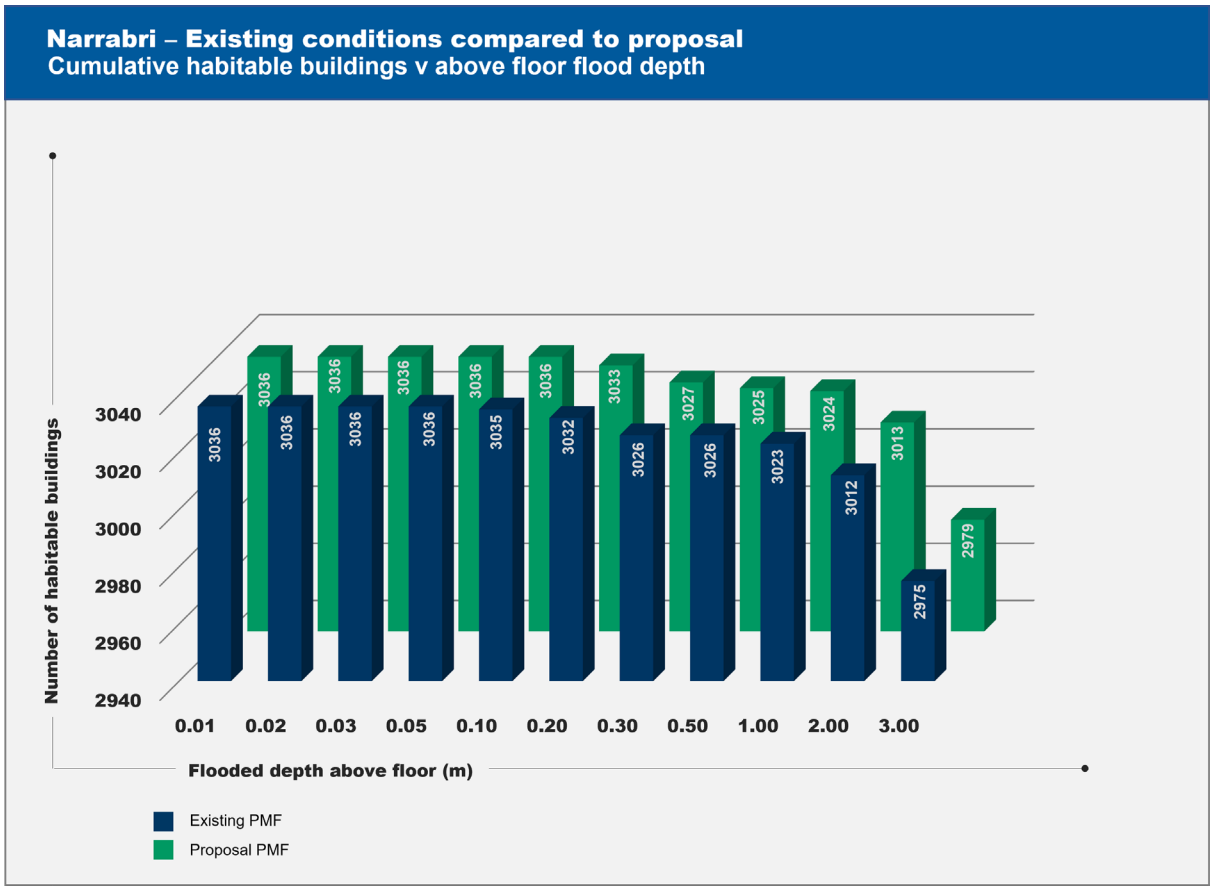

FIGURE 4-2: NARRABRI—CUMULATIVE NUMBER OF HABITABLE BUILDINGS SUBJECT TO ABOVE-FLOOR FLOODING IN THE PMF EVENT

4.3.4 Mitigating residual flood impacts

As described in section 5 of this report, flooding and hydrological considerations have been taken into account in determining the study area, the narrowed focused area of investigation and, finally, the preferred rail corridor for the proposal.

For the majority of the study area, where flooding impacts from the proposal have been assessed as being within the quantitative design limits, the change in flood behaviour is considered to be minimal.

In accordance with amended mitigation measure FH1, additional survey, assessment and modelling would be undertaken during detailed design to confirm building floor levels and determine if the proposal could be modified so that flooding characteristics are not worsened or minimised as far as practicable, up to and including the 1% AEP event (as provided by the quantitative design limits).

As detailed in the updated flooding and hydrology assessment report, at locations where it is not practicable to meet the quantitative design limits, ARTC will manage these departures in accordance with the conditions of approval.

With refinement of the design and flood models during the detailed design phase, potential design solutions that could be considered in addition to providing industry standard scour protection to minimise residual flooding impacts include:

- Replacing culverts with bridges
- Increasing the number of culverts and/or further distribution of culverts
- Extending scour protection into private land with possible provision for improved property access
- Construction of diversion bunds or drainage to protect buildings and land areas.

The ultimate design solution would be subject to detailed design and further consultation with individual landowners.

Refer to the updated flooding and hydrology assessment report for further details on design alternatives that have been considered and could be considered during detailed design.

4.4 Updated noise and vibration assessment—construction and other operations report

The noise and vibration assessment—construction and other operations report, which formed Technical Report 8 for the EIS, assessed the potential impacts of constructing the proposal and operating other proposed infrastructure (that is, the operational noise and vibration impacts associated with roads upgraded or altered as part of the proposal and stationary infrastructure such as maintenance sidings).

The report has been updated to assess the impacts of constructing the proposal as amended by the design changes described in this report. Key changes considered by the updated assessment relate to construction noise and vibration associated with:

- Changes to the public roads requiring realignment due to the proposal
- Changes to the locations of the Narromine North and Baradine temporary workforce accommodation facilities
- Adjustments to the construction footprint.

To assess these changes (described in section 6 of this report) the construction noise models were re-run. The construction noise and vibration predictions have been updated and are presented in the updated report.

The updated report also responds to a submission by the NSW Environment Protection Authority (EPA). The EPA identified that the temporary workforce accommodation facilities were incorrectly assessed according to *Interim Construction Noise Guideline* (DECC, 2009). The potential impacts of the facilities have been assessed in accordance with the *Noise Policy for Industry* (EPA, 2017) and the results are provided in the updated assessment report. The predicted exceedances have increased slightly from 240 to 258 residential receivers during operation of the temporary workforce accommodation facilities.

The updated predictions have been taken into account in the assessment provided in section 7 of this report and the responses provided in the Response to Submissions Report.

Further information about the impacts of the proposal incorporating the proposed amendments is provided in section 7.

4.5 Updated noise and vibration assessment—operational rail report

The noise and vibration assessment—operational rail report, which formed Technical Report 9 for the EIS, assessed the potential noise and vibration impacts of operating trains along the proposed rail infrastructure.

The report has been updated to assess the impacts of the proposal incorporating the amendments described in this report. Key changes considered by the updated assessment relate to train noise and vibration associated with:

- Operation of the amended crossing loop and associated maintenance siding locations
- Operation of the amended public level crossing numbers and locations
- the movement of trains along the rail line incorporating the proposed minor realignments at Narwonah, Nancarrows Road, Narrabri and within Euligal State Forest.

To assess these changes, all operational noise models were re-run. The operational noise and vibration predictions have been updated and are presented in the updated report. As a result of these changes, the updated assessment concludes that the total number of residential receivers that would qualify for consideration of operational noise mitigation would be as follows:

- In 2026, 41 residential receivers would qualify for consideration of operational noise mitigation (compared with 36 in Technical Report 9)
- In 2040, 53 residential receivers would qualify for consideration of operational noise mitigation (compared with 58 in Technical Report 9).

The updated report also addresses a community submission from a property owner located near Narrabri who identified that their residence was not included in Technical Report 9. The updated assessment report provides the predicted operational noise levels at this location.

The updated predictions have been taken into account in the assessment provided in section 7 of this report and the responses provided in the Response to Submissions Report.

Further information about the impacts of the proposal incorporating the proposed amendments is provided in section 7.

4.6 Other assessments undertaken

4.6.1 Addendum social assessment

An addendum social assessment has been prepared to respond to clarification requests from DPE in relation to the findings of the original social assessment, which formed Technical Report 13 for the EIS. The addendum social assessment, which is available separately, provides the following:

- Confirmation of the qualifications of the personnel who prepared the social assessment
- Clarification of how the social assessment aligns with the principles for social impact assessment provided in the *Social Impact Assessment Guideline* (DPIE, 2021)
- Confirmation of the timing of the consultation activities described in the social assessment and any potential impacts from COVID-19 restrictions on these activities
- Summary of the issues raised during consultation to inform the social assessment and where each issue was assessed in the report
- Clarification of the engagement conducted to date with Native Title Applicant Groups
- Addition of a residual impact assessment to the summary of construction and operational impacts, to consider the potential for residual impacts following implementation of the proposed mitigation measures
- Clarification of the intent to prepare a social impact management plan (SIMP) to manage the implementation of the socio-economic mitigation measures (provided in the EIS and (as amended) in section 8.2 of this report), and the specific actions and targets that would be developed to deliver social benefits for the proposal.

4.6.2 Addendum Aboriginal cultural heritage assessment report

The Aboriginal cultural heritage assessment report formed Technical Report 6 for the EIS. An addendum Aboriginal cultural heritage assessment report has been prepared to assess the change in construction and operation footprints described in section 6.7 of this report. The addendum Aboriginal cultural heritage assessment has been undertaken, and the report prepared, with reference to the SEARs, the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a). A copy of the draft report was provided to the Registered Aboriginal Parties (RAPs), Local Aboriginal Land Councils (LALCs) and native title claimants for comment. The addendum report is available separately.

The amended footprint resulted in a change to the impacts on four sites registered by the Aboriginal heritage information management system (AHIMS). As a result of these changes, the addendum assessment concluded that:

- There would be a reduction in impact on the two artefact scatter sites, from complete to partial.
- Two additional modified trees would be located within the amended construction footprint; however, these trees would be able to be retained insitu and would not be impacted, provided that standard protection measures are implemented.

An additional mitigation measure has been developed (mitigation measure AH7) to protect and further minimise risk of inadvertent harm to the two additional modified trees.

4.6.3 Traffic and transport

The assessment of potential delays to road traffic at level crossings contained within Technical Report 10—Traffic and transport assessment has been updated as described below.

The original assessment of potential delays to road traffic at level crossings was undertaken as described in section 6.2.1 of Technical Report 10. The assessment was based on a number of assumptions, including that train speeds would be 115 km/hr; however, as noted in section A1.2.4 of the EIS, train speeds would vary according to axle loads, and range from 80 to 115 km/hr.

The assessment methodology used for the level crossing assessment also included traffic volume information from traffic surveys undertaken in November 2018 and February 2019. This information was used to represent typical (average) conditions within the study area and was the basis for assessing travel delay and queue lengths at the proposed Castlereagh Highway level crossing; however, the prevailing drought conditions at the time the surveys were undertaken affected the harvest period, and it is noted that the traffic surveys may not be representative of the numbers and types of vehicles during a typical harvest period. To address this issue, additional traffic counts were undertaken in November 2020 during a harvest period that produced higher than average yield. As a result of this strong harvest period, higher traffic volumes were experienced along some of the roads in the study area, particularly from heavy vehicles.

To understand the potential impacts at level crossings from higher traffic activity and different train speeds, the traffic analysis at the proposed Castlereagh Highway level crossing has been updated.

The results from the traffic survey undertaken in November 2020 indicated that traffic volumes were about 40 per cent higher than during a 'typical' period, and the proportion of heavy vehicles using Castlereagh Highway increased from about 15 per cent on a typical day to 31 per cent during the harvest period. Based on the harvest period traffic counts and forecast traffic growth, traffic volumes on Castlereagh Highway would be 153 vehicle movements (two way) during the peak period in 2026 and 176 vehicle movements (two way) during the peak period in 2040.

The maximum delays and associated number of vehicles delayed for trains travelling at 80 km/hr and 115 km/hr, based on traffic volumes from the November 2020 harvest period, are provided in Table 4-2. The calculations made for this assessment are provided in Appendix C of the Response to Submissions report, which is available separately. The delays listed in Table 4-2 are considered representative of the time it would take for the opening of the crossing. Table 4-3 provides the maximum delay for the last vehicle in the queue, assuming this is a heavy vehicle with an average speed of 10 km/hr.

The results indicate that the delays and vehicle queue lengths at level crossings would increase if the train speed was 80 km/hr compared to 115 kilometres per hour, which is to be expected. The delays and queue lengths provided in Table 4-2 and Table 4-3 are considered a worst case, as the analysis used a conservative estimate of traffic growth, and the traffic volumes used in the analysis were from a harvest period that had greater than average yields.

TABLE 4-2: CASTLEREAGH HIGHWAY LEVEL CROSSING DELAYS

Scenario [1]		Estimated maximum delay		
Opening year	Train speed (km/hr)	Time (seconds)	No. of vehicles delayed (two-way)	Queue length (m)
2026	80	121	9	74
2026	115	96	8	66
2040	80	121	10	82
2040	115	96	9	74

1. Based on a train with a maximum length of 1,800 metres

TABLE 4-3: CASTLEREAGH HIGHWAY REAL TRAFFIC DELAY

Scenario [1]		Estimated maximum delay		
Opening year	Train speed (km/hr)	Time for level crossing to open (seconds)	Additional delay for last vehicle in queue (seconds)	Total delay (seconds)
2026	80	121	27	148
2026	115	96	24	120
2040	80	121	30	151
2040	115	96	27	123

1. Based on a train with a maximum length of 1,800 m

Delays at all other proposed level crossings would be much less than those reported for the Castlereagh Highway level crossing.

Potential impacts on road users due to level crossing delays would be managed by implementing the management approach described in section B11.5 of the EIS, and the mitigation measures provided in section 8.2 of this report. The increase in delays and vehicle queue lengths at level crossings would not require any changes or additions to the traffic and transport mitigation measures that were originally provided in the EIS.

4.6.4 Aboriginal community and stakeholder engagement preliminary framework

An Aboriginal community and stakeholder engagement preliminary framework has been prepared to provide an overarching framework for engagement with Aboriginal stakeholders and communities during future stages of the proposal. The framework also draws together the commitments for these stages that are considered most relevant to Aboriginal communities.

A detailed Aboriginal community and stakeholder engagement strategy and action plan would be prepared by ARTC during the detailed design phase, in accordance with the framework and new mitigation measure SE3 (see section 8.2 of this report).

4.6.5 Cumulative assessment

ARTC propose to construct the Narwonah Materials Distribution Centre (MDC) adjacent to the southern end of Narromine to Narrabri section of Inland Rail (the proposal). The MDC will be used for temporary track material storage and management prior to their distribution to multiple Inland Rail projects across NSW, including the proposal. An assessment to consider the potential cumulative impacts of the proposal and the MDC has been undertaken and is provided in section 7.7.

5. Additional information on route selection and alternatives

5.1 Overview/context

Inland Rail is a once-in-a-generation program that will complete the backbone of the national freight rail network, enabling Australia to have world-class supply chains, meeting the objectives of the *Inland Rail Implementation Group Report* and the *Inland Rail Program Business Case* (the Business Case) (ARTC, 2015).

To achieve these objectives, Inland Rail has to meet the needs of customers for a rail line that enables trains to carry freight between Melbourne and Brisbane:

- In a comparable timeframe to that achieved by trucks
- At less cost than provided by trucks
- With reliability and predictability comparable to that provided by trucks.

Inland Rail has undergone a progressive route development and selection process since 2006—each stage refining the focus on what is required to deliver the Inland Rail program.

The planned Inland Rail route is about 1,715 km between Melbourne and Brisbane. The Inland Rail route comprises about:

- 1,087 km of track upgrades, enhancements or construction of new track within existing rail corridors (brownfield sections)
- 628 km of track in new rail corridors (greenfield sections).

Along the entire route, track upgrades or enhancements, or use of existing rail corridors, account for 63 per cent of the route. The longest section requiring a new rail corridor, and offering the greatest opportunity to save time and distance, is the proposal section (between Narromine and Narrabri). This section is about 306 km long and forms about 50 per cent of the greenfield sections.

As described in section 1.4.2 of this report, a route selection summary report has been prepared to respond to the Planning Secretary's direction to provide additional information on alternative rail alignments considered and how these alternatives were analysed to inform selection of the preferred route for the proposal. The route selection summary report is provided in Appendix B to this report. The report provides a summary of key route option development, and assessment processes and outcomes for the Narromine to Narrabri section of Inland Rail. It describes the decisions that shaped the development of the proposal from 2006, with a focus on the assessment of options for the proposal between 2016 and 2020, including the key locational decisions made. The report describes the process of confirming the study area for the route between Narromine and Narrabri, and the route options considered during the main route option assessment phases for the proposal.

The route selection summary report also includes information on the extent to which flooding and hydrological considerations were taken into account in determining the study area and, subsequently, the narrowed focused area of investigation within the study area. It describes how the route assessment process was undertaken, including the multi-criteria analysis (MCA) and consultation processes.

Further information on the results of the flooding assessment for the proposal is provided in the EIS and the updated flooding and hydrology assessment report (see section 4.3 of this report).

Further information on the background to developing Inland Rail and the study area for the Narromine to Narrabri section is provided in sections 1 and 2 of the route selection summary report.

5.1.1 Issues raised in submissions

A summary of the key issues raised in submissions about the route selection process, and where relevant information is provided in the route selection summary report, is provided in Table 5-1. Further information on issues raised in submissions (including more detailed summaries of the issues raised) is provided in the Response to Submissions report.

TABLE 5-1: KEY ISSUES RAISED IN COMMUNITY AND AGENCY SUBMISSIONS

Key issue	Summary of types of issues raised	Where addressed in the route selection summary report (Appendix B)
Consideration of alternatives to Inland Rail in the location proposed	▸ Consistency with original alignment for Inland Rail ▸ Why does the route travel between Narromine and Narrabri? ▸ Why was a greenfield section considered rather than upgrading existing rail lines/travelling via Werris Creek?	Sections 1 and 2 (particularly sections 2.1 to 2.3)
Location in relation to Narromine	▸ Concerns about locating the alignment to the east of Narromine and how this option was selected ▸ Change in route location from the original location (to the west of Narromine) to the current location (to the east of Narromine) ▸ Concerns regarding proximity to Narromine ▸ Location in a floodplain and consideration of potential flooding impacts in the option selection and assessment process	Sections 2 (particularly 2.4.1) and 3 (particularly 3.2.1)
Location in relation to Narrabri	▸ Concerns regarding proximity to Narrabri ▸ Selection of location near Narrabri ▸ Location in a floodplain area and consideration of potential flooding impacts in the option selection and assessment process	Sections 2 (particularly 2.4.6) and 3 (particularly 3.2.2)
Consideration of flooding issues	▸ How were flooding issues considered as part of the assessment process, particularly in the vicinity of Narromine and Narrabri? ▸ Were local flooding issues adequately considered? ▸ Did adequate consideration of flooding issues form part of the MCA process?	Sections 2 to 4, including sections 2.4.1 and 2.4.6
Consideration of identified options	▸ Were the options nominated in individual submissions considered? (It is noted that individual submissions suggested a wide range of options that should have been considered/preferred) ▸ Were existing rail alignments considered? ▸ The alignment should travel via Gilgandra ▸ An alternative alignment via Coonamble would be better	Sections 2 (particularly section 2.4) and 3
Route through the Pilliga forests	▸ Why was a route through the Pilliga forests selected as the preferred option? ▸ Concerns regarding the change in the route from one to the west of the Pilliga forests to a route through the forests	Section 2.4.5
Assessment of options and the MCA process	▸ How where options assessed and selected? ▸ Concerns regarding adequacy of the MCA process ▸ Were the community and landholders consulted during the option selection process?	Section 4
Justification for the preferred option	▸ Why is the proposed route (as described in the EIS) preferred?	This issue is addressed in section 5.3 of this report.

5.2 The route option assessment process

Numerous options have been generated and assessed, and the route has been progressively refined, during a comprehensive range of investigations and alignment studies over the following key periods:

Confirmation of the initial alignment and development of the base case for Inland Rail as a whole

The alignment for Inland Rail as a whole was progressively refined between 2006 and 2015, with key studies and reports including the *North–South Rail Corridor Study* (2006), Me*lbourne–Brisbane Inland Rail Alignment Study* (2010) and the *Inland Rail Implementation Group Report* (2015). Further information is provided in sections 1 and 2 of the route selection summary report.

Route options assessment for the proposal

The route options process for the proposal involved the two main phases outlined in Table 5-2. Phase 1 of the options process commenced in 2016 following confirmation of the initial alignment and development of the base case for Inland Rail. The options analysis during this phase considered the preferred location for the route between Narromine and Narrabri. Once a feasible preferred route was identified for the various route sections, a wider study area was identified around the route to provide opportunities to further refine the route during phase 2, to minimise flooding, community and environmental impacts. Phase 1 of the route options process is described in section 2 of the route selection summary report.

TABLE 5-2: PHASES IN THE ROUTE OPTIONS PROCESS

Phase	Timing	Purpose/outcome
Phase 1 Confirming the study area and identifying a concept alignment	2016–2017	▸ Detailed review of the Narromine to Narrabri section based on the route selected in the alignment study (the base case) and endorsed (with certain variations and recommendations) by the Inland Rail Implementation Group in 2015. ▸ Identification of the study area and concept alignment, and announcement of the study area on 18 November 2017 by the (then) Australian Minister for Infrastructure and Transport.
Phase 2 Reference design option assessment	2018–2020	▸ Narrowing the study area to a focused area of investigation for detailed investigations and further targeted consultation with directly affected landholders. ▸ Finalising the preferred alignment and developing the reference design (as described in the EIS) for approval.

On 18 November 2017 the (then) Australian Minister for Infrastructure and Transport (Hon Darren Chester MP) announced the study area for the greenfield section of Inland Rail between Narromine and Narrabri. The study area was formally acknowledged by the NSW and Australian Governments in 2018. The study area varied in width, from about 5-km wide south and east of Narromine, to about 500 m in other sections.

During phase 2, further investigations were undertaken within the study area, including consideration of options for a more focused area of investigation (about 150 to 400 m wide). This is described in section 3 of the route selection summary report.

The process of analysing the identified options, including the MCA workshops and consultation undertaken, is described in section 4 of the route selection summary report.

5.3 Justification for the preferred route option

5.3.1 Background

Inland Rail has undergone a progressive route development and selection process since 2006, each stage refining the focus on what is required to deliver the Inland Rail program. The route selection summary report (Appendix B) summarises the key steps in developing and identifying the preferred alignment for Inland Rail as a whole (including the proposal) over the last 15 years.

As described in section 1.1 of the route selection summary report, a critical component in developing the route was work undertaken to understand the factors that freight firms and customers take into account when determining whether to send freight by road, rail or sea. These factors of price, reliability, availability and transit time were subsequently reaffirmed following consultation by ARTC and the Department of Infrastructure and Regional Development with freight forwarders, rail operators and customers. As a result of this consultation, ARTC formalised the Inland Rail Service Offering (see Figure 5-1).

The key characteristics of the service offering are **transit time, reliability, price** and **availability**. These service offering characteristics are underpinned by key technical characteristics that are particularly relevant to rail operators as they directly influence operating cost structures and service offerings to market.

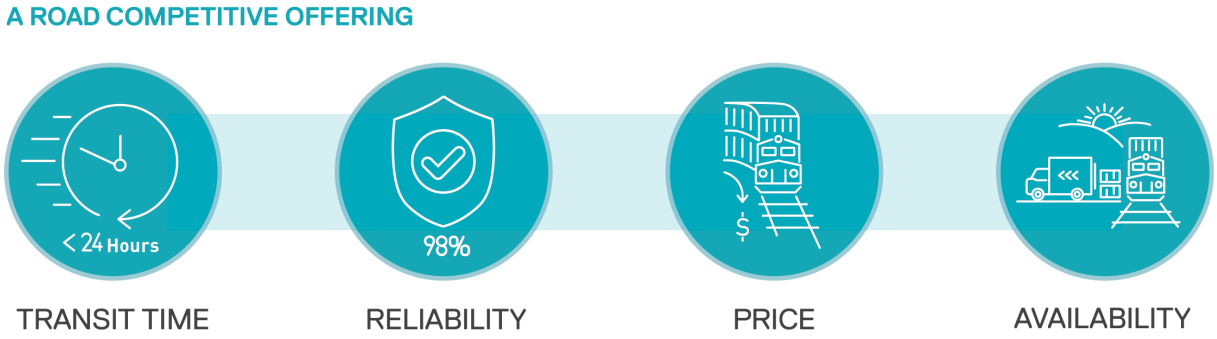

FIGURE 5-1: INLAND RAIL SERVICE OFFERING

The following sections provide a summary of the justification for selection of the preferred route between Narromine and Narrabri. It is based on the route selection processes provided in the route selection summary report and provides additional comparative information as relevant.

5.3.2 Justification for a direct route between Narromine and Narrabri

To be as competitive as possible with road, it is desirable that the Melbourne to Brisbane transit time for express trains should allow for freight delivery in a time as close to road transit time as feasible. The studies and consultation undertaken since 2006 (see section 1.1 of the route selection summary report) confirmed that the Inland Rail Service Offering can only be achieved by routing Inland Rail across significant sections of greenfield areas where there is currently no existing rail line or rail corridor.

As described in section 2.1 of the route selection summary report, transit time and distance are critical considerations in route selection. The length of the route and overall transit time between Melbourne and Brisbane drive the key economic benefits that underpin the business case.

Transit time and distance drive operating costs, which in turn determines the price that Inland Rail can offer compared with transporting freight by road. Together with improved operating parameters (train length and double stacking), these factors drive the cost saving per tonne for moving freight from road to Inland Rail. To meet market needs, a Melbourne to Brisbane transit time of under 24 hours is necessary to compete with road in the time-sensitive express market for intercapital city freight.

Because of the significance of the above factors, route selection has a major bearing on the overall performance of Inland Rail. It is the principal reason why Inland Rail includes significant greenfield sections—the greenfield sections underpin the improved economic performance driven by the reduced distances and transit time. The Narromine to Narrabri section of Inland Rail is the longest greenfield section. To attain the required 24-hour Melbourne to Brisbane transit time the travel time for this section needs to be as efficient and short as possible.

The early route selection processes, as documented in the *Melbourne to Brisbane Inland Rail Alignment Study* (ARTC, 2010), considered a greenfield Narromine to Narrabri section compared to a route using existing corridors via Werris Creek (see section 2.2 for the route selection summary report). The study confirmed that the shorter greenfield route between Narromine and Narrabri increased the forecast demand and revenue, and enhanced the economic benefits, of the Inland Rail program as a whole.

5.3.3 Justification for the preferred route

Between 2016 and 2019 numerous route options were identified, investigated and assessed with consideration of:

- Ability to enhance the Inland Rail Service Offering
- Construction and operating costs
- Outcomes from assessment of route options, including the results of the MCA process.

The final step in the process was that ARTC made a recommendation to the Minister for Infrastructure and Transport through the Inland Rail Sponsors Group.

This initially involved confirmation of a study area, between about 500 m and 5 km wide. On 18 November 2017 the (then) Australian Minister for Infrastructure and Transport (Hon Darren Chester MP) announced the study area for the greenfield section of Inland Rail between Narromine and Narrabri. Following further investigations and assessment the study area was then refined to a narrowed focused area of investigation and ultimately the preferred rail corridor.

The process has been rigorous and involved a comprehensive review of options for a feasible route. As described in section 4 of the route selection summary report, the process involved an MCA assessment process, and a consultation and engagement process.

MCA seeks to identify a balanced outcome that optimises the various factors to maximise the overall benefit of the recommended option. The purpose of an MCA is to permit a comparative assessment of route options, resulting in an indication as to which option/s warrant further consideration. The option is then assessed for its ability to enhance the Inland Rail Service Offering and whether its estimated construction and operating costs are appropriate for any perceived benefits.

It is important to note that the outcome of any MCA is just one factor in choosing between competing route options and not a determining factor in its own right. An MCA in itself is not the sole framework for determining which route option is superior to others.

The MCA process took into account a wide range of criteria including:

- Engineering and technical factors (including flood immunity and hydrology)
- Social and community impacts
- Number of properties directly impacted
- Environmental impacts (including flooding and waterway impacts)
- Geotechnical and constructability related issues.

Flooding is a key consideration as part of the process; however, it is only one of many criteria (and sub-criteria) used to assess the options. For example, an option that may perform better from a flooding perspective could perform worse from a transit time or environmental and community (such as noise) impact perspective, resulting in that option not performing the best overall. In addition, the impacts of an option, such as flooding or noise, can often be resolved through engineering design and mitigation and, as such, do not necessarily mean an option will be discounted.

Further information on the route selection process is provided in section 4 of the route selection summary report.

Why is the preferred option east of Narromine?

Options both to the east and west of Narromine were considered. Overall, the decision to go to the east of Narromine was based on better technical viability, constructability and safety outcomes. In particular, options to the east had a shorter length within the Macquarie River floodplain relative to the western option (about 50 per cent less), which traversed the floodplain and associated soft alluvial soils for about half of the option's length. About 10 km of track (including about 1.6 km of structures) would need to cross the floodplain to the east of Narromine, compared with about 21 km (including about 15.9 km of structures) to the west.

Selection of the western option would have resulted in increased flooding risks to properties on the western side of Narromine, with the potential to also impact the town.

The eastern option is further away from the town of Narromine, thus further minimising the potential for community and amenity impacts.

The eastern option also provided the opportunity to have an expanded study area (to about 5 km). This maximised the design flexibility to identify an alignment that avoided or minimised the flooding effects of the Backwater Cowal, minimised noise impacts within the town of Narromine, and targeted better crossing points of the Dubbo to Narromine rail line, the Mitchell Highway and the Macquarie River.

Following further consideration and assessment of various eastern options within the 5-km wide study area, the preferred route was selected. Relative to the other feasible options, the preferred route offered the following key benefits:

- It is located on the southern edge of the wide study area, minimising the potential for community and amenity impacts
- It is located further upstream of Narromine thereby reducing flooding risks to the town

- It has a shorter crossing of the Macquarie River, minimising the need for structures and earthworks within the main floodway, thereby reducing flooding risks and construction costs
- After crossing the Macquarie River, the alignment follows a ridge line, generally parallel to Eumungerie Road. In this area, this option has relatively good geotechnical conditions and no flooding risks.

Why not via Gilgandra?

Options that used various lengths of the existing Dubbo to Coonamble line south of Curban, or traversed farmland to the west of and close to Gilgandra, were discounted due to longer distances (increased transit time), higher construction costs, operational interface issues, and potential community and amenity impacts for Gilgandra and surrounds.

Why not via Coonamble or Gulargambone?

Options that used various lengths of the existing Dubbo to Coonamble line north of Curban (via Coonamble or Gulargambone) were discounted due to longer distances (increased transit time), higher construction costs and increased flooding issues.

All options that travelled towards Coonamble were located lower in the Castlereagh River catchment resulting in increasing volumes of floodwaters that would need to be managed. This would, in turn, increase flooding risks to any properties or towns located near those options. When considered with the increasing areas of soft alluvial soils that would be traversed, and interface issues with existing train movements, construction costs and complexity would also increase.

Additional economic analysis undertaken by ARTC also demonstrated that the costs of Inland Rail travelling via Coonamble were greater than the benefits. The analysis of options proposed for Inland Rail to go via Coonamble show that even relatively small increases in transit time and distance translate into significant economic disbenefit over the life of Inland Rail. Further analysis by ARTC demonstrated that upgrades to the existing line (separate to the Inland Rail program) would be more beneficial for freight users using the existing line.

Why via the Pilliga forests?

Options that traversed the Pilliga forests were found to perform better than the original 2016 concept alignment that ran further to the west and north. This was mainly due to shorter distances (decreased transit time), lower construction costs and reduced property impacts. In particular, there are numerous small properties located to the north of the Pilliga forests that would have been directly impacted by the 2016 concept alignment. These impacts would have included property acquisition, property severance and amenity changes.

Other advantages of a route through the Pilliga forests relative to the 2016 concept alignment included improved geotechnical conditions and reduced hydrology impacts.

Why is the preferred option on the western edge of Narrabri?

Options through and to the east and west of Narrabri were initially considered; however, options through and to the east of Narrabri were not considered viable primarily due to operational constraints, community severance and amenity impacts within Narrabri and impacts to future growth areas to the east of Narrabri.

The flooding risks associated with going to the west of Narrabri were well understood. As a result, various options up to about 10 km to the west of Narrabri were considered. Overall those options which were located further to the west were located lower in the Namoi River/Narrabri Creek River catchment resulting in increasing volumes of floodwaters that would need to be managed. This would, in turn, increase flooding risks for properties located near those options. When considered with the increasing areas of soft alluvial soils that would be traversed and need for longer bridges to cross the wider floodplain, construction costs and complexity would also increase. In addition, options further to the west would be longer and would reduce the benefits gained from the alignment through the Pilliga forests. These options also rejoined the existing rail line further to the north of Narrabri, resulting in direct impacts to more properties and irrigation infrastructure; therefore, the far western options were not included in the study area.

Following further consideration and assessment of the remaining options within the 2-km wide study area to the west of Narrabri the preferred route was selected. Relative to the other feasible options, the preferred route offered the following key benefits:

- It was located further to the west and therefore minimises community and amenity impacts
- It had a shorter crossing of the floodplain, minimising the need for structures and earthworks within the main floodway, thereby reducing construction costs.

6. Description of the amendments

6.1 Overview

Concurrent with public exhibition of the EIS, ARTC has undertaken further investigations and is proposing a number of design amendments to the proposal. The aim of these amendments is to minimise the potential impacts of the proposal where practicable, particularly in respect of land use and properties, and traffic and access impacts, and to take into account further design development.

As noted in Table 1-1 of this report, it is proposed to amend the following features of the proposal:

- Crossing loops
- Public level crossings
- Public road closures
- Public road realignments
- Temporary workforce accommodation
- Construction and operation footprints.

Table 6-1 provides a summary of the amended proposal's operational features compared with those of the exhibited proposal. Table 6-2 provides a summary of the amended proposal's construction methodology compared with that of the exhibited proposal. A detailed description of, and justification for, the proposed amendments is provided in sections 6.2 to 6.7.

The proposal description chapters provided in the EIS (chapters A7 and A8) have been updated, taking into account the proposed amendments. The updated proposal description is provided in Appendix A of this report.

6.1.1 Amended proposal—features and operations

The proposed design and operational features, and how these changed for the current (amended) proposed compared to the original (exhibited) proposal are summarised in Table 6-1.

TABLE 6-1: KEY FEATURES AND OPERATION

Proposal element	Exhibited proposal	Amended proposal	Figure reference
Rail infrastructure			
Rail corridor	About 306 km of new rail corridor is proposed between Narromine and Narrabri. The new rail corridor would have a minimum width of 40 m, with some variation to accommodate particular infrastructure (such as crossing loops and drainage control areas) and to cater for local topography.	As per the exhibited proposal.	Updated map book
New railway	The new railway would consist of track and concrete sleepers laid on ballast. The ballast would overlay the formation, which would comprise capping, general fill and structural layers consisting of different grade material.	As per the exhibited proposal.	Figure 1.2 in Appendix A

Proposal element	Exhibited proposal	Amended proposal	Figure reference
Crossing loops	Seven crossing loops proposed at the following locations: ▸ Burroway ▸ Balladoran ▸ Curban ▸ Black Hollow/Quanda ▸ Baradine ▸ The Pilliga ▸ Bohena Creek.	Seven crossing loops are proposed. The locations have been refined, with five of the new crossing loops in a different location in the same locality, and two in a different locality (see section 6.2). The proposed locations of the crossing loops are now as follows: ▸ Burroway ▸ Balladoran ▸ Armatree/Tonderburine ▸ Mt Tenandra ▸ Baradine ▸ The Pilliga ▸ Bohena Creek. There would be no change to the crossing loop design or construction methodology, as described in sections A7.3.3 and A8.4.4 of the EIS, respectively.	Figure 6-1 shows the new locations of the crossing loops compared to the original locations as per the exhibited proposal.
Bridges	75 new bridges would be provided along the rail alignment, ranging in length from 15 to 3,940 m.	As per the exhibited proposal. Additional information on bridge heights and lengths have been provided in Appendix A.	Updated map book and Appendix A
Culverts	About 630 culverts of varying types and sizes under the main line and potential future connections.	As per the exhibited proposal, with the exception of the addition of drainage control areas to provide sufficient space outside the rail corridor for the management of flow velocities at culverts. These would be provided at 200 locations along the proposal site.	Updated map book
Narromine West connection	The Narromine West connection is a possible future connection, which would include about 1.2 km of new track to allow trains travelling from the west to access Inland Rail.	As per the exhibited proposal.	Figure 1.4 in Appendix A
Connections with other rail lines	Connections with four existing rail lines that are part of the ARTC and Country Regional Network rail networks: ▸ Parkes to Narromine—The southern end of the proposal would connect to the northern end of the Parkes to Narromine Line. ▸ Dubbo to Coonamble—An at-grade connection would provide connectivity with the Dubbo to Coonamble Line. ▸ Narrabri to Walgett Line—About 1.8 km of new track would be provided to allow trains travelling on the Narrabri to Walgett Line from the west to access the proposal and travel south. The proposed connection is a possible future connection that may be constructed at a later date. ▸ Narrabri to North Star—The northern end of the proposal would connect to the southern end of the Narrabri to North Star section of Inland Rail.	As per the exhibited proposal.	Figures 1.5 to 1.8 in Appendix A

Proposal element	Exhibited proposal	Amended proposal	Figure reference
Public level crossings	51 new public level crossings would be provided, consisting of: ▸ 12 with active controls ▸ 39 with passive controls.	49 new public level crossings would be provided, consisting of: ▸ 15 with active controls ▸ 34 with passive controls. In addition, two existing level crossings would have their controls upgraded from passive to active.	Figure 6-3 shows the change in level crossings between the exhibited proposal and the amended proposal (shown in purple in legend).
Private level crossings	Provision of private level crossings was allowed for in the reference design at the EIS stage, however location details were not provided as these are still to be agreed with landowners as part of the property acquisition process.	Further detail in relation to private level crossings has been included in section 6.4.	n/a
Ancillary infrastructure	Ancillary infrastructure would include: ▸ Embankments and cuttings ▸ Track drainage ▸ Turnouts ▸ Corridor fencing ▸ Operational access roads ▸ Signage ▸ Signalling and communications ▸ Power ▸ Stock underpasses.	As per the exhibited proposal with the exception that for travelling stock reserve R3420, access across the rail corridor would now be provided underneath the Ewenmar Creek bridge, instead of via a level crossing at the intersection with Collie Road.	Updated map book
Road infrastructure			
Public road closures	The following council-managed made roads would be closed: ▸ Dappo Road ▸ Brooks Road ▸ Nalders Access Road ▸ Munns Road. Of these roads, only Dappo Road would be completely closed. The following access tracks/road reserves would be closed or closed/realigned: ▸ Bardens Road ▸ 14 forestry tracks/roads. Of the 42 tracks and paper roads that the rail corridor interacts with: ▸ One would be provided with an underpass ▸ Three provided with passive level crossings.	The following council-managed made roads would be closed: ▸ Dappo Road ▸ Munns Road. Of these roads, only Dappo Road would be completely closed. The amended proposal includes closure or closure/realignment of 14 forestry tracks/roads. Of the 42 tracks and paper roads that the rail corridor interacts with: ▸ One would be provided with an underpass ▸ One would be provided with a passive level crossing ▸ One would be closed with alternative access provided.	Updated map book
Public road realignments	Realignment of 53 public roads, including Pilliga Forest Way.	Realignment of 51 public roads, including Pilliga Forest Way and Nancarrows Road.	Updated map book
Urban design and landscaping			
Urban design and landscape plan	During detailed design, an urban design and landscape plan would be prepared by a suitably qualified consultant in consultation with relevant stakeholders. The plan would guide appropriate urban design responses for key infrastructure, and landscaping approaches for the operational footprint.	As per the exhibited proposal.	Not applicable

Proposal element	Exhibited proposal	Amended proposal	Figure reference
Operation footprint and land requirements			
Operational footprint	1,805 ha	1,986 ha	Updated map book
Permanent land requirements	About 1,723 ha of land would be permanently required for the proposed operational infrastructure. These requirements were anticipated to include about: ▸ 1,222 ha of privately owned land ▸ 501 ha of publicly owned land, mainly owned by the NSW Government.	About 1,834.1 ha of land would be permanently required for the proposed operational infrastructure. These requirements are anticipated to include about: ▸ 1,226.1 ha of privately owned land ▸ 608 ha of publicly owned land.	Table D.1 in Appendix D
Operation of the proposal			
Train operations	Inland Rail as a whole would be operational once all 13 sections are complete, which is estimated to be in 2025 Inland Rail would initially involve operation of a single rail track with crossing loops, to accommodate double-stacked freight trains up to 1,800 m long and 6.5 m high. Train speeds would vary according to axle loads and range from 80 to 115 km/hr. It is estimated that Inland Rail would be trafficked by an average of 10 trains per day (both directions) in 2025, increasing to about 14 trains per day (both directions) in 2040	As per the exhibited proposal, with the exception that the proposal is expected to be operational in 2026 and Inland Rail as a whole is now estimated to be operational in 2027.	Not applicable
Other	Standard ARTC maintenance activities would be undertaken during operation and an operational workforce of about 10 people would be required. The design would be undertaken with an emphasis on safety, and community education programs would be implemented prior to and during operation. Works within the rail corridor would be undertaken in accordance with ARTC's standard operating procedures.	As per the exhibited proposal	Not applicable

6.1.2 Construction of the amended proposal

The following aspects of the construction methodology would be the same for the amended proposal as the exhibited proposal:

- The construction strategy to divide the proposal site into four construction areas (described in section A8.1 of the EIS and Appendix A of this report)
- The construction methodology associated with:
  - Pre-construction activities (described in section A8.2 of the EIS and Appendix A of this report)
  - Site establishment and preliminary activities (described in section A8.3 of the EIS and Appendix A of this report)
  - Main construction works for rail infrastructure (described in section A8.4 of the EIS and Appendix A of this report)
  - Main construction works for road infrastructure (described in section A8.5 of the EIS and Appendix A of this report)
  - Testing and commissioning (described in section A8.6 of the EIS and Appendix A of this report)
  - Finishing and rehabilitation (described in section A8.7 of the EIS and Appendix A of this report)
- The construction program and timing, including the construction working hours (described in section A8.8 of the EIS and Appendix A of this report)
- The location and use of the following construction infrastructure:
  - Borrow pits (described in section A8.9.1 of the EIS and Appendix A of this report)
  - Multi-function compounds (described in section A8.9.2 of the EIS and Appendix A of this report)
  - Welding yards (described in section A8.9.6 of the EIS and Appendix A of this report)
  - Concrete precast yards (described in section A8.9.7 of the EIS and Appendix A of this report)
- Construction resources, including workforce numbers, construction materials, plant and equipment, and site services (described in sections A8.10.1 to A8.10.4 of the EIS and Appendix A of this report)
- Construction access, including access to and within the amended proposal site, and construction traffic numbers (described in section A8.11 of the EIS and Appendix A of this report)
- How public safety would be managed during construction (described in section A8.13 of the EIS and Appendix A of this report).

Table 6-2 provides a summary of the amended proposal's construction methodology compared with that for the exhibited proposal for those aspects of the construction methodology that have changed.

TABLE 6-2: CONSTRUCTION METHODOLOGY

Proposal element	Exhibited proposal	Amended proposal	Figure reference
Construction footprint and land requirements			
Construction footprint	3,316.5 ha	3,489.3 ha	Updated map book
Temporary land requirements	About 1,612 ha of land would be temporarily required in addition to the permanent land requirements. These requirements were anticipated to include about: - 1,158 ha of privately owned land - 454 hectares of publicly owned land, mainly owned by the NSW Government.	About 1,732 ha of land would be temporarily required in addition to the permanent land requirements. These requirements are anticipated to include about: - 1,248.5 ha of privately owned land - 483.5 ha of publicly owned land.	Table D.2 in Appendix D

Proposal element	Exhibited proposal	Amended proposal	Figure reference
Construction infrastructure			
Other compounds	Other compounds to support construction would be required at regular locations along the proposal site, with three general types of compound areas proposed: ▸ Structure compounds, located at the Macquarie River, Castlereagh River and Narrabri Creek/Namoi River bridge sites ▸ General compounds, located about every 10 km ▸ Minor compounds, located about every 5 km.	As per the exhibited proposal, with the exception that the location of some of the general and minor compounds has changed in response to the amendments to the construction and operational footprints.	Updated map book
Temporary workforce accommodation	Temporary workforce accommodation facilities would be established at the following locations: ▸ Within the Narromine South multi-function compound ▸ Narromine North ▸ Gilgandra ▸ Baradine ▸ Within the Narrabri West multi-function compound.	As per the exhibited proposal, with the exception that the proposed locations of the Narromine North and Baradine temporary workforce accommodation facilities have been amended. In addition, mobile accommodation facilities would be located within some of the general compounds to provide improved flexibility on the workforce approach.	Figure 6-5 shows the change in temporary workforce accommodation locations between the exhibited proposal and the amended proposal.
Concrete batching plants	Fixed and mobile batching plants would be established to meet the concrete demands. Fixed batching plants would be established within the following compounds: ▸ Curban multi-function compound ▸ Structure compounds ▸ The general compound at the crossing of Gwabegar Road. Mobile concrete batching plants would also be established within general compounds, where insitu concrete is required and road transport is not feasible.	As per the exhibited proposal, with the exception that the proposed locations of mobile batching plants have changed in conjunction with the proposed changes to the locations of some of the general compounds. The need for mobile batching plants would be determined by the construction contractor.	Updated map book
Sedimentation basins	Sedimentation basins would be provided at regular intervals along the proposal site, including at key construction infrastructure, such as compounds and temporary workforce accommodation facilities.	As per the exhibited proposal, with the exception that the location of some of the basins has changed in response to the amendments to the construction and operational footprints, and the other changes noted above.	Updated map book
Utility relocation and protection			
Utility relocation and protection	Preliminary investigations and consultation have identified that a number of utilities would need to be relocated, adjusted or protected. These utility relocations and adjustments would generally be contained within the proposal site. A utilities management framework (provided in Appendix J of the EIS) has been prepared, adopting a risk-based approach to avoiding and/or minimising impacts associated with the relocation and/or adjustment of affected public utilities.	As per the exhibited proposal, with the exception that further confirmation has been provided regarding the location of utilities that would require protection based on additional consultation with utility providers.	Updated map book (indicative locations only)

6.2 Crossing loop locations

6.2.1 Original proposal

Crossing loops are sections of track off to the side of the main track that allow trains to move to the side so that other trains can pass.

As described in sections A1.2.2 and A7.3.3 and shown in Figure A1.2 of the EIS, the proposal included provision of seven crossing loops at Burroway, Balladoran, Curban, Black Hollow/Quanda, Baradine, The Pilliga and Bohena Creek.

The loops would be parallel to the new main line track within the rail corridor. They would each be up to 2.2 km long, to fit the design length of the trains (1,800 m).

Each crossing loop would also include a maintenance siding.

6.2.2 Justification for the proposed amendment

As a result of further consultation with landowners and other relevant stakeholders, the locations of the crossing loops have been amended to avoid the need to divert public roads (specifically Brooks Road, Nalders Access Road and Cains Crossing Road) and move them further away from residential dwellings. These changes would minimise the potential impacts of constructing and operating the loops, particularly in relation to amenity and access.

In addition, many of the proposed new locations are within flatter areas, which would require less earthworks and associated construction traffic movements for construction.

6.2.3 Description of the proposed amendment

Figure 6-1 and Figure 6-2 show the new locations of the crossing loops compared to the original locations described in the EIS. In summary:

- The Burroway crossing loop is now proposed to be located about 500 m north of the location in the exhibited proposal.
- The Balladoran crossing loop is now proposed to be located about 3.3 km north of the location in the exhibited proposal.
- The Curban crossing loop has been moved to a new locality (Armatree/Tonderburine) about 10.8 km north of the originally proposed location.
- The Black Hollow/Quanda crossing loop has been moved to a new locality (Mt Tenandra) about 3 km south of the originally proposed location.
- The Baradine crossing loop is now proposed to be located about 8.2 km south of the location in the exhibited proposal.
- The Pilliga crossing loop is now proposed to be located about 11 km south of the location in the exhibited proposal.
- The Bohena Creek crossing loop is now proposed to be located about 5.6 km south of the location in the exhibited proposal.

There would be no change to the crossing loop design or construction methodology, as described in sections A7.3.3 and A8.4.4 of the EIS, respectively.

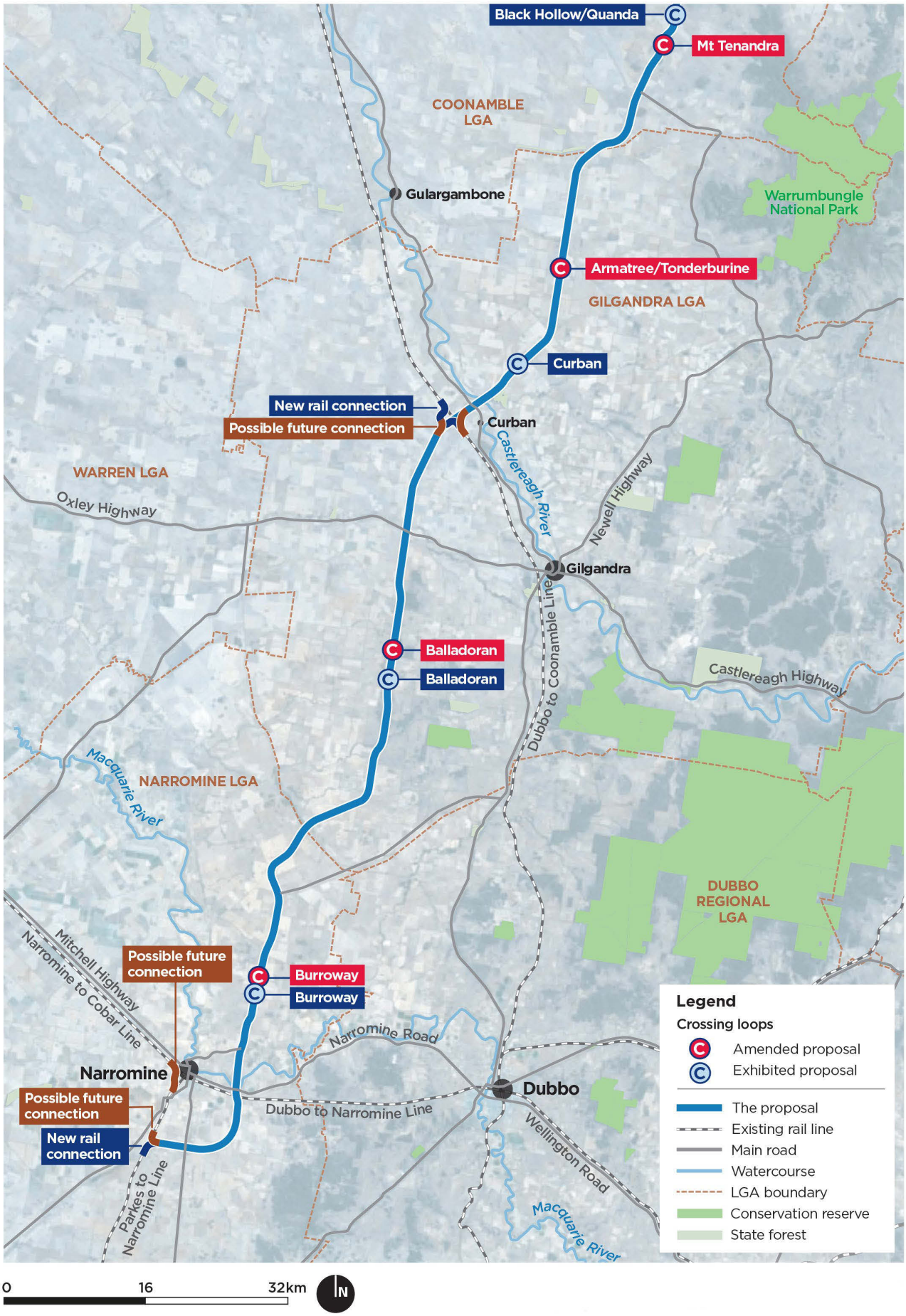

FIGURE 6-1: CHANGE IN CROSSING LOOP LOCATIONS BETWEEN EXHIBITED PROPOSAL AND AMENDED PROPOSAL (MAP 1 OF 2)

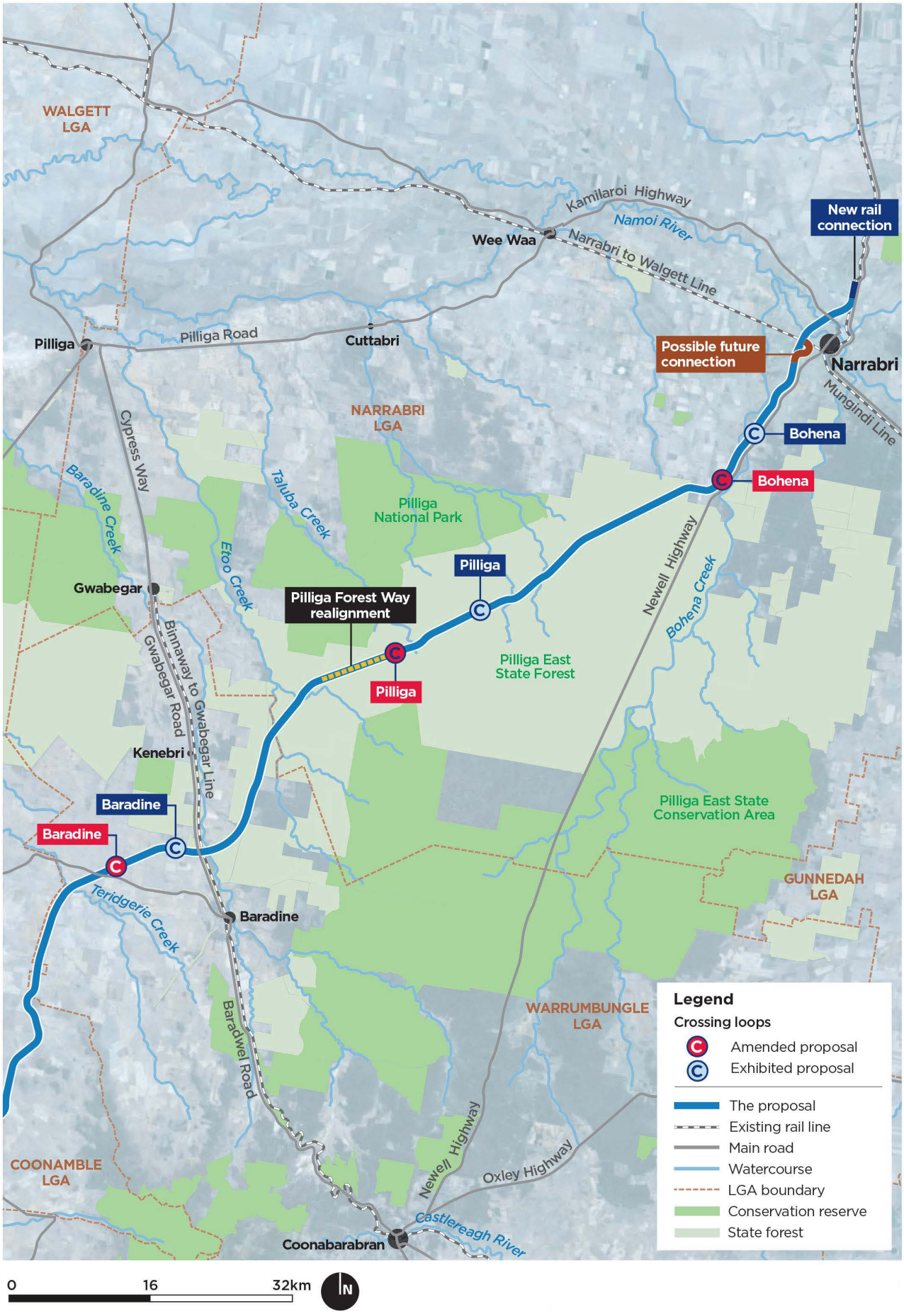

FIGURE 6-2: CHANGE IN CROSSING LOOP LOCATIONS BETWEEN EXHIBITED PROPOSAL AND AMENDED PROPOSAL (MAP 2 OF 2)

6.3 Changes to public level crossings

6.3.1 Original proposal

As described in section A7.3.7 and shown in Figure A7.9 of the EIS, the proposal included 51 public level crossings along the rail line to maintain vehicular access along public roads that cross the rail corridor. Of those, it was proposed that 12 would have active controls and the remaining 39 would have passive controls.

There are also five existing level crossings with passive controls within the proposal site, located on:

- Berida Road, on the Dubbo and Coonamble Line
- Yarrie Lake Road, on the Narrabri to Walgett Line
- Narwonah Siding Road, on the Parkes to Narromine Line
- Old Backwater Road, on the Parkes to Narromine Line
- Dandaloo Road, on the Parkes to Narromine Line.

No changes were proposed to the existing level crossings.

6.3.2 Justification for the proposed amendment

Changes to the number and type of new public level crossings are proposed, taking into account:

- Further design development, including a review of sighting distances and updated traffic data from traffic surveys undertaken in November 2020
- Consultation with affected landholders and other relevant stakeholders
- Changes to crossing loop locations (see section 6.2).

6.3.3 Description of the proposed amendment

A total of 49 new public level crossings are now proposed, consisting of 15 with active controls and 34 with passive controls. In addition, two of the existing level crossings within the proposal site, at Narwonah Siding Road and Dandaloo Road, would have traffic controls upgraded from passive controls (stop signs) to active controls; however, the existing passive level crossing on Dandaloo Road would only be upgraded to an active level crossing if the Narromine West connection is constructed.

Figure 6-3 and Figure 6-4 show the proposed location and types of public level crossings for the amended proposal compared to the original locations as per the exhibited proposal. As shown in purple in Figure 6-3 and Figure 6-4, some of the level crossings originally proposed have been removed from the design or replaced by private level crossings in response to refinements to the proposed location of the rail corridor and track. New public level crossings are now proposed at some locations to avoid the need for road closures. Where no changes are proposed, these are shown in red on Figure 6-3 and Figure 6-4.

There would be no change to the level crossing construction methodology for the amended proposal, as described in section A8.4.4 of the EIS.

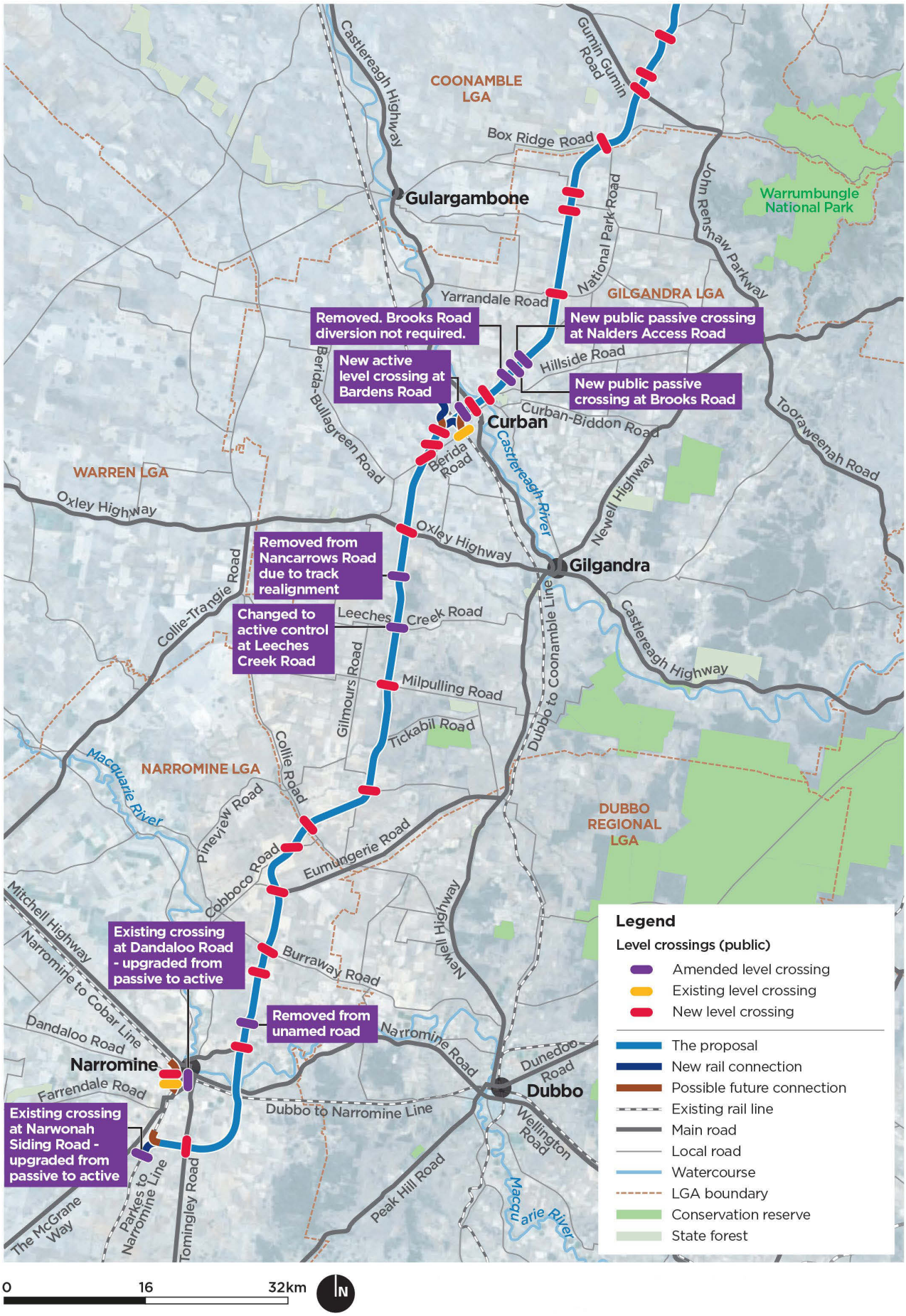

FIGURE 6-3: CHANGE IN LEVEL CROSSINGS BETWEEN EXHIBITED PROPOSAL AND AMENDED PROPOSAL (MAP 1 OF 2)

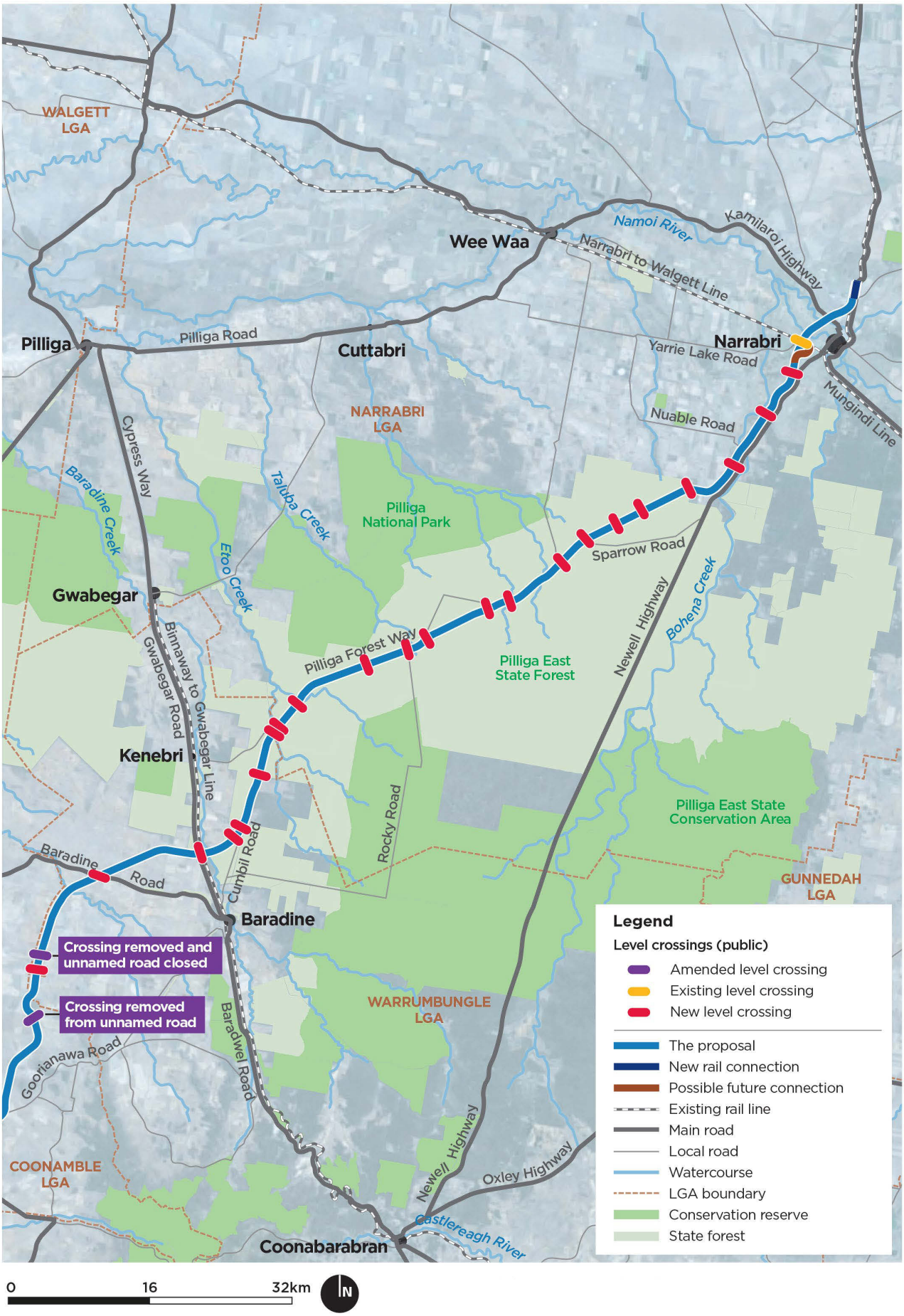

FIGURE 6-4: CHANGE IN LEVEL CROSSINGS BETWEEN EXHIBITED PROPOSAL AND AMENDED PROPOSAL (MAP 2 OF 2)

6.4 Private level crossings

Due to the inherent safety risks associated with level crossings, both the national rail safety regulator and state agencies have a strong preference that no new level crossing be introduced onto the rail network. ARTC is working with landowners to minimise the number of new private level crossings which are proposed although in some cases, level crossings would be required to maintain access within a private property, or between a private property and a public road.

Where a level crossing is proposed on a property, the exact location would be agreed in consultation with the impacted landowner. ARTC would seek to install the level crossing at a location which works best for the landowner noting that the final location would need to be compliant with the safety standards and engineering requirements. For example, a level crossing could not be installed near a curve in the track or where there is a large embankment as this would impact the landowner's ability to see a train in time to safely cross the rail line.

ARTC manages a network with over 2,700 public and private level crossings and have significant experience in working with private landowners in developing level crossing designs. While all level crossing designs need to meet the design standards, there are a number of areas where the typical level crossing designs can be modified to support landowners' operational requirements. Examples include:

- The clearances between the stop signs and the gate widths at the corridor boundary can be increased where required to facilitate the movement of wider machinery
- Where landowner have stock, a cattle grid can be installed at the corridor boundary to prevent stock entering the corridor
- All level crossings would have crossing panels installed across the rail corridor. This is above what is required by the standards and will enable vehicles to clear the crossing in less time.

During the reference design phase, 30 private level crossings were proposed. The exact number and location of private level crossings may be subject to change, based on consultation with impacted landowners during the property acquisition process. Details will be finalised on a case-by-case basis with the landowners.

6.5 Public road closures and realignments

6.5.1 Original proposal

As described in section A7.4 of the EIS, the proposal would involve closing and/or realigning a number of public roads due to their interaction with the rail corridor. The following council-managed roads were proposed to be closed:

- Dappo Road
- Brooks Road
- Nalders Access Road
- Munns Road.

Of the above, however, only Dappo Road would have been completely closed. The other roads were proposed to be closed near the end of the road and realigned to a new level crossing or around the rail corridor via an existing road.

The following access tracks/road reserves were also proposed to be closed and realigned:

- Baradine Road, which is a vehicle access track managed by Gilgandra Shire Council
- 14 forestry tracks/roads within state forests managed by the Forestry Corporation of NSW.

Of the 42 tracks and paper roads that the rail corridor interacts with, it was proposed that one would be provided with an underpass and three would be provided with passive level crossings.

In addition to the above road closures/realignments, the realignment of 53 public roads was also proposed, including realignment of:

- Pilliga Forest Way in the Pilliga East State Forest for a distance of about 6.7 km
- 52 roads for short sections to suit the proposed new level crossings, including Cains Crossing Road.

6.5.2 Justification for the proposed amendment

Concerns about increased travel time and access changes as a result of the proposal have been frequently raised during consultation with the community and key stakeholders.

As described in section 6.2.2, the locations of some of the crossing loops have been amended. By moving the crossing loop from Curban to Armatree/Tonderburine there would no longer be a need to close Brooks and Nalders access roads. In addition, by moving the Bohena crossing loop 5.6 km south, Cains Crossing Road would not need to be realigned.

Other changes to a number of the roads proposed for closure and/or realignment have been developed to minimise the potential impacts on property, access and travel time, and to reduce the amount of earthworks required. This includes Nancarrows Road, which would now be realigned as a result of refinements to the rail corridor undertaken to minimise property impacts (see section 6.7.2). It also includes Bardens Road, which provides access to some properties north west of the alignment.

6.5.3 Description of the proposed amendment

Brooks Road and Nalders Access Road would not be closed and realigned as part of the amended proposal, and would be provided with passive level crossings; however, the following council-managed roads would still be closed:

- Dappo Road, with road users required to use Webbs Siding Road about 1 km to the north
- Munns Road, which would be closed and diverted 650 m to the north of its existing location.

Closure/realignment of Bardens Road is not proposed as part of the amended proposal. Instead, it would cross the rail corridor via a public level crossing. The amended proposal would also result in the closure and realignment of 14 forestry tracks/roads.

Of the 42 tracks and paper roads that the rail corridor interacts with, one would be provided with an underpass, one with a passive level crossing and one would be closed with alternative access provided in consultation with landowners.

The amended proposal would include the realignment of 51 public roads, including Pilliga Forest Way and Nancarrows Road.

There would be no changes to the construction methodology for changes to the road network, as described in section A8.5.1 of the EIS.

6.6 Temporary workforce accommodation

6.6.1 Original proposal

As described in section A8.9.4 and shown in Figure A1.3 of the EIS, temporary workforce accommodation facilities were proposed to be provided and operated at the following locations, to accommodate the construction workforce:

- Within the Narromine South multi-function compound
- Narromine North, about 11 km north east of Narromine
- Gilgandra, about 1.5 km from the Gilgandra town centre
- Baradine, within the Baradine Showground
- Within the Narrabri West multi-function compound.

Each temporary workforce accommodation facility was proposed to operate for the duration of construction and accommodate up to 500 people.

6.6.2 Justification for the proposed amendment

Based on additional consultation with the landowner of the site at which the Narromine North temporary workforce accommodation was proposed, it was determined that the site is prone to local flooding. As a result, a new location was selected at another site on Euromedah Road. This site is owned by the same landowner and is located about 2 km south-west of the originally proposed location.

Based on further consultation with the Baradine Showground Trust, Warrumbungle Shire Council and NSW Crown Lands, the location of the Baradine temporary workforce accommodation facility has been revised to:

- Reduce the amount of native vegetation that would need to be removed
- Minimise impacts on Baradine Showground and ensure that events can continue to be held at the showground
- Enable the ongoing operation of Camp Cypress (a tourist accommodation facility located within Baradine Showground).

The Baradine temporary workforce accommodation facility is now proposed to be located directly south-east of the showground, within the former Baradine Racecourse.

In areas where timely access to the main temporary workforce accommodation facilities may be more difficult, particularly where focus on a specific work activity is required, it is now proposed to provide some mobile accommodation facilities within some of the general compounds for short-term use by workers. This would improve productivity for the workforce by reducing travel times.

6.6.3 Description of the proposed amendment

The Narromine North temporary workforce accommodation facility would be located about 9 km north-east of Narromine.

The Baradine temporary workforce accommodation facility would be located within the former Baradine Racecourse.

Figure 6-5 and Figure 6-6 show the locations of the temporary workforce accommodation facilities compared to the original locations, as per the exhibited proposal.

The establishment and use of the temporary workforce accommodation would be as described in section C2.1 of the EIS.

Mobile accommodation facilities would be established within some of the general compounds, with the exact compound locations to be determined by the construction contractor. The proposed location of general compounds are shown on the maps in the updated map book. The mobile accommodation facilities would consist of up to 30 self-contained small rooms with a capacity of up to 30 people. The facilities would be built on wheels or skids and would be established, where required, for a period no greater than three months.

Services required for the mobile accommodation facilities would be provided as per those for the general compounds. Potable water would be delivered to the compounds/facilities and wastewater would be pumped out at regular intervals by suitably licensed contractors. The compounds and facilities would be powered by portable generators.

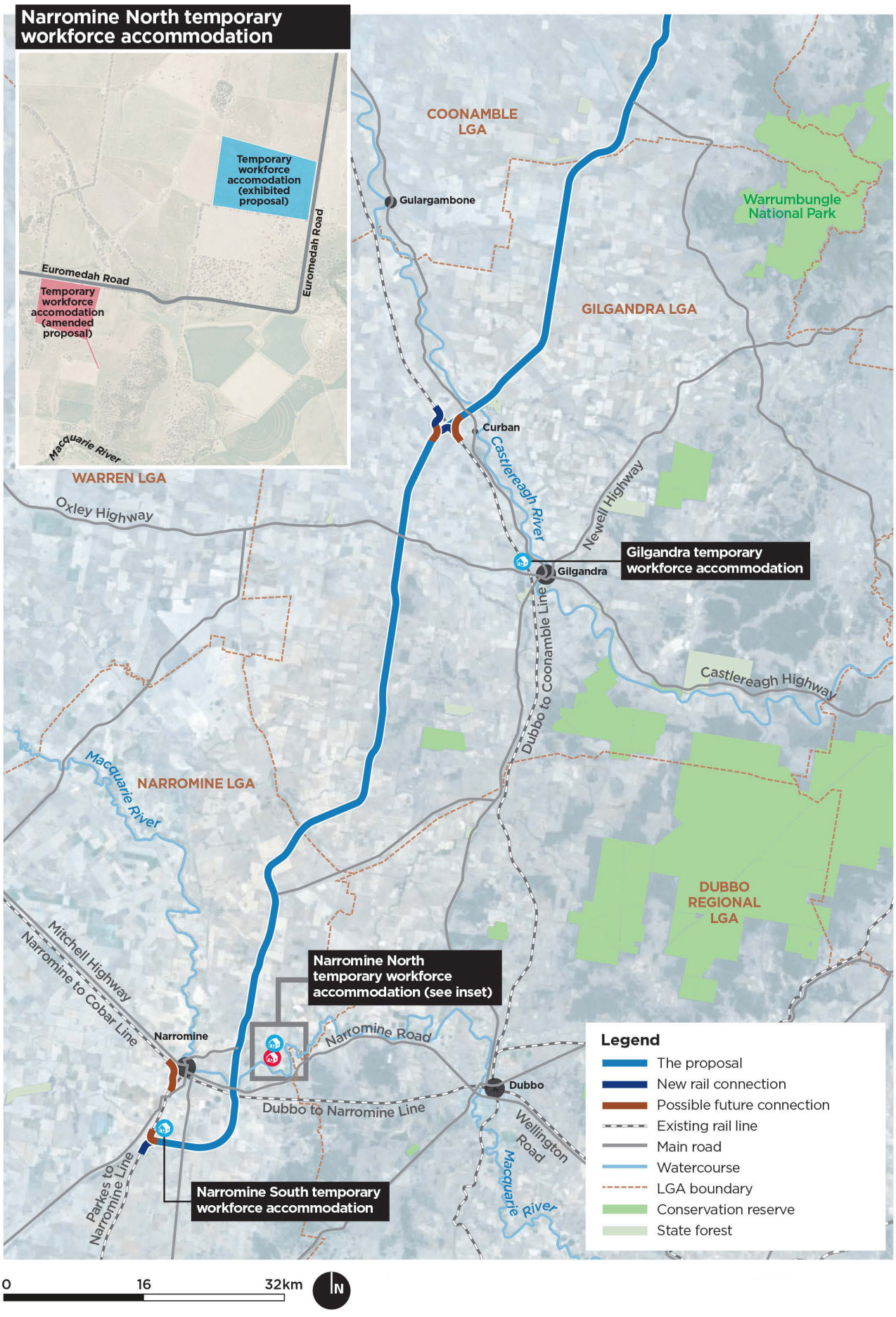

FIGURE 6-5: CHANGE IN TEMPORARY WORKFORCE ACCOMMODATION LOCATIONS BETWEEN EXHIBITED PROPOSAL AND AMENDED PROPOSAL (MAP 1 OF 2)

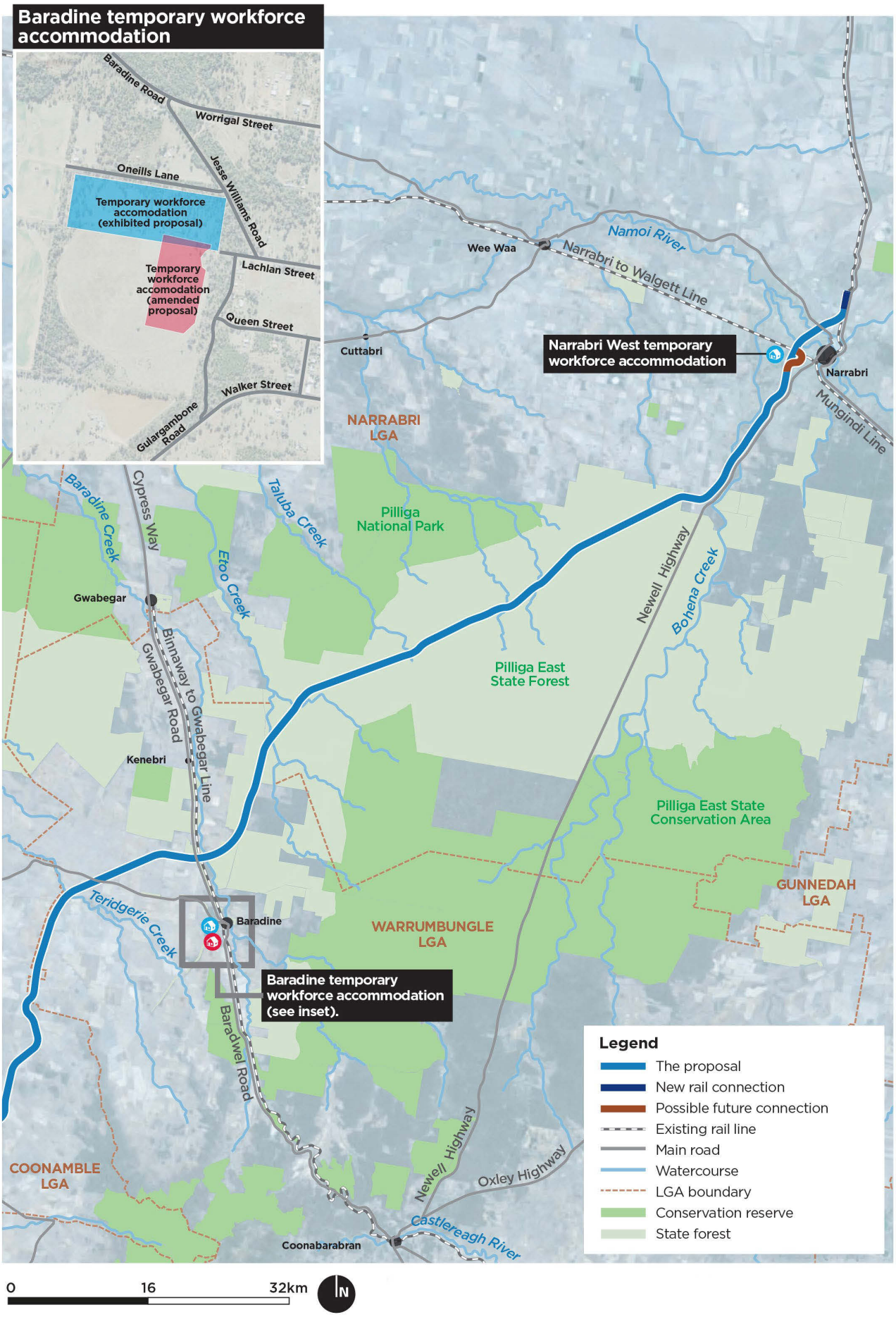

FIGURE 6-6: CHANGE IN TEMPORARY WORKFORCE ACCOMMODATION LOCATIONS BETWEEN EXHIBITED PROPOSAL AND AMENDED PROPOSAL (MAP 2 OF 2)

6.7 Construction and operational footprints

6.7.1 Original proposal

The proposal would require the use of land both temporarily and permanently. While the permanent land requirements would be long term and relate to operation, these impacts would commence during construction. As described in the EIS, the land requirements are based on preliminary estimates, which would be refined and confirmed as the design and construction planning progress.

6.7.1.1 Operational footprint and permanent land requirements

The proposal's operational footprint consists of the land that would be permanently required for the proposal's functional and operational infrastructure. The operational footprint for the exhibited proposal was shown in the maps in Part E of the EIS. The anticipated land requirements within this footprint were listed in Appendix F of the EIS.

The operational footprint was estimated to consist of 1,805 ha of land.

To achieve this footprint, it was estimated that about 1,723 ha of land would be permanently required. These requirements were anticipated to include about:

- 1,222 ha of privately owned land
- 501 ha of publicly owned land, mainly owned by the NSW Government (includes about 20 ha of land leased to private landholders).

As described in the EIS, all property acquisitions would be managed by ARTC in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW). It is TfNSW's preference to acquire land by negotiated agreement; however, a compulsory acquisition process may be required if agreement cannot be reached or is otherwise necessary.

Compensation payable pursuant to section 55 of the *Land Acquisition (Just Terms) Compensation Act 1991* generally includes, among other things, provisions for market value and disturbance items, such as associated legal costs, valuation fees, relocation and removal expenses, and mortgage costs (i.e. fees associated with the discharge of mortgages and creation of a new mortgage where relocation is required).

6.7.1.2 Temporary land requirements

Construction would require temporary use of land for the duration of the construction period (referred to as the construction footprint). In addition to the indicative permanent land requirements described above, some land would be required during construction only. These areas would be required for some key construction infrastructure and compounds not located within the operational footprint, to provide access to construction work areas, and to facilitate manoeuvering of construction plant and machinery. There temporary land requirements were listed in Appendix F and shown in the maps in Part E of the EIS.

The construction footprint was estimated to consist of 3,316.5 ha of land.

To achieve this footprint, it was estimated that an additional 1,612 ha of land would be temporarily required during construction only. These requirements were anticipated to include about:

- 1,158 ha of privately owned land
- 454 ha of publicly owned land, mainly owned by the NSW Government (includes about 9 ha of land leased to private landholders).

Land required during construction only would be via a lease or memorandum of understanding with the relevant government agency or private landholder. As construction is completed, this land would be rehabilitated and returned as close as practicable to the pre-construction condition, or as agreed with landowners.

6.7.2 Justification for the proposed amendment

Since exhibition of the EIS, the construction and operational footprints have been amended to:

- Minimise land requirements and the potential for associated impacts were possible
- Respond to the proposed amendments described in sections 6.2 to 6.6
- Take into account additional design work and design refinements undertaken since public exhibition, including those summarised in Table 6-3.

TABLE 6-3: DESIGN REFINEMENTS AND ASSOCIATED JUSTIFICATION

Design refinement	Justification
Utilities locations	Further consultation has been undertaken with utility providers to confirm the location of utilities that would require protection and relocation. The construction footprint has been updated accordingly.
Compound locations	The locations of a number of the proposed general and minor compounds have been refined to minimise property impacts, based on further consultation undertaken with landowners.

Rail corridor refinements	The location of the rail corridor has been refined at a number of locations to minimise potential impacts and address issues raised, including at:
	- Narwonah—to minimise impacts to the existing grain silo and siding
	- Nancarrows Road—to use the existing road reserve rather than private property
	- Narrabri—based on further consultation with Narrabri Shire Council and North West Local Land Services (LLS), the alignment of the rail corridor has been refined to maximise the width of the travelling stock reserve (TSR) and maintain access to the Narrabri Sewage Treatment Plant. ARTC engaged an independent expert on animal behaviour to assess the TSR and their recommendations have been incorporated into the refined design:
	  - Appropriate fencing along the 1,000m of TSR impacted by the proposal
	  - Appropriate design of the stock underpass.
	  The animal behaviour report is provided in Appendix F. Recommendations for consideration by LLS include training for drovers, limiting mob size to smaller groups and avoiding TSR use during train movements. In accordance with mitigation measure LP12, LLS would continue to be consulted during detailed design to confirm how impacts on TSRs would be minimised during construction and operation
	- Graves of the Dingwell children—further assessment has been undertaken to confirm the location of the graves of the Dingwell children, which was identified as a potential heritage item in the EIS. Following confirmation of the location of the graves, the location of the rail corridor was refined to avoid the potential for direct impacts to the graves.

Collie Road TSR	The exhibited proposal included provision for the TSR at Collie Road (travelling stock reserve R3420) to cross the proposal site by means of a level crossing. Based on issues raised regarding the potential for road user impacts due to stock movement on public roads, the design has been refined. Access across the proposal site for this TSR would now be provided underneath Ewenmar Creek bridge to the north of Collie Road.
Woodvale Park Private Cemetery access road refinement	As described in chapter B7 of the EIS, Woodvale Park Private Cemetery is a locally significant heritage-listed item. A preliminary assessment has been undertaken to identify the location of the item. The proposed location of the access road to a compound site was refined to minimise direct impacts to the heritage-listed item.
Drainage control areas	Drainage control areas would be provided at 200 locations along the proposal site to provide additional space outside the rail corridor in which to manage exceedances of the quantitative design limits during detailed design and construction. The proposed drainage control areas are typically 50 m wide on the downstream side of the rail corridor and 15 m wide on the upstream side of the rail corridor (measured from the edge of the corridor). Each proposed drainage control area varies in length to suit the various drainage structure configurations. Where a drainage control area is not provided at a culvert, it is expected that the exceedances of the quantitative design limits can be managed within the rail corridor. The proposed location of the drainage control areas is shown in the updated map book. The drainage control areas, as currently proposed, represent a conservative scenario in terms of additional land requirements. During detailed design, these areas would be refined when further flood modelling is undertaken and the extent of works within each drainage control area is confirmed. The extent of works could include but not be limited to: - No physical works (velocity management structures), with erosion protection provided by either existing or planted vegetation - Construction of drainage channels - Construction of concrete aprons - Installation of rock boulders (rip-rap). The land required for each drainage control area would be finalised during detailed design in consultation with landowners as part of the property acquisition process.

6.7.3 Description of the proposed amendment

6.7.3.1 Operational footprint and permanent land requirements

The amended operational footprint is estimated to consist of 1,986 ha of land, which is a 181 ha increase in footprint from the exhibited proposal.

To achieve this footprint, it is estimated that about 1,834.1 ha of land would be permanently required. These requirements are anticipated to include about:

- 1,226.1 ha of privately owned land
- 608 ha of publicly owned land, mainly owned by the NSW Government (includes about 22 ha of land leased to private landholders).

The updated land requirements are listed in more detail in Appendix D. The amended operational footprint is shown in the maps in the updated map book, which is available separately.

The property acquisition and compensation process is described in sections A7.5 and B12.3.1 of the EIS, and summarised in section 6.7.1 above. Further information about acquisition and compensation is provided in the Response to Submissions Report in the responses to issues raised in submissions.

6.7.3.2 Temporary land requirements

The construction footprint is estimated to consist of 3,489.3 ha of land, which is a 172.8 ha increase in footprint from the exhibited proposal. The construction footprint comprises:

- The construction area for operational infrastructure
- Additional temporary construction requirements
- Land already owned by ARTC
- Other areas that do not require acquisition (such as existing road corridors).

To achieve this footprint, it is estimated that an additional 1,732 ha of land would be temporarily required during construction only. These requirements are anticipated to include about:

- 1,248.5 ha of privately owned land
- 483.5 ha of publicly owned land, mainly owned by the NSW Government (includes about 4.6 ha of land leased to private landholders).

The updated land requirements are listed in more detail in Appendix D. The amended construction footprint is shown in the maps in the updated map book.

The leasing process for the temporary land requirements is as described in sections A8.10.5 and B12.3.1 of the EIS, and summarised in section 6.7.1 above. Further information is provided in the Response to Submissions Report in the responses to issues raised in submissions.

7. Assessment of impacts

7.1 Approach

The EIS provides an assessment of the potential impacts of the original (exhibited) proposal in accordance with the SEARs. The assessment presented in this section considers whether the proposed amendments described in section 6 of this report are likely to change the potential impacts of the proposal as described in the EIS.

The assessment involved a screening level assessment of each proposed amendment to determine if it could change the potential impacts described in the EIS. The environmental impact screening results are provided in the tables in sections 7.2 to 7.6. Where the screening assessments concluded that the proposed amendments were unlikely to result in a change to the potential impacts identified in the EIS, or introduce new impacts, no further assessment was considered warranted. Further assessment was undertaken where the screening assessments identified that the potential impacts described in the EIS could change as a result of the proposed amendments. The results of these assessments are described in the following sections.

As described in section 4 of this report, additional biodiversity, flooding and hydrology, construction noise and vibration, operational noise and vibration, social, Aboriginal cultural heritage, and traffic and transport assessments have been undertaken since exhibition. The assessments have assisted with assessing the impacts of the proposed amendments. A description of the scope of the additional assessments is provided in section 4.

Where impacts may change from those described in the EIS, the results of the further assessment summarised in the following sections should be read in conjunction with the EIS, and the updated technical reports and addendum reports described in section 4 (as relevant).

The need for changes to mitigation measures as a result of the proposed amendments is also considered in the following sections. A complete set of updated environmental mitigation measures is provided in section 8.2 of this report, which also includes the changes to the measures made as described in the Response to Submissions Report.

7.2 Crossing loop locations

The screening assessment presented in Table 7-1 considers whether the proposed changes to the crossing loop locations, as described in section 6.2, could change the potential impacts described in the EIS. Table 7-1 indicates where the need for additional assessment of the amended proposal has been identified, and where the assessment of the exhibited proposal in the EIS remains applicable in relation to the revised crossing loop locations. The additional environmental assessment is provided in sections 7.2.1 and 7.2.2.

TABLE 7-1: CROSSING LOOP LOCATIONS ENVIRONMENTAL SCREENING

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Biodiversity	The revised crossing loop locations remain within the construction footprint assessed by the biodiversity assessment undertaken as part of the EIS and would not result in any additional clearing of vegetation or fauna habitat.	No
Water resources	There would be no changes to the proposed construction methodology or operation of the crossing loops. The revised crossing loop locations remain within the construction footprint assessed by the water resources assessment undertaken as part of the EIS. As such, the impacts to water resources associated with the revised crossing loop locations would be consistent with those assessed in the EIS.	No
Flooding	There would be no changes to the proposed construction methodology or operation of the crossing loops. The revised crossing loop locations remain within the construction footprint assessed by the flooding assessment undertaken as part of the EIS. However, updated flooding modelling has been undertaken and the results are included in the updated flooding and hydrology assessment report.	Yes—refer to the updated flooding and hydrology assessment report

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Soils and contamination	There would be no changes to the proposed construction methodology or operation of the crossing loops. The revised crossing loop locations remain within the construction footprint assessed by the soils and contamination assessment undertaken as part of the EIS. As such, the impacts to soils and potential for contamination associated with the revised crossing loop locations would be consistent with those assessed in the EIS.	No
Water quality	There would be no changes to the proposed construction methodology or operation of the crossing loops. The revised crossing loop locations remain within the construction footprint assessed by the water quality assessment undertaken as part of the EIS. As such, the impacts to water quality associated with the revised crossing loop locations would be consistent with those assessed in the EIS.	No
Aboriginal heritage	The revised crossing loop locations remain within the construction footprint assessed by the Aboriginal assessment undertaken as part of the EIS and would not result in any additional impacts to Aboriginal items.	No
Non-Aboriginal heritage	The revised crossing loop locations remain within the construction footprint assessed by the non-Aboriginal assessment undertaken as part of the EIS and would not result in any additional impacts to non-Aboriginal items.	No
Noise and vibration (construction)	Crossing loop construction formed part of the track construction modelling scenario considered by the construction noise and vibration assessment undertaken as part of the EIS; therefore, any noise impacts associated with the construction of the crossing loops have been considered across the length of the rail corridor. Potential changes to construction noise and vibration impacts have been assessed as part of the amendments to the construction and operational footprints in section 7.6.2.	Yes – refer to section 7.6.2
Noise and vibration (operation)	The operational noise impact assessment undertaken as part of the EIS considered the potential for noise impacts to receivers during operation as a result of idling of trains at crossing loops. The change in locations of crossings loops mean that there are changes to the receivers with the potential to be affected during operation. As a result, additional assessment is required to consider the potential for operational noise impacts associated with the revised crossing loop locations. An updated operational noise and vibration rail assessment has been prepared and is summarised in section 7.2.1.	Yes—refer to section 7.2.1
Air quality	A quantitative assessment was undertaken as part of the EIS to consider the potential air quality impacts associated with idling of trains at crossing loops. As the location of the crossing loops has changed, there is the potential for the impacts experienced by receivers to change. As a result, an air quality assessment taking into account the new locations has been undertaken, as described in section 7.2.2.	Yes—refer to section 7.2.2
Traffic and transport	No changes to construction vehicle numbers or routes are anticipated and there would be no changes to the operation of the proposal due to the revised crossing loop locations. As such, the traffic and transport impacts associated with the revised crossing loop locations would be consistent with those assessed in the EIS.	No
Land use and property	There would be no changes to the proposed construction methodology or operation of the crossing loops. The revised crossing loop locations remain within the construction footprint assessed by the land use and property assessment undertaken as part of the EIS. As such, the land use and property impacts associated with the revised crossing loop locations would be consistent with those assessed in the EIS.	No
Visual amenity	As described in section 6.2.2, the crossing loop locations have been revised to move them further away from residential dwellings. Potential visual amenity impacts associated with the revised crossing loop locations would therefore be reduced from those that were assessed in the EIS.	No
Socio-economic assessment	As described in section 6.2.2, the crossing loop locations have been revised to move them further away from residential dwellings and reduce requirement for road closures and associated access impacts. The potential socio-economic impacts associated with the revised crossing loop locations would therefore be reduced from those that were assessed in the EIS.	No

7.2.1 Noise and vibration (operation) impact assessment

7.2.1.1 Potential impacts

The operational noise and vibration assessment undertaken as part of the EIS (Technical Report 9: Noise and vibration assessment—operational rail) considered the potential noise impacts at sensitive receivers of trains using the crossing loops (including entering, leaving and idling in the loops). The assessment identified that noise levels from trains using the crossing loops are lower than noise levels from train pass-by events on the main line, and that the noise levels are within the relevant noise criteria. As the crossing loops are within 4.5 m of the main line, they are not expected to be the primary influence on overall noise levels at sensitive receivers.

Given the change in crossing loop locations, an updated operational noise and vibration assessment has been carried out for the amended proposal. The assessment found that, similar to the EIS findings, noise levels from trains using the crossing loops are lower than noise levels from train pass-by events on the main line and are within the relevant noise criteria.

7.2.1.2 Changed or additional mitigation measures

The proposed amendment would not require any changes to the operational noise and vibration mitigation measures provided in the EIS.

7.2.2 Air quality impact assessment

7.2.2.1 Potential impacts

The air quality assessment undertaken as part of the EIS determined that nitrogen dioxide emissions from two locomotives idling at crossing loops would comply with relevant criteria at a distance of about 25 m from the emission source. In other words, receivers would need to be located within 25 m to have the potential to be affected. The assessment undertaken as part of the EIS did not identify any receivers within 25 m of the crossing loop locations proposed as part of the exhibited proposal.

Given the change in crossing loop locations, a revised assessment of separation distances has been carried out for the amended proposal. The assessment found that there are no receivers located within 25 m of the revised crossing loop locations. As such, operational impacts associated with trains idling at the amended crossing loop locations are still considered negligible.

7.2.2.2 Changed or additional mitigation measures

The proposed amendment would not require any changes to the air quality mitigation measures provided in the EIS.

7.3 Changes to public level crossings

The screening assessment presented in Table 7-1 considers whether the proposed changes to the public level crossings, described in section 6.3, could change the potential impacts described in the EIS. Table 7-1 indicates where the need for additional assessment of the amended proposal has been identified, and where the assessment of the exhibited proposal in the EIS remains applicable in relation to the proposed changes to the public level crossings. The additional environmental assessment is provided in sections 7.3.1 to 7.3.3.

TABLE 7-2: LEVEL CROSSING CHANGES ENVIRONMENTAL SCREENING

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Biodiversity	All public level crossings, including those that have changed, remain within the construction footprint assessed by the biodiversity assessment undertaken as part of the EIS. There would not be any additional clearing of vegetation or fauna habitat.	No
Water resources	There would be no changes to the proposed construction methodology or operation of the public level crossings. The revised level crossing locations remain within the construction footprint assessed by the water resources assessment undertaken as part of the EIS. Additionally, the minor changes in operation of some of the level crossings (passive vs active) would not result in any water resources impacts. As such, the impacts to water resources associated with the proposed changes to public level crossings would be consistent with those assessed in the EIS.	No

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Flooding	There would be no changes to the proposed construction methodology or operation of the public level crossings. The revised level crossing locations remain within the construction footprint assessed by the flooding assessment undertaken as part of the EIS; however, where the proposed amendments have resulted in a change to a construction or operational feature, updated flooding modelling has been undertaken and the results are included in the updated flooding and hydrology assessment report.	Yes—refer to the updated flooding and hydrology assessment report
Soils and contamination	There would be no changes to the proposed construction methodology or operation of the public level crossings. The revised level crossing locations remain within the construction footprint assessed by the soils and contamination assessment undertaken as part of the EIS. Additionally, the minor changes in operation of some of the level crossings (passive vs active) would not result in any impacts to soil or potential for contamination. As such, the impacts to soils and potential for contamination associated with the proposed changes to the public level crossings would be consistent with that assessed in the EIS.	No
Water quality	There would be no changes to the proposed construction methodology or operation of the public level crossings. The revised level crossing locations remain within the construction footprint assessed by the water quality assessment undertaken as part of the EIS. Additionally, the minor changes in operation of some of the level crossings (passive vs active) would not result in any water quality impacts. As such, the impacts to water quality due to the proposed changes to the public level crossings would be consistent with those assessed in the EIS.	No
Aboriginal heritage	All public level crossings, including those that have changed, remain within the construction footprint assessed by the Aboriginal heritage assessment undertaken as part of the EIS and would not result in any additional impacts to Aboriginal items.	No
Non-Aboriginal heritage	All public level crossings, including those that have changed, remain within the construction footprint assessed by the non-Aboriginal assessment undertaken as part of the EIS. There would not by any additional impacts to non-Aboriginal items.	No
Noise and vibration (construction)	The construction of level crossings was assessed as its own construction modelling scenario by the construction noise and vibration assessment undertaken as part of the EIS. As a number of changes to public level crossings are now proposed, there are changes to the receivers with the potential to be affected. As a result, assessment is required to consider the potential for construction noise impacts associated with the revised public level crossing locations. An updated construction noise and vibration assessment has been prepared and is summarised in section 7.3.1.	Yes—refer to section 7.3.1
Noise and vibration (operation)	The operational noise impact assessment undertaken as part of the EIS considered the potential for noise impacts to receivers as a result of the operation of warning bells/alarms at public level crossings with active controls. The noise assessment considered operational noise impacts based on the public level treatments and locations proposed as part of the exhibited proposal. As a result of the proposed amendments, there is the potential for the impacts experienced by receivers to change. Assessment is required to consider the potential for operational noise impacts associated with the changes to public level crossings. An updated operational noise and vibration assessment has been prepared and is summarised in section 7.3.2.	Yes—refer to section 7.3.2
Air quality	There would be no changes to the proposed construction methodology or operation of the public level crossings. The revised level crossing locations remain within the construction footprint assessed by the air quality assessment undertaken as part of the EIS. Additionally, the minor changes in operation of some of the level crossings (passive vs active) would not result in any air quality impacts. As such, the air quality impacts associated with the proposed changes to the public level crossings would be consistent with those assessed in the EIS	No

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Traffic and transport	The traffic and transport assessment undertaken as part of the EIS considered the potential travel time impacts at active level crossings based on the public level crossing treatments and locations proposed as part of the exhibited proposal. As a result of the proposed amendments, there is the potential for travel time impacts to change. Assessment is required to consider the potential traffic and transport impacts associated with the changes to public level crossings. A traffic and transport assessment is provided in section 7.3.3.	Yes—refer to section 7.3.3
Land use and property	There would be no changes to the proposed construction methodology or operation of the public level crossings. The revised level crossing locations remain within the construction footprint assessed by the land use and property assessment undertaken as part of the EIS. As such, the land use and property impacts associated with the proposed changes to public level crossings would be consistent with those assessed in the EIS.	No
Visual amenity	The visual amenity impacts associated with the proposed changes to the public level crossings would be consistent with those assessed in the EIS. No changes are proposed to the public level crossings assessed as part of viewpoints 02, 06, 07, 08, 11, 15 and 17 in the visual amenity assessment undertaken as part of the EIS. There would be minor changes to the public level crossings assessed as part of viewpoints 13 and 14 (use of passive controls instead of the active controls proposed for the exhibited proposal); however, as some level crossings are now proposed to be active rather than passive, overall the visual amenity impacts associated with the proposed changes to public level crossings would be consistent with those assessed in the EIS.	No
Socio-economic assessment	With the exception of a potential change in access and connectivity considered as part of the additional traffic and transport assessment noted above, the potential socio-economic impacts associated with the revised crossing loop locations would be consistent with those assessed in the EIS.	No

7.3.1 Noise and vibration (construction) impact assessment

7.3.1.1 Potential impacts

The construction noise and vibration assessment undertaken as part of the EIS (Technical Report 8: Noise and vibration assessment construction and other operations) considered potential noise impacts at sensitive receivers during construction of public level crossings (construction scenario Rail08). The assessment identified the following predicted exceedances of the criteria (the proposal-specific construction noise management level):

- Noise levels during recommended standard working hours were predicted to exceed the criteria at 45 residential receivers, with exceedances of up to 19 dB(A) predicted.
- Noise levels during out-of-hours work were predicted to exceed the criteria at 553 residential receivers, with exceedances of up to 29 dB(A) predicted.

The updated construction noise and vibration assessment included a review of potential construction noise impacts during construction of the level crossings (construction scenario Rail08). The updated assessment identified the following predicted exceedances of the criteria:

- Noise levels during recommended standard working hours are predicted to exceed the criteria at 54 residential receivers, with exceedances of up to 19 dB(A) predicted.
- Noise levels during out-of-hours work are predicted to exceed the criteria at 629 residential receivers, with exceedances of up to 29 dB(A) predicted.

As noted by the above results, the number of receivers that have been identified as potentially experiencing exceedances of the criteria has increased. This is due to a combination of the updated proposal design and a minor adjustment to the noise prediction methodology. The updated prediction methodology has resulted in an increase in the extent of potential impacts, which encompasses additional receivers in some locations.

7.3.1.2 Changed or additional mitigation measures

The proposed amendment would not require any changes to the construction noise and vibration mitigation measures provided in the EIS. This is because, in general, the highest levels of potential impact and nature of the works has not changed. In accordance with mitigation measure CNV1, location and activity-specific construction noise and vibration impact statements would be prepared prior to specific construction activities. These would be 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 (as required). The statements would confirm predicted impacts at relevant receivers to assist with the selection of feasible and reasonable management measures. The statements would also confirm noise and vibration auditing and monitoring requirements.

The construction activities would remain the same for the majority of receivers, and the specific construction management measures identified by the construction noise and vibration impact statements would still be applied based on the predicted noise levels at each individual receiver.

7.3.2 Noise and vibration (operation) impact assessment

7.3.2.1 Potential impacts

The operational noise and vibration assessment undertaken as part of the EIS (Technical Report 9: Noise and vibration assessment—operational rail) considered potential noise impacts at sensitive receivers associated with train horns and warning bells at level crossings. The assessment identified that, in most cases, while the level crossings are a potential source of noise, predicted noise levels were mainly influenced by train pass-by noise. Noise levels were predicted to exceed the relevant noise criteria at sensitive receivers near a proposed level crossing on Cains Crossing Road. Train horns sounding on approach to the level crossing are the main source of noise associated with this crossing.

The updated operational noise and vibration assessment included a review of the potential impacts at level crossings (as amended). The assessment found, similar to the EIS findings, that while the level crossings are a potential source of noise in the local environment, the predicted noise levels at sensitive receivers was primarily influenced by train pass-by events on the main line. Train operations at two proposed public active level crossings (at Cains Crossing Road and an unnamed road to the north of Cains Crossing Road) are predicted to result in exceedances of the relevant noise criteria at nearby sensitive receivers. Train horns sounding on approach to the level crossings are the main source of noise.

7.3.2.2 Changed or additional mitigation measures

The proposed amendment would not require any changes to the operational noise and vibration mitigation measures provided in the EIS.

7.3.3 Traffic and transport impact assessment

7.3.3.1 Potential impacts

The traffic and transport assessment undertaken as part of the EIS (Technical Report 10—Traffic and transport assessment) considered the potential for delays to road users due to the presence of public level crossings. The assessment identified the potential for delays at the worst-case active level crossing, which was considered to be the level crossing proposed at the Castlereagh Highway, as this is the busiest location at which a level crossing is proposed. The assessment determined that there would be a maximum delay of 96 seconds and a maximum queue length of about 39 m during the proposal's opening year (2025). In 2040, the delay would still be 96 seconds but the maximum queue length would be about 46 m.

A review was undertaken of the public level crossings proposed as part of the amended proposal, to determine whether there would be any changes to the outcomes of the traffic impact assessment undertaken as part of the EIS. The review determined that the Castlereagh Highway is still the busiest location at which a level crossing is proposed; however, as described in Table 6-1, the opening year of the proposal will now be 2026, rather than 2025. As a result, a forecast growth factor was applied to the traffic volumes used by the original traffic and transport assessment. In addition, the assessment was updated to account for the differing train speeds and increased traffic volumes experienced during harvest time, as described in section 4.6.3 of this report. The assessment determined that, based on forecast traffic volumes of 153 two-way vehicle movements during peak hours in 2026 on the Castlereagh Highway (compared to forecast traffic volumes of 108 in 2025), there would be a maximum delay of 121 seconds and a maximum queue length of about 74 m during the proposal's opening year of 2026. In 2040, the delay would still be 121 seconds but the maximum queue length would be about 82 m.

7.3.3.2 Changed or additional mitigation measures

The proposed amendment would not require any changes to the traffic and transport mitigation measures provided in the EIS.

7.4 Public road closures and realignments

The screening assessment presented in Table 7.3 considers whether the proposed changes to public road closures and realignments, described in section 6.4, could change the potential impacts described in the EIS. Table 7.3 indicates where the need for additional assessment of the amended proposal has been identified, and where the assessment of the exhibited proposal in the EIS remains applicable in relation to the proposed changes to the public road closures and realignments. The additional environmental assessment is provided in sections 0 and 7.4.2.

TABLE 7.3 PUBLIC ROAD CLOSURES AND REALIGNMENTS ENVIRONMENTAL SCREENING

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Biodiversity	All public road closures, and the majority of road realignments, would be located within the construction footprint assessed by the biodiversity assessment undertaken as part of the EIS. There would not be any additional clearing of vegetation or fauna habitat. Where there have been changes to the construction footprint due to the proposed amendments, these have been assessed as part of the updated biodiversity development assessment report which is summarised in section 7.6.	Yes—refer to section 7.6.1
Water resources	There would be no changes to the proposed construction methodology. There would be only minor changes to the operation of the proposal, and the construction and operational footprints, due to the proposed changes to the public road closures and realignments. As such, the impacts to water resources associated with the proposed changes to public road closures/realignments would be consistent with those assessed in the EIS.	No
Flooding	There would be no changes to the proposed construction methodology. There would be only minor changes to the operation of the proposal, and the construction and operational footprints, due to the proposed changes to the public road closures/realignments; however, where the proposed amendments have resulted in a change to a construction or operational feature, updated flooding modelling has been undertaken and the results are included in the updated flooding and hydrology assessment report.	Yes—refer to the updated flooding and hydrology assessment report
Soils and contamination	There would be no changes to the proposed construction methodology. There would be only minor changes to the operation of the proposal, and the construction and operational footprints, due to the proposed changes to the public road closures/realignments. As such, the impacts to soils and potential for contamination associated with the proposed changes to the public road closures/realignments would be consistent with that assessed in the EIS.	No
Water quality	There would be no changes to the proposed construction methodology. There would be only minor changes to the operation of the proposal, and the construction and operational footprints, due to the proposed changes to the public road closures/realignments. As such, the impacts to water quality associated with the proposed changes to public road closures/realignments would be consistent with those assessed in the EIS.	No
Aboriginal heritage	All public road closures, and the majority of road realignments, would be located within the construction footprint assessed by the Aboriginal heritage assessment undertaken as part of the EIS. While there have been minor changes to the construction footprint due to the proposed changes to road realignments, these would not result in additional impacts to Aboriginal heritage.	No
Non-Aboriginal heritage	All public road closures, and the majority of road realignments, would be located within the construction footprint assessed by the non-Aboriginal heritage assessment undertaken as part of the EIS. Where there have been minor changes to the construction footprint due to road realignments (for the amended proposal) the impacts to non-Aboriginal heritage would be consistent with those assessed in the EIS.	No

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Noise and vibration (construction)	The noise and vibration assessment undertaken as part of the EIS considered the construction noise impacts associated with the road closure and realignment works through a number of construction modelling scenarios. As a number of changes to public road closures/realignments are now proposed, there are changes to the receivers with the potential to be affected. As a result, assessment is required to consider the potential for construction noise impacts associated with the amended public road closures/realignments. An updated construction noise and vibration assessment has been prepared and is summarised in section 7.4.1.	Yes—refer to section 7.4.1
Noise and vibration (operation)	The noise and vibration assessment—construction and other operations considered operational road traffic noise impacts based on the road closures and realignments proposed as part of the exhibited proposal. As a result of the proposed amendments, there is the potential for the impacts experienced by receivers to change. Assessment is required to consider the potential for operational noise impacts associated with the amended public road closures/realignments. An updated operational noise and vibration assessment has been prepared and is summarised in section 7.4.2.	Yes—refer to section 7.4.2
Air quality	There would be no changes to the proposed construction methodology. There would be only minor changes to the operation of the proposal, and the construction and operational footprints, due to the proposed changes to the public road closures/realignments. As such, the air quality impacts associated with the proposed changes to public roads closures/realignments would be consistent with those assessed in the EIS.	No
Traffic and transport	The traffic and transport assessment undertaken as part of the EIS considered the potential travel distance impacts associated with the public road closures/realignments proposed as part of the exhibited proposal. The amended proposal would result in less public road closures/realignments than that described in the EIS. Potential impacts on travel distances would therefore be less than that of the exhibited proposal.	No
Land use and property	There would be no changes to the proposed construction methodology. There would be only minor changes to the operation of the proposal, and the construction and operational footprints, due to the proposed changes to the public road closures and realignments. As such, the land use and property impacts associated with the proposed changes to public roads closures/realignments would be consistent with those assessed in the EIS.	No
Visual amenity	There would be no changes to the proposed construction methodology. There would be only minor changes to the operation of the proposal, and the construction and operational footprints, due to the proposed changes to the public road closures/realignments. As such, the visual amenity impacts associated with the proposed changes to the public roads closures/ realignments would be consistent with those assessed in the EIS.	No
Socio-economic assessment	As noted above, the amended proposal would result in less road closures and realignments than those described in the EIS; therefore, there would be a reduction in socio-economic impacts due to the reduction in travel distance impacts.	No

7.4.1 Noise and vibration (construction) impact assessment

The updated construction noise and vibration assessment considered the potential construction noise and vibration impacts of the proposed changes to public road closures/realignments. The key findings are summarised below.

7.4.1.1 Potential noise impacts

The key findings of the updated noise assessment compared to the findings of the assessment undertaken for the exhibited proposal are summarised below:

- **Highly affected noise management level**—the highly affected noise management level (75 dB(A)) is predicted to be exceeded at two residential receivers (compared to one exceedance for the exhibited proposal).
- **Construction during recommended standard hours**—noise levels generated by road construction works undertaken during recommended standard hours have the potential to exceed the relevant construction noise management level (45 dB(A)) at up to 288 residential receivers, one community facility (a Rural Fire Service building) and three commercial/industrial receivers (six fewer exceedances compared to the exhibited proposal).
- **Out-of-hours work**—noise levels during out-of-hours work are predicted to exceed the 35 dB(A) construction noise management level at up to 1,372 residential receivers (77 fewer exceedances compared to the exhibited proposal). The construction scenarios with the highest number of predicted impacts are stripping topsoil (scenario ROAD02), main earthworks (scenario ROAD03) and landscaping (scenario ROAD07). 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.
- **Sleep disturbance and awakening**—stripping topsoil, road earthworks and landscaping (scenarios ROAD02, ROAD03 and ROAD07) are predicted to be the worst-case scenarios in relation to sleep disturbance and awakening potential. These activities are predicted to generate noise levels that exceed the external 52 dB(A) sleep disturbance criteria at up to 543 residential receivers and the internal 55 dB(A) criteria at up to 71 residential receivers (21 fewer exceedances of the external criteria and two additional exceedances of the internal criteria compared to the exhibited proposal).
- **Ground-borne noise**—receivers may be subject to ground-borne noise levels (caused by vibration-generating works associated with road earthworks) of greater than 35 dB(A) at distances of up to 180 m from the works. A total of three residential receivers have been identified within this distance (one additional exceedance compared to the exhibited proposal). External airborne noise levels at these receivers are predicted to be 21 to 28 dB greater than ground-borne noise.

The number of receivers that have been identified as potentially experiencing exceedances of the proposal-specific noise management level have increased. This is due to a combination of the updated proposal design and a minor adjustment to the noise prediction methodology. The updated prediction methodology has resulted in an increase in the extent of potential impacts. which encompasses additional receivers in some locations.

Detailed results for each noise catchment area are provided in section 5.1 of the updated noise and vibration assessment—construction and other operations report, which is available separately.

7.4.1.2 Potential vibration impacts

The key findings of the updated vibration assessment compared to the findings of the assessment undertaken for the exhibited proposal are summarised below.

For vibration-generating works within the road construction earthworks extent (vibratory roller activities):

- Residential receivers may be affected by vibration within a maximum of 130 m of the works—two residential receivers have been identified within this distance (compared to one receiver for the exhibited proposal).
- Other sensitive land uses, such as offices, schools, educational institutions and places of worship, may be affected within 54 m of the works. One community facility and five commercial/industrial premises have been identified within this buffer distance (four fewer exceedances compared to the exhibited proposal). No other non-residential sensitive locations have been identified within this buffer distance.

During general construction works, vibration may be perceptible at certain times within 140 m of the vibratory roller activities at two residential receivers (one additional exceedance compared to the exhibited proposal).

7.4.1.3 Changed or additional mitigation measures

As described in section 7.3.1, the proposed amendment would not require any changes to the construction noise and vibration mitigation measures provided in the EIS. In accordance with mitigation measure CNV1, location and activity-specific construction noise and vibration impact statements would be prepared prior to specific construction activities. The specific construction management measures identified by the construction noise and vibration impact statements would still be applied based on the predicted vibration levels at each individual receiver.

7.4.2 Noise and vibration (operation) impact assessment

7.4.2.1 Potential impacts

The noise and vibration assessment undertaken as part of the EIS (Technical Report 8: Noise and vibration assessment—construction and other operations) considered potential operational road traffic noise impacts for public roads that were subject to more substantial realignments. The modelling results for the exhibited proposal indicated that no operational road traffic noise impacts were predicted. The predicted noise levels were shown to be below the road traffic noise criteria at the nearest sensitive receivers. The updated noise and vibration assessment included a review of the proposed amendments to public road realignments. The updated assessment identified that, similar to the EIS, no operational road traffic noise impacts are expected. The predicted noise levels are below the road traffic noise criteria at the nearest sensitive receivers.

7.4.2.2 Changed or additional mitigation measures

The proposed amendment would not require any changes to the operational noise and vibration mitigation measures provided in the EIS.

7.5 Temporary workforce accommodation

The screening assessment presented in Table 7-4 considers whether the proposed changes to temporary workforce accommodation, described in section 6.6, could change the potential impacts described in the EIS. Table 7-4 indicates where the need for additional assessment of the amended proposal has been identified, and where the assessment of the exhibited proposal in the EIS remains applicable in relation to the proposed changes to temporary workforce accommodation. The additional environmental assessment is provided in sections 0 and 7.5.2.

TABLE 7-4: TEMPORARY WORKFORCE ACCOMMODATION ENVIRONMENTAL SCREENING

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Biodiversity	The changes to the locations of the Narromine North and Baradine temporary workforce accommodation facilities have resulted in changes to the construction footprint assessed by the EIS; however, where there have been changes to the construction footprint due to the proposed amendments, these have been assessed as part of the updated biodiversity development assessment report, with the key findings summarised in section 7.6. There would be no changes to the impacts considered by the biodiversity assessment undertaken as part of the EIS due to the provision of mobile accommodation facilities within the general compounds.	Yes—refer to section 7.6.1
Water resources	There would be no changes to the proposed construction methodology. There would be only minor changes to the construction footprint due to the proposed changes in temporary workforce accommodation. As such, the impacts to water resources associated with the changes to temporary workforce accommodation, including the provision of mobile accommodation facilities, would be consistent with those assessed in the EIS.	No
Flooding	There would be no changes to the proposed construction methodology for temporary workforce accommodation; however, where the proposed amendments have resulted in a change to a construction or operational feature, updated flooding modelling has been undertaken and the results are included in the updated flooding and hydrology assessment report.	Yes—refer to the updated flooding and hydrology assessment report

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Soils and contamination	There would be no changes to the proposed construction methodology for temporary workforce accommodation. There would be only minor changes to the construction footprint due to the proposed changes in temporary workforce accommodation. As such, the impacts to soils and potential for contamination associated with the changes to temporary workforce accommodation, including the provision of mobile accommodation facilities, would be consistent with that assessed in the EIS.	No
Water quality	There would be no changes to the proposed construction methodology. There would be only minor changes to the construction footprint due to the proposed changes in temporary workforce accommodation. As such, the impacts to water quality associated with the changes to temporary workforce accommodation, including the provision of mobile accommodation facilities, would be consistent with those assessed in the EIS.	No
Aboriginal heritage	The changes to the locations of the Narromine North and Baradine temporary workforce accommodation facilities have resulted in changes to the construction footprint assessed by the EIS. The revised location of the Baradine facility was encompassed in the study area for the Aboriginal heritage assessment undertaken as part of the EIS and the location change would not result in any additional impacts to Aboriginal heritage. However, the revised location of the Narromine North temporary workforce accommodation is not included in the construction footprint assessed by the EIS. Any disturbance of areas outside the construction footprint assessed by the EIS has the potential to impact additional listed or unlisted Aboriginal sites or areas of archaeological potential. As such, mitigation measure AH3 has been amended to include a requirement to undertake a targeted archaeological survey of the additional areas that form the construction footprint of the amended proposal, which were not surveyed as part of the EIS, to identify any new sites. This includes the location of the Narromine North temporary workforce accommodation. The impacts on any additional Aboriginal sites identified by this survey would be managed in accordance with the Aboriginal cultural heritage management plan (mitigation measure AH10). Despite the changes to the construction footprint as a result of the proposed changes to the locations of the Narromine North and Baradine temporary workforce accommodation facilities, the approach to mitigation and management remains the same. As a result, further assessment is not considered to be required. Direct impacts would be reduced as far as practicable by avoiding identified sites (mitigation measure AH1). Where this is not practicable, sites would be managed (including salvage of artefacts prior to construction), in accordance with the Aboriginal cultural heritage management plan (mitigation measure AH10). The provision of mobile accommodation facilities within the general compounds would not result in any change to the impacts identified by the Aboriginal heritage assessment undertaken as part of the EIS.	No
Non-Aboriginal heritage	No additional non-Aboriginal heritage items would be impacted as a result of the changes to the locations of the Narromine North and Baradine temporary workforce accommodation facilities. All mobile accommodation facilities would be located within the existing construction footprint. As such, the impacts to non-Aboriginal heritage associated with the changes to temporary workforce accommodation, including the provision of mobile accommodation facilities, would be consistent with those assessed in the EIS.	No
Noise and vibration (construction)	The noise and vibration assessment undertaken as part of the EIS considered the construction noise impacts associated with establishing and using the temporary workforce accommodation facilities. As the locations of the Narromine North and Baradine temporary workforce accommodation facilities have changed there are changes to the receivers with the potential to be affected. As a result, assessment is required to consider the potential for construction noise impacts. An updated construction noise and vibration assessment has been prepared and is summarised in section 7.4.1.	Yes—refer to section 7.4.1

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Noise and vibration (operation)	There would be no operational noise and vibration impacts associated with the temporary workforce accommodation, including the provision of mobile accommodation facilities, as these would only be used during the construction period.	No
Air quality	The air quality assessment undertaken as part of the EIS considered the potential air quality impacts associated with establishing and using the temporary workforce accommodation facilities. As the locations of the Narromine North and Baradine temporary workforce accommodation facilities have changed, there are changes to the receivers with the potential to be affected. As a result, assessment is required to consider the potential for construction air quality impacts associated with these changes. An air quality impact assessment is provided in section 7.5.2.	Yes—refer to section 7.5.2
Traffic and transport	No changes to construction vehicle numbers or routes are anticipated due to the changes to the locations of the Narromine North and Baradine temporary workforce accommodation facilities and the inclusion of mobile accommodation facilities in some of the general compounds. As such, the traffic and transport impacts associated with the changes to temporary workforce accommodation, including the provision of mobile accommodation facilities, would be consistent with those assessed in the EIS.	No
Land use and property	The changes to the locations of the Narromine North and Baradine temporary workforce accommodation facilities have been produced to reduce the potential land use and property impacts (see section 6.6.2). The workforce accommodation facilities are temporary, and the sites would be rehabilitated and returned to the existing land use following construction. As such, and as a result of the justification for the proposed changes to two of the facilities, the land use and property impacts associated with the changes to temporary workforce accommodation, including the provision of mobile accommodation facilities, would be less than those assessed in the EIS.	No
Visual amenity	There would be no changes to the proposed construction methodology. There would be only minor changes to the construction footprint as a result of the proposed changes to temporary workforce accommodation. As such, the visual amenity impacts associated with the changes, including the provision of mobile accommodation facilities, would be consistent with those assessed in the EIS.	No
Socio-economic assessment	The changes to the locations of the Narromine North and Baradine temporary workforce accommodation facilities have been proposed to reduce the potential socio-economic impacts (see section 6.6.2). As such, the socio-economic impacts would be less than those assessed in the EIS. However, the provision of mobile accommodation facilities could result in changes to the socio-economic impacts assessed as part of the EIS. As a result, further assessment has been undertaken and is summarised in section 7.5.3	Yes—refer to section 7.5.3

7.5.1 Noise and vibration impact assessment (construction)

7.5.1.1 Potential impacts

The construction noise and vibration assessment undertaken as part of the EIS (Technical Report 8: Noise and vibration assessment—construction and other operations) predicted exceedances of the construction noise management levels during the establishment and use of the temporary workforce accommodation facilities. The key findings of the updated construction noise and vibration assessment compared to the findings of the assessment undertaken for the exhibited proposal are summarised below.

Facility establishment

The assessment undertaken as part of the EIS predicted the following exceedances of the construction noise management level during facility establishment:

- Narromine North—exceedances of up to 20 dB(A) at four residential receivers
- Baradine—exceedances of up 29 dB(A) at 285 residential receivers.

The updated construction noise and vibration assessment considered the establishment and use of the Narromine North and Baradine temporary workforce accommodation facilities at the revised locations with the same construction scenarios. The updated assessment predicted the following exceedances of the noise management level during facility establishment for the amended proposal:

- Narromine North—exceedances of up to 16 dB(A) at three residential receivers
- Baradine—exceedances of up to 20 dB(A) at 285 residential receivers.

Potentially affected receivers are shown in Figure 7-1 and Figure 7-2. Further detail is provided in section 6 of the updated construction noise and vibration assessment report.

Facility use

The assessment undertaken as part of the EIS predicted the following exceedances of the construction noise management level during facility use:

- Narromine North—exceedances of up to six dB(A) at one residential receiver
- Baradine—exceedances of up to 21 dB(A) at 81 residential receivers and 11 non-residential receivers (all associated with Camp Cypress and the Baradine Showground).

The updated construction noise and vibration assessment included additional assessment against the *Noise Policy for Industry* (EPA, 2017) for the use of the temporary workforce accommodation. The updated assessment predicted the following exceedances of the relevant noise criteria from the *Noise Policy for Industry*:

- Narromine North—exceedance of the evening and night criteria by up to three dB(A) at one residential receiver.
- Baradine—exceedances of:
  - The daytime criteria by up to six dB(A) at five residential receivers
  - The evening and night criteria by up to 11 dB(A) at 12 residential receivers
  - The *Noise Policy for Industry* criteria of 48 dB(A) L_{Aeq} by up to 18 dB(A) at four non-residential receivers classified as 'passive recreation'.

Potentially affected receivers are shown in Figure 7-1 and Figure 7-2. Further detail is provided in section 6 of the updated construction noise and vibration assessment report.

7.5.1.2 Changed or additional mitigation measures

Mitigation measure SE-CI2 has been amended (see section 8.2 and Appendix C of this report) to ensure the temporary workforce accommodation plan addresses and defines the arrangement and layout of facilities to minimise amenity impacts on surrounding sensitive receivers (including noise impacts).

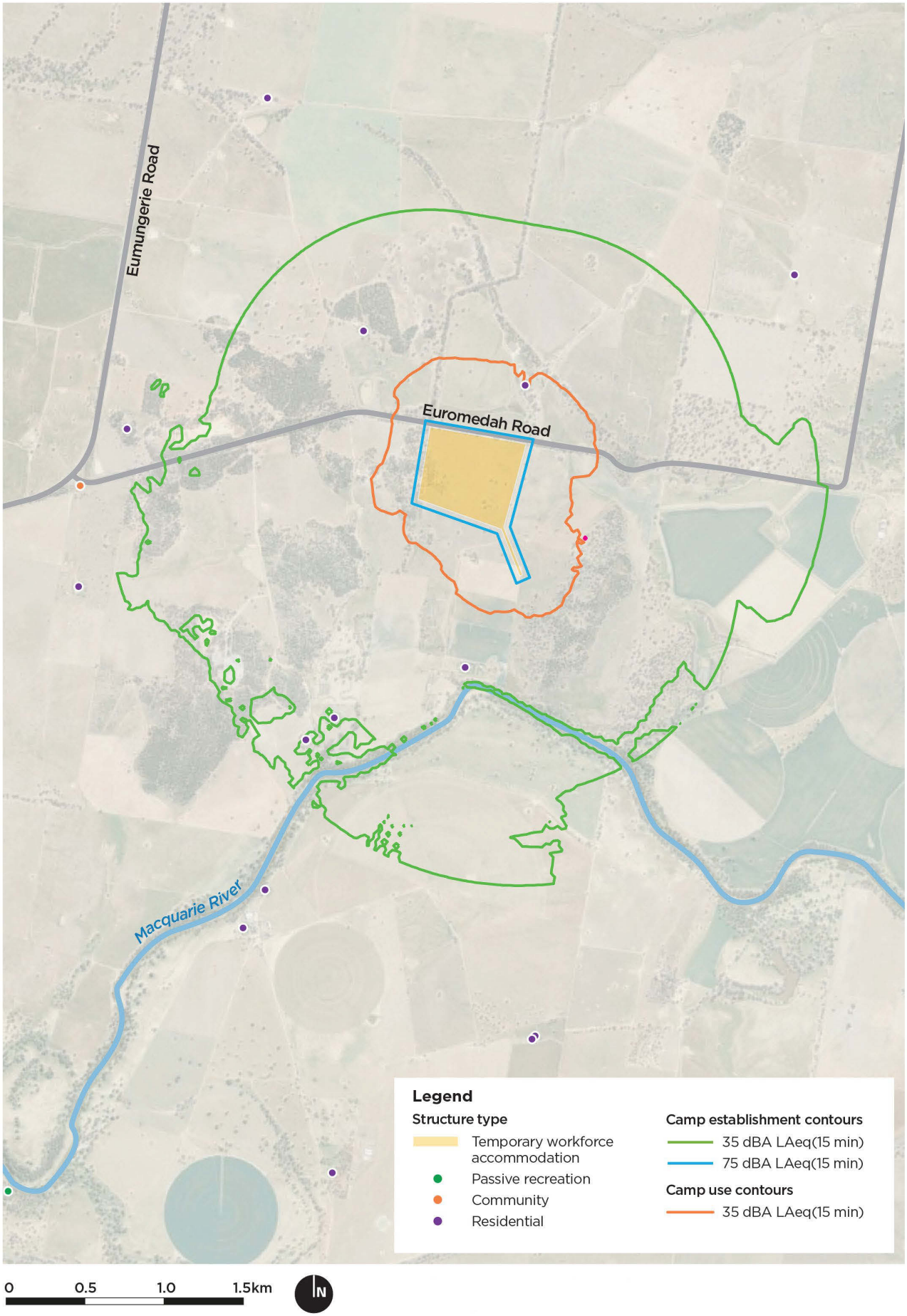

FIGURE 7-1: NOISE IMPACTED RECEIVERS—NARROMINE NORTH TEMPORARY WORKFORCE ACCOMMODATION

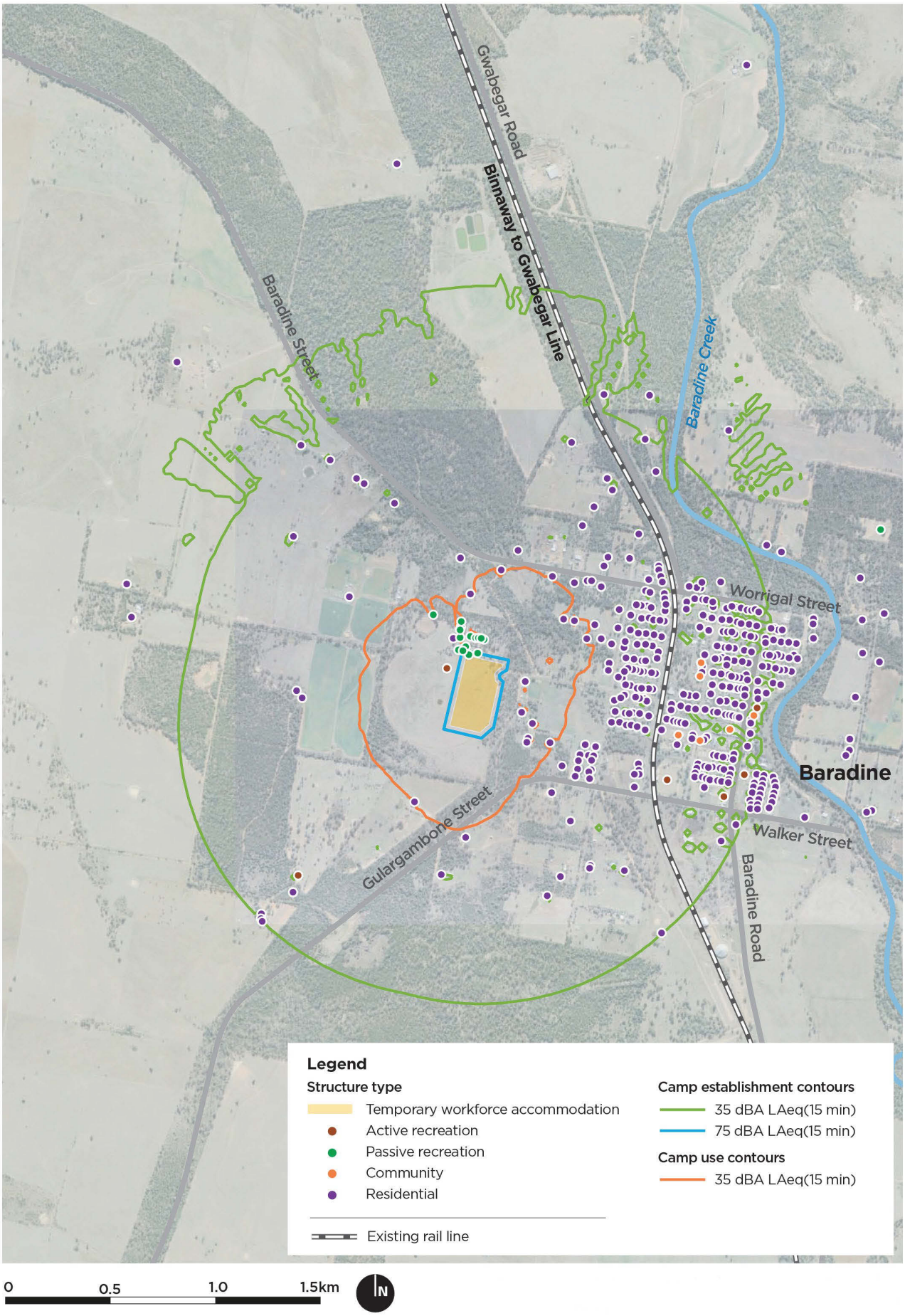

FIGURE 7-2: NOISE IMPACTED RECEIVERS—BARADINE TEMPORARY WORKFORCE ACCOMMODATION

7.5.2 Air quality impact assessment

7.5.2.1 Potential impacts

The assessment approach, background air quality and management levels/criteria for the amended proposal are as described in the EIS (chapters B10 and C2). The findings of the updated assessment for the establishment and use of temporary workforce accommodation, as a result of the changes in the locations of the Narromine North and Baradine temporary workforce accommodations, are summarised in this section. There are no changes to the locations of the Narromine South, Gilgandra and Narrabri West temporary workforce accommodation. As a result, the potential air quality impacts associated with establishing and using these facilities are as described in the EIS.

A screening level assessment was undertaken with consideration of the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (DEC, 2007). An emissions inventory for potential particulate sources was derived for the proposal and was provided in Appendix M of the EIS. Table 7-5 summarises the estimated total dust emissions from temporary workforce accommodation.

TABLE 7-5: ESTIMATED EMISSIONS DURING CONSTRUCTION—TEMPORARY WORKFORCE ACCOMMODATION

Proposal component—source of emission	Assumed dimensions for the purposes of the assessment	Total emissions of PM_{10}	Total emissions of $PM_{2.5}$	Separation distance
Establishment	250 x 250 m (indicative)	0.00000951 grams per square metre per second	0.00000095 grams per square metre per second	140 m

The predicted worst-case 24-hour PM_{10} and $PM_{2.5}$ concentrations were presented in Appendix M of the EIS as concentration versus distance graph for establishment and use of temporary workforce accommodation.

The number of potentially impacted receivers are provided in Table 7-6. There are no significant air emissions expected during use of temporary workforce accommodation. As a result, no modelling has been undertaken.

TABLE 7-6: SUMMARY OF AIR QUALITY IMPACTED RECEIVERS—TEMPORARY WORKFORCE ACCOMMODATION

Construction activity	Temporary workforce accommodation	Number of potentially impacted receivers
Use of facility	Narromine North	0
	Baradine	15

Facility establishment

During the establishment of temporary workforce accommodation facilities, air quality issues may arise from increases in dust emissions associated with vegetation clearing, and disturbance of soils and emissions (exhaust fumes) from plant and equipment.

As shown in Table 7-6, during establishment of the Narromine North and Baradine temporary workforce accommodation, exceedances of the relevant air quality criteria are predicted at sensitive receivers as follows:

- Narromine North—no exceedances predicted, which is consistent with the assessment undertaken as part of the EIS, despite the location change
- Baradine—exceedances at up to 15 sensitive receivers of which 13 are associated with Camp Cypress and the Baradine Showground. The change in location has resulted in an overall reduction of three impacted receivers.

The potentially affected receivers are shown in Figure 7-3 for the Baradine temporary workforce accommodation. These potential impacts would be managed in accordance with the air quality management plan (see mitigation measure AQ1 in section 8.2), which would be prepared as part of the CEMP.

Facility use

During use of the Narromine North and Baradine temporary workforce accommodation, no significant air emissions are predicted that would impact nearby sensitive receivers. This is consistent with the assessment undertaken as part of the EIS.

7.5.2.2 Changed or additional mitigation measures

The proposed amendment would not require any changes to the air quality mitigation measures provided in the EIS.

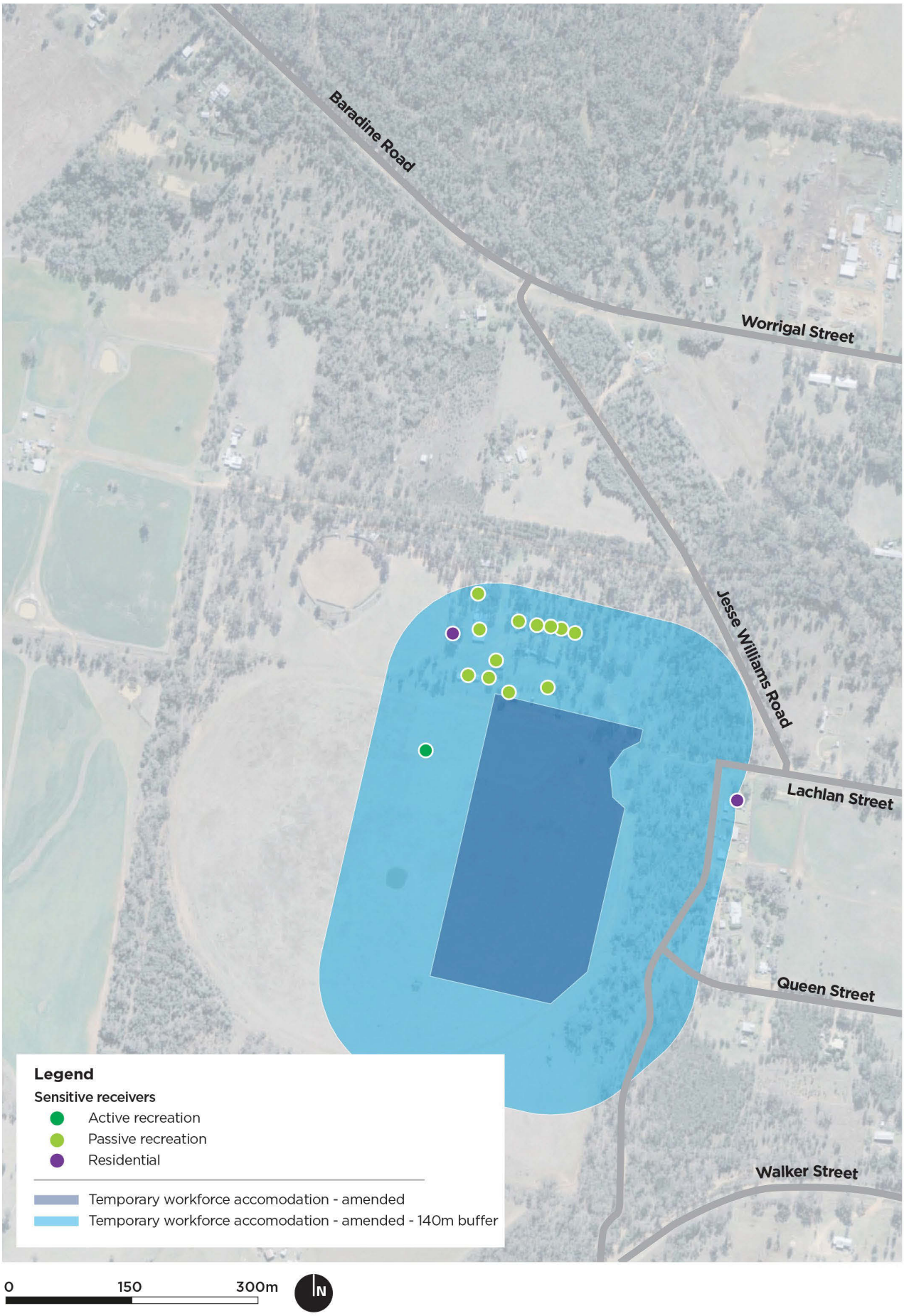

FIGURE 7-3: AIR QUALITY IMPACTED RECEIVERS—BARADINE WORKFORCE ACCOMMODATION

7.5.3 Socio-economic impact assessment

7.5.3.1 Potential impacts

It is expected that provision of the mobile accommodation facilities at the general compounds may enhance worker wellbeing due to the reduced need to commute long distances to the main temporary workforce accommodation after a shift. This may help to reduce worker fatigue and reduce road safety risks associated with longer commutes.

There are, however, also potential risks to worker wellbeing associated with being accommodated in small rooms without supporting amenities such as recreation areas, for more than short periods of time. Depending on the location of the compounds, the mobile accommodation facilities may be some distance from communities and convenient access to recreational facilities, shops and services. As discussed in section 7.5.4 of Technical Report 13—Social assessment, isolation and loneliness has been found in a recent study to contribute to the poor mental health and wellbeing of non-resident workers. The workforce management plan (mitigation measure SE11) would include strategies to promote the wellbeing of the workforce, such as access to mental health services and activities for workers to overcome isolation.

The general compounds may be located on private properties in the proposal site. As a result, they may be close to some residences. Section 7.5 of Technical Report 13 considers the potential impacts to residents due to the proximity of compounds, including the potential for noise and visual impacts. The presence of mobile accommodation facilities is not expected to increase these impacts overall; however, there is potential for increased privacy concerns and perceptions regarding reduced safety and security for neighboring residents, due to the increased number of workers at the compounds. This could be intensified by the presence of workers in the compounds in the evenings/overnight, as well as potential additional vehicle movements in and out of compounds. These potential impacts would depend on the proximity of compounds to residences. As discussed in section 7.5.4 of Technical Report 13, while non-resident workforces do not increase risks associated with crime and disorder, they can be the source of ‘blame’ and communities can perceive risks. This may be a concern for residents located in close proximity to the compounds and mobile accommodation facilities. This would be managed through the workforce management plan (mitigation measure SE11), which would define the measures to be implemented to manage the construction workforce, including a code of conduct.

The temporary workforce accommodation plan would guide the design of the mobile accommodation facilities, which would include amenity requirements, such as space for workers to socialise between shifts.

7.5.3.2 Changed or additional mitigation measures

Mitigation measure SE-CI2 has been amended (see section 8.2 and Appendix C of this report) to ensure the temporary workforce accommodation plan addresses and defines:

- the location, design, service and amenity requirements for mobile accommodation facilities, including amenities for workers
- the arrangement and layout of facilities to minimise amenity impacts on surrounding sensitive receivers (including noise, visual amenity, lighting and privacy).

7.6 Construction and operational footprints

The construction and operational footprints have been amended as described in section 6.7.

The screening assessment presented in Table 7-7 considers whether these proposed amendments and design refinements could change the potential impacts described in the EIS. Table 7-7 indicates where the need for additional assessment of the amended proposal has been identified, and where the assessment of the exhibited proposal in the EIS remains applicable in relation to the proposed changes. The additional environmental assessment is provided in sections 7.6.1 to 7.6.4.

TABLE 7-7: CONSTRUCTION AND OPERATIONAL FOOTPRINT ENVIRONMENTAL SCREENING

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Biodiversity	Changes to the construction footprint mean that there would be changes to the vegetation and fauna habitats affected. As a result, an assessment is required to consider the potential for terrestrial biodiversity impacts associated with the changes to the construction footprint. An updated biodiversity development assessment report has been prepared, and the key results are summarised in section 7.6.1. While there have been changes to the construction and operational footprints, the main potential change in impacts relates to terrestrial biodiversity. Associated impacts to aquatic ecology would be consistent with those assessed in the EIS.	Yes—refer to section 7.6.1
Water resources	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. Similarly, the proposed design refinements that have contributed to the footprint changes are relatively minor. As such, impacts to water resources associated with the proposed amendments to the construction and operational footprints and refinements would be consistent with those assessed in the EIS.	No
Flooding	The construction and operational footprints, including drainage control areas, have been amended due to a number of design refinements, which have the potential to change the flooding impacts assessed as part of the EIS. Where the proposed amendments have resulted in a change to a construction or operational feature, updated flooding modelling has been undertaken and the results are included in the updated flooding and hydrology assessment report.	Yes—refer to the updated flooding and hydrology assessment report
Soils and contamination	While there have been changes to the construction and operational footprints, these are only minor, and the construction methodology and operation of the proposal have not changed. Similarly, the proposed design refinements that have contributed to the footprint changes are relatively minor. As such, the impacts to soils and potential for contamination associated with the proposed amendments to the construction and operational footprints and refinements would be consistent with those assessed in the EIS.	No
Water quality	While there have been changes to the construction and operational footprints, these are only minor, and the construction methodology and operation of the proposal have not changed. Similarly, the proposed design refinements that have contributed to the footprint changes are relatively minor. As such, the impacts to water quality associated with the proposed amendments to the construction and operational footprints and refinements would be consistent with those assessed in the EIS.	No
Aboriginal heritage	Disturbance of additional areas outside the construction footprint assessed by the EIS has the potential to impact additional listed or unlisted Aboriginal sites or areas of archaeological potential. An addendum Aboriginal cultural heritage assessment report has been prepared to assess the amended footprint and the findings are summarised in section 7.6.6. Mitigation measure AH3 has been amended to include a requirement to survey the additional areas that form the construction footprint of the amended proposal, which were not surveyed as part of the EIS, to identify any new sites. This includes areas around Mungery Creek, Caleriwi Creek and the location of the Narromine North temporary workforce accommodation. The impacts on any additional Aboriginal sites identified by this survey would be managed in accordance with the Aboriginal cultural heritage management plan (mitigation measure AH10). An additional mitigation measure (AH7) has been provided to protect two culturally modified trees that would be located within the amended footprint of but would not be directly impacted. Direct impacts would be reduced as far as practicable by avoiding identified sites (mitigation measure AH1). Where this is not practicable, sites would be managed (including salvage of artefacts prior to construction), in accordance with the Aboriginal cultural heritage management plan (mitigation measure AH10).	Yes—refer to section 7.6.6

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Non-Aboriginal heritage	The non-Aboriginal heritage assessment undertaken as part of the EIS identified the potential for direct impacts to Woodvale Park Private Cemetery, which is a locally significant heritage listed item. The assessment also identified a potential heritage item—graves of the Dingwell children—which could be impacted during construction. As described in section 6.7.2, the construction and operation footprints have been amended to avoid and/or minimise direct impacts to these items; therefore, the amended proposal would reduce the potential impacts to non-Aboriginal heritage compared with that of the exhibited proposal described in the EIS. As a result of these amendments, mitigation measure NAH6 from the EIS, which was provided to minimise direct impacts to the graves of the Dingwell children, has been removed (see section 8.2 and Appendix C of this report).	No
Noise and vibration (construction)	The construction footprint has been amended in response to a number of design refinements. These refinements have the potential to change the construction noise and vibration impacts assessed as part of the EIS, including the receivers with the potential to be affected. As such, a construction noise and vibration assessment is required to consider the potential for impacts. An updated construction noise and vibration assessment has been prepared and is summarised in section 7.6.2.	Yes
Noise and vibration (operation)	The operational footprint has been amended in response to a number of design refinements. These refinements, have the potential to change the operational noise and vibration impacts assessed as part of the EIS, including the receivers with the potential to be affected. As such, an operational noise and vibration assessment is required to consider the potential for impacts. An updated operational noise and vibration assessment has been prepared and is summarised in section 7.6.3.	Yes
Air quality	The construction footprint has been amended in response to a number of design refinements, including changes to some of the compound locations. The changes in compound locations have the potential to change the construction air quality impacts assessed as part of the EIS, including the receivers with the potential to be affected. As such, a construction air quality assessment is required to consider the potential for impacts. As the operation of the proposal would not change, the operational air quality impacts associated with the proposed amendments to the operational footprint would be consistent with those assessed in the EIS. A construction air quality impact assessment is provided in section 7.6.4.	Yes
Traffic and transport	Design refinements that have resulted in changes to public roads closures and realignments have been considered in section 7.4. While there have been changes to the construction and operational footprints, these are only minor, and the construction methodology and operation of the proposal have not changed. Similarly, the proposed design refinements that have contributed to the footprint changes are relatively minor. As such, the traffic and transport impacts associated with the proposed amendments and refinements to the construction and operational footprints are considered to be consistent with those assessed in the EIS.	No
Land use and property	The changes to the construction and operational footprints would result in changes to the temporary and permanent land requirements of the proposal. As a result, assessment is required to consider the potential for land use and property impacts. A land use and property impact assessment is provided in section 7.6.5.	Yes
Visual amenity	While there have been changes to the construction and operational footprints, these are only minor, and the construction methodology and operation of the proposal have not changed. Similarly, the proposed design refinements that have contributed to the footprint changes are relatively minor. As such, the visual amenity impacts associated with the proposed amendments and refinements would be consistent with those assessed in the EIS.	No

Environmental aspect	Comparison of proposed amendment against the EIS	Further detailed assessment required?
Socio-economic assessment	While there have been changes to the construction and operational footprints, these are only minor, and the construction methodology and operation of the proposal have not changed. Similarly, the proposed design refinements that have contributed to the footprint changes are relatively minor. As such, the socio-economic impacts associated with the proposed amendments and refinements would be consistent with those assessed in the EIS.	No

7.6.1 Biodiversity impact assessment

In addition to the proposed amendments, the updated biodiversity development assessment report takes into account and includes the results of additional surveys completed since 2019, updated vegetation mapping and biodiversity credit calculations. The updated biodiversity development assessment report contains revised calculations of the impacts on biodiversity based on species polygon consultation with BCS and expert reports.

One of the key changes to the vegetation mapping approach was to remove derived grassland plant community types (PCTs) that had been identified in the EIS and Technical Report 1: Biodiversity development assessment report (particularly PCT 619). Any areas of derived native grassland were assigned to the appropriate woodland or forest parent community based on results of vegetation integrity plot surveys and identity of nearby woodland or forest PCTs. In addition, paddock trees were also assigned to the appropriate woodland or forest parent community. These changes have resulted in changes to areas of these PCTs, and associated areas of impact for some threatened ecological communities. Furthermore, seven related biodiversity assessment method calculator cases were set up under one parent case for the proposal, to account for each of the subregions the proposal crosses. This allowed for more rigorous assessment of appropriate PCTs and candidate threatened species.

The change in biodiversity impacts associated with the amended proposal compared to the exhibited proposal are summarised below, taking into account the changes in mapping approach and updated survey results.

Further information is provided in the updated biodiversity development assessment report.

7.6.1.1 Potential impacts

Native vegetation

It is estimated that up to about 1,791 ha of native vegetation would need to be removed for the amended proposal, compared to 1,732 ha for the exhibited proposal, comprising:

- 1,173 ha of native woodland and forest vegetation in good condition, compared to 1,125 ha for the exhibited proposal
- 618 ha of derived native grassland and shrubland, compared to 600 ha for the exhibited proposal
- no wetland vegetation, compared to seven ha for the exhibited proposed.

About 654 ha of native woodland and forest vegetation located within the Pilliga forests would be directly impacted by the amended proposal, compared to 624 ha for the exhibited proposal. This change is a factor of the changes to vegetation mapping as well as the footprint amendments.

The largest areas of permanent impacts on native vegetation (more than 100 ha removed) would still occur within the following native vegetation communities:

- PCT 88 Pilliga Box-White Cypress Pine-Buloke shrubby woodland
- PCT 49 Partly derived Windmill Grass-copperburr alluvial plains shrubby grassland
- PCT 148 Dirty Gum–Buloke–White cypress pine–ironbark shrubby woodland of the deep sandy soils on the Liverpool Plains Region of the Brigalow Belt South Bioregion
- PCT 398 Narrow-leaved Ironbark-White Cypress Pine-Buloke tall open forest on lower slopes and flats in the Pilliga Scrub and surrounding forests.

None of these PCTs are commensurate with a threatened ecological community listed under the BC Act or EPBC Act.

Threatened ecological communities

The proposal would impact the following threatened ecological communities listed under the BC Act:

- 6.5 ha of Myall Woodland in the Darling Riverine Plains, Brigalow Bet South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions [PCT 27], compared to 3.05 ha for the exhibited proposal.
- 7.3 ha of Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions (Brigalow Woodland) [PCT 35], compared to 0.61 ha for the exhibited proposal.
- 3.6 ha of Fuzzy Box Woodland on Alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions [PCT202], which is the same as the exhibited proposal
- 17.2 ha of Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions [PCT 248], compared to 14.71 ha for the exhibited proposal.
- 8.4 ha of White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland) [PCTs 435 and 599], compared to 8.32 ha for the exhibited proposal.

Where there has been changes in impacted areas, these are largely a result of the additional surveys completed in spring 2020, and changes to the classification and mapping of derived grasslands requested by BCS during the submissions process.

The total direct impacts on BC Act listed threatened ecological communities for the amended proposal is 43 ha, compared to 30.28 ha for the exhibited proposal.

To mitigate the potential impacts on biodiversity, biodiversity offsets would be provided in accordance with mitigation measure BD4, as described below.

The total direct impact on EPBC Act listed threatened ecological communities for the amended proposal is 115.7 ha, compared with 52.42 ha for the exhibited proposal, comprising the following:

- Weeping Myall Woodlands—6.5 ha, compared to 3.05 ha for the exhibited proposal
- Brigalow (*Acacia harpophylla* dominant and co-dominant)—7.3 ha, compared to 0.61 ha for the exhibited proposal
- Grey Box (*Eucalyptus macrocarpa*) grassy woodlands and derived native grasslands of South-eastern Australia—17.2 ha, compared to 14.71 ha for the exhibited proposal
- Poplar Box grassy woodland on alluvial plains—76.3 ha, compared to 29.95 ha for the exhibited proposal (it is noted that this TEC was listed following referral of the proposal
- White Box-Yellow Box- Blakely's Red Gum Grassy Woodland—8.4 ha, compared to 2.21 ha for the exhibited proposal.

Where there have been changes in impacted areas, these are largely a result of changes to the classification and mapping of derived grasslands requested by BCS during the submissions process. The additional surveys conducted in spring 2020 also allowed further refinement of vegetation classification and mapping. The amendments to the footprints as described in this report have also contributed to the increased areas.

Notwithstanding the increases in impacted areas for TECs, the amended proposal is unlikely to result in a significant impact on these communities. This is a result of the relatively small area of TECs affected compared to retained vegetation in the area, existing levels of fragmentation and the generally small patch size of impacted areas.

Threatened flora

The proposal would impact the following candidate flora species listed under the BC Act:

- *Commersonia procumbens*—573 ha of assumed potential habitat, compared to 565.14 ha for the exhibited proposal
- Pine donkey orchid (*Diuris tricolor*)—388.2 ha of potential habitat, compared to 630 ha for the exhibited proposal
- Slender Darling pea (*Swainsona murrayana*) – 50 ha of assumed potential habitat compared to 43.58 ha for the exhibited proposal
- Spiny peppercress (*Lepidium aschersonii*)—338.7 ha of assumed potential habitat, compared to 10.27 ha for the exhibited proposal

- Native milkwort (*Polygala linariifolia*)—263.2 ha of assumed potential habitat compared to 565.86 ha for the exhibited proposal
- *Tylophora linearis*—154.3 ha of known habitat, compared to 582.5 ha for the exhibited proposal
- Winged peppercress (*Lepidium monoplocoides)*—177.5 ha of assumed potential habitat, compared to 194.29 ha for the exhibited proposal.
- Cobar greenhood (*Pterostylis cobarensis*)—442.6 ha, compared to 193.04 ha for the exhibited proposal.
- Silky Swainson-pea (*Swainsona sericea*)—78.9 hectares of assumed potential habitat compared to 0 ha for the exhibited proposal
- Coolabah bertya (*Bertya opponens*)—no impacts, compared to 13.85 ha of potential habitat for the exhibited proposal
- *Cyperus conicus*—50.8 ha of assumed potential habitat compared to 0 ha for the exhibited proposal.
- Bluegrass (*Dichanthium setosum*)—3.5 ha of assumed potential habitat compared to 0 ha for the exhibited proposal
- Scant Pomaderris (*Pomaderris queenslandica*)—69.06 ha of assumed potential habitat compared to 0 ha for the exhibited proposal
- Ingram's Zieria (*Zieria ingramii*)—48.6 ha of assumed potential habitat compared to 0 ha for the exhibited proposal.

The updated credit calculators in Appendix K of the updated biodiversity development assessment report include these changes.

The proposal would impact potential habitat for six threatened flora species listed under the EPBC Act (as identified in the exhibited EIS). Significant impacts would remain for four of these species:

- *Commersonia procumbens*—573 ha of assumed potential habitat, compared to 565.14 ha for the exhibited proposal
- *Tylophora linearis*—154.3 ha of known habitat, compared to 582.57 ha for the exhibited proposal
- Winged peppercress (*Lepidium monoplocoides)*—177.5 ha of assumed potential habitat, compared to 194.29 ha for the exhibited proposal.
- Spiny peppercress (*Lepidium aschersonii*)—338.7 ha of assumed potential habitat, compared to 10.27 ha for the exhibited proposal.

The updated credit calculators in Appendix K of the updated biodiversity development assessment report include these changes.

Terrestrial fauna

It is estimated that between 14,503 and 41,103 hollow-bearing trees would be removed, compared to between 13,000 and 30,000 hollow-bearing trees for the exhibited proposal. The change in number is partly due to a data entry error in the exhibited EIS. During submissions process, BCS requested that paddock trees, which had previously been included in grassland PCTs, be included as woodland PCTs. This also resulted in an increase in the estimate of the number of hollow-bearing trees with the potential to be affected. The amendments to the footprints as described in this report have also contributed to the increased number of hollow-bearing trees that could be removed; however, the impact is similar to that assessed for the exhibited proposal, in that the proposal would have a substantial impact on hollow-dependent fauna.

The proposal would impact the following candidate fauna species listed under the BC Act:

- Barking owl (*Ninox connivens*)—258.4 ha of breeding habitat, compared to 24.29 ha for the exhibited proposal
- Masked owl (*Tyto novaehollandiae)*—186 ha of breeding habitat, compared to 7.25 ha for the exhibited proposal
- Glossy black-cockatoo (*Calyptorhynchus lathami*)—324.7 ha of breeding habitat based on the species expert report, compared to 30.55 ha for the exhibited proposal
- Little eagle (*Hieraaetus morphnoides*)—465.4 ha of breeding habitat based on the species expert report, compared to 15.9 ha for the exhibited proposal
- Square-tailed kite (*Lophoictinia isura*)—407.5 ha of breeding habitat, compared to 35.09 ha for the exhibited proposal

- Bush stone-curlew (*Burhinus grallarius*)—551 ha of potential habitat, compared to 337.29 ha for the exhibited proposal
- Eastern pygmy-possum (*Cercartetus nanus*)—835.7 ha of potential habitat, compared to 707 ha for the exhibited proposal
- Squirrel glider (*Petaurus norfolcensis*)—651.3 ha of potential habitat, compared to 688.3 ha for the exhibited proposal
- Rufous bettong (*Aepyprymnus rufescens*)—357.9 ha of potential habitat, compared to 244.35 ha for the exhibited proposal
- Koala (*Phascolarctos cinereus*)—60.4 ha of important habitat based on the species expert report, compared to 718.26 ha for the exhibited proposal
- Pale-headed snake (*Hoplocephalus bitorquatus*)—286.9 ha of potential habitat, compared to 206.7 ha for the exhibited proposal.

The updated species credits in Appendix K of the updated biodiversity development assessment report reflect the changed areas of impact.

The proposal would impact known or potential habitat for at least nine threatened fauna species and three migratory fauna species listed under the EPBC Act, as identified in the exhibited proposal. A significant impact is likely for the following species, as identified in the exhibited proposal:

- Koala—260.4 ha of occupied habitat impacted based on the species expert report, compared to 718.26 ha of habitat for the exhibited proposal
- Corben's long-eared bat—1,107.4 ha of potential habitat impacted, compared to 1,125 ha of assumed potential habitat for the exhibited proposal
- Pilliga mouse—647.1 ha of potential habitat impacted, compared to 630 ha for the exhibited proposal
- Painted honeyeater—1,107.4 ha of potential habitat impacted, compared to 1,125 ha for the exhibited proposal
- Regent honeyeater—286.8 ha of potential habitat impacted, compared to 1,125 ha for the exhibited proposal
- Swift parrot—732.9 ha of potential habitat impacted containing preferred feed trees impacted, compared to 717 ha for the exhibited proposal.

The potential for a significant impact is due to the areas of habitat to be removed and potential impacts on connectivity (all species), and the substantial numbers of hollow-bearing trees to be removed (for Corben's long-eared bat), as assessed in the EPBC Act assessments of significance.

Serious and irreversible impacts

The proposal would have the following impacts on TECs that may be subject to serious and irreversible impacts:

- *Bertya opponens* (Coolabah bertya) - previously recorded in the proposal site, however surveys have now concluded it is not present
- 7.3 ha of Brigalow Woodland TEC [PCT 35], compared to 0.61 ha for the exhibited proposal
- 3.6 ha of Fuzzy Box Woodland TEC [PCT 202], which is the same as the exhibited proposal
- 8.4 ha of White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland) TEC [PCTs 435 and 599], compared to 8.32 ha for the exhibited proposal.

Where there have been changes in areas impacted these are largely as a result of changes to the classification and mapping of derived grasslands requested by BCS during the submissions process. The additional surveys conducted in spring 2020 and March 2022 also allowed for further refinement of vegetation classification and mapping.

An assessment of serious and irreversible impacts has been prepared for Coolabah Bertya, as this species was identified as an entity subject to serious and irreversible impacts following submission of the BDAR for exhibition. The species had been assumed present in in two remote locations of the Pilliga forests where access was not possible. A targeted survey was completed over two weeks in March 2022 using multiple ecologists to minimise safety issues and improve potential for detection. No individuals were recorded in these two locations, and in consultation with BCS it has been concluded that the species can be considered absent from the proposal site.

7.6.1.2 Changed or additional mitigation measures

Notwithstanding the change in impacts, the overall approach to managing impacts on biodiversity is as described in section B1.5.1 of the EIS.

Biodiversity mitigation measures (as updated) are provided in section 8.2 of this report to mitigate impacts that cannot be avoided. The potential for impacts during construction would be protected in accordance with a proposal-specific biodiversity management plan, which would be implemented as part of the CEMP (mitigation measure BD8).

A total of 46,814 ecosystem credits are required for the amended proposal, including 9,638 for prescribed impacts, compared to a total of 34,820 for the exhibited proposal. Two small vegetation zones do not require ecosystem credit offset due to vegetation integrity scores being less than 17.

The proposal site is known to support 11 species credit species and an additional 13 that are assumed to be present due to site access limitations in certain areas and poor survey conditions due to prolonged drought. These species require a total of 275,702 species credits for the amended proposal, including 87,501 credits for prescribed impacts, compared to a total of 160,421 species credits for the exhibited proposal. Species credits have been calculated for similar species listed in section B1.5.1 of the EIS, with species credits no longer required for two species.

The difference in ecosystem and species credits between the exhibited proposal and this amendment is as a consequence of the incorporation of the additional survey findings in spring 2020, August 2021 and March 2022, improved conditions resulting in increased vegetation integrity scores for some vegetation zones, the changed requirements for vegetation mapping, and changed requirements for credit calculations that were requested by DPIE (Biodiversity, Conservation and Science Directorate), in addition to footprint changes discussed in this report. It should be noted that the ecosystem and species credits are not calculated as a result of a direct ratio with area.

A preliminary fauna connectivity strategy has been prepared to establish the framework for the management of impacts on fauna connectivity (see Appendix J of the updated biodiversity development assessment report). A detailed fauna connectivity strategy would be prepared to guide detailed design in accordance with mitigation measure BD6 to inform the investigation and design of final locations for fauna crossing structures, localised fencing and fauna furniture installation, as well as monitoring and reporting requirements.

7.6.2 Noise and vibration (construction) impact assessment

The updated construction noise and vibration assessment considered the potential construction noise and vibration impacts of the proposed design refinements and footprint changes. The key findings are summarised below.

7.6.2.1 Potential noise impacts

Rail infrastructure impacts

The key findings of the updated noise assessment for construction of rail infrastructure compared to the findings of the assessment undertaken for the exhibited proposal are summarised below:

- **Highly affected noise management level**—the highly affected noise management level (75 dB(A)) is predicted to be exceeded at up to 17 residential receivers across all scenarios (compared to 19 exceedances at residential receivers for the exhibited proposal).
- **Construction during recommended standard hours**—noise levels generated by rail construction activities undertaken during recommended standard working hours have the potential to exceed the relevant construction noise management level—45 dB(A)) at up to 987 residential receivers (15 additional exceedances compared to the exhibited proposal), five passive recreation receivers, one active recreation receiver and 31 commercial/industrial receivers (compared to exceedances at 24 commercial/industrial receivers for the exhibited proposal).
- **Out-of-hours work**—noise levels during out-of-hours work are predicted to exceed the 35 dB(A) construction noise management level at up to 2,894 residential receivers across all rail infrastructure assessment scenarios (compared to up to 2,836 residential receivers for the exhibited proposal). The scenario with the highest number of predicted impacts is stripping topsoil (scenario RAIL03), with impacts at up to 2,246 residential receivers (12 additional exceedances compared to the exhibited proposal).
- **Sleep disturbance and awakening**—stripping topsoil and landscaping (scenarios RAIL03 and RAIL11) are predicted to be the worst-case scenarios in relation to sleep disturbance and awakening potential. These activities are predicted to generate noise levels that exceed the external 52 dB(A) *Noise Policy for Industry* (EPA, 2017) sleep disturbance criteria at up to 1,024 residential receivers (compared to the 981 receivers for

the exhibited proposal) and the internal 55 dB(A) *Road Noise Policy* awakening criteria at up to 226 residential receivers (compared to the 220 receivers for the exhibited proposal). On average, the duration of impacts at any individual receiver is estimated to be between one day and eight weeks for stripping topsoil (RAIL03) and one day to seven weeks for landscaping (RAIL11).

Potential ground-borne noise impacts associated with vibration-generating works for rail infrastructure construction scenarios are summarised as follows:

- **Works within the construction footprint (dozer activities)**—receivers may be subject to ground-borne noise levels of greater than 35 dB(A) $L_{Aeq\ (15\ min)}$ at distances of up to 100 m from the works. A total of 12 residential receivers have been identified within this distance. External airborne noise levels at these receivers are predicted to be 25 dB to 33 dB greater than ground-borne noise (compared to 31 to 33 dB predicted for the exhibited proposal).
- **Rail earthworks**—receivers may be subject to ground-borne noise levels of greater than 35 dB(A) $L_{Aeq\ (15\ min)}$ at distances of up to 180 m from the works. A total of 15 residential receivers were identified within this distance. External airborne noise levels at these receivers are predicted to be 21 to 28 dB greater than ground-borne noise (compared to 23 to 28 dB predicted for the exhibited proposal).
- **Bridge construction (impact piling)**—receivers may be subject to ground-borne noise levels of greater than 35 dB(A) $L_{Aeq\ (15\ min)}$ at distances of up to 540 m from the works. A total of 31 residential receivers were identified within this distance. External airborne noise levels at these receivers are predicted to be 20 dB to 25 dB greater than ground-borne noise (compared to 20 to 24 dB predicted for the exhibited proposal).

It is noted that the overall numbers of impacted receivers, while similar to those for the exhibited proposal, are relatively high; however, this should be read in the context of the length of the proposal and the low proposal-specific construction noise management level adopted for the proposal. In practice, for the majority of receivers, construction noise or vibration world only be experienced by affected receivers for relatively short periods of time as the works move along the proposal site. Furthermore, the predictions consider a likely worst-case noise level based on a number of conservative assumptions, which would not occur for most of the time even when works are occurring close to a receiver.

The changes to the number of receivers affected are due to a combination of the updated proposal design and a minor adjustment to the noise prediction methodology. The updated prediction method has resulted in an increase in the extent of potential impacts, which encompasses additional receivers in some locations.

Impacts of ancillary construction facilities

The updated construction noise assessment considered potential noise impacts associated with construction activities at the amended compound and concrete batching plant locations. The potential noise impacts associated with changes to the temporary workforce accommodation facilities are considered in section 7.5 of this report. There are no proposed changes to the multi-function compounds or borrow pits and, as such, these are not considered in this report.

The key findings of the updated noise assessment for amended construction infrastructure compared to the findings of the assessment undertaken for the exhibited proposal are summarised below:

- **Highly affected noise management level**—the highly affected noise management level (75 dB(A)) is not predicted to be exceeded at any residential receivers (compared to one exceedance for the exhibited proposal).
- **Construction during recommended standard hours**—noise levels generated by the construction infrastructure considered during recommended standard hours have the potential to exceed the relevant construction noise management level (45 dB(A)) at up to 20 residential receivers (compared to 74 residential receivers for the exhibited proposal) and one community facility (consistent with the exhibited proposal).
- **Out-of-hours work**—noise levels during out-of-hours work are predicted to exceed the relevant construction noise management level (35 dB(A)) at up to 197 residential receivers (compared to 312 residential receivers for the exhibited proposal) across construction scenarios.
- **Ground-borne noise**—the updated assessment did not identify any changes to the predicted ground-borne noise impacts associated with construction infrastructure.

7.6.2.2 Potential vibration impacts

Amenity impacts

For vibration-generating works associated with dozer activities, receivers may be affected by vibration within a maximum of 54 m of the works. A total of seven residential receivers were identified within this distance. Other sensitive land uses, such as offices, schools, educational institutions and places of worship, may be affected within 23 m of the works. Seventeen commercial/industrial premises and one community facility have been identified within this distance (compared to the 19 commercial/industrial premises for the exhibited proposal).

For vibration-generating works associated with vibratory roller activities, receivers may be affected by vibration within a maximum of 130 m of the works. A total of nine residential receivers were identified within this distance (compared to the eight for the exhibited proposal). Other sensitive land uses may be affected within 54 m of the works. Nineteen commercial/industrial premises have been identified within this distance (compared to the 14 commercial/industrial premises for the exhibited proposal).

For vibration-generating works associated with bridge construction (impact piling), receivers may be affected by vibration within a maximum of 670 m of the works. A total of 39 residential receivers were identified within this distance. Other sensitive land uses may be affected within 280 m of the works. A total of 47 commercial/ industrial premises were identified within this buffer distance.

During general construction works, vibration may be perceptible at certain times within 60 m of dozer operation (eight residential receivers), 140 m of the vibratory roller activities (11 residential receivers, compared to 10 residential receivers for the exhibited proposal), and 700 m of impact piling (40 residential receivers, compared to 41 residential receivers for the exhibited proposal).

Structural impacts

The updated assessment indicates that:

- For vibration-generating works associated with dozer activities, receivers may be affected by vibration within a maximum of 8 m of the works. A total of 49 structures, including four residential receivers, were identified within the buffer (compared to the 44 structures predicted for the exhibited proposal).
- For vibration-generating works within the rail earthworks extent (vibratory roller activities), standard dwellings or buildings of similar construction may be affected by vibration within a maximum of 18 m of the works. A total of 17 structures including one residential receiver were identified within this distance (compared to no residential receivers predicted for the exhibited proposal).

Impacts on heritage structures

Structures at listed and potential heritage items located within 35 m of vibration-intensive activities such as bulldozers and vibratory rollers, or 180 m of impact piling at bridges, may receive vibration levels exceeding the 3 millimetres per second (mm/s) structural damage criteria.

The Woodvale Park Private Cemetery and Curban Inn heritage-listed sites are located within these distances; however, no vibration-intensive activities are proposed within the vibration buffer distances from any structures on these sites.

7.6.2.3 Changed or additional mitigation measures

As described in section 7.3.1, the proposed amendment would not require any changes to the construction noise and vibration mitigation measures provided in the EIS. In accordance with mitigation measure CNV1, location and activity-specific construction noise and vibration impact statements would be prepared prior to specific construction activities. The specific construction management measures identified by the construction noise and vibration impact statements would still be applied based on the predicted noise and vibration levels at each individual receiver.

7.6.3 Noise and vibration (operation) impact assessment

The updated operation noise and vibration assessment considered the potential operation noise and vibration impacts of the proposed design refinements and footprint. The key findings are summarised below.

7.6.3.1 Potential noise impacts

Airborne noise

The key findings of the updated operational noise and vibration assessment compared to the findings of the assessment undertaken for the exhibited proposal are summarised below.

Noise levels at 2026

- Predicted noise levels during the day achieve the 60 dB(A) noise criterion at the majority of sensitive receivers. There is one residential receiver where the predicted noise levels are predicted to be 1 dB(A) above the criterion (no change compared to the exhibited proposal).
- Predicted noise levels during the night achieve the 55 dB(A) noise criterion at the majority of sensitive receivers. The predicted noise levels are 1 to 11 dB(A) above the criterion at up to 40 residential receivers (seven additional exceedances compared to the exhibited proposal).
- Predicted maximum noise levels may exceed the 80 dB(A) noise criterion at up 35 residential receivers by 1 to 11 dB(A) (no change compared to the exhibited proposal). Similar to the EIS findings, maximum noise levels may also be exceeded at one receiver located near the Narromine West connection; however, this was based on a locomotive type that is not currently operating on this section of track.

Noise levels at 2040

- Predicted noise levels during the day achieve the 60 dB(A) noise criterion at the majority of sensitive receivers. The predicted noise levels are up to 1 to three dB(A) above the criterion at up to three residential receivers (two additional exceedances compared to the exhibited proposal).
- Predicted noise levels during the night achieve the 55 dB(A) noise criterion at the majority of sensitive receivers. The predicted noise levels are one to 12 dB(A) above the criterion at up to 52 residential receivers (six less exceedances compared to the exhibited proposal).
- Predicted maximum noise levels may exceed the 80 dB(A) noise criterion at up 35 residential receivers by one to 11 dB(A) (no change compared to the exhibited proposal). Similar to the EIS findings, maximum noise levels may also be exceeded at one receiver located near the Narromine West connection; however, this was based on a locomotive type that is not currently operating on this section of track.

Noise from train operations (rolling noise) is the dominant noise source in all cases; however, maximum noise levels are also influenced by train horn noise at level crossings.

Receivers eligible for consideration for mitigation

Sensitive receivers are eligible for consideration of noise mitigation where exceedances of the criteria are predicted. The updated operational noise and vibration assessment identified that the following receivers are eligible for consideration for mitigation:

- In 2026—41 residential receivers (five more receivers than the exhibited proposal)
- In 2040—53 residential receivers (five less receivers than the exhibited proposal).

Exceedances were mainly caused by train movements during the night. The receivers eligible for consideration of noise mitigation are listed in Table 28 of the updated noise and vibration assessment—operational rail report and shown in the updated map book. An investigation of feasible and reasonable noise mitigation measures to minimise the predicted noise levels at these receivers would be undertaken as described in section 15 of the updated noise and vibration assessment—operational rail report and in accordance with the mitigation measures.

Potential for sleep disturbance

The night-time maximum (L_{Amax}) criteria, as defined by the *Rail Infrastructure Noise Guideline* (NSW EPA, 2013), consider the potential for sleep disturbance impacts, such as awakening, disrupted sleep or a general reduction to the quality of sleep over time. The criteria account for the highest level of noise during train pass-by events and the number of pass-by events over the night-time period.

The updated operational noise and vibration assessment identified that predicted noise levels achieve the criteria (2026 and 2040) for the majority of sensitive receivers. The criteria is generally achieved where receivers are located further than 400 m from the rail corridor. Similar to the EIS findings, predicted noise levels exceed the criteria by up to 11 dB(A) during the night-time period at up to 36 sensitive receivers.

Ground-borne noise

The updated assessment identified that the ground-borne noise criteria would be achieved at a distance of greater than 50 m from the outer rail track. The assessment predicted that the ground-borne noise criteria may be exceeded at four residential receivers (one less than the exhibited proposal).

While ground-borne noise levels are within the assessment criteria at the majority of sensitive receivers, there can be a risk of minor perceptible ground-borne noise at sensitive receivers. At this stage of the design, it is not possible to forecast with certainty the indoor ground-borne noise levels that could occur as the building construction of sensitive receivers is not known. As described in section B9.5 of the EIS, and in accordance with mitigation measure ONV1, all noise levels (including ground-borne noise levels) would be reviewed during detailed design to confirm the assessment outcomes and need for mitigation.

7.6.3.2 Potential vibration impacts

Train operations

Similar to the EIS findings, the updated operational noise and vibration assessment identifies that there are no general structures or heritage structures within the offset distances of 13 and 15 m, respectively; as such, there are no predicted exceedances of human comfort or cosmetic damage vibration criteria.

The potential for structural vibration impacts would be confirmed during detailed design as part of the operational noise and vibration review (mitigation measure ONV1). The review would take into account condition surveys of any potentially affected structures.

Other operations

Similar to the EIS findings, the updated assessment of potential vibration impacts from other operational activities identifies that there are no predicted human comfort or structural vibration impacts.

7.6.3.3 Changed or additional mitigation measures

The proposed amendment would not require any changes to the operational noise and vibration mitigation measures provided in the EIS.

7.6.4 Air quality impact assessment

The assessment approach, background air quality and management levels/criteria for the amended proposal are as described in the EIS (chapters B10 and C2). The findings of the updated assessment for the change to footprints (including the associated design refinements), are summarised below.

7.6.4.1 Potential impacts

Dust dispersion modelling

A screening level assessment was undertaken with consideration of the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*. An emissions inventory for potential particulate sources was derived for the proposal and were provided in Appendix M of the EIS. Table 7-8 summarises the estimated total dust emissions from construction of the amended proposal, including the following scenarios:

- Fixed batching plants at the following locations:
  - Structure compounds at the Macquarie River, Castlereagh River and Narrabri Creek/Namoi River bridges
  - The general compound at the crossing of Gwabegar Road, given its remoteness to the other sites
- Mobile batching plants at general compounds.

The locations of the fixed and mobile batching plants are shown in the updated map book.

The predicted worst-case 24-hour PM_{10} and $PM_{2.5}$ concentrations were presented in Appendix M of the EIS as concentration versus distance graph for construction of the road and rail infrastructure.

TABLE 7-8: ESTIMATED EMISSIONS DURING CONSTRUCTION

Proposal component—source of emission	Assumed dimensions for the purposes of the assessment	Total emissions of PM_{10} (grams per second)	Total emissions of $PM_{2.5}$ (grams per second)	Separation distances
Construction of rail and road infrastructure	40 x 100 m	0.00000951	0.00000095	50 m
Fixed concrete batching plants (200 m^3/hour)	100 x 100 m	1.9	0.19	375 m
Mobile concrete batching plants (50 m^3/hour)	60 x 60 m	0.38	0.038	125 m

Construction footprint

The results for the amended construction footprint are consistent with those for the exhibited proposal, as summarised below:

- The criteria of 50 µg/m³ for PM_{10} may be exceeded at a distance of up to 50 m from the proposal site.
- The criteria of 25 µg/m³ for $PM_{2.5}$ may be exceeded at a distance of up to 10 m from the proposal site, under worst case conditions.

As a result, a 50-m separation distance from work sites is considered appropriate for the protection from adverse air quality impacts. There are 25 sensitive receivers located within 50 m of where the road and rail infrastructure would be constructed, as shown in Figure 7-4 and Figure 7-5.

Potential impacts along the proposal site would generally be short term, as construction works would move along the proposal site, limiting the duration of potential impacts at any one location.

Use of the fixed concrete batching plants

The results for the amended construction footprint are consistent with those for the exhibited proposal, as summarised below:

- The criteria of 50 µg/m³ for PM_{10} may be exceeded at a distance of up to 375 m from the location of fixed concrete batching plants.
- The criteria of 25 µg/m³ for $PM_{2.5}$ will not be exceeded at any location due to operation of fixed concrete batching plants.

As a result, a 375-m separation distance from fixed concrete batching sites is considered appropriate for the protection from adverse air quality impacts. There are no sensitive receivers located within 375 m of where the fixed concrete batching plants would be located.

Use of mobile concrete batching plants

The results for the amended construction footprint are consistent with those for the exhibited proposal, as summarised below:

- The criteria of 50 µg/m³ for PM_{10} may be exceeded at a distance of up to 125 m from the location of mobile concrete batching plants.
- The criteria of 25 µg/m³ for $PM_{2.5}$ will not be exceeded at any location due to operation of mobile concrete batching plants.

As a result, a 125-m separation distance from mobile concrete batching sites is considered appropriate for the protection from adverse air quality impacts. There are no sensitive receivers located within 125 m of where the mobile concrete batching plants would be located.

7.6.4.2 Changed or additional mitigation measures

The proposed amendment would not require any changes to the air quality mitigation measures provided in the EIS.

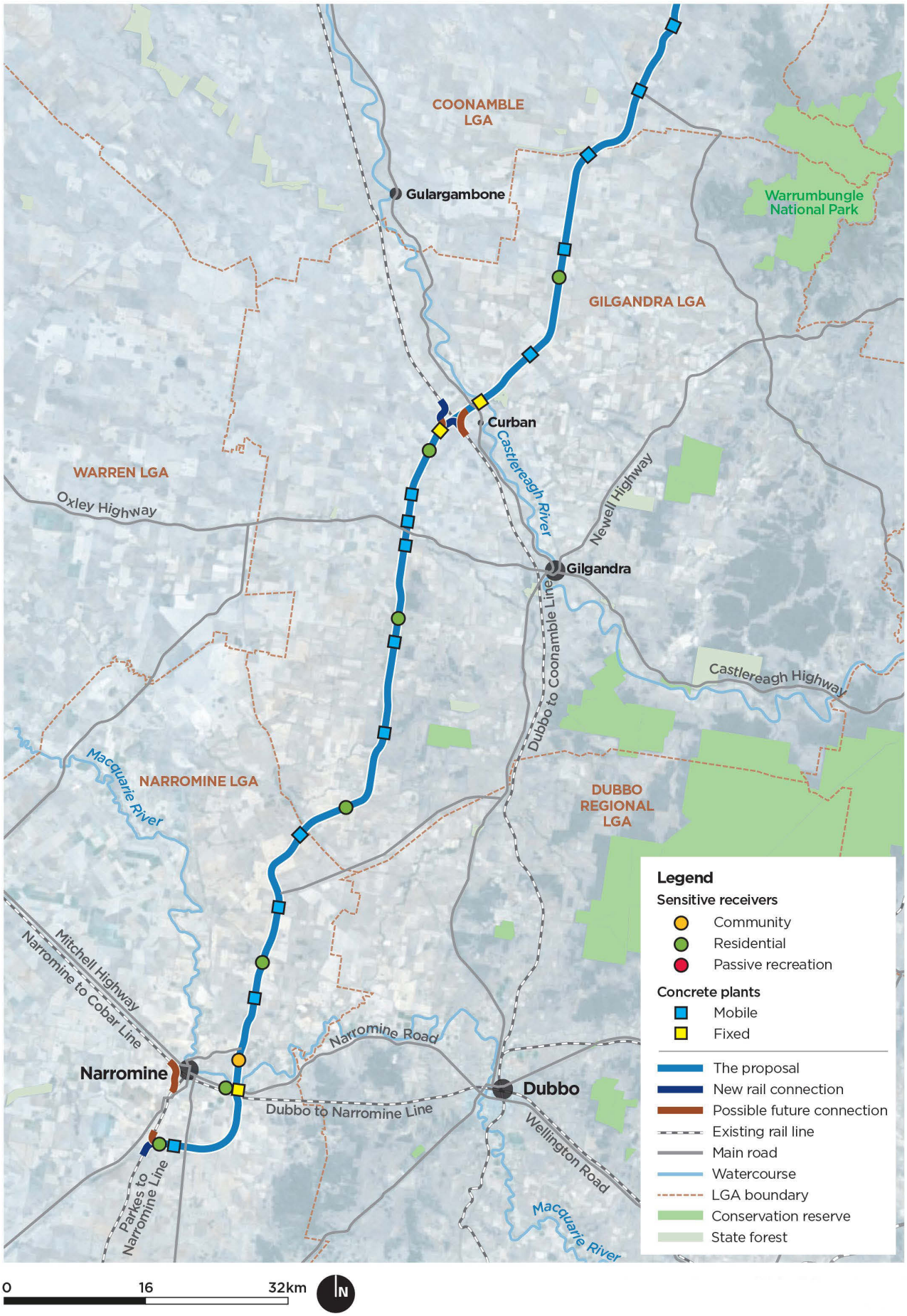

FIGURE 7-4: SENSITIVE RECEIVERS WITHIN 50 METRES OF THE PROPOSAL SITE (MAP 1 OF 2)

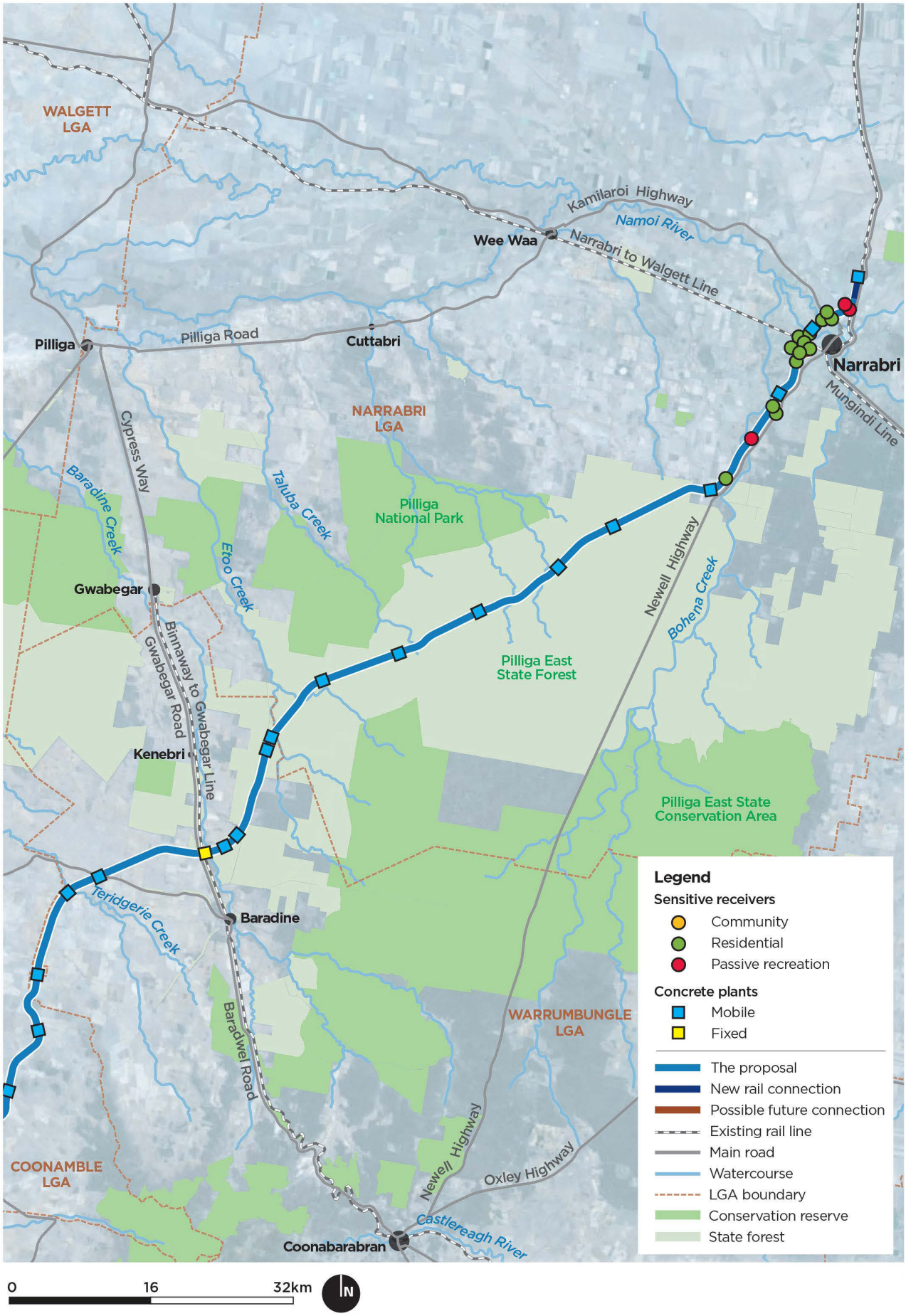

FIGURE 7-5: SENSITIVE RECEIVERS WITHIN 50 METRES OF THE PROPOSAL SITE (MAP 2 OF 2)

7.6.5 Land use and property assessment

The calculations of potential impacts on land use and property (including agricultural land) that were provided in the EIS and Technical Report 11: Agriculture and land use assessment have been updated for the amended proposal and are provided below. The results show that, overall, the proposed amendments to the construction and operational footprints would not materially alter the agriculture and land use impacts assessed by the EIS. The proposed changes to construction and operation footprints would not substantially alter the degree of property severance assessed by the EIS.

7.6.5.1 Potential construction impacts

Land use/property impacts

During the construction phase, there would be an increase (172.8 ha) in the amount of land affected by the construction footprint, which is now estimated to be 3,489.3 ha (compared to 3,316.5 ha for the exhibited proposal).

The temporary land requirements for the amended proposal would include about 1,732 ha of land (compared to 1,612 ha for the exhibited proposal) and use of land within about 417 properties (compared to 413 properties for the exhibited proposal). As noted in the EIS, the property impact estimates have been based on known ownership information and treat each collection of adjacent lots with the same owner as a separate property; as such, they may overstate the number of properties affected.

The temporary land requirements would now include about:

- 1,248.5 ha of privately owned land, compared to 1,158 ha for the exhibited proposal
- 483.5 ha of publicly owned land (mainly owned by the NSW Government), compared to 454 ha for the exhibited proposal.

Agricultural land

About 2,623 ha of agricultural land, representing 0.07 per cent of agricultural land in the regional study area, would be affected for various periods during construction, compared to 2,554 ha for the exhibited proposal.

There has been an increase in the total area of biophysical strategic agricultural land (BSAL) impacted by the proposal. The total area of BSAL affected by the amended proposal is 120.4 hectares, compared to 90.9 hectares for the exhibited proposal. This equates to removal of 0.08 per cent of BSAL from the regional study area, compared to 0.064 per cent for the exhibited proposal.

7.6.5.2 Potential operation impacts

Land use/property impacts

Direct impacts during operation would result from the permanent land requirements and the presence of operational rail and road infrastructure within the operational footprint.

About 1,986 ha of land would be permanently affected by the operational footprint for the amended proposal, compared with 1,805 for the exhibited proposal (a 181 ha increase). This comprises land that is mainly used for:

- Agriculture—about 1,458 ha, which is about 73 per cent of the proposal site, compared to 1,300 ha (75 per cent of the proposal site) for the exhibited proposal
- Production native forestry—about 457 ha, which is about 23 per cent of the proposal site, compared to 429 ha (25 per cent of the proposal site) for the exhibited proposal.

The permanent land requirements for the amended proposal would directly affect about 310 properties (compared to 274 for the exhibited proposal), including about:

- 146 privately owned properties (compared to 142 for the exhibited proposal)
- 164 publicly owned properties (compared to 132 for the exhibited proposal).

As noted above, the property impact estimates have been based on known ownership information and treat each collection of adjacent lots with the same owner as a separate property; as such, they may overstate the number of properties affected.

Agricultural land

Across agricultural land, the rail corridor would traverse predominately land used for:

- Dryland cropping (40 per cent compared to 38 per cent for the exhibited proposal)
- Grazing (32 per cent compared to 34 per cent for the exhibited proposal)
- Production native forestry (23 per cent compared to 24 per cent for the exhibited proposal).

The area of agricultural land affected by the amended proposal represents about 0.04 per cent of agricultural land across the five LGAs that comprise the regional study area, compared to 0.04 per cent for the exhibited proposal.

Land and soil capability

The amended proposal would impact more Class 3 land (588 ha compared to 435 ha for the exhibited proposal) and less Class 4 and 5 land (1,199 ha compared to 1,275 ha for the exhibited proposal).

Property severance / impacts

The desktop analysis of property impacts has been expanded in response to a request from DPE for additional detail. The property acquisition process has commenced, and due to the sensitive and confidential nature of the process, it is essential that clear and consistent information is communicated, particularly where individual property discussions may be underway. Cadastral and property ownership data do not necessarily provide the full picture of how a farm may operate, or reflect all parties with a compensable interest under the *Land Acquisition (Just Terms Compensation) Act 1991*. Property ownership may be registered in different names but farmed collectively. The sensitivity of operations at each landholding will also vary, as will their ability to accommodate any proposed changes.

A detailed discussion on the types of potential direct impacts on land capability, farm infrastructure and biosecurity was provided in Table 7.9 of Technical Report 11 (Agricultural and land use assessment). Utilising these findings, the preliminary land requirements provided in Appendix D of this report, and the mapping illustrated in the Map Book, the following scenarios have been identified regarding impacts on private land:

- Change in public road access
- Change in internal access arrangements
- Severance, potential isolation of a portion of a landholding
- Severance of a landholding
- Acquisition on the external boundary of a landholding.

Each of these scenarios is discussed in the sections below, providing additional detail on how the property negotiation process will facilitate the management and mitigation of potential impacts in a manner that is sensitive to the needs of each individual landholder.

Table D.1 in Appendix D of this report has been updated to provide a preliminary indication of these potential scenarios on properties, based on a desktop assessment. This should be taken as indicative only and will not be used as the basis for any future property acquisition negotiations.

Change in public road access

A change in public road network access requirements for a landholding would potentially arise where the proposed rail alignment:

- Is located between a landholding boundary and the public road network (see Figure 7-8)
- Crosses an internal access road that connected to the public road network (see Figure 7-7).

ARTC is currently discussing access arrangements and requirements with each property owner to understand current arrangements and future needs for the property during construction and once the rail line is operational. Through these discussions, a reconfigured access arrangement would be agreed between both parties during the construction phase of the project, taking into consideration timing and potential temporary measures as required.

Private level crossings are discussed in section 6.4.

Change in internal access arrangements

A change in internal access arrangements would potentially arise where the proposed rail alignment affects internal (see Figure 7-7 and Figure 7-8):

- access track arrangements
- connectivity between farm infrastructure (items or hubs)
- functionality of an operational farm.

Through the property acquisition process, ARTC would individually discuss access arrangements and operations with each property owner to understand current and future needs for the property during construction and once the rail line is operational. Through these discussions requirements for changes to internal access would be discussed between both parties. These discussions may include, but not be limited to – fencing, unsealed tracks, location of and access to farm infrastructure (such as silos or water troughs) and machinery mobility requirements. The timing of the agreed changes would be considered as part of the negotiation process, taking into consideration factors relevant to the operations on the property, such as harvest times, stock needs, safety, etc, with any agreed measures being in line with the principles of the *Land Acquisition (Just Terms Compensation) Act 1991*.

Severance

In order to form a preliminary understanding of potential severance impacts at the individual property level, a qualitative desktop assessment was conducted. From a purely physical perspective, severance was considered in three ways:

- Isolation of a portion of land holding, considering connectivity to the public road network and potential functionality of the isolated portion based on visible evidence from aerial photography (see Figure 7-6)
- Severance of a portion of land holding (where alternate access to the public road network may be available) (see Figure 7-7 and Figure 7-8)
- Acquisition located on external boundary of a land holding, and thereby not causing severance (see Figure 7-9).

Through the property acquisition process, ARTC would individually discuss the potential property impacts with each owner to understand current and future needs for the property during construction and once the rail line is operational. These discussions would include, but not be limited to, changes to farming activities that may be necessitated by the property acquisition, suitability of the remaining land to meet current, or future agricultural activities. The impact of severance of a landholding and altered access arrangements will differ for each property, depending on the current and future operations and how the landowner chooses to respond to the change in land use. Some parcels of land may be deemed to be commercially unviable while others may be suitable for a new type of agricultural activity with some adjustment to internal infrastructure and arrangements. In all cases, ARTC utilise the services of externally appointed valuers who are required to take into account the impacts of severance as a requirement of the compensation assessment pursuant to the *Land Acquisition (Just Terms Compensation) Act 1991*.

Private property where alternative public road access is not available - severance

FIGURE 7-6: EXAMPLE OF PRIVATE PROPERTY IMPACT (SEVERANCE) WHERE ALTERNATIVE PUBLIC ROAD ACCESS IS NOT AVAILABLE

Private property where alternative public road access is available - considerable severance

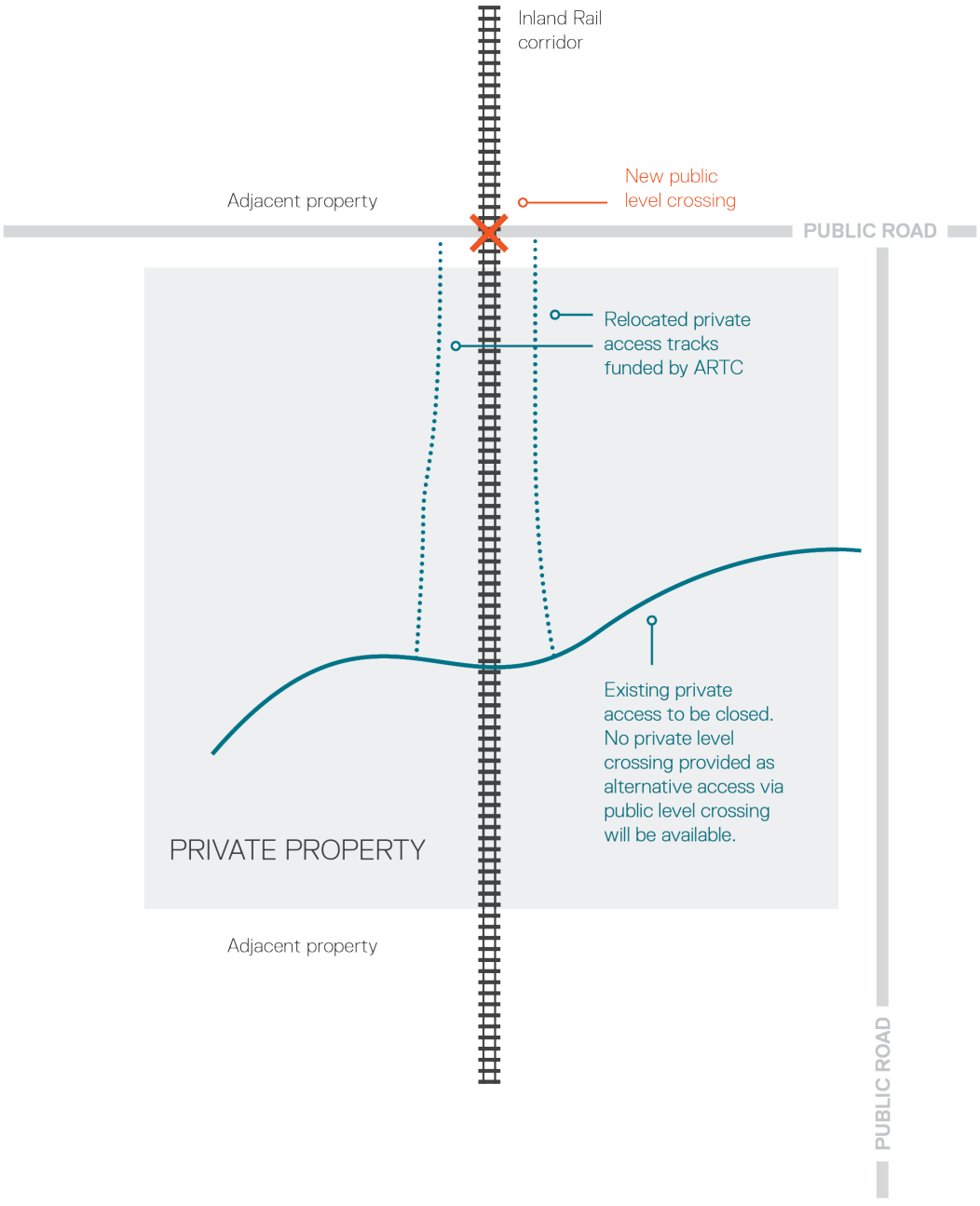

FIGURE 7-7: EXAMPLE OF PRIVATE PROPERTY IMPACT (SEVERANCE) WHERE ALTERNATIVE PUBLIC ROAD ACCESS COULD BE ESTABLISHED

Private property where alternative public road access is available - small severance

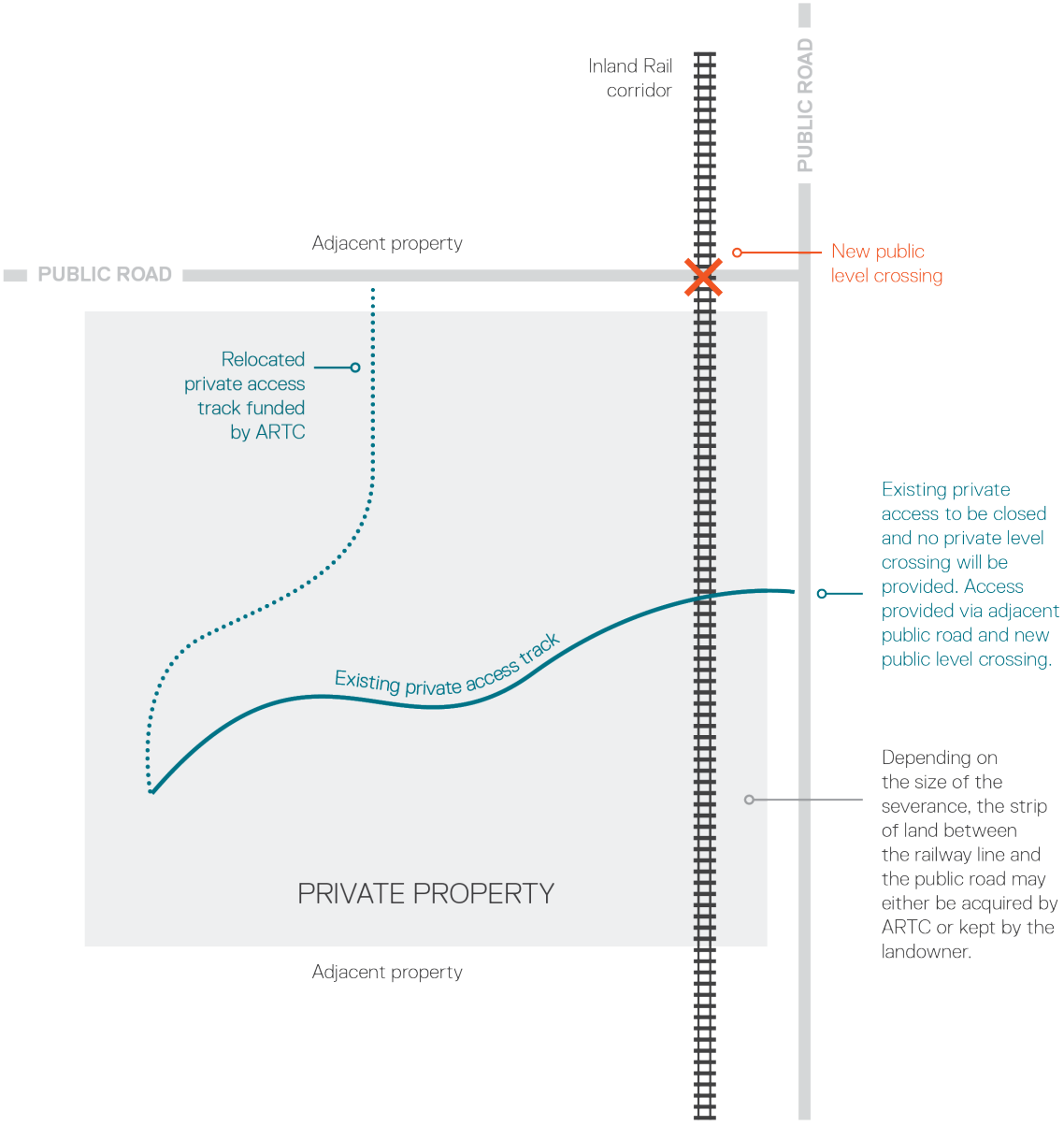

FIGURE 7-8: EXAMPLE OF PRIVATE PROPERTY IMPACT (SEVERANCE) WHERE ALTERNATE PUBLIC ROAD ACCESS IS AVAILABLE

Private property - no severance (rear boundaries)

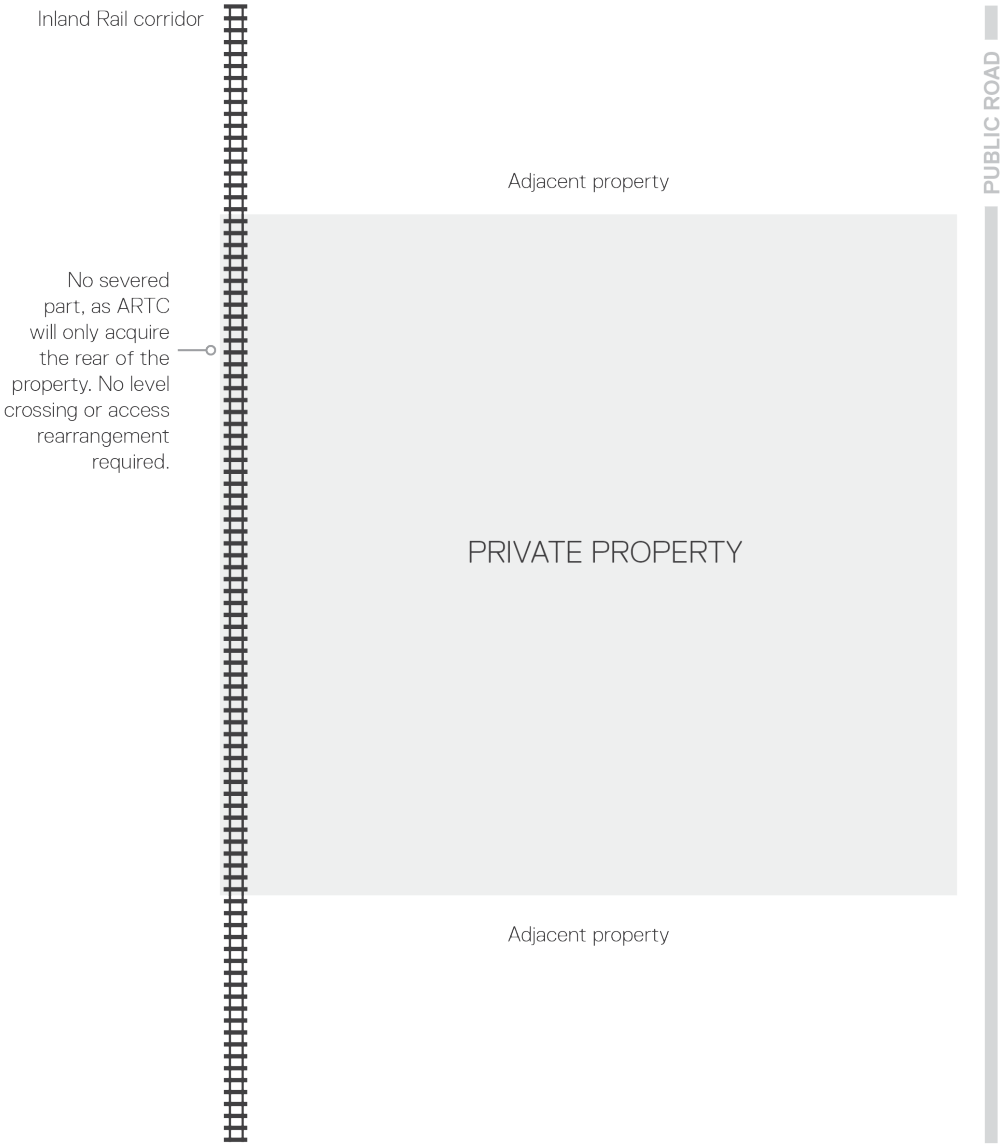

FIGURE 7-9: EXAMPLE OF PRIVATE PROPERTY IMPACT – NO SEVERANCE

7.6.5.3 Changed or additional mitigation measures

Mitigation measures to manage the land use and property impacts, including property severance, were proposed in the EIS and have been updated in this report (see section 8.2 and Appendix C). Mitigation measures LP1 to LP6 specifically relate to measures to be taken to minimise impacts and consult with landholders in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW).

7.6.6 Aboriginal cultural heritage assessment

An addendum Aboriginal cultural heritage assessment has been prepared to assess the potential impacts of the amended proposal on Aboriginal cultural heritage. This provides an updated assessment of the proposal originally assessed by Technical Report 6: Aboriginal cultural heritage assessment report.

7.6.6.1 Potential impacts

The results show that, overall, the proposed amendments to the construction and operational footprints would not materially alter the Aboriginal cultural heritage impacts assessed by Technical Report 6 and described in the EIS.

The amended footprint results in a change to the impacts on four sites registered by the Aboriginal heritage information management system (AHIMS).

- Modified tree—BCST6 (AHIMS ID 35-3-0270): The tree was located outside the study area considered by the Aboriginal cultural heritage assessment and was not assessed. The tree would now be located within the construction footprint; however, it would be able to be retained insitu and protected from impacts.
- Modified tree—Berida Road ST1 (AHIMS ID 28-4-0283): Although the tree was located outside the study area considered by the Aboriginal cultural heritage assessment, the assessment concluded that there was the potential for it to be indirectly impacted by the proposal. The tree would now be located within the construction footprint; however, it would be able to be retained insitu and protected from impacts.
- Artefact scatter—Calga Creek AFT and PAD (AHIMS ID 28-1-0059): The Aboriginal cultural heritage assessment identified that this site would be directly impacted by the proposal, resulting in harm to the entire extent of the site. The site would now be partially impacted by the amended proposal footprint, resulting in a partial loss of value.
- Artefact scatter—NB-AS-04 (AHIMS ID 28-1-0095): The Aboriginal cultural heritage assessment identified that this site would be directly impacted by the proposal resulting in harm to the entire extent of the site. The site would now be partially impacted by the amended proposal footprint, resulting in a partial loss of value.

As a result of these changes, the addendum assessment concluded that:

- There would be a reduction in impact on the two artefact scatter sites, from complete to partial
- Two additional modified trees would be located within the amended construction footprint; however, these trees would be able to be retained insitu and would not be impacted, provided that standard protection measures are implemented.

7.6.6.2 Changed or additional mitigation measures

An additional mitigation measure has been developed (mitigation measure AH7) (see section 8.2 and Appendix C of this report) to provide for the insitu protection of the two additional modified trees located within the amended construction footprint, and further design development to minimise risk of inadvertent harm to these items. The change in impact to the artefact scatters would not require any changes to the mitigation measures provided in the EIS.

7.7 Cumulative assessment

ARTC propose to construct the Narwonah Materials Distribution Centre (MDC) adjacent to the southern end of Narromine to Narrabri section of Inland Rail (the proposal). The MDC will be used for temporary track material storage and management prior to their distribution to multiple Inland Rail projects across NSW, including the proposal. The Narwonah MDC was assessed under a review of environmental factors (REF) in accordance with Part 5 of the EP&A Act, with ARTC being the proponent and determining authority. The REF was publicly exhibited between 5-18 May 2022.

The Narwonah MDC is currently at the concept design stage and will further refined during detailed design. Existing environmental assessments undertaken to inform the REF may be further refined or additional assessments undertaken as the Narwonah MDC design progresses. Any further assessments undertaken during detailed design to support the construction and operation of the Narwonah MDC will ensure the REF conclusion of 'no significant impact' remains, otherwise further environmental assessment and approval will be required. The Narwonah MDC will be:

- constructed and be operational immediately prior to the commencement of construction of the proposal.
- designed and constructed to ensure no significant cumulative flooding or hydrology (including water quality) impacts. Management measures detailed in the REF include the placement of site elements to minimise impacts to overland flow conveyance and storage, and appropriate cross and open drain features to maintain designated flow regime and avoid flow redirection and/or flood impacts on external properties.
- decommissioned and rehabilitated to a yet to be determined land use prior to commencement of operation of the proposal:
  - this will create a landform that will not have any ongoing restrictions or constraints that would affect the flooding predictions for the proposal
  - any future land use (by ARTC or others such as council as mentioned in the REF) would be subject to appropriate environmental assessment and approval processes

Potential cumulative impacts are discussed in Table 7-9. Based on this assessment, and with implementation of recommended mitigation measures in this preferred infrastructure / amendment report and the REF, no significant cumulative impacts are predicted.

TABLE 7-9: CUMULATIVE ASSESSMENT

Aspect	Potential cumulative impacts
Noise and vibration	**Proposal construction phase** For sensitive receivers located more than 300 metres from the proposal, cumulative noise levels associated with the proposal and Narwonah MDC are estimated to increase by between two and three dB(A). These increases are not likely to be noticeable. For those receivers located within 300 metres of the proposal noise levels would be dominated by construction of the proposal and no noticeable cumulative impacts are predicted. There are no predicted vibration impacts to sensitive receivers during operation of the Narwonah MDC. **Proposal operational phase** During operation of the proposal the Narwonah MDC will be decommissioned and there would be no associated noise and vibration impacts. **Conclusion** Therefore, there are no predicted significant cumulative noise and vibration impacts associated with the proposal and the Narwonah MDC. With the implementation of the recommended mitigation measures in this preferred infrastructure / amendment report and the REF, any noticeable cumulative noise impacts are not expected to be significant.
Traffic and transport	**Proposal construction phase** The estimated traffic movements associated with operation of the Narwonah MDC are 32 light vehicles two way movements per day and 20 heavy vehicle two way movements per week. Estimated traffic movements near Narromine associated with construction of the proposal are up to 98 light vehicle movements and 326 heavy vehicle movements per day. Traffic movements would be distributed across various public roads in the Narromine area depending on the activity being undertaken. It is expected that construction vehicle movements, particularly delivery trucks, would be spread out across the day. This would also assist in minimising any additional delays for vehicles turning from side roads at intersections along the construction access routes. Given the relatively low number of vehicle movements associated with the Narwonah MDC, and the distribution of proposal generated vehicle movements, no noticeable impacts are predicted. **Proposal operational phase** During operation of the proposal the Narwonah MDC will be decommissioned and there would be no associated traffic movements. **Conclusion** Therefore, there are no predicted significant cumulative traffic and transport impacts associated with the proposal and the Narwonah MDC.

Aspect	Potential cumulative impacts
Flooding and hydrology	**Proposal construction phase** As described above the Narwonah MDC will be designed and constructed to ensure no significant cumulative flooding impacts. The Narwonah MDC will include site elements to minimise impacts to overland flow conveyance and storage, and appropriate cross and open drain features to maintain designated flow regime and avoid flow redirection and/or flood impacts on external properties. **Proposal operational phase** As described above the Narwonah MDC will be decommissioned and rehabilitated to a yet to be determined land use prior to commencement of operation of the proposal. This will create a landform that will not have any ongoing restrictions or constraints that would affect the flooding predictions for the proposal. **Conclusion** Therefore, there are no predicted cumulative flooding and hydrology impacts associated with the proposal and the Narwonah MDC.
Biodiversity	**Proposal construction phase** Construction of the Narwonah MDC will require clearing of 146.3 hectares of native vegetation including 1.07 hectares of a threatened ecological community (Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions) listed under the BC Act. Construction of the proposal would require clearing of 1,791 hectares of native vegetation including 6.5 hectares of the Myall Woodland threatened ecological community. While there would be a minor increase in the cumulative loss of native vegetation (including the above threatened ecological community) the increase is not considered to be significant. **Proposal operational phase** During operation of the proposal the Narwonah MDC will be decommissioned and rehabilitated and there would be no associated biodiversity impacts that would result in any cumulative impacts. **Conclusion** Therefore, there are no predicted significant cumulative biodiversity impacts associated with the proposal and the Narwonah MDC. With the implementation of the recommended mitigation measures in this preferred infrastructure / amendment report and the REF, including biodiversity offsets, the cumulative impacts are not considered to be significant.
Aboriginal heritage	**Proposal construction phase** Potential Aboriginal heritage impacts during construction of the Narwonah MDC were assessed to be low in the REF. As such, there are no expected significant cumulative impacts. **Proposal operational phase** During operation of the proposal the Narwonah MDC will be decommissioned and rehabilitated and there would be no associated Aboriginal heritage impacts that would result in any cumulative impacts. **Conclusion** Therefore, there are no predicted significant cumulative Aboriginal heritage impacts associated with the proposal and the Narwonah MDC.
Surface water quality	**Proposal construction phase** As described above the Narwonah MDC will be designed and constructed to ensure no significant water quality impacts. Appropriate measures such as erosion and sediment control will be implemented during construction of the proposal to minimise potential surface water quality impacts. **Proposal operational phase** As described above, during operation of the proposal the Narwonah MDC will be decommissioned and rehabilitated and there would be no associated surface water quality impacts that would result in any cumulative impacts. **Conclusion** Therefore, there are no predicted significant cumulative surface water quality impacts associated with the proposal and the Narwonah MDC. With the implementation of the recommended mitigation measures in this preferred infrastructure / amendment report and the REF, no significant cumulative surface water quality impacts are predicted.

Aspect	Potential cumulative impacts
Air quality	**Proposal construction phase** With the implementation of recommended mitigation measures in the REF there were no predicted air quality impacts to sensitive receivers. As such, there are no predicted cumulative air quality impacts. **Proposal operational phase** During operation of the proposal the Narwonah MDC will be decommissioned and rehabilitated and there would be no associated air quality impacts. **Conclusion** Therefore, there are no predicted significant cumulative air quality impacts associated with the proposal and the Narwonah MDC.

8. Evaluation and conclusion

8.1 Summary and justification

The Inland Rail Narromine to Narrabri proposal is critical State significant infrastructure (SSI) and is subject to assessment and approval in accordance with Part 5, Division 5.2 of the EP&A Act. An EIS was prepared to address the requirements of Division 5.2, the SEARs and Schedule 2 of the EP&A Regulation. The EIS was placed on public exhibition by DPIE between 8 December 2020 and 7 February 2021.

During the exhibition period, interested stakeholders and members of the community were able to make a written submission to DPIE for consideration in its assessment of the proposal.

This combined Preferred Infrastructure Report and Amendment Report describes and assess the proposed amendments developed as a result of continued design development and refinement to minimise the potential environmental impacts of the proposal. The following amendments are proposed and considered in this report:

- Relocation of the seven crossing loops to new locations to minimise overall impacts
- Changes to public level crossing numbers, locations and treatments due to changes to crossing loop locations, updated traffic data and refinement of sight distances
- Reduction in the number of public road and access tracks that would need to be closed, mainly as a result of the crossing loop relocations
- Changes to the public roads requiring realignment to minimise property impacts
- Changes to the locations of the Narromine North and Baradine temporary workforce accommodation facilities based on consultation with key stakeholders
- Mobile accommodation facilities are now proposed be provided within some of the general compounds for improved flexibility on the workforce approach
- Adjustments to the construction and operational footprints to accommodate the above amendments and other proposed design refinements and, in some areas, to minimise the amount of disturbance where possible.

A separate Response to Submissions Report has been prepared that includes consideration of the issues raised by the community, agencies and other stakeholders in their submissions. The proposed amendments relate to and address some of the issues raised within submissions and during consultation, including the potential for property, land use, traffic and access impacts. The amendments were developed in consultation with potentially affected landholders and other relevant stakeholders as described in section 3.4. The aim of the amendments is to minimise the potential impacts of the proposal where practicable, particularly in respect of land use and property, and traffic and access, and to take into account further design development. A description of, and justification for, the proposed amendments is provided in section 6 of this report.

The changes in potential impacts associated with the proposed amendments compared to those described in the EIS are considered in section 7 of this report. These mainly include changes to biodiversity, flooding, noise, air quality, land use and property, socio-economic, and traffic and transport impacts. The assessments show that the proposed changes to impacts identified would not result in any unacceptable or significant impacts.

Considering the proposed changes in the context of the strategic need for Inland Rail (considered in Chapter 5 of the EIS and summarised in section 2.3 of this report) and justification (noted below), there is not considered to be any change to the overall justification and strategic merit of the proposal in the context of Inland Rail as a whole.

8.1.1 Justification of the proposal

The SEARs and clause 7(1)(f) of Schedule 2 of the EP&A Regulation require an EIS to provide '*the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4)*'.

8.1.1.1 Biophysical considerations

Detailed environmental investigations have been carried out as described in the EIS, the combined Preferred Infrastructure Report and Amendment Report and Response to Submissions Report to:

- Understand the existing environment of the proposal site and surrounds
- Inform route selection and option development

- Inform development of the reference design and preliminary construction planning
- Undertake the environmental impact assessment and prepare the EIS
- Respond to issues raised in submissions
- Further progress the design and assessment process in accordance with the commitments made in the EIS, and in response to issues raised during community consultation
- Assess the potential impacts of the amended proposal.

To provide a high level of certainty in understanding the environment and identifying potential impacts, all investigations were undertaken by technical specialists experienced in impact assessment, using best practice methodologies in accordance with relevant requirement statutory requirements and guidelines.

The first step of the impact assessment process involved identifying key potential environmental issues, impacts and risks that would be subject to detailed assessment as part of the EIS. Investigations were informed by the impact scoping exercise and environmental risk assessment, as described in chapter A9 of the EIS, and were undertaken in accordance with the SEARs. The results of environmental investigations and consideration of the environmental risk assessment were used to ensure that potential impacts are avoided as far as possible. The key potential biophysical impacts of the proposal, based on the design and construction methodology described in chapters A7 and A8 of the EIS, are summarised in chapter D5 of the EIS.

Ways to further reduce and minimise unavoidable potential impacts on the environment have also been considered. Mitigation and management measures (as amended) to minimise any outstanding impacts are identified in this report (see section 8.2). These include changes to respond to issues raised in submissions, as described in the Response to Submissions Report.

8.1.1.2 Economic and social considerations

Inland Rail is fundamental to the continued growth of rail freight. It is estimated that Inland Rail will shift the share of freight moved by rail between Melbourne and Brisbane from 26 to 62 per cent, so that by 2050 about 7.9 million tonnes of inter-capital freight will be moved by rail between the two cities (ARTC, 2015). Inter-capital freight includes products such as hardware, steel, groceries and other consumer goods. It travels between major ports and capital cities before being distributed to retailers.

Inland Rail will also travel through some of Australia's richest farming regions and mining regions. It is expected to draw significant volumes of grain, cotton, chilled beef, coal and other commodities onto rail. During construction, Inland Rail is expected to be a major economic enabler in the regions, as ARTC will aim to utilise local procurement and employment as far as possible.

In summary, as described in chapter A5 of the EIS, Inland Rail is needed to respond to the growth in demand for freight transport, and address existing freight capacity and infrastructure issues. The analysis of demands undertaken by ARTC indicated that there would be sufficient demand for Inland Rail.

The proposal is a critical component of Inland Rail and is required to enable Inland Rail to operate. The benefits of Inland Rail are described in chapter D6 of the EIS.

The potential for social and economic impacts has been assessed by the EIS. The key potential socio-economic and community impacts of the proposal are summarised in chapter D5 of the EIS. The approach to managing the identified impacts is also described in chapter D5 of the EIS. Concurrent with public exhibition of the EIS, ARTC has undertaken further investigations and is proposing a number of design refinements/amendments to the proposal. The aim of these amendments is to minimise the potential impacts of the proposal where practicable, particularly in respect of land use and property, and traffic and access, and to take into account further design development.

The amendments have been developed taking into account consultation with the community and key stakeholders and submissions made. The proposed amendments would address some of the potential socio-economic impacts of the proposal (as exhibited). The potential socio-economic impacts of the amendments have been assessed. Additional and amended mitigation measures are proposed to respond to the changes in potential socio-economic impacts and issues raised in submissions (as described in the Response to Submissions Report). These changes (see section 6.2) would further minimise the potential socio-economic impacts of the proposal.

8.1.1.3 Ecologically sustainable development

The EP&A Act adopts the definition of ecologically sustainable development contained in the *Protection of the Environment Administration Act 1991* (NSW). The following sections provide reasons justifying the proposal having regard to the principles of ecologically sustainable development defined by clause 7(4) of Schedule 2 of the EP&A Regulation.

Precautionary principle

The precautionary principle is defined as *'…if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation*'.

A range of environmental investigations have been undertaken during the development of the proposal and the environmental assessment process, to ensure that potential impacts are understood with a high degree of certainty. The assessment of the potential impacts of the proposal is considered to be consistent with the precautionary principle. The assessments undertaken are consistent with accepted scientific and assessment methodologies and have taken into account relevant statutory and agency requirements. The assessments have applied a conservative approach with regard to construction and operational arrangements, and the modelling used.

The proposal alignment and design has evolved to avoid impacts, where possible, and to reflect the findings of the studies undertaken. Mitigation and management measures have been proposed to minimise potential impacts, and these management measures would be implemented during construction and operation.

Lack of full scientific certainty has not been used as a reason to postpone or avoid identification and adoption of design or management measures to avoid or minimise potential environmental degradation. Where potential suitable habitat for species credit species is present, the species are assumed present and appropriate offsets have been calculated. No threat of serious or irreversible damage to the environment arising from the proposal has been identified.

Principle of inter-generational equity

The principle of inter-generational equity is defined as '…*the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations*.'

Construction of a long linear infrastructure proposal such as the proposal has the potential for some degree of environmental and social disturbance. These disturbances include the clearing of vegetation; some disturbance to private properties during construction; potential disturbance of some heritage sites; and localised impacts; however, the potential for environmental and social disturbance as a result of construction has to be balanced against the long-term benefits of the Inland Rail overall.

Should the proposal not proceed, the principle of intergenerational equity may be compromised, as future generations would experience the increased environmental and safety impacts associated with the transport of large volumes of freight via the Newell Highway. The strategic planning studies summarised in chapter 5 have identified a strong need and justification for Inland Rail. The proposal would, as part of Inland Rail, benefit future generations by providing a safer, more efficient means of freight transport.

Conservation of biological diversity and ecological integrity

The principle of conservation of biological diversity and ecological integrity is defined as '*…conservation of biological diversity and ecological integrity should be a fundamental consideration*.'

Ecological studies have been undertaken to identify potential adverse impacts on biodiversity. Where potential impacts cannot be avoided, mitigation measures would be implemented to reduce the impact as far as possible.

The proposal would result in the clearing of vegetation to establish the new rail corridor. The route has been refined to minimise this impact as far as possible, while endeavouring to balance the potential for land use impacts. A biodiversity assessment was undertaken in accordance with the *Biodiversity Assessment Method 2020* (DPIE, 2020b) to identify potential adverse impacts on biodiversity. Mitigation measures are proposed to minimise and manage the significance of the impact on native vegetation and flora and fauna. Biodiversity offsets would be implemented to address the impacts that cannot be avoided.

Improved valuation and pricing of environmental resources

The principle of improved valuation and pricing of environmental resources is defined as *'…that environmental factors should be included in the valuation of assets and services*.'

The assessment has identified the environmental and other consequences of the proposal, and identified mitigation measures where appropriate to manage potential impacts. If approved, the construction and operation of the proposal would be in accordance with relevant legislation, the conditions of approval, and the construction and operation environmental management plans. These requirements would result in an economic cost to the proponent. The implementation of mitigation measures would increase both the capital and operating costs of the proposal. This signifies that environmental resources have been given appropriate valuation.

The value of environmental resources is also inherently considered in the development of a design that avoids and minimises impacts.

The reference design for the proposal (as amended) has been developed with an objective of minimising potential impacts on the surrounding environment. The extra cost of alignments, designs, proposal elements, management measures and impact offset or mitigation packages, are selected to avoid and minimise environmental and/or social impacts, are included in the total estimated proposal cost. Examples include the provision of numerous bridges to minimise potential impacts on the flood plains and the proposed biodiversity offset package.

8.2 Updated mitigation measures

The EIS identified the proposed approach to environmental management and the mitigation measures that would be implemented to avoid or minimise the potential impacts of the proposal. These measures were provided in chapter D5 of the EIS.

After consideration of the issues raised in the submissions and additional work undertaken since exhibition, the mitigation measures have been 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
- Respond to the findings of further assessments (described in section 4 of this report) and the amendments described in this report.

Some new measures have been added and the wording of some measures has been amended.

The full set of updated mitigation measures is provided in Table 8- 1 to Table 8-3. The measures are broadly grouped according to the main stage of implementation, and the relevant key issues and impacts mitigated. Table 8- 1 provides the measures that would be implemented during the design phase and prior to construction. It includes measures to guide how the proposal would be designed and construction would be planned to minimise the construction and operational impacts of the proposal. Table 8-2 provides the measures relevant to the management of construction activities and the works proposed. Table 8-3 provides the measures relevant to operation that would be implemented during the operational stage to guide how the proposal is operated and maintained in the long term. These tables supersede the mitigation measures originally presented in the EIS.

Appendix C shows how the mitigation measures provided in Table 8- 1 to Table 8-3 have changed compared to those presented in the EIS. In Appendix C the new mitigation measures and additions to the mitigation measures included in the EIS are shown in **red bold** text, and where a measure or text has been deleted, it appears as ~~strikethrough~~ text.

TABLE 8- 1: COMPILATION OF UPDATED MITIGATION MEASURES FOR DETAILED DESIGN/PRE-CONSTRUCTION

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
Biodiversity		
BD1	*Impacts on biodiversity*	Vegetation clearing would be limited to the minimum necessary to construct the proposal and allow for its effective operation.
BD2	Impacts on biodiversity	Where appropriate, facilities within the multi-function compounds and temporary workforce accommodation would be located to further minimise or avoid impacts on native vegetation, where practicable.
BD3	*Impacts on threatened species*	Additional threatened flora surveys would be undertaken (where suitable climatic conditions occur) prior to clearing for the threatened species likely to be impacted by the proposal, including: ▸ *Diuris tricolor* in the Pilliga forests ▸ *Pterostylis cobariensis* in the Pilliga forests ▸ *Tylophora linearis* in the Pilliga forests. Surveys would include seed collection where possible. The need for translocation options would be discussed with the Department of Planning and Environment (Biodiversity, Conservation and Science Directorate), should these be required.
BD4	*Offsetting impacts on native vegetation and threatened species*	Biodiversity offsets would be finalised in accordance with the NSW Biodiversity Offsets Scheme and in consultation with the NSW Department of Planning and Environment (DPE) (Biodiversity, Conservation and Science Directorate). This would include retirement of like-for-like offsets for impacts on matters of national environmental significance (MNES).

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
BD5	*Impacts on fish passage*	Watercourse crossing structures would meet Inland Rail design standards and be designed in accordance with *Why do fish need to cross the road? Fish passage requirements for waterway crossings* (Fairfull, S. and Witheridge, G., 2003).
BD6	*Impacts on fauna connectivity*	A detailed fauna connectivity strategy would be prepared to guide detailed design based on the preliminary fauna connectivity framework provided in Appendix J of the updated biodiversity development assessment report. It would include investigation and design of: ▸ Locations for fauna crossing structures in the Pilliga forests, including bridges and dedicated underpasses for threatened fauna (such as the koala and Pilliga mouse in areas of preferred habitat), canopy bridges at regular intervals, and wooden barrier poles at selected bridges ▸ The provision of localised fencing to direct fauna to crossing structures ▸ Fauna furniture to be included in the design of bridges and dedicated underpasses, where appropriate, to encourage crossings by koalas and other native fauna ▸ Landscaping of the rail corridor to encourage movement of fauna across the gap. The detailed connectivity strategy would include threatened species management plans for key threatened species or groups identified in the preliminary fauna connectivity strategy, in addition to monitoring and reporting requirements in relation to the operational performance of the final measures.
BD7	*Impacts on fauna connectivity*	The fauna connectivity structures listed in the register of proposed connectivity structures in Appendix J of the updated biodiversity development assessment report would be further developed in detailed design and constructed as proposed. If any changes occur to the proposed number, type or location of connectivity structures, an appropriate level of assessment would be conducted, in consultation with BCS, to confirm any changes to credit liabilities for the proposal.
Water resources		
WR1	*Construction and potable water supply*	Construction water supply options would continue to be explored during detailed design and could include reuse of excess water from the Narrabri Gas Project or other suitable facilities in the area, or lease and/or purchase of existing water access licences (WALs) from surrounding landholders. Potable water supply options would continue to be explored during detailed design. Water quality testing would be undertaken to confirm that the water sourced is suitable for its intended use. Any required approvals/agreements would be obtained prior to use.
WR2	*Impacts on existing bores*	Where existing licensed bores are located within the proposal site, they would be decommissioned in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2020). Where bores are decommissioned, compensation would be provided, or alternative water supply arrangements made, as agreed with the landowner/landholder.
WR3	Impacts on existing bores	A bore census would be undertaken for existing licensed bores within 1 km of the proposal's bore fields, where landholders permit. The census would collect baseline groundwater level data and information on a given bore's typical usage and characteristics (including bore construction, pump depth, yield, water level during pumping and water level outside of pumping periods).
WR4	*Impacts of extracting groundwater*	Test bores would be installed during detailed design, and further investigation would be undertaken by a qualified hydrogeologist, to confirm the depth and location of the proposed bore field bores. The test bores and bore fields would consider the design considerations detailed in section 11.1 of Technical Report 4—Groundwater assessment, as well as the potential for unidentified faults and other geological structures to connect shallow and deep-water tables.
WR5	Impacts of extracting groundwater	Water volumes required to be extracted from groundwater bores for construction water and potable water (for the Narromine North and Baradine temporary workforce accommodation facilities) would be confirmed, and the appropriate approvals would be obtained, prior to extraction. Monitoring would be undertaken during extraction to ensure volumes stipulated by licence requirements are not exceeded. Meters would be installed, and groundwater extraction recorded and reported, in accordance with the relevant requirements of the *Non-Urban Metering Policy* (DPIE, 2020f) and clause 21(6) of the Water Management (General) Regulation 2018.
WR-CI1	*Groundwater drawdown impacts*	Further investigation would be undertaken to determine the potential for the bores associated with the Narromine North and Baradine temporary workforce accommodation facilities to cause groundwater drawdown impacts. This would include ensuring any impacts to existing bores are below the *NSW Aquifer Interference Policy* (DPI, 2012b) minimal impact considerations.

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
WR-CI2	*Suitability of groundwater*	The quality of groundwater from the proposed bores at the Narromine North and Baradine facilities would be assessed for the suitability of its intended use. Where required, treatment systems would be designed, and a monitoring program established, to ensure water quality complies with relevant drinking water criteria from the *National Water Quality Management Strategy Australian Drinking Water Guidelines 6* 2011 (National Health and Medical Research Council, 2017).
Flooding		
FH1	*Flooding impacts*	The design would continue to be refined, where practicable, to not worsen existing flooding characteristics for flood events up to and including the 1% AEP event. Detailed flood modelling would assess potential impacts to: ▸ Building and property inundation (including flood level surveys and consideration of existing inundation levels) ▸ Existing rail line, at rail connections ▸ Road flood levels and extent of flooding along roads ▸ Flood evacuation routes ▸ Overland flow paths and storage effects of construction and operational infrastructure. Flood modelling would have regard to the guidelines listed in section B3.1.1 of the EIS, and the revised quantitative design limits provided in the updated flooding and hydrology assessment report. Flood modelling, and any mitigation identified as an outcome of modelling, would consider floodplain risk management plans, and would be undertaken in consultation with the relevant local council and local emergency management committees, DPE, the NSW State Emergency Service and potentially impacted landholders.
FH2	*Downstream watercourse stability*	Further modelling and site-specific assessments would be undertaken during detailed design to confirm the locations downstream of culverts and within drainage control areas that require erosion protection, and to confirm the extent and type of protection required.
Soils and contamination		
SC1	*Structural integrity*	Foundation and batter design would include engineering measures to minimise operational risks from shrink swell, dispersive and/or low strength soils.
SC2	Structural integrity	Soil salinity would be considered in the design of subsurface structures.
SC3	*Acid sulfate soils*	Prior to ground disturbance in high-probability acid sulfate areas, testing would be carried out to determine the presence of acid sulfate soils (ASS). If ASS are encountered, they would be managed in accordance with the *Acid Sulfate Soils Assessment Guidelines* (ASSMAC, 1998), and the *Waste Classification Guidelines — Part 4: Acid Sulfate Soils* (NSW EPA, 2014).
SC4	*Contamination*	Hazardous materials surveys would be undertaken during detailed design for all proposed demolition activities.
SC5	Contamination	An appropriately licensed asbestos removal contractor would be engaged to remove all asbestos identified at the illegal waste dump at which sample CS-21 was collected (easting 737305, northing 6617403) prior to works commencing. Asbestos would be removed in accordance with the requirements of applicable work health and safety legislation, and codes of practice.
SC6	Contamination	Site investigations would be undertaken by a suitably qualified and experienced consultant, as defined in Schedule B9 of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC, 2013) to assess exposure risks to site workers and other receptors as a result of disturbances to the following areas considered to be at a higher risk of being contaminated: ▸ Narromine West connection ▸ Parkes to Narromine connection ▸ Dubbo to Coonamble Line connection ▸ Narrabri to Walgett Line connection ▸ Narrabri to North Star connection ▸ Where the proposal site borders the Santos Narrabri Operations Centre (directly west of the Narrabri West multi-function compound). The results of the site investigations would be assessed against the criteria contained within the *National Environment Protection (Assessment of Site Contamination) Measure 1999* to determine the need for any remediation.
SC-CI1	*Soils and water quality*	The final approach to reusing wastewater from the Narromine North and Baradine temporary workforce accommodation facilities would be confirmed during detailed design.

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
SC-CI2	Soils and water quality	Any irrigation areas would be designed and operated in accordance with the risk framework and management principles contained in the *National Guidelines on Water Recycling* (Environment Protection and Heritage Council, 2006) and the *Environmental guidelines: Use of effluent by irrigation* (Department of Environment and Conservation (DEC), 2004). This would include the following design requirements: ▸ Irrigation area/s would be delineated based on the expected rate of irrigation and the drainage characteristics of the receiving soil ▸ The quality of treated water would be determined to prevent accumulation of contaminants, with reference to the relevant guidelines ▸ Irrigation area/s would be designed to include capacity to store treated water for the duration of typical wet weather events ▸ The rate of irrigation would be optimised to avoid waterlogging or ponding of reclaimed water ▸ Soil and groundwater conditions would be monitored to identify and correct trends in soil salinity or other potential effects of irrigation.
Water quality		
WQ1	*Water quality*	The design features listed in section B5.1.4 would continue to be refined and implemented to minimise the potential impacts on water quality.
Aboriginal heritage		
AH1	*Avoiding and minimising impacts on Aboriginal heritage*	Detailed design and construction planning would avoid direct impacts on identified items/sites of Aboriginal heritage significance, as far as reasonably practicable. Construction compounds and associated access routes would not be located in areas of medium or high archaeological potential.
AH2	*Management of salvaged items*	A detailed salvage methodology would be prepared by a suitably qualified archaeologist in consultation with relevant registered Aboriginal parties. The methodology would be included in the Aboriginal cultural heritage management plan (mitigation measure AH10) to ensure any artefacts salvaged are managed in accordance with the requirements of the *National Parks and Wildlife Act 1974* (NSW). The methodology would include the process for consultation with Heritage NSW and Registered Aboriginal Parties (RAPs) in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010c), and the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011). It would also include requirements in relation to the management of, and care and control plans for, salvaged objects. RAPs would be engaged to assist in the salvage, which would be managed by an appropriately qualified archaeologist engaged to support the process. Detailed analysis and reporting of cultural material collected would be provided to DPE.
AH3	*Management of salvaged items*	Prior to construction, a targeted archaeological survey would be undertaken for areas identified as culturally sensitive, requiring further investigation, including: ▸ Wallaby Creek ▸ Ewenmar Creek ▸ Marthaguy Creek ▸ Castlereagh River ▸ Gulargambone Creek ▸ Tenandra Creek ▸ Baradine Creek ▸ Namoi River ▸ Mungery Creek ▸ Caleriwi Creek. In addition, a targeted archaeological survey would be undertaken at the location of the Narromine North temporary workforce accommodation. The targeted survey would be undertaken with registered Aboriginal parties in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Additional mitigation and management measures would be developed, in consultation with the RAPs, for areas or items of Aboriginal cultural heritage significance identified during the targeted survey. The additional measures would be included in the Aboriginal cultural heritage management plan (mitigation measure AH10). If additional sites or items are identified that cannot be avoided, salvage of artefacts would be undertaken prior to construction, in accordance with the salvage methodology (mitigation measure AH2).

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
AH4	Management of salvaged items	A pre-construction survey would be undertaken to confirm the locations of the previously listed AHIMS sites that could not be located during the site survey. Surveys would be undertaken with RAPs in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. If the sites are located, impacts would be avoided, as far as practicable, and protection measures put in place in accordance with the Aboriginal cultural heritage management plan (mitigation measure AH10). Any sites with the potential to be impacted would be managed in accordance with the salvage methodology (mitigation measure AH2).
AH5	*Impacts on Potential Archaeological Deposits (PADs)*	Detailed archaeological investigations would be undertaken at the following six PADs that may be directly impacted by the proposal: ▸ Ewenmar Creek 27-6-0036 ▸ Castlereagh River 28-4-0280 (and associated artefact scatter) ▸ Gulargambone Creek 28-1-0060 and 28-1-0090 (and associated artefact scatter) ▸ Calga and Looking Glass creeks 28-1-0059 (and associated artefact scatter) ▸ Baradine Creek 19-5-0230. Sub-surface archaeological test excavations would be undertaken to confirm the nature (and extent, if verified) of any archaeological deposits. The test excavations would be carried out in accordance with the approved methodology prepared for the proposal. If test excavation confirms that the PAD has heritage significance and has the potential to be impacted by the proposal, the site would be managed in consultation with Heritage NSW and RAPs. If salvage is required it would be managed in accordance with the agreed salvage methodology (mitigation measure AH2).
AH6	*Impacts on modified trees*	Field validation of the following modified trees would be undertaken prior to construction, in accordance with *Aboriginal scarred trees in New South Wales: A field manual* (DEC, 2005): ▸ Backwater Cowal 35-3-0175 ▸ Ewenmar Creek 27-6-0035 ▸ Boothaguy Creek 27-6-0042 ▸ Baronne Creek 28-1-0062, 28-1-0063 and 28-1-0064 ▸ Mungery Creek 28-1-0083, 28-1-0084, 28-1-0086 and 28-1-0087. Impacts on those trees confirmed to be scarred trees would be avoided, as far as practicable. If impacts are unavoidable, the tree would be photographed and catalogued prior to removal, in consultation with the RAPs, by an appropriately qualified archaeologist. The salvaged artefacts would be managed in accordance with the salvage methodology.
AH7	*Impacts on modified trees*	The following modified trees would be protected insitu: ▸ BCST6 (35-3-0270) ▸ Berida Road ST1 (28-4-0283). During detailed design, ARTC would identify opportunities to reduce or remove the need for drainage protection works in the vicinity of these trees.
AH8	*Impacts on artefact scatters*	Surface collection (salvage) of the following artefact scatters would occur prior to construction, in accordance with the approved salvage methodology: ▸ Macquarie River 35-3-0276 ▸ Castlereagh River 28-4-0280 ▸ Gulargambone Creek 28-1-0090 and 28-1-0060 ▸ Calga and Looking Glass Creek 28-1-0059 and 28-1-0095 ▸ Noonbar Creek 28-1-0096 ▸ Baradine Creek 19-5-0226 ▸ Bohena Creek 19-6-0180. Artefacts located outside the proposal site would not be salvaged and would remain in situ.
AH9	*Aboriginal heritage survey of biodiversity offset sites*	Once biodiversity offset sites are secured (in accordance with mitigation measure BD4) an Aboriginal heritage survey of representative locations within the offset sites would be undertaken. The survey would record any evidence of Aboriginal land use occupation and identify appropriate management strategies. The approach to the survey, including selection of representative survey locations and reporting, would be determined in consultation with the RAPs.

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
Non-Aboriginal heritage		
NAH1	*Impacts on non-Aboriginal heritage*	Detailed design and construction planning would avoid direct impacts on identified items/sites of non-Aboriginal heritage significance, as far as reasonably practicable. This would include small sections of the following listed items that overlap with the proposal site: ▸ Curban Inn site ▸ Convict Road, Baradine. The location of construction compounds and associated access routes would be reviewed to ensure, as far as practicable, they are not located in areas of medium or high archaeological potential.
NAH2	Impacts on non-Aboriginal heritage	The location of the graves at the Woodvale Park Private Cemetery listed item would be confirmed by an appropriately qualified archaeologist. Once confirmed, the location would be marked on plans, fenced onsite and avoided during construction.
NAH3	Impacts on non-Aboriginal heritage	In the event that the following items are unable to be avoided, an archaeological assessment, research design and methodology would be prepared. Test excavation would be undertaken by an appropriately qualified Excavation Director, in accordance with the NSW Heritage Council's Excavation Director criteria: ▸ Curban Inn site ▸ Convict Road, Baradine. The archaeological assessment would be prepared in consultation with relevant stakeholders, including the local council and Heritage NSW.
NAH4	*Heritage interpretation*	A Heritage Interpretation Strategy for non-Aboriginal heritage would be prepared in consultation with the relevant local council and key stakeholders. This would provide a framework for interpreting the heritage items (listed and potential) impacted by the proposal, set out the key interpretative themes and identify communication strategies. The strategy would include interpretation requirements for specific parts of the proposal; particularly, where heritage items are proposed to be removed or archaeological sites are proposed to be excavated. These may include approaches such as interpretive signage at heritage items that have been removed or excavated, historical/artefact displays at local museums or visitor centres, and online media about heritage items and history in the vicinity of the proposal. The strategy would be prepared with regard to *Interpreting Heritage Places and Items: Guidelines* (NSW Heritage Office, 2005), and the NSW Heritage Council's Heritage Interpretation Policy.
NAH5	*Archival recording*	Archival photographic recording of buildings to be removed would be carried out prior to removal, in accordance with *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Council of NSW, 2006) and *How to prepare archival records of heritage items* (NSW Heritage Office, 1998a) at the following sites: ▸ Drinane Public School (former) ▸ Corrugated iron hut with chimney ▸ Two-storey barn/shed.
NAH6	*Visual impacts at heritage items*	The urban design and landscape plan would include vegetation screening, where practicable, to minimise visual impacts on homesteads identified as potential heritage items—'Kickabil' homestead and woolshed, 'Allandale' homestead and 'Digilah' homestead.
Noise and vibration		
CNV1	*Construction noise and vibration impacts*	Location and activity specific construction noise and vibration impact statements would be prepared 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, as required. The statements would confirm predicted impacts at relevant receivers to assist with the selection of feasible and reasonable management measures (such as shielding plant and equipment, temporary noise barriers or provision of temporary alternative accommodation). The statements would also confirm noise and vibration auditing and monitoring requirements.
CNV2	*Construction vibration (structural) impacts*	Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and vibration monitoring would be carried out in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework, to ensure vibration levels remain below appropriate limits for that structure.

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
ONV1	*Operation noise and vibration impacts*	An operational noise and vibration review would be undertaken during detailed design to review the potential for operational impacts, and guide the approach to identifying feasible and reasonable mitigation measures to be incorporated in the detailed design.
ONV2	Operation noise and vibration impacts	Feasible and reasonable mitigation measures would be identified where exceedances of operational noise and vibration criteria are confirmed. Measures would be identified in accordance with the outcome of the operational noise and vibration review and the Inland Rail Noise and Vibration Strategy. Where at-property noise treatments are identified as the preferred mitigation option, these would be developed and implemented in consultation with individual property owners.
ONV3	*Operation structural vibration impacts*	If the operational noise and vibration review indicates that vibration levels are predicted to exceed the screening criteria at sensitive receivers, a more detailed assessment of the structure would be carried out. For any heritage items with the potential to be affected, the detailed assessment would determine any specific sensitivities, in consultation with a heritage specialist, to ensure risks are adequately managed. If a heritage structure is found to be structurally unsound following inspection, a more conservative cosmetic damage objective (e.g. 2.5 mm/s peak component particle velocity for long-term vibration) would be considered.
Traffic and transport		
TT1	*Impacts on existing infrastructure transport and access*	Detailed design and construction planning would avoid or minimise the potential for impacts on the surrounding road and transport network, and property accesses, as far as reasonably practicable.
TT2	*Impacts on existing infrastructure transport and access*	Input would be sought from relevant stakeholders (including local councils and TfNSW) prior to finalising the detailed design of those aspects of the proposal that affect the operation of road and other transport infrastructure under the management of these stakeholders. This would include confirming ongoing operation and maintenance arrangements for those assets under the control of other stakeholders.
TT3	*Road user safety at changes to the road network*	Road safety audits would be undertaken where changes to the road network are required, in accordance with relevant Austroads guidelines, to ensure the safety of all road users is considered in the design process.
TT4	*Road user safety at level crossings*	Level crossings would be designed in accordance with relevant guidelines and standards, including *AS 1742.7:2016 Manual of uniform traffic control devices, Part 7: Railway crossings* (Standards Australia, 2016), *Guide to Road Design Part 4: Intersections and Crossings* (Austroads, 2021a), *Guideline: Lighting for railway crossings* (Roads and Maritime Services, 2013b) and ARTC standards, including provision of warning signage, line marking and other relevant controls. Public level crossings with active controls would include boom gates and flashing lights. Where level crossings would provide access for travelling stock routes (TSRs), consultation would be undertaken with Crown lands and Local Land Services (LLS) to determine appropriate controls.
TT5	Road user safety at level crossings	A level crossing treatment report would be prepared to document the level crossing design and assessment process that has been undertaken. The report would be developed in consultation with TfNSW and the relevant councils. The report would provide an assessment of road risks consistent with the guideline *Establishing a Railway Crossing Safety Management Plan* (Roads and Traffic Authority, 2011). Justification would be provided where no works are proposed on existing level crossings.
Land use and property		
LP1	*Land use and property impacts, including severance and other impacts on operations*	The design and construction planning would continue to be refined, to minimise potential impacts on land uses and properties, as far as reasonably practicable. Consultation with landholders would be ongoing, to identify feasible and reasonable measures to minimise impacts on their operations/properties.

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
LP2	*Acquisition and property impacts*	All property acquisitions would be undertaken in consultation with landowners/landholders and in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW). In line with *the Land Acquisition Act (Just Terms Compensation) Act*, ARTC's preference is for acquisition by agreement, where practicable.
LP3	*Acquisition and property impacts*	During the property acquisition process, ARTC would seek to secure agreement with affected landholders, to guide property-level design requirements and the management of construction on, or immediately adjacent to, private properties. Each impacted property owner would be consulted to identify and understand the operational needs of their property and the activities conducted upon it, with tailored agreements prepared to document the agreed outcomes. The agreements may include: ▸ Measures to minimise property impacts, including impacts on agricultural operations (mitigation measure LP5) ▸ Specific requirements to ensure that operations, including the movement of livestock and farm machinery, are able to be maintained as efficiently as possible (mitigation measure LP7) ▸ Measures to manage severance impacts as they relate to each property, where practicable, including appropriate movement arrangements (mitigation measure LP6) such as new or adjusted accesses to the public road network or internal access networks, divestment or amalgamation opportunities ▸ Required adjustments to and/or replacement of affected structures, such as livestock handling yards, fencing, silos, holding pens, barns, etc ▸ Assistance to reconfigure farming operations to accommodate the alteration in land use. Where land is acquired, compensation would be assessed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW) and the NSW Property Acquisition Process https://www.nsw.gov.au/housing-and-construction/property-acquisition. Depending on the individual circumstances of each land/business owner and the proposed impacts on the land and to operations, compensation may take the form of money or land/works—as agreed by the parties.
LP4	*Acquisition and property impacts*	Property owners and occupants would be consulted in accordance with the communication management plan (mitigation measure SE1), to ensure that owners/occupants are informed about: ▸ The timing and scope of activities in their area ▸ Any potential property impacts/changes, particularly in relation to potential impacts on access, services or farm operational arrangements ▸ Activities that have the potential to impact on livestock.
LP5	Impacts of construction on private properties	Where construction is located on, or immediately adjacent to, private properties and has the potential to affect farm operational arrangements/properties, property-specific measures would be identified and implemented, in consultation with landholders, to address identified issues where feasible and reasonable. The measures would include, as appropriate, arrangements in terms of works timing and practices; any required adjustments to fencing, access, and farm infrastructure; and relocation or compensation for any impacted structures or improvements.
LP6	*Maintaining permanent access to properties*	Where the proposal affects access to and from a public road, input would be sought from relevant landholders regarding alternative access arrangements prior to finalising the detailed design. Where any legal access to a property is permanently affected and a property has no other legal means of access, alternative access to and from a public road would be provided to an equivalent standard, where feasible and reasonable. Where an alternative access is not feasible or reasonable, and a property or part of a property is left with no access to a public road, consideration would be given to acquisition of the property or part of the property in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW). In accordance with the Land Acquisition Act, ARTC's preference is for acquisition by agreement, where practicable.

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
LP7	*Internal access arrangements*	Where the proposal affects internal property access arrangements, input would be sought from relevant landholders prior to finalising the detailed design. Where changes to internal property access arrangements are required, ARTC would consult with relevant property owners/occupants regarding alternative access arrangements and identify feasible and reasonable measures to minimise impacts on existing operational arrangements/properties. Impacts and any proposed mitigations would be taken into account at the time compensation is assessed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW).
LP8	*Impacts on Crown land*	The acquisition of Crown land would be undertaken in consultation with DPE, and in accordance with the requirements of the *Crown Lands Management Act 2016* (NSW) and the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW).
LP9	*Impacts on livestock*	The need for additional stock management infrastructure on either side of level crossings, such as forcing yards and holding pens, would be identified in consultation with the relevant landholders.
LP10	Impacts on livestock	Livestock fencing would be provided in agricultural areas (as required) to minimise the risk of livestock–train collisions. The preferred fencing arrangements would be confirmed in consultation with landholders.
LP11	*Maintenance of fencing*	Maintenance agreements would be established for fencing along the rail corridor where it adjoins private properties. The agreements would include protocols for reporting damage and arranging repairs of shared boundary fencing.
LP12	*Minimising impacts on travelling stock reserves*	LLS would continue to be consulted during detailed design to confirm how impacts on TSRs would be minimised during construction and operation. Alternative access arrangements would be made, as required, subject to maintaining rail safety.
LP13	*Impacts on services and utilities*	The location of all utilities, services and other infrastructure, and requirements for access to, diversion, protection and/or support, would be confirmed prior to construction. This would include (as required), undertaking utilities investigations, including intrusive investigations, and consultation and agreement with service providers, in accordance with the utilities management framework provided in Appendix J of the EIS.
LP14	*Impacts on, and construction within, State forests*	The Forestry Corporation of NSW would continue to be consulted in relation to: ▸ Those aspects of construction planning, programming, and work methodologies with the potential to affect forestry management practices ▸ Measures to minimise the potential impacts on forestry management practices, including the need for exclusion zones in specific areas, where required ▸ Opportunities for beneficial reuse of forest products that would be removed during construction.
LP15	Impacts on, and construction within, State forests	Appropriate management measures and communication requirements for users of state forests in the vicinity of the proposal site would be defined in consultation with the Forestry Corporation of NSW and forest users.
Visual amenity		
LV1	*Minimising the potential for visual and landscape impacts*	Detailed design and construction planning would seek to minimise the construction and operation footprints, and avoid impacts on mature native vegetation, as far as reasonably practicable.

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
LV2	*Minimising the potential for visual and landscape impacts*	An urban design and landscape plan would be prepared to provide a consistent approach to design and landscaping. The urban design and landscape plan would include: ▸ Vegetation screening in strategic locations to visually mitigate impacts from new structures and rail operations, including around bridges and locations where the proposal would be visible from sensitive receivers, where the presence of screening does not impact safe rail operations ▸ Appropriate species that respond to the existing landscape character setting and environmental conditions ▸ Design guidelines to minimise the visual impacts of bridges, with consideration of the existing landscape and visual context and with regard to *Bridge aesthetics: design guidelines to improve the appearance of bridges in NSW* (Roads and Maritime Services, 2019). Detailed design would be undertaken in accordance with the urban design objectives developed for the design, and the urban design and landscape plan.
LV3	*Batter slopes in contrast with the existing landform*	Batter slopes would be integrated into the surrounding landscape, as far as practicable. Appropriate slope stabilisation would be integrated into batter design to ensure successful rehabilitation and stabilisation.
LV4	*Minimising light spill*	Temporary and any permanent lighting would be designed and sited in accordance with *AS/NZS 4282 2019 Control of the Obtrusive Effects of Outdoor Lighting* and *Dark Sky Planning Guideline: Protecting the observing conditions at Siding Spring* (DPE), 2016), and in consultation with the Siding Spring Observatory Dark Sky Planning Committee.
Socio-economic impacts		
SE1	*Social impacts, communication and engagement*	ARTC would continue to manage and deliver program-wide community and stakeholder engagement for Inland Rail in accordance with the Inland Rail Communications and Engagement Strategy. A proposal-specific communication management plan would be developed, in accordance with the Inland Rail Communications and Engagement Strategy, and implemented prior to and during construction, to ensure that: ▸ The community and key stakeholders are provided opportunities for input to the design and construction planning, where appropriate ▸ Landowners/landholders and community members with the potential to be affected by construction activities are notified in a timely manner about the timing of activities and potential for impacts, and the measures (developed in accordance with mitigation measure LP5) that would be implemented to minimise the potential for impacts on individual properties ▸ Enquiries and complaints are managed, and a timely response is provided for concerns raised ▸ Accurate and accessible information is made available ▸ Feedback from the community is encouraged. The communication management plan would define the requirements for the complaints management system to be implemented during construction.
SE2	Social impacts, communication and engagement	The communication management plan would include measures to ensure ongoing consultation with local emergency services providers, to inform providers about the locations of level crossings, and changes to access routes and road conditions.
SE3	Social impacts, communication and engagement	A detailed Aboriginal community and stakeholder engagement strategy and action plan would be prepared and implemented at the commencement of the detailed design phase, to require that: ▸ Information about the proposal is shared with Aboriginal stakeholders and communities in a timely manner ▸ Strong relationships between ARTC and Aboriginal stakeholders and communities are built and maintained ▸ Local Aboriginal cultural and community values are identified and understood ▸ Opportunities to reflect Aboriginal community and cultural values in infrastructure or other outcomes of the proposal are identified and implemented.

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
SE4	*Socio-economic impacts*	A social impact management plan (SIMP) would be prepared to manage the implementation of the proposed socio-economic mitigation measures, and to detail the specific management actions and targets that would be developed in response to these measures. The SIMP would define specific actions, roles and responsibilities, and a monitoring, reporting and adaptive management framework for construction.
SE5	Socio-economic impacts	Prior to construction, ARTC would confirm workforce requirements and the associated requirements for, and availability of, support services (including health, wellbeing and emergency services) to meet the needs of the non-resident construction workforce. ARTC would develop strategies and measures to meet these needs, as far as practicable, with minimal potential impacts on the local community. The measures would be developed in consultation with local councils and service providers (including health and emergency service providers), where relevant, and would be detailed in the workforce management plan.
SE6	*Economic benefits and impacts on regional industries and businesses*	ARTC would continue to support local employment in accordance with the *Australian Jobs Act 2013* (Cth) and Australian Industry Participation National Framework, and through the Inland Rail Academy; to leverage training programs, upskill local residents and young people, and connect businesses with Inland Rail opportunities and key regional industries.
SE7	Economic benefits and impacts on regional industries and businesses	A proposal-specific industry participation plan would be developed and implemented to manage the potential employment and regional economic benefits of the proposal. The plan would address the requirements of the *Australian Jobs Act 2013* (Cth), the Australian Industry Participation National Framework, and the *Inland Rail Indigenous Participation Plan* (ARTC, 2020c). The industry participation plan would identify appropriate measures to achieve the objectives of the *Australian Jobs Act 2013* (Cth) and the Inland Rail Indigenous Participation Plan, including an achievable list of goods and services that could be subcontracted, as well as targets for local and Indigenous business participation.
SE8	*Impacts on the Narrabri Dirt Bike Club*	ARTC would continue to consult with the Narrabri Dirt Bike Club, Narrabri Council and the DPE (Crown Lands) in relation to: ▸ The temporary and permanent land requirements at the club site ▸ The potential impacts on the club's facilities ▸ Measures to address the identified impacts.
SE-CI1	*Impacts on the Baradine Showground*	ARTC would continue to consult with the Baradine Showground Trust to manage access and temporary land requirements at the showground.
SE-CI2	*Temporary workforce accommodation*	A temporary workforce accommodation plan would be prepared to guide the design and provision of temporary accommodation. The plan would be developed in accordance with ARTC's Inland Rail Program Accommodation Principles, relevant council development codes and guidelines, and the following overarching principles: ▸ Temporary workforce accommodation is designed to be integrated into, and minimise the impacts on, the existing communities ▸ Temporary workforce accommodation adequately provides for occupants and has a high level of onsite amenity. The plan would define: ▸ The arrangement and layout of facilities to minimise amenity impacts on surrounding sensitive receivers (including noise, visual amenity, lighting and privacy) ▸ Proposed built-form heights to ensure heights are appropriate within their surrounding context ▸ Opportunities for retention of screening vegetation (where present) and provision of additional landscaping as required ▸ How services (such as water, waste, stormwater, wastewater) would be provided and managed to ensure consistency with relevant codes and guidelines, and minimise potential impacts on local infrastructure networks and the environment ▸ Location, design, service and amenity requirements for mobile accommodation facilities, including amenities for workers ▸ Provision of adequate parking onsite ▸ How sites would be decommissioned and rehabilitated consistent with the rehabilitation strategy for the proposal. The plan would be developed in consultation with relevant key stakeholders, including the relevant local council.
WM1	*Excess waste generation*	Detailed design would include measures to minimise spoil generation. This would include a focus on optimising the design to minimise spoil volumes and the reuse of material onsite.

Ref	Issue/impact	Mitigation measures—detailed design/pre-construction
WM2	*Management of spoil*	A spoil management strategy would be developed to define the preferred approach to managing spoil, including the use of spoil to rehabilitate borrow pits. The strategy would include: ▸ Confirming spoil quantities ▸ Undertaking appropriate investigations and surveys, including geotechnical investigations ▸ Consideration of the approvals and land application of waste exemptions required, associated lead time, and any associated sampling and reporting obligations ▸ Consultation with landholders on where borrow pits are located ▸ Defining the preferred option for reusing and/or disposing of any spoil not able to be reused at borrow pits. The outcomes of the strategy would inform the construction waste management plan.
Sustainability		
SU1	*Achieving the target sustainability rating*	A sustainability management plan would be developed to guide the proposal to achieve an 'excellent' design rating according to ISCA's Infrastructure Sustainability rating scheme. The sustainability management plan would incorporate sustainability objectives and targets consistent with the Inland Rail program sustainability objectives and targets, roles and responsibilities, strategies for achieving the 'excellent' design rating, and review and reporting requirements.
SU2	*Sustainable procurement*	Procurement would be undertaken in accordance with the *Inland Rail Sustainable Procurement Policy* (ARTC, 2020d).
SU3	*Reporting*	Monthly sustainability reporting (and corrective action, where required) would be undertaken during detailed design in accordance with the sustainability management plan.
Climate change		
CC1	*Climate change risk management*	The climate change risk assessment would continue to be refined as the design of the proposal progresses. The adaptation measures identified for the proposal would be reviewed and final measures would be incorporated into the design, where practicable.

TABLE 8-2: COMPILATION OF UPDATED MITIGATION MEASURES FOR CONSTRUCTION

Ref	Issue/impact	Mitigation measures—construction
Biodiversity		
BD8	*Biodiversity impacts*	A biodiversity management plan would be prepared prior to construction and implemented as part of the CEMP. The plan would include measures to protect biodiversity and minimise the potential for impacts during construction. The plan would be prepared in accordance with relevant legislation, guidelines and standards. The plan would include but not be limited to: ▸ Locations and requirements for pre-clearing surveys ▸ Establishing protocols for the staged clearing of vegetation, and safe tree felling and log removal, to reduce the risk of fauna mortality ▸ Measures to avoid and minimise clearing of hollow-bearing trees, where practicable ▸ Measures relating to the provision and management of nest boxes, including reuse of hollows and monitoring protocols ▸ An unexpected finds protocol ▸ Measures to manage biosecurity risks in accordance with the Biosecurity Act 2015 (NSW) ▸ Measures to reduce the risk of aquatic fauna mortality/injury.

Ref	Issue/impact	Mitigation measures—construction
BD9	Biodiversity impacts	Pre-clearing surveys would be undertaken, prior to construction, by a suitably qualified ecologist in accordance with the biodiversity management plan. Specific surveys would include: ▸ Surveys for roosting microbats and birds in structures and habitats that are proposed to be removed, including telegraph poles, buildings, hollow trees and bark fissures ▸ Searches for nest trees ▸ Identification of hollow-bearing trees and logs requiring fauna rescue, relocation or other management during removal ▸ Surveys for koalas, which may include trained detection dogs or other appropriate survey techniques ▸ Aquatic fauna salvage in watercourses or residual pools within 50 metres of the construction footprint, and in areas that would be enclosed by silt curtains (e.g. piling locations).
BD10	*Biodiversity impacts*	Compounds and stockpile sites would be located an appropriate distance from riparian habitat to avoid indirect impacts on aquatic habitat. This includes, where practicable, a minimum of 100 metres (m) for Type 1, Class 1 watercourses, 50 m for Type 2, Class 2 and 3 watercourses, and 10 to 50 m for Type 3, Class 2 to 4 watercourses. Direct impacts on in-stream vegetation and native vegetation on the banks of watercourses would be avoided, as far as practicable.
BD11	Biodiversity impacts	Exclusion areas would be established and maintained around native vegetation to be retained; particularly areas of high biodiversity value adjoining the proposal site (e.g. threatened ecological communities, known threatened plant populations etc) that are located in close proximity to work areas.
BD12	*Rehabilitation of vegetation subject to temporary disturbance*	A rehabilitation strategy would be prepared to guide rehabilitation planning, implementation, monitoring and maintenance of disturbed areas within the construction footprint that are not required as part of the operational footprint (such as compounds and temporary workforce accommodation). The strategy would include clear objectives for rehabilitation of native vegetation in temporary disturbances areas.
BD13	*Habitat linkages*	To improve fauna connectivity across the rail corridor, habitat linkages would be included in the rail corridor where practicable and consistent with the safe operation and maintenance of Inland Rail. Linkages would involve retaining or rehabilitating groundcovers and low shrubs, with a focus on those areas of the rail corridor within the Pilliga forests and other areas of connected vegetation. Rehabilitation or revegetation is to occur as soon as possible to minimise the lag between impact and mitigation. As part of construction planning, opportunities to minimise construction clearing within the rail corridor would be investigated for high value connectivity areas.
Water resources		
WR6	*Sedimentation and erosion management*	A soil and water management plan would be prepared and implemented as part of the CEMP. The plan would include measures, processes and responsibilities to minimise the potential for soil and water impacts, including impacts to groundwater, during construction.
WR7	*Monitoring groundwater drawdown and quality*	A groundwater monitoring program would be developed in consultation with DPE Water and implemented, as part of the soil and water management plan, to monitor potential groundwater impacts. The program would define the following in accordance with chapter 10 of Technical Report 4—Groundwater assessment: ▸ Monitoring parameters ▸ Monitoring locations ▸ Frequency and duration of monitoring. The monitoring program would include baseline monitoring to determine the water quality of groundwater from the proposed bore field bores. Monitoring of groundwater levels would continue following the completion of groundwater pumping and extraction until water levels recover to baseline conditions. A review would be undertaken six months and one year after the completion of groundwater pumping to assess the recovery rates and determine if further mitigation is required.

Ref	Issue/impact	Mitigation measures—construction
WR8	*Bore field groundwater quality*	The quality of groundwater obtained from the proposed bore field bores would be assessed for the suitability of its intended use. Where required, treatment systems would be designed to ensure water quality is consistent with the relevant water quality criteria from the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
WR9	*Impacts on existing bores*	Where groundwater monitoring identifies the potential for groundwater drawdown in existing bores to exceed the NSW Aquifer Interference Policy minimal impact considerations, make-good provisions would be triggered for those bores, in consultation with the relevant landholders and DPE Water.
WR10	*Proposal bore construction*	All bores required for the proposal would be constructed by appropriately licensed drillers in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2020) and the relevant requirements of each Water Sharing Plan.
WR11	*Works within watercourses*	Works within or near watercourses would be undertaken with consideration of the *Guidelines for watercourse crossings on waterfront land* (DPI, 2012a) and *Guidelines for controlled activities on waterfront land – Riparian corridors* (NRAR, 2018).
WR12	*Unforeseen water table penetration by bulk earthworks*	If bulk excavations unexpectedly intersect the water table, works would be halted while the potential impacts are assessed by a hydrogeologist and adaptive mitigation measures implemented, as required.
WR13	*Proposal bore fields*	Where there is benefit to the local community, the potential for retaining bores post-construction would be considered in consultation with relevant stakeholders (e.g. local councils). Any approvals, operating costs and maintenance associated with retaining and using these bores would be the responsibility of the party that takes ownership.
WR14	*Proposal bore construction*	A bore field extraction plan would be prepared as part of the soil and water management plan and provided to DPE Water prior to construction of the proposed bore field bores. The plan would include information about the locations, water source, depth and proposed volumes of water take per year for the proposed bore field bores, as well as any measures proposed to minimise the potential for impacts of extracting groundwater for use as construction water. The plan would also provide confirmation that any applicable water sharing plan rules have been met.
WR-CI3	*Unforeseen water table penetration by borrow pits*	If excavations at borrow pits B, C and/or borrow pit D intersect the water table, works would be halted while the potential impacts are assessed by a hydrogeologist and additional management measures implemented as required.
WR-CI4	*Groundwater inflow rate (borrow pits)*	If the groundwater inflow rate at borrow pit A is higher than one mega litre per year, the inflow rate and implications would be assessed by a hydrogeologist and additional management measures implemented, as required. If the groundwater inflow rate at borrow pit A has the potential to exceed 3 mega litres per year, sufficient entitlement would be obtained prior to any extraction or interception.
Flooding		
FH3	*Flooding impacts*	Construction planning and the layout of construction work sites and compounds would be undertaken with consideration of overland flow paths and flood risk, avoiding flood liable land and flood events where practicable.
FH4	Flooding impacts	A flood and emergency response plan would be prepared and implemented as part of the CEMP. The plan would include measures, process and responsibilities to minimise the potential impacts of construction activities on flood behaviour, as far as practicable. It would also include measures to manage flood risks during construction and address flood recovery during construction. The plan would be developed in consultation with Transport for NSW, local councils, emergency services and key affected landholders/managers (including Forestry Corporation of NSW).
FH5	*Downstream watercourse stability*	A geomorphology monitoring program would be implemented in accordance with the soil and water management plan (mitigation measure WR6). The monitoring would observe changes in the geomorphological stability of watercourses that may be attributable to the proposal, and inform appropriate management responses. The monitoring program would be developed in consultation with the Department of Planning and Environment and with reference to the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).

Ref	Issue/impact	Mitigation measures—construction
FH-CI1	*Flooding impacts (temporary accommodation facilities)*	The Narromine South and Narrabri West temporary workforce accommodation facilities would incorporate appropriate flood protection measures, such as elevating buildings on stilts and storing hazardous materials above the flood levels that inundate these sites.
Soils and contamination		
SC7	*General soil and erosion management*	The soil and water management plan (mitigation measure WR6) would include erosion and sediment controls appropriate for dispersive soils.
SC8	*Contamination*	A contamination and hazardous materials plan would be prepared and implemented as part of the CEMP. It would include measures, processes and responsibilities to minimise the potential for contamination impacts on the local community, workers and environment, and procedures for incident management and managing unexpected contamination finds (an unexpected finds protocol).
SC9	*Rehabilitation*	Disturbed areas would be rehabilitated following construction, in accordance with the rehabilitation strategy (mitigation measure BD12).
Water quality		
WQ2	*Discharge to surface water*	Discharge to surface water would be undertaken in accordance with the environment protection licence for construction of the proposal and would consider the hydrological attributes of the receiving waterbody.
WQ3	*Surface water monitoring*	A surface water monitoring framework would be developed and implemented as part of the soil and water management plan in the CEMP. It would identify: ▸ Monitoring locations at discharge points and selected watercourses where works are being undertaken ▸ Monitoring parameters ▸ Frequency and duration of monitoring. The monitoring framework would include the relevant water quality objectives, parameters and criteria from Technical Report 5. It would be developed in consultation with the Department of Planning and Environment, and the NSW EPA.
WQ4	*Dewatering of farm dams that require relocation and/or decommissioning*	A dam dewatering protocol would be developed as part of the soil and water management plan. It would consider: ▸ Options for reuse of water in the dam ▸ Licensing and approval requirements, where relevant ▸ The quality and quantity of the water to be released and the location of potential discharge points of the water into watercourses, where relevant ▸ Strategies to minimise impacts on native, threatened or protected species ▸ Strategies to minimise spread of pest flora and fauna species.
Aboriginal heritage		
AH10	*Protecting Aboriginal heritage and minimising impacts during construction*	An Aboriginal cultural heritage management plan would be prepared prior to construction and implemented as part of the CEMP. The plan would include measures to minimise the potential for impacts and manage Aboriginal heritage, including: ▸ A salvage methodology (mitigation measure AH2) ▸ An unexpected finds procedure (mitigation measure AH12) ▸ Plans and installation procedures for fencing and protective coverings ▸ Induction package for construction workers and supervisors (mitigation measure AH11) ▸ Measures to protect sites close to the proposal site from inadvertent impacts ▸ Outcomes of further investigations (mitigation measures AH3 and AH4) ▸ Erosion and sediment controls in accordance with *Managing Urban Stormwater: Soils and construction – Volume 1* (Landcom, 2004) to minimise the potential for erosion impacts to Aboriginal sites located close to watercourses/drainage lines ▸ Measures to manage the potential for impacts to potential Aboriginal heritage items (including burial sites) located in sensitive landscapes (such as alluvium landscapes) ▸ Measures to minimise and mitigate potential impacts to plant species that hold medicinal and food value (guided by a cultural plant survey). The plan would be prepared in consultation with registered Aboriginal parties and Heritage NSW.

Ref	Issue/impact	Mitigation measures—construction
AH11	Protecting Aboriginal heritage and minimising impacts during construction	A requirement for cultural and historic heritage awareness training would be included in the Aboriginal cultural heritage management plan. Cultural heritage awareness training would be provided by an Aboriginal representative at the commencement of substantial works for the proposal.
AH12	*Unexpected finds*	An unexpected finds procedure would be developed and included in the Aboriginal cultural heritage management plan (mitigation measure AH10) to provide a consistent method for managing any unexpected Aboriginal heritage items discovered during construction, including potential heritage items or objects, and human skeletal remains. The procedure would define the requirements for managing any human skeletal remains discovered during construction in accordance with mitigation measure NAH8.
AH13	*Impacts on Aboriginal cultural values at Etoo Creek 19-5-0239*	Prior to construction commencing, and once rehabilitation is complete, a smoking ceremony would be undertaken at the location of Etoo Creek 19-5-0239. Prior to construction commencing, the age of the culturally modified (scarred) tree would be verified by an arborist.
Non-Aboriginal heritage		
NAH7	*Protecting non-Aboriginal heritage and minimising impacts during construction*	A heritage management plan would be prepared and implemented as part of the CEMP. It would include measures to manage non-Aboriginal heritage and minimise the potential for impacts during construction. The plan would be prepared in consultation with the relevant heritage agencies (local councils) and take into account the outcomes of further investigations and surveys during detailed design. The heritage management plan would define a requirement for non-Aboriginal historical heritage awareness training for site workers prior to commencement of construction works. The awareness training would promote an understanding of heritage items that may be impacted during the works and the requirements of the unexpected finds procedure.
NAH8	*Unexpected finds including human skeletal remains*	An unexpected finds procedure would be developed and included in the heritage management plan to provide a consistent method for managing any unexpected heritage or archaeological items and unexpected human skeletal remains. The procedure would define the requirements for managing any human skeletal remains discovered during construction, in accordance with relevant legislation and guidelines, including the Public Health Regulation 2012 (NSW), *Heritage Act 1977* (NSW), *National Parks and Wildlife Act 1974* (NSW), *Work Health and Safety Act 2011* (NSW), *Coroners Act 2009* (NSW), *NSW Health Procedures Exhumation of human remains* (NSW Health, 2013), and *Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office, 1998b). Any human skeletal remains discovered during construction would be managed in accordance with the *Policy Directive – Exhumation of Human Remains* (NSW Health, 2013) and *Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office, 1998b).
NAH9	*Avoiding impacts on heritage items*	The following heritage items would be fenced and marked on site plans within the CEMP as areas to be avoided during construction: ▸ Graves within the Woodvale Park Private Cemetery ▸ Curban Inn site ▸ 'Kickabil' homestead and woolshed ▸ 'Allandale' homestead ▸ 'Digilah' homestead ▸ Convict road, Baradine ▸ Rocky Creek Mill site ▸ Graves within 'The Aloes' homestead ▸ Graves of the Dingwell children.
Noise and vibration		
CNV3	*Noise and vibration impacts*	A construction noise and vibration management plan would be prepared and implemented as part of the CEMP, in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework. The plan would include measures, processes and responsibilities to manage and monitor noise and vibration, and minimise the potential for impacts during construction.

Ref	Issue/impact	Mitigation measures—construction
CNV4	Noise and vibration impacts	The Inland Rail NSW Construction Noise and Vibration Management Framework would be implemented, and the proposal would be constructed, with the aim of achieving the construction noise management levels and vibration criteria identified by the noise and vibration assessment. All feasible and reasonable noise and vibration measures would be implemented. Any activities that could exceed the construction noise management levels and vibration criteria would be identified and managed in accordance with the framework, the noise and vibration management plan, and the construction noise and vibration impact statements. Notification of impacts would be undertaken in accordance with the communication management plan for the proposal.
CNV5	Impacts of out-of-hours work	An out-of-hours work protocol would be developed to define the process for considering, approving and managing out-of-hours work, including implementation of feasible and reasonable measures and communication requirements. Measures would be aimed at proactive communication and engagement with potentially affected receivers, provision of respite periods and/or alternative accommodation for defined exceedance levels. All work outside the primary proposal construction hours would be undertaken in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework and in accordance with the out-of-hours work protocol. The protocol would provide guidance for the preparation of out-of-hours work plans for each construction work location and for key works. Out-of-hours work plans would be prepared in consultation with key stakeholders, including the NSW EPA and the community with the potential to be impacted, and incorporated into the construction noise and vibration management plan.
CNV6	*Construction vibration (structural) impacts*	If vibration-generating activities are conducted within 18 m of a residence, attended vibration measurements would be undertaken at the commencement of vibration-generating activities to confirm that structural vibration limits are within the acceptable range. For piling, this distance is increased to 100 m. Where vibration levels are found to be unacceptable, alternative work methods would be implemented so the vibration impacts are reduced to acceptable levels.
CNV7	Construction vibration (structural) impacts	Building condition surveys would be completed before and after construction works where buildings or structures are within the minimum vibration working distances for cosmetic damage.
CNV8	*Construction vibration (structural) impacts on heritage items*	Prior to the commencement of vibration-intensive works within the minimum working distances for cosmetic damage for heritage items, the potential for damage to the item would be assessed. Where there is potential for damage, alternative methods that generate less vibration would be investigated and substituted, where practicable. Where residual cosmetic damage risks remain, condition surveys would be carried out and vibration monitoring with real-time notification of exceedance would occur during the activity. Site activities would be modified, where practicable, to avoid exceeding the cosmetic damage criteria. Any identified vibration-related damage to the items would be rectified.
CNV-CI1	*Impacts of blasting at borrow pits*	A blast management strategy would be prepared in accordance with relevant guidelines and in consultation with the NSW EPA. The strategy would form part of the construction noise and vibration management plan and would include: ▸ Sequencing and review of trial blasting to inform blasting ▸ Regularity of blasting ▸ Intensity of blasting ▸ Periods of relief ▸ Blasting program.
CNV-CI2	*Impacts of blasting at borrow pits*	Blasting would be undertaken during the recommended standard hours for blasting. Management measures defined by the blasting management strategy would be implemented.
Air quality		
AQ1	*General air quality impacts*	An air quality management plan would be prepared and implemented as part of the CEMP. The plan would include measures, processes and responsibilities to minimise the potential for air quality impacts on the local community and environment during construction.

Ref	Issue/impact	Mitigation measures—construction
AQ2	*Construction activities and earthworks that may cause dust impacts*	Where sensitive receivers are located within the separation distances determined for each key activity, or visible dust is generated from vehicles using unsealed access roads, road watering and/or other stabilising approaches would be implemented.
AQ-CI1	*Impacts of blasting at borrow pits*	Blasting would be avoided when winds in excess of 5 metres per second could carry dust towards a sensitive receiver.
Traffic and transport		
TT6	*General impacts of construction on traffic, transport, access, pedestrians and cyclists.*	A traffic, transport and access management plan would be prepared and implemented as part of the CEMP. The plan would include measures, processes and responsibilities to minimise the potential for impacts on the community and the operation of the surrounding road and transport environment during construction. The plan would be developed in consultation with relevant stakeholders, including local councils, Transport for NSW, Forestry Corporation of NSW, emergency services and public transport/bus operators. The plan would include, as appropriate, additional reasonable and feasible measures identified as an outcome of consultation (in accordance with mitigation measure TT7).
TT7		Consultation with relevant stakeholders would be undertaken regularly to facilitate the efficient delivery of the proposal and to minimise impacts on road users and landholders. Stakeholders would include the relevant local council/s, bus operators, Transport for NSW, emergency services, the Forestry Corporation of NSW (in relation to access within State forests), Crown Land, Local Land Services and other affected property owners/occupants. Additional measures identified as an outcome of consultation would be implemented during construction, where reasonable and feasible. This would include modifying work areas, activities and construction access arrangements to address traffic flow and access issues identified by key stakeholders, where practicable.
TT8	Access impacts	The community would be notified in advance of any proposed road and pedestrian network changes through signage, the local media, and other appropriate forms of communication.
TT9	*Emergency vehicle access*	Emergency vehicle access routes that may be impacted by the proposal would be identified, and appropriate control measures would be implemented, in consultation with the relevant emergency services providers.
TT10	*Heavy vehicles damaging local roads*	A dilapidation survey would be undertaken of the made public roads within the proposed haulage routes, prior to and following completion of construction, and provided to the relevant road authority. Pavement condition monitoring would be carried out during works, as required. Rectification measures would be implemented as needed, during and/or following completion of construction, to address any damage caused by construction.
TT-CI1	*Construction traffic impacts (temporary workforce accommodation)*	The traffic, transport and access management plan would include measures to manage potential traffic impacts at and near temporary workforce accommodation facilities. The plan would include approved access routes and any restrictions on the use of residential streets.
Land use and property		
LP16	*Biosecurity*	The biodiversity management plan included in the CEMP (mitigation measure BD8) would include measures to minimise the potential for biosecurity risks during construction in accordance with the *Biosecurity Act 2015* (NSW).
LP17	*Access to properties*	Access to individual residences, services and businesses, and for livestock, pedestrians and machinery across the rail corridor, would be maintained during construction. The traffic, transport and access plan included in the CEMP (mitigation measure TT6) would include measures to ensure that access to properties would be maintained at all times during construction. Where alternative access arrangements need to be made, these would be developed in consultation with affected property owners/occupants, and Local Land Services for travelling stock reserves.
LP18	*Access within State forests*	The traffic, transport and access plan included in the CEMP (mitigation measure TT6) would include measures to ensure that access within State forests is retained to enable forestry operations to continue during construction.

Ref	Issue/impact	Mitigation measures—construction
LP19	*Rehabilitation*	The rehabilitation strategy (mitigation measure BD12) would include measures to restore disturbed sites that do not form part of the operational footprint (such as compounds, temporary workforce accommodation) as close as practicable to the pre-construction condition or as agreed with the landholder. Rehabilitation of disturbed areas would be undertaken progressively, consistent with the rehabilitation strategy and property-level design requirements (where relevant).
LP20	*Water supplies for farm operations*	Farm water pipelines, dams and drainage channels would be replaced or reinstated in consultation with landowners/landholders to ensure continuity of stock and domestic water supplies prior to removal of existing impacted infrastructure.
LP21	*Bushfire risk in forest areas*	The flood and emergency response plan (mitigation measure FH4) would include measures to minimise the potential for bushfire risks.
Visual amenity		
LV5	*Visual impacts of construction compounds*	Construction compounds would be located, as far as practicable, within cleared areas and away from sensitive receivers. Compounds would be designed and orientated to minimise visual impacts. This would include locating areas of low visual amenity away from sensitive receivers, and erecting boundary screening around compounds, where appropriate.
LV6	*Protection of trees*	Trees to be retained would be protected, prior to the commencement of construction, in accordance with *AS4970-2009 Protection of trees on development sites* (Standards Australia, 2009).
LV7	*Landscape character and visual impacts*	Rehabilitation of disturbed areas would be undertaken progressively in accordance with the rehabilitation strategy (mitigation measure BD12) and individual property agreements (mitigation measure LP3) (where relevant).
LV8	*Minimising light spill*	Lighting of work areas, compounds, and work sites would be designed and sited in accordance with mitigation measure LV4, and oriented to minimise glare and light spill impact on adjacent receivers.
LV-CI1	*Landscape character and visual impacts associated with (borrow pits)*	The borrow pits would be rehabilitated in accordance with the borrow pit rehabilitation strategy provided in Appendix K of the EIS.
LV-CI2	*Visual impact from construction activities (temporary accommodation facilities)*	The temporary workforce accommodation plan (mitigation measure SE-CI2) would include requirements for the design and visual screening of facilities, to minimise the potential for visual impacts, particularly where facilities are visible from sensitive receivers.
Socio-economic impacts		
SE9	*Social impacts, communication and engagement*	Key stakeholders (including local councils, emergency service providers, public transport providers, the general community and surrounding landowners/occupants) would continue to be consulted in accordance with the communication management plan. Local residents, landholders, landowners, businesses, affected social and recreation facilities and other relevant stakeholders would be notified before work starts, in accordance with the communication management plan, and be regularly informed of construction activities.
SE10	Social impacts, communication and engagement	Complaints during construction would be managed in accordance with the complaints management system defined by the communication management plan. The complaints management system would be maintained throughout the construction period and for a minimum of 12 months after construction finishes.
SE11	*Workforce management*	A workforce management plan would be developed and implemented during construction to manage: ▸ Potential impacts of the non-resident construction workforce ▸ Local business and employment opportunities ▸ Health and wellbeing services needs of the temporary construction workforce, including medical, allied health and wellbeing services. The plan would be developed in consultation with local councils and service providers, including local and regional health and emergency services providers.

Ref	Issue/impact	Mitigation measures—construction
SE12	*Local employment and training opportunities*	The workforce management plan would include measures to manage local employment and procurement requirements, including but not limited to: ▸ Recruitment, skills and training measures, including identification of skills and qualifications required, and training targets ▸ How the contractor would work with regional stakeholders to upskill local residents.
SE13	*Impacts of non-resident workforce on local communities*	The workforce management plan would include measures to manage potential impacts of the non-resident construction workforce on local and regional communities, including: ▸ A code of conduct for workers, including a zero-tolerance policy relating to anti-social behaviour ▸ Strategies to promote wellbeing of the workforce ▸ A monitoring mechanism for use of local tourist accommodation and rental housing by workers ▸ Processes for managing potential increased demands due to the non-resident workforce.
SE14	*Temporary land requirements at the Narrabri Dirt Bike Club*	The area of land within the Narrabri Dirt Bike Club site, which is required during construction only, would be restored and returned to (as a minimum) the pre-existing condition.
Waste management		
WM3	*Construction waste management*	A construction waste management plan would be prepared and implemented as part of the CEMP. The plan would adopt the waste hierarchy principles contained in the *Waste Avoidance and Resource Recovery Act 2001* (NSW), and detail processes, responsibilities and measures to manage waste and minimise the potential for impacts during construction.
WM4	*Construction waste and spoil management*	All waste generated would be classified in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014) and disposed of in accordance with the relevant requirements of the Protection of the Environment Operations (Waste) Regulation 2014.
Sustainability		
SU4	*Achieving the target sustainability rating*	A sustainability management plan would be developed to define the measures required to be implemented achieve an 'excellent' as built rating according to the ISCA's Infrastructure Sustainability scheme. The sustainability management plan would incorporate Inland Rail program-aligned sustainability objectives and targets, roles and responsibilities, strategies for achieving the 'excellent' as built rating, and review and reporting requirements.
SU5	*Reporting*	Monthly sustainability reporting (and corrective action where required) would be undertaken during construction, in accordance with the sustainability management plan.
Climate change		
CC2	*Climate change risk management*	The adaptation measures identified for the proposal would be reviewed, and final measures would be implemented during construction, as far as practicable.

TABLE 8-3: COMPILATION OF UPDATED MITIGATION MEASURES FOR OPERATION

Ref	Issue/impact	Mitigation measures—operation
Biodiversity		
BD14	*Weed management*	Weed inspections would be undertaken and weed management would occur, in accordance with ARTC's standard operating procedures, to meet its obligations under the *Biosecurity Act 2015* (NSW).
BD15	*Fauna connectivity*	The operational performance of fauna connectivity measures, including impacts on fauna as a result of train operations and maintenance activities, would be monitored in accordance with the fauna connectivity strategy. This would include recording of wildlife collisions with trains. ARTC would also monitor the use of crossing structures by target species (including the Pilliga mouse, squirrel glider, koala, rufous bettong and eastern pygmy-possum) and feral predators. The threatened species management plans (BD6) would include appropriate adaptive management measures to address situations where fauna connectivity and population impact thresholds are exceeded.
BD16	*Aquatic ecology*	Culverts that provide for the flow of watercourses would be inspected and maintained, in accordance with ARTC's standard operating procedures, to address any issues that may contribute to the blockage of fish passage.
Soils and contamination		
SC10	*Soil erosion and sedimentation*	During any maintenance work where soils are exposed, sediment and erosion control devices would be installed in accordance with *Managing Urban Stormwater: Soils and Construction*, Volume 1 (Landcom, 2004).
SC11	*Contamination*	ARTC's existing spill response procedures would be reviewed to determine applicability and suitability during operation. The adopted procedure would include measures to minimise the potential for impacts on the local community and the environment as a result of any leaks and spills.
Water quality		
WQ5	*General water quality management*	The proposal would be managed in accordance with the water quality management requirements specified in the environment protection licence.
Noise and vibration		
ONV4	*Operational noise and vibration*	The proposal would be operated with the aim of achieving the operational noise and vibration criteria identified by the operational noise and vibration review, the requirements of the conditions of approval, and the environment protection licence for Inland Rail.
ONV5	*Operational noise and vibration*	Operational noise and vibration compliance monitoring would be undertaken, once Inland Rail has commenced operation, at representative locations, to compare actual noise performance against that predicted by the operational noise and vibration review. Compliance monitoring requirements would be defined by the operational noise and vibration review. The results of monitoring would be included in an operational noise and vibration compliance report, prepared in accordance with the conditions of approval. The need for any additional feasible and reasonable mitigation measures would be identified as an outcome of the monitoring.
Air quality		
AQ3	*Locomotive emissions*	Locomotive emissions would be managed in accordance with the air quality management requirements specified in the rollingstock operator's environment protection licence.
AQ4	*Impacts during track maintenance*	Maintenance service vehicles and equipment would be maintained and operated in accordance with the manufacturer's specifications.
Traffic and transport		
TT11	*Road user safety at level crossings*	The operation of all level crossings constructed on classified roads as part of the proposal would be reviewed after Inland Rail commences operation to confirm that the: ▸ Level of protection is appropriate ▸ Proposed infrastructure is appropriate for the traffic conditions.
TT12	*Road user safety at level crossings*	In accordance with National and State Rail Safety Law requirements, public road crossings would be subject to an Interface Agreement with the relevant road manager to ensure that safety risks are identified and minimised, as far as practicable, during operations.

Ref	Issue/impact	Mitigation measures—operation
Land use and property		
LP22	*Safe scheduling*	ARTC would develop a 'Call Train Control' process to enable landowners to use levels crossings as stock crossings. Details of the 'Call Train Control' process will be provided to agricultural landholders prior to the commencement of operations.
Visual amenity		
LV9	*Landscape character and visual impacts*	Vegetation provided in accordance with the rehabilitation strategy (mitigation measure BD12), and urban design and landscape plan (mitigation measure LV2) would be subject to ongoing monitoring and maintenance in accordance with ARTC's standard operating procedures.
Socio-economic impacts		
SE15	*Increased safety risks due to new level crossings*	A rail safety awareness program would be developed and implemented prior to the operation of Inland Rail to educate the community regarding safety around trains. This would include landholders with properties that are intersected by the proposal.
Waste management		
WM5	*Operational waste management*	Operational waste, including general litter clean up, would be managed in accordance with ARTC's existing operational maintenance requirements and the waste hierarchy principles in the *Waste Avoidance and Resource Recovery Act 2001* (NSW).
Sustainability		
SU6	*Sustainability*	Prior to operation commencing, a sustainability handover plan would be prepared, and relevant initiatives would be maintained and implemented, through operational management and maintenance procedures.
Climate change		
CC3	*Climate change risk management*	Operational management and maintenance procedures would address potential climate change risks and adaptation measures.

8.3 Concluding statement

The proposal is needed to support the development of Inland Rail. The proposal, as part of Inland Rail, is needed to respond to the growth in demand for freight transport, and address existing freight capacity and infrastructure issues. The proposal is a critical component of Inland Rail and is required to enable Inland Rail to operate.

Concurrent with public exhibition of the EIS, ARTC has undertaken further investigations and is proposing a number of design refinements/amendments to the proposal. The aim of these amendments is to minimise the potential impacts of the proposal where practicable, particularly in respect of land use and property, and traffic and access, and to take into account further design development. The amendments have been developed taking into account consultation with the community and key stakeholders and submissions made; however, a proposal of this scale would inevitably have some impacts on the local environment and community, particularly during construction and as a result of establishing a significant new section of freight rail corridor. The proposal (as amended) would continue to incorporate environmental management and design features to ensure that potential impacts are managed and mitigated as far as practicable. The majority of the potential construction-related impacts would be effectively mitigated by the implementation of best practice construction management, including the implementation of the environmental management approaches described in section D5.2 of the EIS and the revised mitigation measures provided in this report.

In addition, this report, supported by the updated flooding and hydrology assessment report and the route selection summary report, responds to the Planning Secretary direction to prepare a preferred infrastructure report to:

- Address the hydrology and flooding impacts of the project, as raised in submissions and by the independent review of hydrology undertaken by Bewsher Consulting in March 2021
- Provide appropriate justification and information on the design of the project and alternative rail alignments considered, particularly near the towns of Narromine and Narrabri, and how these alternatives were analysed to inform the selection of the preferred route
- Provide design alternatives to demonstrate how residual flooding impacts can be reduced.

The request to provide additional information on the route options near the towns of Narromine and Narrabri is a result of the concern in relation to potential flooding impacts at these locations.

This report, supported by the updated flooding and hydrology assessment report and route selection summary report, provided further assessment to in relation to the above items. The updated flooding and hydrology assessment report has identified that there are no predicted significant residual impacts associated with the proposal and as such, the preferred alignment is appropriate and justified.

The biodiversity offset strategy would be finalised and implemented to address the residual impacts of the proposal on biodiversity values, according to the requirements for Division 5.2 projects under the EP&A Act, and to offset impacts on controlled EPBC Act matters for the proposal.

The detailed design for the proposal would be developed with the objective of minimising potential impacts on the local and regional environment, and the local community. The design and construction methodology would continue to be developed with this objective in mind, taking into account the input of stakeholders and the local community, and the conditions of approval.

To manage the potential impacts identified by the EIS, and in some cases remove them completely, the assessment chapters outline a range of mitigation measures that would be implemented during construction and operation of the proposal. Section 8.2 of this report provides the mitigation measures that would be implemented. The environmental performance of the proposal would be managed by implementing the CEMP and OEMP. These plans would also ensure compliance with relevant legislation and any conditions of approval.

With the implementation of the proposed mitigation measures, and the approach to management described in the EIS, it is concluded that the potential environmental impacts of the proposal (as amended) would be adequately managed.

9. References

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APPENDICES

NARROMINE TO NARRABRI PREFERRED INFRASTRUCTURE/AMENDMENT REPORT

ARTC | INLAND RAIL
An Australian Government Initiative

APPENDIX A

Updated proposal description

INLAND RAIL

Narromine to Narrabri Project
Updated project description

ARTC

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

IR_1929

Contents

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1. Proposal features and operation

This chapter provides a description of the features of the proposal (as amended) and how it would operate. The proposed approach to construction is described in chapter 2.

1.1 Overview

The proposal involves constructing and operating a section of Inland Rail between the towns of Narromine and Narrabri in NSW. The proposal would link the Parkes to Narromine section of Inland Rail in central western NSW with the Narrabri to North Star section of Inland Rail in north western NSW.

The proposal includes two main types of infrastructure:

- Rail infrastructure – about 306 kilometres of new single-track standard gauge railway and associated rail infrastructure would be established within a new rail corridor.
- Road infrastructure – changes to some roads would be required to establish the new rail corridor and railway.

The proposal described in this chapter is based on the level of design developed to date. Detailed design would include further engineering, construction planning, and detailed assessment work, and would be subject to further input from key stakeholders and consultation with the community.

1.1.1 Key design features

The key design features of the proposal are listed below and shown in Figure 1.1. Maps showing the proposal features are provided in the updated Map Book (referred to as the 'Map Book' throughout).

Rail infrastructure

- a new 306 kilometre long rail corridor between Narromine and Narrabri
- a single-track standard gauge railway and track formation within the new rail corridor
- seven crossing loops 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), floodplains and roads
- level crossings
- new rail connections and possible future connections with existing ARTC and Country Regional Network rail lines, including a new 1.2 kilometre long rail junction between the Parkes to Narromine section of Inland Rail and the existing Narromine to Cobar Line (the Narromine West connection)

Road infrastructure

- road realignments at various locations, including realignment of the Pilliga Forest Way for a distance of 6.7 kilometres
- limited road closures.

The key design features are described in sections 1.2 and 1.3.

Ancillary infrastructure to support the proposal would include signalling and communications, drainage, drainage control areas, signage and fencing, and services and utilities.

1.2 Rail infrastructure

1.2.1 Rail corridor

The proposal comprises about 306 kilometres of new rail corridor between Narromine and Narrabri. A new section of rail corridor would also be provided for the Narromine West connection. The new rail corridor would have a minimum width of 40 metres, with some variation to accommodate particular infrastructure (such as crossing loops) and to cater for local topography. The corridor would be of sufficient width to accommodate the infrastructure currently proposed for construction, including possible future expansion of crossing loops for 3,600 metre long trains.

The rail corridor would be owned by the NSW Government (Transport for NSW) and leased by ARTC. The corridor would be fenced as described in section 1.2.8.

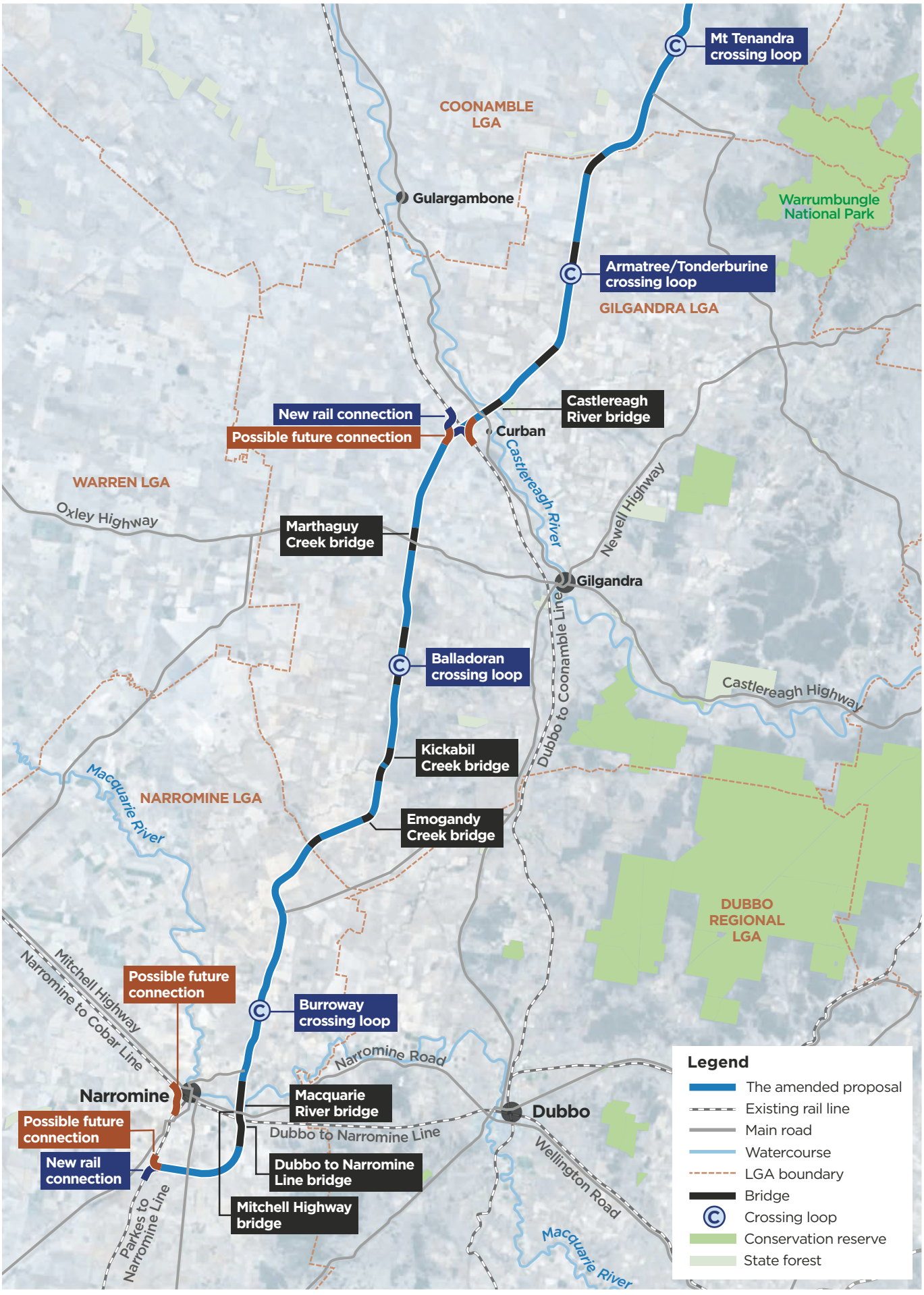


Figure 1.1 **Key features of the proposal (map 1)**

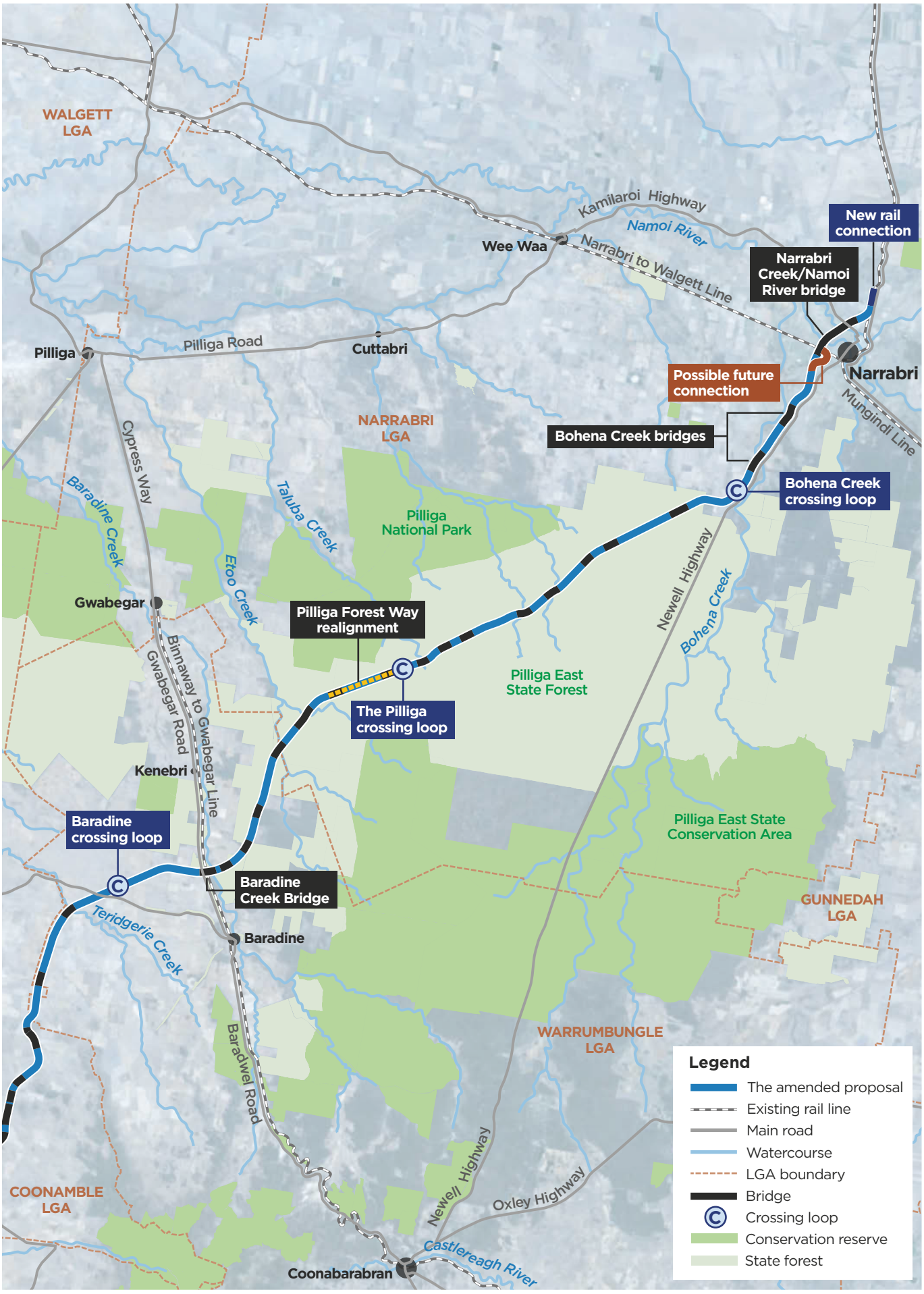


Figure 1.1 **Key features of the proposal (map 2)**

1.2.2 New railway

About 306 kilometres of new single-track standard gauge railway would be provided within the new rail corridor between Narromine and Narrabri. Maps showing the proposed alignment for the new railway are provided in the Map Book.

The new railway would consist of track and concrete sleepers laid on ballast. The ballast would overlay the formation, which would comprise capping, general fill and structural layers consisting of different grade material. The track and formation would be designed consistent with ARTC's standards. An indicative design for the railway is shown in Figure 1.2.

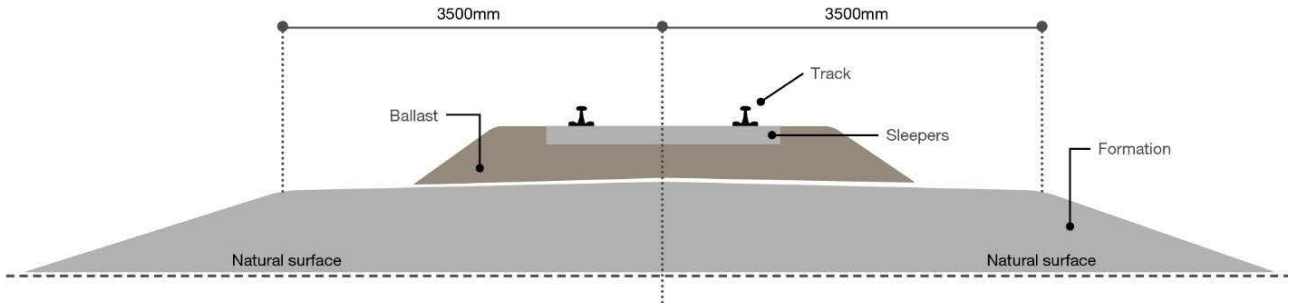


Figure 1.2 Indicative railway design

1.2.3 Crossing loops

Crossing loops are sections of track off to the side of the main track that allow trains to move to the side so that other trains can pass.

Seven crossing loops are proposed at the following locations (shown in Figure 1.1):

- Burroway
- Balladoran
- Armatree/Tonderburine
- Mt Tenandra
- Baradine
- The Pilliga
- Bohena Creek.

The loops would be parallel to the new main line track within the rail corridor. They would each be up to 2.2 kilometres long, to fit the design length of the trains (1,800 metres).

Each crossing loop would also include a maintenance siding. These sidings would provide for temporary storage of maintenance trains (250 metres long) when the main line and crossing loop is required for train movements.

An indicative crossing loop design is shown in Figure 1.3. Maps showing the proposed crossing loop arrangements are provided in the Map Book.

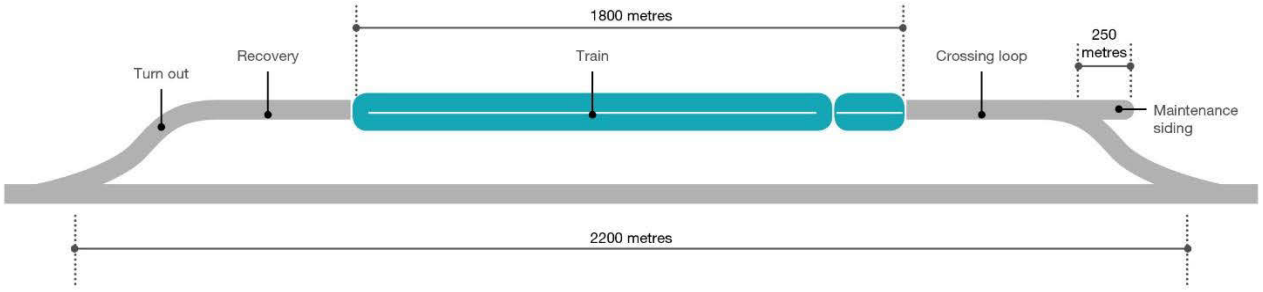


Figure 1.3 Indicative crossing loop design

1.2.4 Bridges and culverts

Bridges and culverts would be provided where the new railway needs to cross main roads, rail lines, watercourses and associated floodplains.

Additionally, a small number of dedicated culverts would be provided to minimise impacts on fauna.

Bridges and culverts have been designed to meet the following, as relevant:

- design flood levels
- minimum required clearance for watercourse navigation, road vehicles and trains
- rail and road collision protection requirements
- scour protection requirements.

Watercourse crossings have also been designed to provide for the retention of natural watercourse functions and maintenance of fish passage in accordance with the Department of Primary Industries (NSW Fisheries) guidelines *Policy and guidelines for fish habitat conservation and management* (Department of Primary Industries, 2013) and *Why do fish need to cross the road? Fish passage requirements for waterway crossings* (Fairfull and Witheridge, 2003).

Bridges

The proposal would include 75 new bridges along the rail alignment, ranging in length from 15 metres to 3,940 metres. The bridge types would also vary, from discrete spans to long viaducts.

In general, the bridges would consist of a bridge foundation with reinforced concrete headstock walls placed on bored or driven concrete piles. Bridge planks would be placed on the headstocks. Ballast walls would be connected on each side of the structure. These would function to hold the ballast and track in place.

The height of the bridges has been determined with consideration of the existing topography and the following design considerations:

- Watercourses – a one per cent annual exceedance probability (AEP) flood event with a 500 millimetre freeboard and navigational clearance.
- Existing rail lines – clearance of 7.1 metres for ARTC controlled rail lines and 5.1 metres for other lines (with the exception of the Narrabri to Walgett Line as detailed below).
- Existing roads – where practicable, a minimum clearance of 5.4 metres for classified main roads and 4.6 metres for local roads.

The clearance height of the proposed bridge over the Narrabri to Walgett Line would be raised by a further two metres to future proof the line for double-stacked train operations. This would allow double-stacked trains on the Narrabri to Walgett Line to access the proposed Northern NSW Inland Port and minimise future interruption to Inland Rail infrastructure and operations.

Bridges would be built over watercourses, floodplains, rail lines and roads. In a number of instances, a single bridge would cross multiple features, including the following key features and infrastructure within the proposal site (shown in Figure 1.1):

- Dubbo to Narromine Line – the Dubbo to Narromine Line bridge would also cross Webbs Siding Road and have a length of about 150 metres.
- Macquarie River – the Macquarie River bridge would also cross Mitchell Highway and a travelling stock reserve (R34248) and have a length of about 1,170 metres.
- Emogandy Creek – the Emogandy Creek bridge would also cross Old Mill Road and have a length of about 330 metres.
- Kickabil Creek – the Kickabil Creek bridge would also cross Kickabil Road and have a length of about 255 metres.
- Marthaguy Creek – the Marthaguy Creek bridge would have a length of about 1,150 metres.
- Castlereagh River – the Castlereagh River bridge would also cross two travelling stock reserves (R48903 and R23332) and have a length of about 610 metres.
- Baradine Creek – the Baradine Creek bridge would have a length of about 250 metres.
- Bohena Creek – two bridges would be provided to cross Bohena Creek: the Bohena Creek 1 bridge, which would also cross Cains Crossing Road and one travelling stock reserve (R44590) and have a length of about 1,330 metres, and the Bohena Creek 2 bridge, which would cross one travelling stock reserve (R941) and have a length of about 760 metres.
- Narrabri Creek/Namoi River – the Narrabri Creek/Namoi River bridge would also cross three private accesses, Yarrie Lake Road, The Island Road and the Kamilaroi Highway, and have a length of about 3,940 metres.

Figures showing the bridge locations are provided in the Map Book. Details for all bridges are provided in Table 1.2.

Table 1.1 Bridges

Chainage (approx.)	Bridge No.	Features crossed	Bridge length (m) (approx.) [1]	Maximum bridge height (m) (approx.)
561.2	250-BR560872	Backwater Cowal (tributary)	240	4.8
561.3	250-BR561237	Backwater Cowal (tributary)	45	7.9
561.5	250-BR561466	Backwater Cowal (tributary)	45	4.9
561.7	250-BR561665	Backwater Cowal (tributary)	45	8.2
562	250-BR561838	Dubbo to Narromine Line, Webbs Siding Road	150	8.7
563.5	250-BR562344	Macquarie River, Mitchell Highway	1,170	21.7
565.6	250-BR565592	Unnamed tributary to Macquarie River	15	3.9
595.6	250-BR595239	Ewenmar Creek	320	4.4
603	250-BR602663	Emogandy Creek, Old Mill Road	330	7.6
607.2	250-BR607145	Native Dog Creek	90	5.3
607.3	250-BR607323	Unnamed tributary to Native Dog Creek	30	4.8
609	250-BR608929	Pint Pot Gully	115	4
610	250-BR609715	Kickabil Creek, Kickabil Road	255	5.1
612.2	250-BR612110	Unnamed watercourse	75	8.7
616.8	250-BR616680	Milpulling Creek	120	5.3
618.5	250-BR618445	Unnamed watercourse	65	5.8
620.3	250-BR620300	Unnamed watercourse	35	7.5
623.3	250-BR623146	Bundijoe Creek	180	3.7
634.8	250-BR633677	Marthaguy Creek	1,150	4.4
643	250-BR643000	Unnamed watercourse	40	3.3
652.3	250-BR651728	Castlereagh River	610	11.4
652.7	250-BR652520	Castlereagh River (northern overflow channel)	210	3.9
661.4	250-BR661275	Unnamed watercourse	85	2.2
673.5	250-BR673082	Gulargambone Creek	415	6.7
681.5	250-BR681404	Unnamed watercourse	140	3.4
682.4	250-BR682242	Unnamed watercourse	110	2.7
682.7	250-BR682601	Baronne Creek	100	3.1

Chainage (approx.)	Bridge No.	Features crossed	Bridge length (m) (approx.) [1]	Maximum bridge height (m) (approx.)
700.2	250-BR700017	Mungery Creek	185	5.2
702	250-BR701890	Unnamed watercourse	55	3
702.2	250-BR701981	Unnamed watercourse	40	2.8
702.5	250-BR702305	Caleriwi Creek	145	1.6
704.6	250-BR704588	Quanda Quanda Creek	55	2.7
705.4	250-BR705358	Unnamed watercourse	15	3.8
705.4	250-BR705407	Unnamed watercourse	15	3.6
705.5	250-BR705460	Unnamed watercourse	60	4
705.8	250-BR705735	Unnamed watercourse	80	7.1
707.2	250-BR707183	Unnamed watercourse	15	3.4
709.3	250-BR709266	Salty Springs Creek	25	4.7
714.7	250-BR714593	Calga Creek	160	5
716.1	250-BR716029	Unnamed watercourse	15	4
722.4	250-BR722288	Bucklanbah Creek	140	4.3
730.6	250-BR730462	Teridgerie Creek	185	10
748	250-BR747768	Baradine Creek	250	11.1
749.3	250-BR749279	Unnamed watercourse	45	4.6
752.8	250-BR752712	Coolangla Creek	70	4.1
756.9	250-BR756853	Unnamed watercourse	45	4.8
763.8	250-BR763460	Etoo Creek	345	6.8
768	250-BR767941	Stockyard Creek	75	2.5
769.3	250-BR769143	Rocky Creek	115	6.3
773.4	250-BR773373	Unnamed watercourse	55	2.6
779.7	250-BR779635	Talluba Creek	60	5.9
779.9	250-BR779828	Unnamed watercourse	70	4.5
781.6	250-BR781523	Unnamed watercourse	85	6
783.8	250-BR783652	Cubbo Creek	115	13.4
786.9	250-BR786808	Unnamed watercourse	80	7.7
789.7	250-BR789380	Rocky Creek	190	9.7
796.6	250-BR796414	Coghill Creek	180	6.4

Chainage (approx.)	Bridge No.	Features crossed	Bridge length (m) (approx.) [1]	Maximum bridge height (m) (approx.)
800.5	250-BR800445	Mollieroi Creek	90	5
805.8	250-BR805743	Unnamed watercourse	40	3.5
809.2	250-BR809114	Goona Creek	55	3
817.1	250-BR817058	Unnamed watercourse	30	3.6
817.3	250-BR817258	Unnamed watercourse	30	4.2
817.5	250-BR817325	Unnamed watercourse	205	4.2
817.6	250-BR817573	Unnamed watercourse	30	4.2
817.8	250-BR817650	Bundock Creek	140	5.3
829.6	250-BR828222	Bohena Creek, Cains Crossing Road	1,330	11.53
834.5	250-BR834450	Unnamed watercourse	40	5.9
834.6	250-BR834541	Unnamed watercourse	40	8.7
835.5	250-BR834764	Bohena Creek	760	8.5
835.8	250-BR835640	Unnamed watercourse	55	5.5
843.7	250-BR843613	Narrabri to Walgett Line	90	6.8
848.1	250-BR844116	Narrabri Creek / Namoi River, Yarrie Lake Road, The Island Road, Kamilaroi Highway	3,940	13.6
848.5	250-BR848406	Unnamed watercourse	40	4.6
779.7	250-BR-Road-N2N5-1	Talluba Creek (Pilliga Forest Way realignment)	110	3.8
779.9	250-BR-Road-N2N5-2	Unnamed watercourse (Pilliga Forest Way realignment)	60	1.4

1 Maximum height (approx.) from underside of bridge soffit to ground level.

Culverts and drainage control areas

Culverts are structures that allow water (in a watercourse or drain) to pass under the rail line or road.

The proposal would include about 630 culverts of varying types and sizes. The majority of culverts would be reinforced concrete box culverts. Some road culverts would be constructed from reinforced concrete pipe.

The locations of culverts have been selected to maintain existing flow paths and minimise potential impacts on flood depths upstream and downstream of the culverts. Protection works, such as scour protection, would be provided as required.

Culverts have been designed to:

- take into account local constraints and flooding/hydrological conditions
- permit an appropriate flow and minimise the potential for adverse flooding impacts, by:
  - locating culverts at low points along the proposal site
  - ensuring that the inside base of the culverts match the natural surface level
  - minimising the potential for increases in the area of flood inundation
  - where relevant, ensuring that sizes and capacities limit potential changes to existing flooding conditions where practicable, to minimise impacts on adjacent land and infrastructure

- meet ARTC design standards
- provide for natural processes and fish passage.

In order to provide sufficient space outside the rail corridor for the management of flow velocities at culverts, drainage control areas would be provided at 200 locations along the proposal site (as shown in the Map Book). These drainage control areas are typically 50 metres wide (i.e. from the edge of the rail corridor) on the downstream side and 15 metres wide on the upstream side of the rail corridor. Each drainage control area varies in length along the rail corridor to suit the relevant culvert positions. Where a drainage control area is not provided at a culvert, it is expected that the flow velocities can be managed within the rail corridor.

The drainage control areas represent a conservative scenario in terms of additional land requirements. During detailed design these areas would be refined when further flood modelling and site specific investigations are undertaken and the extent of works within each drainage control area is confirmed. The extent of works could include, but not limited to:

- no physical works, with erosion protection provided by either existing or planted vegetation
- construction of drainage channels
- construction of concrete aprons
- installation of rock boulders (rip-rap).

The land required for each drainage control area would be finalised during detailed design in consultation with landowners as part of the property acquisition process.

1.2.5 Narromine West connection

The proposed new connection (rail junction) would provide connectivity between the Parkes to Narromine Line and Narromine to Cobar Line (see Figure 1.4). The Narromine West connection would include about 1.2 kilometres of new track to allow trains travelling from the west to access Inland Rail. Access to Inland Rail (including the proposal) for trains from the east is provided by existing track. Constructing the connection would involve some works to existing rail lines, as described in section 2.4.6.

The Narromine West connection is a possible future connection. Approval for the connection is being sought as part of the proposal and it may be constructed at a later date.

Figure 1.4 **Narromine West connection**

1.2.6 Connections with other rail lines

The proposal connects with four existing rail lines that are part of the ARTC and Country Regional Network rail networks. The connections are described in Table 1.2. Constructing the connections would involve some works to existing rail lines, as described in section 2.4.6

Table 1.2 Connections with other rail lines

Existing rail line	Connection
Parkes to Narromine	The southern end of the proposal would connect to the northern end of the Parkes to Narromine Line (which forms part of Inland Rail). The proposed connection is located about 2.2 kilometres south of Craigie Lea Lane (see Figure 1.5). Providing this connection would involve adjusting about 500 metres of the Parkes to Narromine Line (as part of the proposal). The connection would ultimately provide for all train movements between the proposal and the Parkes to Narromine Line. However, the north to east leg is a possible future connection that may be constructed at a later date.
Dubbo to Coonamble Line	An at-grade connection would provide connectivity between the proposal and the Dubbo to Coonamble Line at Curban (see Figure 1.6). The connection would provide a route for train movements from east to south and from west to north. The connection would include about 4.6 kilometres of new track. Two of the legs of the connection that enable movements from west to south and east to north are possible future connections that may be constructed at a later date.
Narrabri to Walgett Line	The proposal would cross the Narrabri to Walgett Line on a bridge to the west of Narrabri. About 1.8 kilometres of new track would be provided to allow trains from the west to access the proposal and travel south (see Figure 1.7). Access for trains travelling from west to north is possible via the existing track through Narrabri. The proposed connection is a possible future connection that may be constructed at a later date.
Narrabri to North Star section of Inland Rail (currently the Mungindi Line)	The northern end of the proposal would connect to the southern end of the proposed Narrabri to North Star section of Inland Rail (currently the Mungindi Line) about two kilometres north of the intersection between the Newell Highway and Killarney Gap Road (Figure 1.8). Providing this connection would involve adjusting about 600 metres of the Narrabri to North Star section of Inland Rail (as part of the proposal). This connection would allow trains travelling south on the Narrabri to North Star section of Inland Rail to join the proposal or existing track through Narrabri and for trains travelling north on the proposal to join the Narrabri to North Star section of Inland Rail.

The proposal does not include connections with the following existing lines:

- Dubbo to Narromine Line – the proposal crosses the Dubbo to Narromine Line and Webbs Siding Road to the east of Narromine on a bridge. No connection is provided as access to Inland Rail would be available to the south of Narromine where the proposal connects with the Parkes to Narromine section of Inland Rail.
- Binnaway to Gwabegar Line – the proposal would cross the non-operational Binnaway to Gwabegar Line at-grade to the north of Baradine, with no connection provided.

Figure 1.5 **Connection with the Parkes to Narromine section of Inland Rail**

Figure 1.6 **Connection with the Dubbo to Coonamble Line**

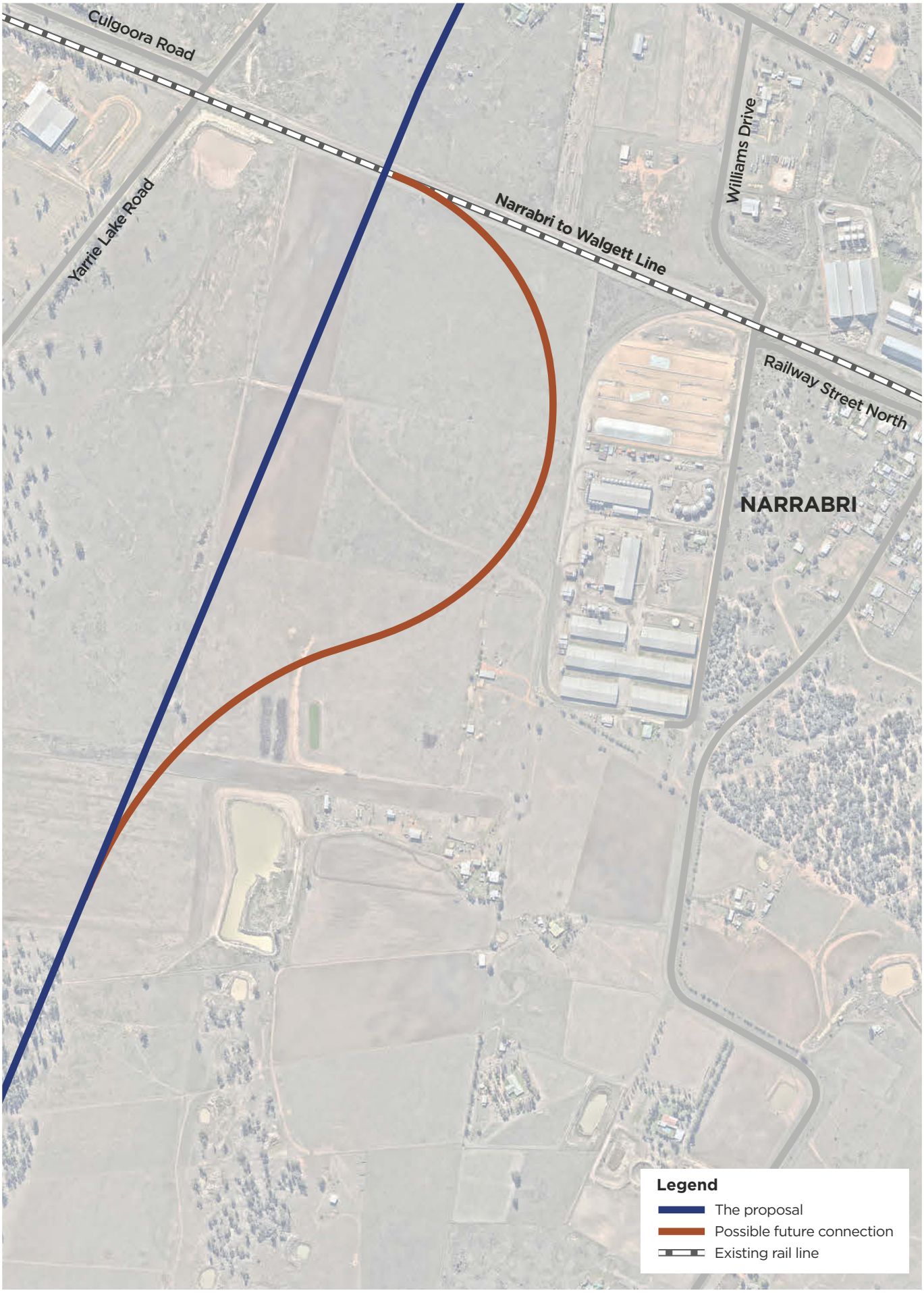


Figure 1.7 **Connection with the Narrabri to Walgett Line**

Figure 1.8 **Connection with the Narrabri to North Star section of Inland Rail**

1.2.7 Level crossings

A total of 49 new public level crossings would be provided along the rail line to maintain vehicular access along public roads that cross the rail corridor (see Figure 1.9). Of these, it is proposed that 15 would have active controls, which involve providing warning devices in the form of flashing lights and bells, and boom barriers for motorists. In addition, the controls at two existing level crossings at Narwonah Siding Road and Dandaloo Road would be upgraded from passive (stop signs) to active controls. Active controls devices are activated prior to and during the passage of a train through the level crossing. Signalling and communications would be provided at active level crossings to tie the crossings into the rail network.

Passive controls are proposed to be provided at other crossings, in the form of static warning signs (eg stop signs) that are visible on approach. This signage is unchanging with no mechanical aspects or light devices.

The proposed treatments would continue to be reviewed, refined and finalised during detailed design, in consultation with the relevant road manager and appropriate design guidelines.

Further information about the proposed interaction between the rail line and public roads is provided in section 1.3.

All level crossings would be designed to meet relevant Australian, Transport for NSW and ARTC design standards. The section of road that intersects with the rail line via level crossings would be re-constructed at the same grade as the proposed rail line, requiring some realignment and reconstruction works in the vicinity of the proposal site.

Maps showing the location, type and road arrangements for all public level crossings are provided in the Map Book.

1.2.8 Ancillary infrastructure

Embankments and cuttings

As the proposal site would be located within a predominantly greenfield environment, a number of cuttings and embankments would be required. Cuttings would occur where the rail infrastructure is proposed below existing ground level, with material required to be cut out or excavated. Embankments would be required where the proposal is above the natural surface.

Embankments and cuttings would vary in size and shape in response to local conditions. The exact dimensions and locations would be confirmed during detailed design. Typical features would include:

- embankments:
  - 3.5 metres shoulder at the top of capping
  - batters with a slope of 3:1 (horizontal:vertical)
- cuttings:
  - 3.5 metres shoulder at the top of capping
  - cess drain in the base of the cutting
  - 2:1 (horizontal:vertical) cutting slope
  - benching at seven metres where the depth of the cut exceeds 10 metres
  - construction of top drains where the local topography results in overland flow entering a cutting.

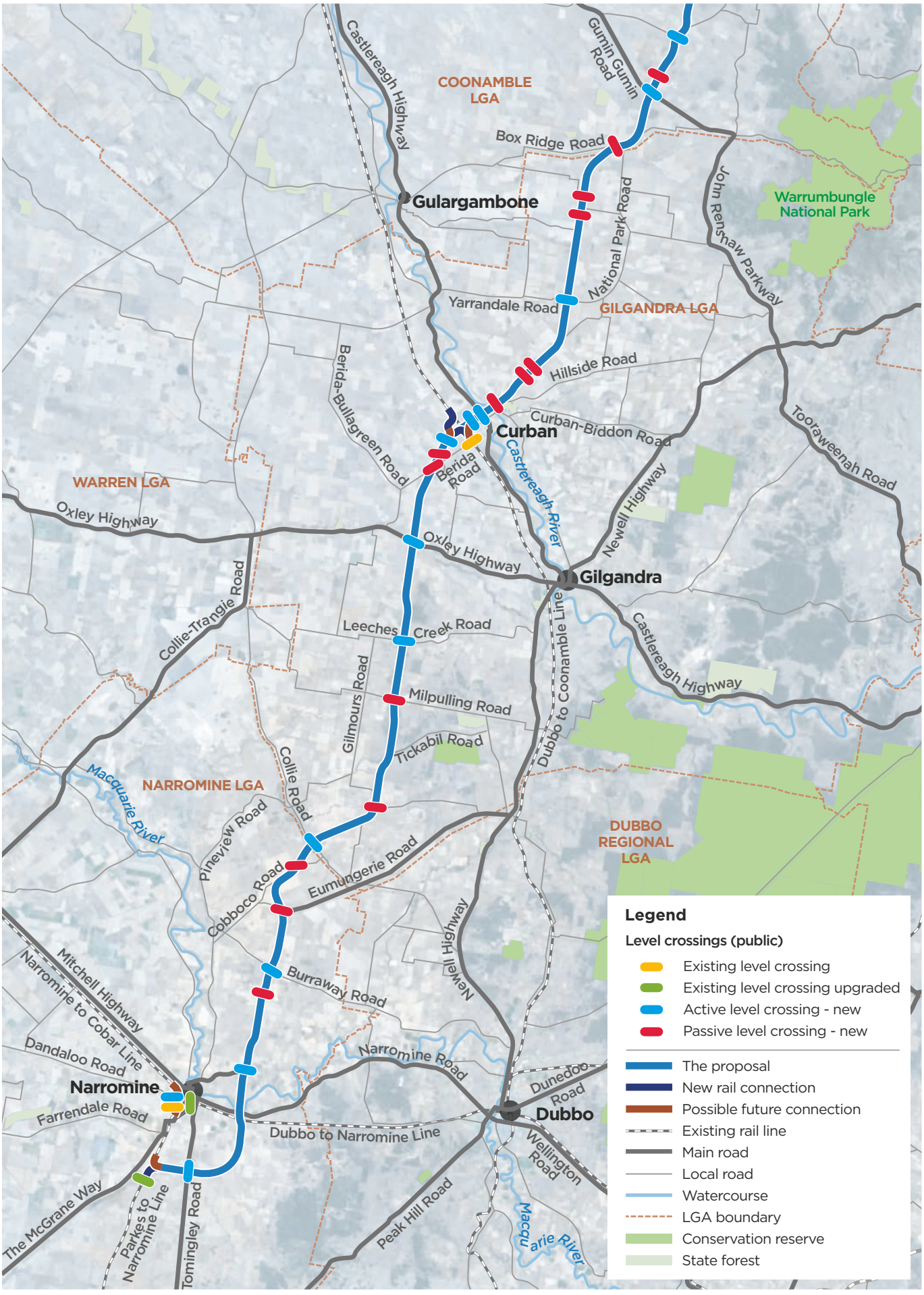


Figure 1.9 **Level crossings (map 1)**

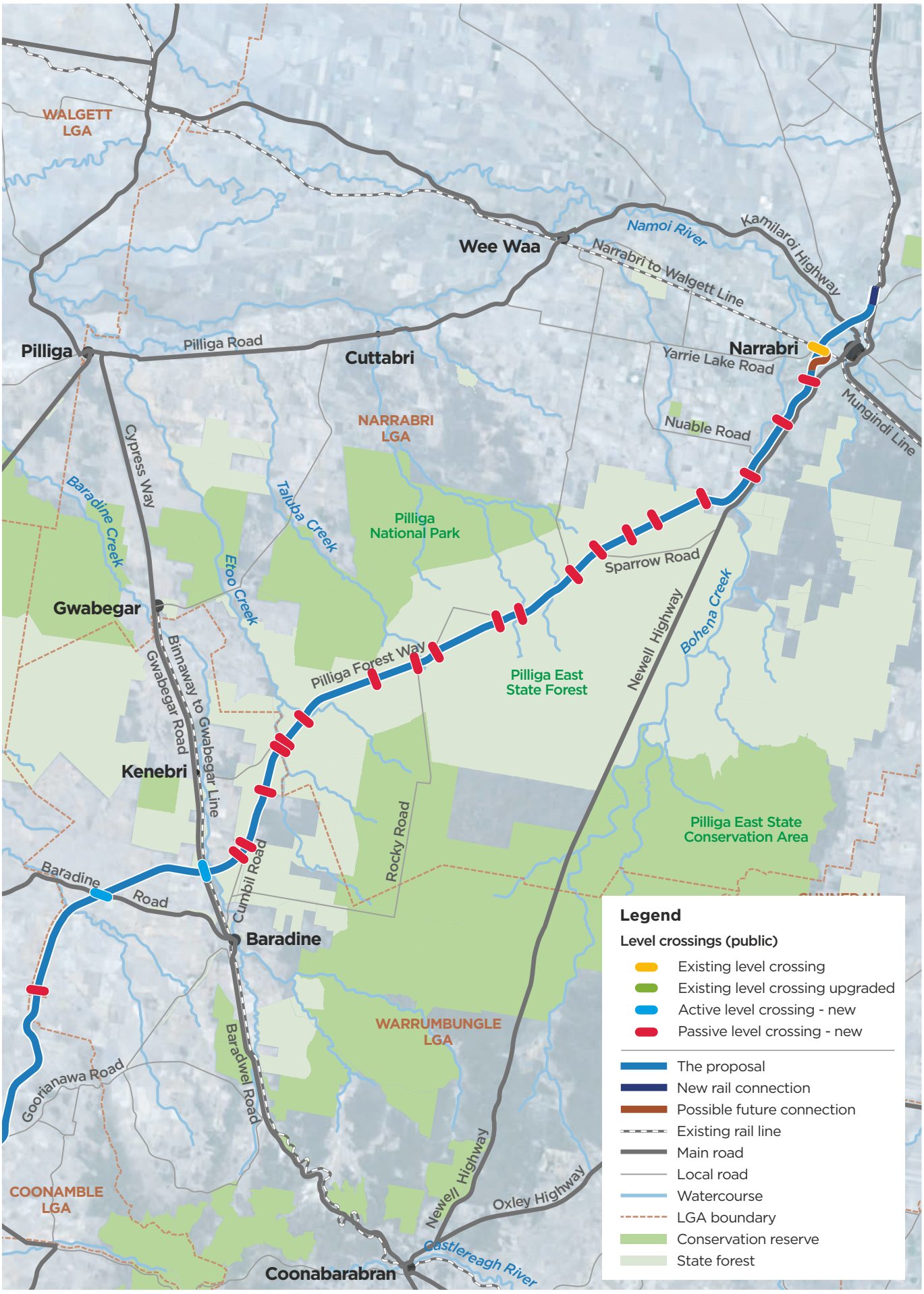


Figure 1.9 **Level crossings (map 2)**

Track drainage

Drainage, in the form of top drains, toe drains and cess drains, would be installed within the rail corridor to divert and capture surface flows as follows:

- Top drains would be provided upslope of cuttings to divert any surface flow around the cutting.
- Toe drains would be provided at the base of embankments to divert any surface flow around the embankment.
- Cess drains would be provided in the base of cuttings to capture water within the cutting and convey it to the ends of the cutting. These drains are used to remove water that percolates through the ballast and flows along the capping layer towards the outside of the track formation.

The drains are used to protect the track formation by keeping it dry. They are required to capture runoff from the formation and local catchment area and direct the intercepted flows to points where it would be discharged to the nearest watercourse or drainage line. Not all cuttings and embankments would require a drain, with the need determined based on the local topography. Appropriate scour protection measures would be provided as required.

An indicative embankment/cutting and drainage arrangement is shown in Figure 1.10.

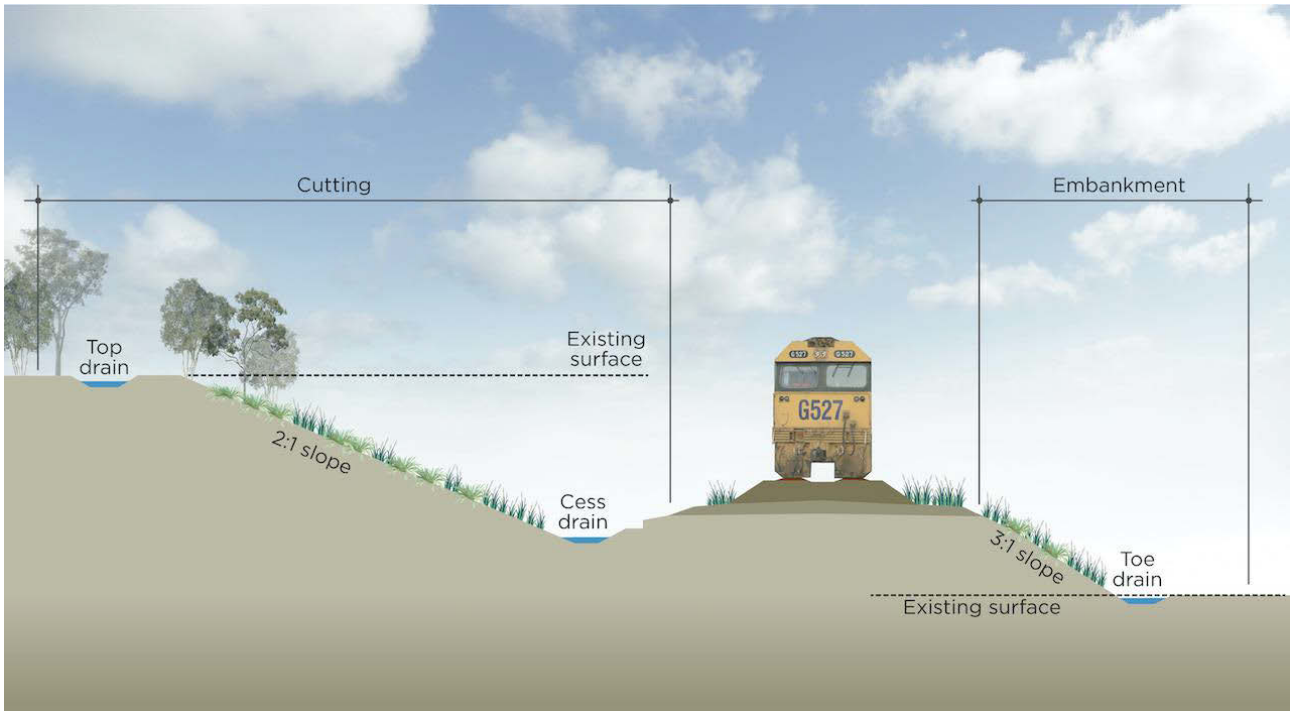


Figure 1.10 Indicative embankment, cutting and track drainage

Turnouts

Turnouts allow the train to be guided from one track to another. Within the proposal site turnouts would be located at:

- each end of the Narromine West connection (see section 1.2.5)
- each end of connections with other rail lines (see section 1.2.6)
- the beginning and end of each crossing loop (including maintenance siding) (see section 1.2.3).

Corridor fencing

Fencing would be constructed along the rail corridor where it adjoins private land. Fencing (for stock) is not required in State forest areas. Where the rail corridor abuts an existing public road with stock movements, fencing would be provided on both sides of the proposed rail corridor.

The type of fencing would be discussed with landholders and refined during detailed design. In general, unless otherwise agreed, fencing would consist of a standard stock fence (1.2 metres high), with gates provided in locations aligning with the access roads and other key access points to the rail corridor from public and private roads.

The requirement for fauna exclusion fencing to minimise the potential for wildlife strike was also considered during design development. In general, including fauna exclusion fencing is not considered to be desirable as a result of the potential to affect broader fauna movement and connectivity, particularly in key parts of the Pilliga East State Forest.

Operational access roads

Operational access roads would provide for maintenance access, access to crew change and train stowage locations, access for emergency recovery, and access from public roads to the rail corridor.

New construction haul roads would be provided to construct the proposal (see section 2.11.2). Following completion of construction, the haul roads would be modified (where required) to form a permanent operational access road within the rail corridor and other operational access roads.

The operational access road network for the proposal would consist of:

- formal access roads at critical infrastructure, such as bridges, large culverts, crossing loops, turnouts, signalling and communications equipment rooms and level crossings
- informal access tracks (modified construction haul roads along part of the rail corridor) in other locations, where practicable.

The operational access roads would typically be 3.5 metres wide and would be constructed in about 34 locations, totaling about 104 kilometres in length. The roads would be contained within the rail corridor and would be maintained by ARTC.

Signage

Rail signage, including kilometre posts, speed boards and control markers, would be provided along the proposal site. Road signage would also be provided associated with level crossings, bridges, road realignments and road closures, as required.

Signalling and communications

Signalling and communications infrastructure would be provided as required. ARTC's Advanced Train Management System (ATMS) would be implemented to manage signalling and communications for the wider rail network. ATMS is a communication based train management system, which communicates via both voice and data between Network Control Centres and locomotives operating on ARTC's rail network.

Power

Power would be required at all active level crossings and crossing loops. This would be supplied by mains power (eg overhead power lines). A generator and diesel storage would also be required at each crossing loop to provide power in the event of mains power outages.

Stock underpasses

The proposal intersects, or is close to travelling stock reserves at seven locations. Where these existing travelling stock reserves are severed by the proposal, access across the proposal has been provided for by means of level crossings (see section 1.2.7) or stock underpasses at bridges and culverts (where topography and sizing permits). Underpasses would be designed with consideration of *Primefact 823 Underpasses for moving livestock under expressways* (DPI, 2009). Where culverts are used they would typically comprise reinforced concrete box culverts with dimensions of three metres high by three metres wide.

Stock underpasses proposed to be provided for travelling stock reserves are summarised in Table 1.3 and their locations are shown in the maps in the Map Book.

The final design solutions for stock crossings would continue to be refined during detailed design in consultation with relevant stakeholders, including Local Land Services and Crown Lands.

Table 1.3 Stock crossings (via underpasses)

Chainage (approx.)	Land use	Description
563	Travelling stock reserve (R34248)	Access beneath the proposal is provided by the Macquarie River bridge.
595.4	Travelling stock reserve (R3420)	Access beneath the proposal is provided by the Ewenmar Creek bridge.
652.4	Travelling stock reserve R48903 and R23332)	Access beneath the proposal is provided by the Castlereagh River bridge.

Chainage (approx.)	Land use	Description
828.5 to 836	Travelling stock reserve (R44590 and R941)	Access beneath the proposal is provided by a bridge over Bohena Creek at chainage 828.9.
849	Travelling stock reserve (R27999)	Access beneath the proposal is provided by a small bridge.

1.3 Road infrastructure

The proposed changes to road infrastructure are described below. The proposed treatments would continue to be reviewed, refined and finalised during detailed design, in consultation with the relevant road manager and appropriate design guidelines. Crossings over the rail corridor would be reassessed using ALCAM if the design, or other relevant factors (such and traffic volumes and composition) change.

1.3.1 Public road closures

Made roads

The majority of road closures would involve closure near the end of the road and realignment to a new level crossing or around the proposal via an existing road.

The council-managed made roads that would be closed, and the proposed alternative access arrangements, are listed in Table 1.4. Of the roads listed in this table, only Dappo Road would be completely closed.

Table 1.4 Proposed public road closures and alternative access arrangements

Road proposed for closure	Alternative access across the new rail corridor
Dappo Road	This road would be closed and road users would need to use Webbs Siding Road instead, located about one kilometre to the north.
Munns Road	This road would be closed and diverted 650 metres to the north of its existing location.

Access tracks/road reserves

The proposal would also result in the closure and realignment of 14 forestry tracks/roads within State forests managed by the Forestry Corporation of NSW.

Of the 42 tracks and paper roads that the proposal site interacts with, one would be provided with an underpass, one would be provided with a passive level crossing, and one would be closed with alternative access provided in consultation with landowners.

Maps showing the location and arrangements of public road closures are provided in the Map Book.

Approval for closures, where required, would be progressed in consultation with the relevant road manager and in accordance with the relevant legislative requirements.

1.3.2 Public road realignments

For the majority of the proposed level crossings (see section 1.2.7), the road would need to be realigned to provide a safe crossing of the rail corridor. Depending on the circumstances this would involve:

- Horizontal and vertical realignment – typically involves relocating the road within a new road corridor to improve the angle of crossing for safety reasons (ie line of sight) at a level crossing or divert the road to a new level crossing. The road would also be raised as required, on its approach and departure at a level crossing to match the height of the rail line.
- Vertical realignment – typically involves raising the road on its approach and departure at a level crossing to match the height of the rail line within the existing road corridor but in some instances may require minor adjustments to the existing road corridor.

In summary, the proposal would involve the realignment of 51 public roads, including:

- realignment of Pilliga Forest Way in the Pilliga East State Forest for a distance of about 6.7 kilometres to avoid the new rail corridor
- realignment of Nancarrows Road in Gilgandra at two locations for distances of 560 metres (northern realignment) and 750 metres (southern realignment)
- realignment of 49 roads for short sections to suit the proposed new level crossings, including any additional tie-in work that may be required.

Maps showing the location and arrangements of public road alignments are provided in the Map Book.

1.4 Permanent land requirements

The proposal's operational footprint consists of the land that would be permanently required for the proposal's functional and operational infrastructure, as described in this chapter. The operational footprint is shown in the maps in the Map Book. The anticipated land requirements within this footprint are listed in Appendix C of the Amendment Report.

It is estimated that about 1,490.9 hectares of land would be permanently required. These requirements are anticipated to include about:

- 1,005.1 hectares of privately-owned land
- 485.8 hectares of publicly-owned land, mainly owned by the NSW Government (includes about 20 hectares of land leased to private landholders).

ARTC has been appointed as Transport for NSW's representative to undertake land acquisition negotiations for Inland Rail. All property acquisitions would be managed by ARTC in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. It is Transport for NSW's preference to acquire land by negotiated agreement. However, a compulsory acquisition process may be required if agreement cannot be reached or is otherwise necessary.

Compensation payable pursuant to section 55 of the Land Acquisition (Just Terms) Compensation Act generally includes, among other things, provisions for market value and disturbance items such as associated legal costs, valuation fees, relocation and removal expenses, and mortgage costs (ie fees associated with the discharge of mortgages and creation of a new mortgage where relocation is required).

The proposal would also require temporary leasing of land for construction. Temporary land requirements are described in section 2.10.5.

1.5 Urban design and landscaping

1.5.1 Objectives

The following general urban design and landscaping objectives have been identified for the proposal:

- to fit sensitively within the setting and topography of each landscape topology it passes through
- to minimise impacts on cross connectivity and maximise active transport permeability for communities
- to design built form elements that fit well in their setting, are legible and minimise disturbance to existing connectivity
- to respond to the local natural and cultural context to integrate the proposal into the local setting
- to minimise landscape and visual impacts for communities
- to deliver a fully integrated resilient landscape corridor that requires minimal maintenance.

During the route selection process these objectives were considered in conjunction with other technical, environmental and social criteria. In particular, the selection process considered proximity to residences, minimising changes to topography, co-location with existing transport corridors, avoiding key geographical features and minimising vegetation removal.

These urban design objectives would continue to be refined and tested during the detailed design. This would assist in minimising the potential for adverse impacts on communities and the broader landscape.

1.5.2 Urban design and landscape plan

During detailed design, an urban design and landscape plan would be prepared by a suitably qualified consultant in consultation with relevant stakeholders (including councils and the community). The plan would guide appropriate urban design responses for key infrastructure, and landscaping approaches for the operational footprint.

The plan would be prepared in accordance with the urban design and landscaping objectives identified for the proposal and relevant guidelines, policies and strategies, including, where applicable:

- ARTC's Inland Rail Landscape and Rehabilitation Strategy and ARTC's Inland Rail Landscape and Rehabilitation Framework, which have been developed to establish governing landscape objectives and principles, as well as outline landscape and rehabilitation treatment solutions for various phases of the overall program
- *Urban Green Cover in NSW: technical guidelines* (Office of Environment and Heritage, 2015)
- *Bridge aesthetics: design guidelines to improve the appearance of bridges in NSW* (Roads and Maritime, 2019)
- Beyond the Pavement: Urban design policy, procedures and design principles (Roads and Maritime, 2014)
- crime prevention through environmental design (CPTED) principles
- Australian Standard AS4282-1997 Control of the obtrusive effects of outdoor lighting
- *Noise wall design guideline. Design guideline to approve the appearance of noise walls in NSW* (Roads and Maritime, 2016a)
- *Landscape Guideline: Design guideline to improve the quality, safety and cost effectiveness of green infrastructure in road corridors* (Roads and Maritime, 2018a)
- *Water sensitive urban design guideline* (Roads and Maritime, 2017a).

1.6 Operation

1.6.1 Train operations

The proposal would form part of the rail network managed and maintained by ARTC. Train services would be provided by a variety of operators. The proposal is expected to be operational in 2026. Inland Rail as a whole would be operational once all 13 sections are complete, which is estimated to be in 2027.

Inland Rail would initially involve operation of a single rail track with crossing loops, to accommodate double-stacked freight trains up to 1,800 metres long and 6.5 metres high. The corridor would be of sufficient width to accommodate the infrastructure currently proposed for construction, including the possible future expansion of crossing loops for 3,600 metre long trains. Train speeds would vary according to axle loads, and range from 80 to 115 kilometres per hour.

It is estimated that the proposal would be trafficked by an average of 10 trains per day (both directions) in 2026, increasing to about 14 trains per day (both directions) in 2040. This rail traffic would be in addition to the existing rail traffic using other lines that the proposal interacts with, as described in sections 1.2.5 and 1.2.6 .

The Inland Rail trains would be a mix of grain, bulk freight, and other general transport trains. Total annual freight tonnages would be about 10 million tonnes in 2027, increasing to about 17.5 million tonnes in 2040.

Train timetabling would be the responsibility of operators.

1.6.2 Maintenance activities

Standard ARTC maintenance activities would be undertaken during operations. Typically, these activities include minor maintenance works, such as bridge and culvert inspections, rail grinding and track tamping, through to major maintenance, such as reconditioning of track and ballast cleaning as required.

Maintenance activities would be undertaken in accordance with ARTC's existing environment protection licence (EPL no. 3142).

1.6.3 Employment

The proposal would require an operational workforce of about 10 people, who would be responsible for maintenance.

1.6.4 Public safety

Potential risks to the health and safety of the local community include:

- risks to pedestrians and road vehicles as a result of collisions with trains at level crossings
- risks to stock as a result of collisions with trains at level crossings
- other safety risks, such as security risks, unauthorised access to the rail corridor etc
- train derailment.

These potential risks would be managed by undertaking the design with an appropriate emphasis on safety according to relevant design standards and requirements. In particular all level crossings would be designed for the intended use and the corridor would be secured and fenced, as required, to exclude unauthorised access.

Community education programs would be implemented prior to and during operation to provide information about Inland Rail operation and safety, particularly at level crossings.

Works within the rail corridor would be undertaken in accordance with ARTC's standard operating procedures, thereby reducing the potential for impacts on the health and safety of workers, visitors and users.

2. Construction of the proposal

This chapter provides an outline of the indicative construction activities likely to be used to construct the proposal. It includes an indicative construction methodology, timing, likely resources, and proposed access arrangements.

2.1 Overview and approach

Construction would commence once all necessary approvals are obtained. It is anticipated that construction would commence in late 2021 and take about four years to complete.

The indicative approach to construction is described in sections 2.3 to 2.7. Detailed construction planning, including timing, staging and work sequencing, would be confirmed once construction contractors have been engaged. Further information on the construction program and timing is provided in section 2.8.

Overall, the construction strategy is based on an approach of dividing the proposal site into four construction areas, with each construction area made up of a number of smaller work areas. The construction areas, shown in Figure 2.1, are as follows:

- Narromine – the southern end of the proposal site to Wyuna Road
- Gilgandra – Wyuna Road to Merriwindi State Forest
- Pilliga – Merriwindi State Forest to the northern end of Pilliga East State Forest
- Narrabri – from the northern end of Pilliga East State Forest to the northern end of the proposal site.

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

- pre-construction activities (described in section 2.2)
- site establishment and preliminary activities (described in section 2.3)
- main construction works (described in sections 2.4 and 2.5)
- testing and commissioning (described in section 2.6)
- finishing and rehabilitation (described in section 2.7).

To facilitate construction, each construction area would contain a range of construction features, including borrow pit/s, construction compounds, laydown and storage areas, temporary workforce accommodation, concrete batching plants, welding yards and concrete precast yard (described in section 2.9). Indicative construction resources, workforce, traffic and access arrangements, and utility works are described in sections 2.10 to 2.12.

The construction information described in this chapter is preliminary and is based on the current stage of the design. It provides an indicative construction methodology that retains flexibility for the successful contractor to refine and optimise aspects of the approach. The construction methodology would be refined as the design progresses, and once the construction contractor is engaged. A final construction methodology and program would be developed by the construction contractor based on the conditions of approval and the mitigation and management measures provided in this document.

2.2 Pre-construction activities

To prepare for the main construction works, construction materials would be delivered to the multi-function compounds at Narromine, Curban and Narrabri (see section 2.9.3) up to about six months prior to the commencement of site establishment activities. These deliveries would also be ongoing during the later phases of construction.

At this stage it is anticipated that early delivery of construction materials would consist of rail tracks and sleepers.

The early delivery of these materials would assist with minimising the potential for traffic and access impacts during other construction phases. It would also ensure undue demand is not placed on available commercial suppliers. The tracks and sleepers would be delivered to the multi-function compounds by trains using the existing rail network. Laydown areas within the compounds would be established and appropriate environmental and safety (eg fencing) controls installed.

No other construction-related activities are proposed during this phase.

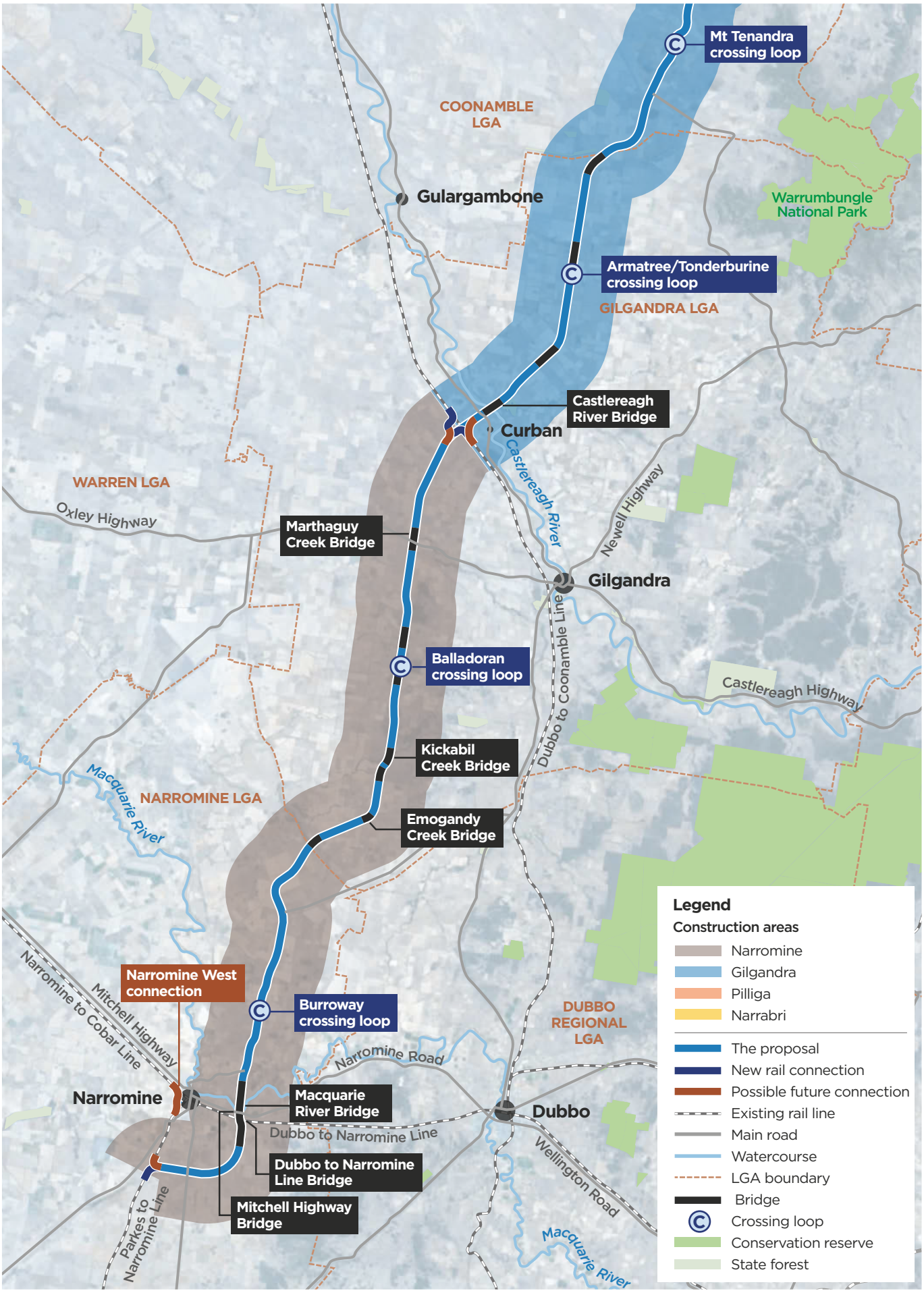


Figure 2.1 **Construction areas (map 1)**

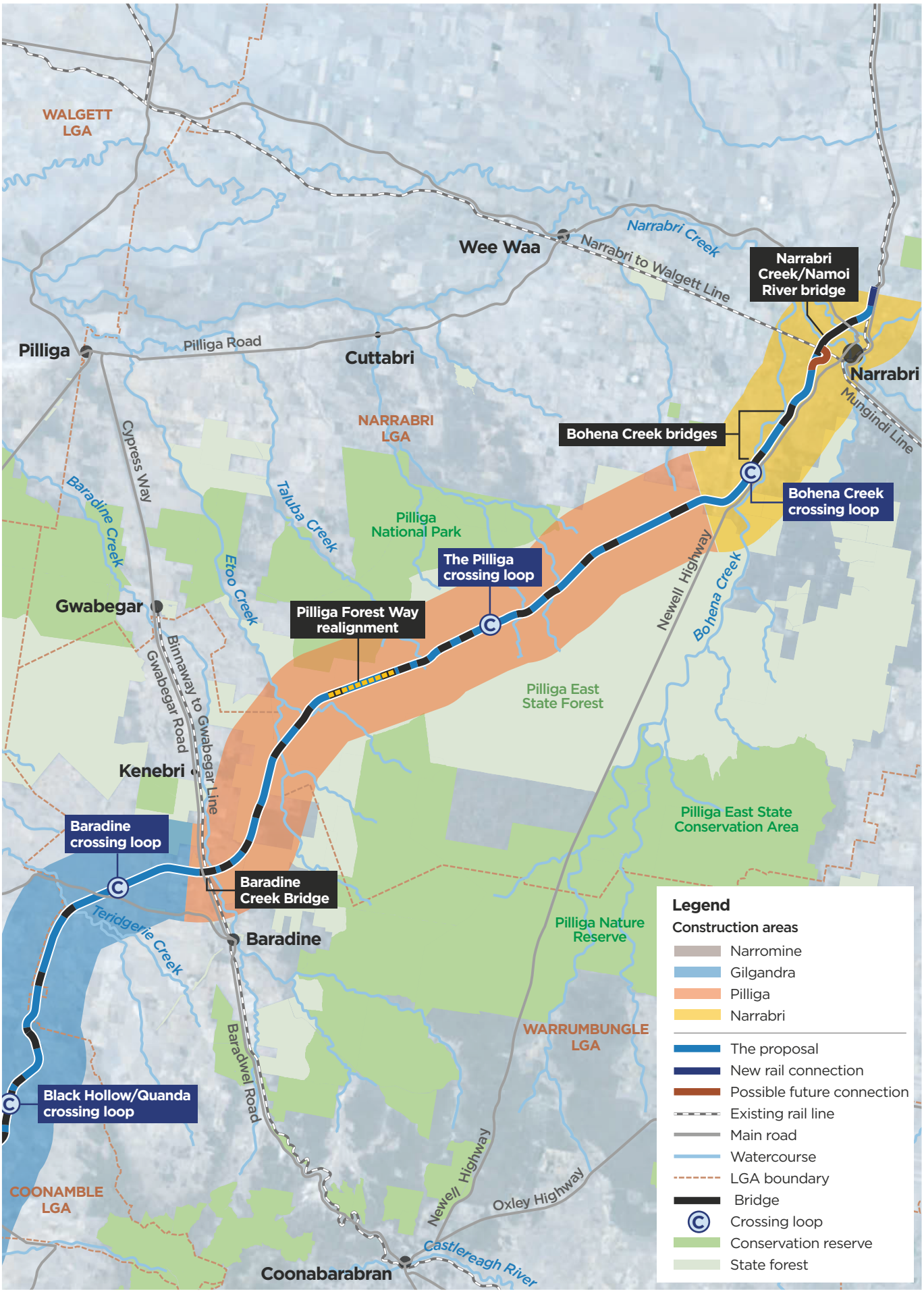


Figure 2.1 **Construction areas (map 2)**

2.3 Site establishment and preliminary activities

Site establishment would generally involve the following activities:

- consult landowners/occupants, where required and ensure land access is available
- install site environment management and traffic controls, including drainage and erosion management controls, in accordance with the construction environmental management plan (CEMP)
- erect temporary site fencing to ensure construction areas and areas to be impacted are clearly delineated
- vegetation clearing and removal where required, including slashing, mulching and stockpiling within the proposal site for reuse
- establish construction infrastructure, including borrow pits, construction compounds and temporary workforce accommodation (see section 2.9)
- establish haul roads (see section 2.11)
- utility relocation or protection where required (see section 2.12)
- prepare the site for main construction works (levelling, grading and/or compacting as required)
- commence delivery and stockpiling of bulk materials, including ballast and capping
- install water infrastructure, including sedimentation dams and bores
- establish concrete precast yards and commence production.

2.4 Main construction works – rail infrastructure

2.4.1 Main rail line

As described in section 1.2, the proposal involves constructing a new section of rail line. Main line track works would include foundation, formation and track works as described in this section. Figure 2.2 shows the typical activities that would be used to construct the main line.

Foundation and formation works

The general methodology for the foundation and formation works is as follows:

- survey and identify area
- clearing and grubbing, if required
- strip topsoil and any unsuitable materials along the alignment and stockpile within the proposal site for reuse in site rehabilitation
- for cuts – excavate to the desired level using excavators and/or scrapers, and transport for temporary stockpiling (as required) and reuse in areas of fill
- for fills – prepare surface material and place, grade and compact material in appropriate layers to build to the required level
- install drainage infrastructure
- install formation material, grade and compact to the required level.

Track works

The general methodology for constructing the track is as follows:

- place ballast, sleepers and rail tracks on top of the new formation
- tamp and profile the ballast around the sleepers and line to a smooth alignment
- install signalling/communication infrastructure, as required
- tie-in to existing rail lines and/or previously constructed sections of track.

2.4.2 Crossing loops

The general methodology for constructing crossing loops is as follows:

- excavate for the length of the crossing loop
- place and compact formation material
- place ballast, sleepers and rail tracks on top of the new formation
- tamp and profile the ballast around the sleepers and line to a smooth alignment
- install signalling/communication and power infrastructure, as required.

2.4.3 Turnouts

The general methodology for constructing turnouts is as follows:

- carry out formation improvement works as required
- install ballast, sleepers and rails
- install control mechanisms (points motor, power supply etc).

2.4.4 Level crossings

The general methodology for level crossings is as follows:

New level crossings

- excavate area to the required depth and prepare base material
- place and compact sub-base
- install drainage, as required
- install signalling/communication, as required
- lay and compact base course layers
- provide standard road signs and road markings
- install active crossing equipment, as required
- divert traffic to new road and remove redundant controls and infrastructure
- install permanent fencing, as required.

Upgrading controls

- remove existing controls
- excavate to a suitable depth, as required
- place new formation material and ballast
- replace track and surface panel, as required
- install new controls
- provide standard road signs and road markings.

2.4.5 Bridges and culverts

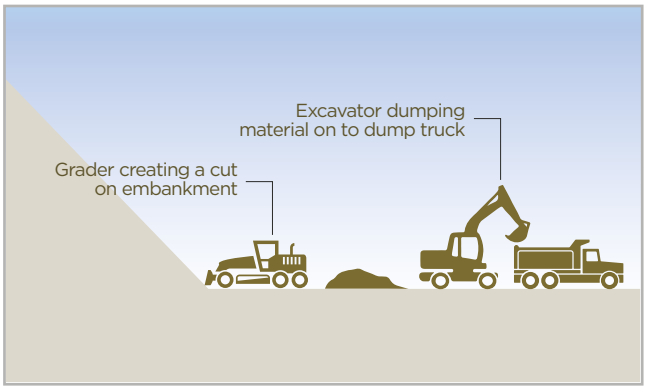
Bridge works

The general methodology for bridges works is as follows:

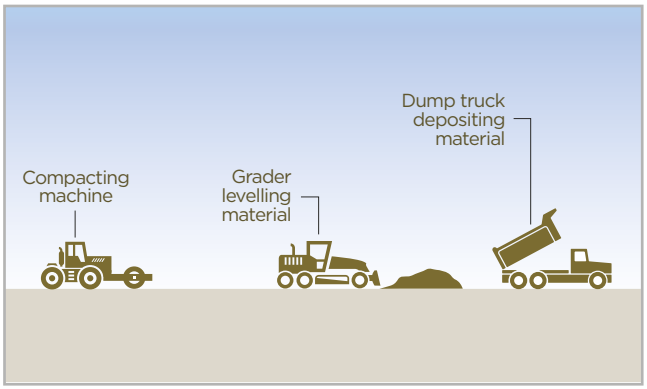
- install bored or driven piles at abutments and piers
- construct reinforced soil walls at each end of the bridge
- construct column extensions and pier headstocks
- install girders or planks and construct reinforced concrete deck
- install expansion joints and steel traffic barrier railing
- place ballast mat, ballast, sleepers and rail on top of the new bridge
- tamp and profile the ballast under and around the sleepers and weld tracks.

Figure 2.3 shows the typical activities that would be used to construct large bridges in the proposal site.

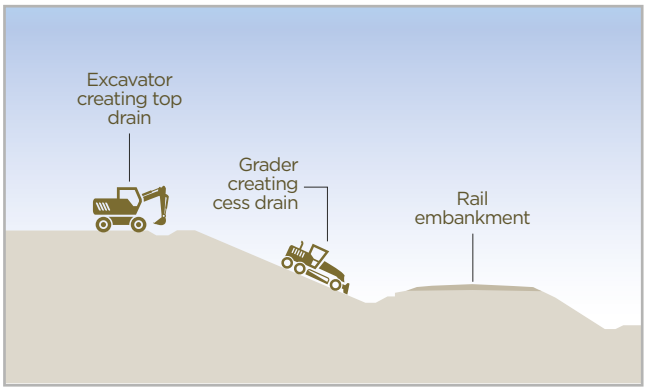
Provided there is enough water present, a barge would be used to construct the bridge piers for the bridges over the Macquarie River and Narrabri Creek/Namoi River. The barge would be lifted by crane into the river. During these activities there may be disruptions to navigational access within the river. All other bridges would be constructed by conventional means with no obstruction to water flow.



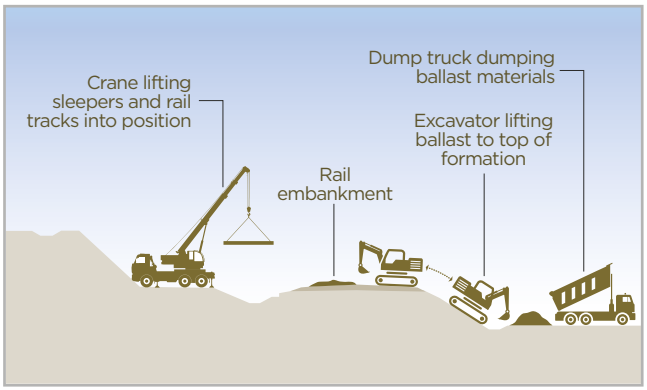
1. Strip topsoil and excavate (for cuts) or build (for fills) to required surface level



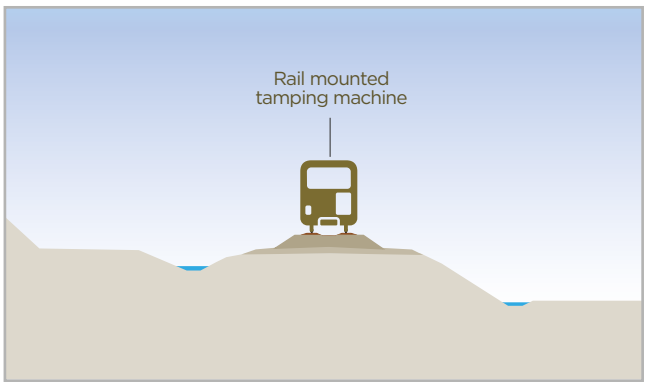
2. Install formation and compact



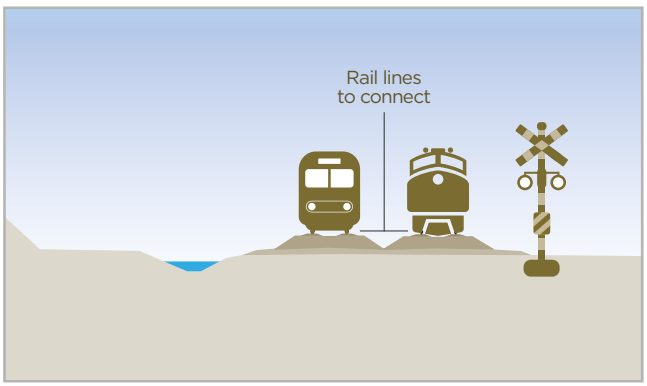
3. Install drainage infrastructure



4. Place ballast, sleepers and rail tracks on top of the new formation

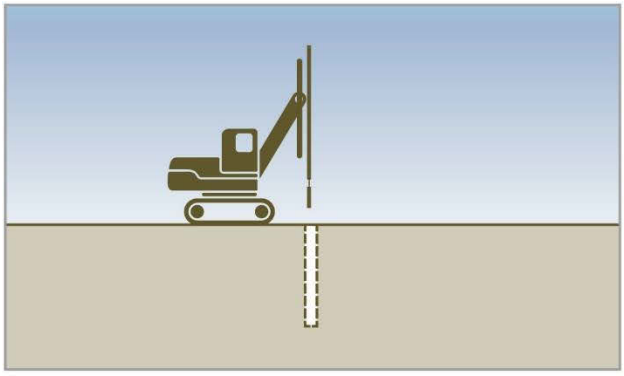


5. Tamp and profile the ballast around the sleepers and line to a smooth alignment

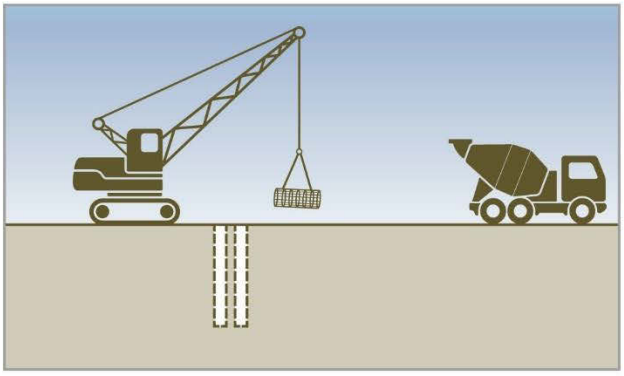


6. Install signalling/communication infrastructure and tie-in to existing rail lines

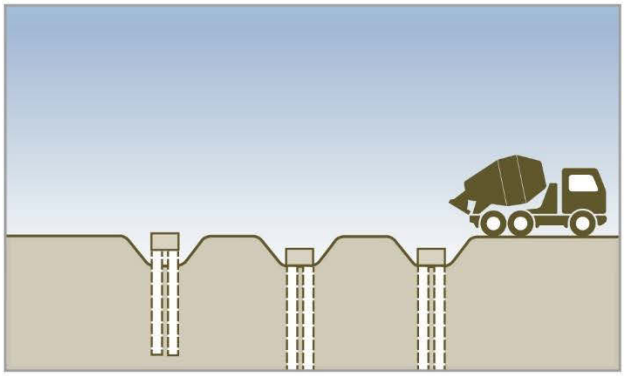
Figure 2.2 **Typical construction process for track works**



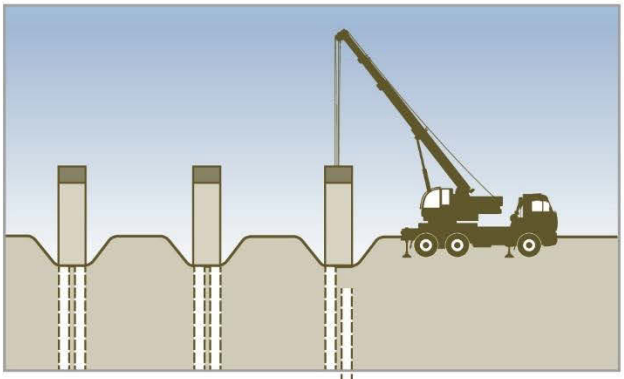
1. Drill holes or drive piles with rotary piling rig



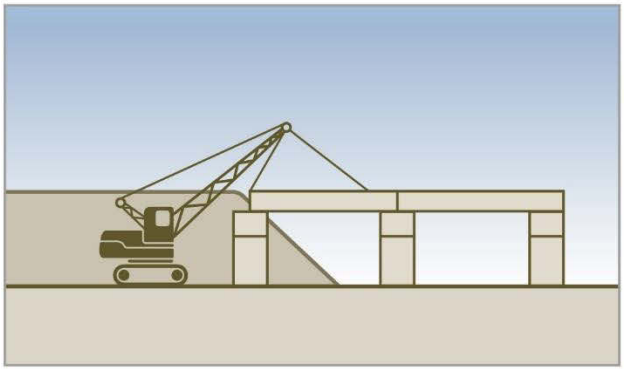
2. Install reinforcing cage and pour concrete (only if holes drilled)



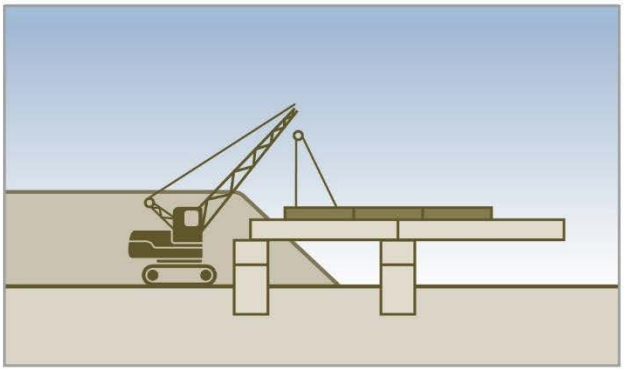
3. Form and pour pilecaps



4. Construct the piers on top of the pilecaps



5. Install superstructure beams with mobile crane



6. Pour bridge deck and install side barriers, finishes etc

Figure 2.3 Typical construction activities for large bridges

Culvert works

The general methodology for culvert works is as follows:

- excavate area to the required depth and prepare base material
- place and compact bedding material, pour base slab in situ
- place pre-fabricated culvert structures on the new formation area
- backfill culvert
- form and pour in situ elements of the structure (wing walls, top pad etc)
- install scour protection and rip rap as required
- place and compact formation material over culvert structure
- place ballast mat, ballast, sleepers and rail on top of the culverts
- tamp and profile the ballast under and around the sleepers and weld tracks.

2.4.6 Rail connections

Rail connection works would be undertaken to connect the proposal with existing rail lines as described in sections 1.2.5 and 1.2.6. These works, which include constructing the Narromine West connection, would affect small sections of the existing lines as shown in Figure 1.4 to Figure 1.9.

The general methodology for rail connection works is as follows:

New sections of rail line

The foundation, formation and track works for the new sections of rail line would be as described in section 2.4.1.

Tie-ins with existing rail lines

The general methodology for 'tieing in' the new connections with existing rail lines would be as follows (as required, depending on the characteristics of the existing line):

- remove fastenings, rail and sleepers up to the tie-in point
- excavate the existing ballast and earth formation to the tie-in point
- place new earth into the excavated area and compact to the tie-in point
- place ballast, sleepers and rail tracks on top of the formation
- tamp and profile the ballast around the sleepers and line to a smooth alignment
- install signalling/communication infrastructure, as required.

2.5 Main construction works – road infrastructure

2.5.1 Changes to the local road network

The general methodology for changes to the road network is as follows:

- survey and identify area
- clearing and grubbing, if required
- undertake earthworks to remove surface layers, including identifying and stripping suitable top soil, and stockpiling for future use or removal
- import embankment, foundation and select materials, and fill to the road formation levels
- install new culverts and subsoil drains
- install new utility infrastructure
- install new kerbs and gutters
- construct the road pavements, including placing and compacting the base course, and the wearing surface (either spray seal or asphalt)
- construct tie-ins to existing roads
- install new street lights (where required)
- undertake progressive landscaping and tree planting
- undertake line-marking and install signage.

The methodology would vary depending on the nature of the road, and whether the works construction of a new road alignment or a road closure.

2.5.2 Operational access roads

The indicative methodology for constructing the operational access roads would be as follows:

- clear and strip area of topsoil, and stockpile for stabilisation and rehabilitation works
- proof roll the surface to highlight any soft spots
- install sub-base and base materials using materials with appropriate cross fall
- compact base materials
- construct running surface using all weather materials.

The methodology would vary depending on whether the particular section of access road is a formal road or informal tracks (see section 1.2.8).

2.6 Testing and commissioning

Testing and commissioning of the rail line and communications/signalling systems would be carried out to ensure that all systems and infrastructure are designed, installed and operating according to ARTC's operational requirements. Testing for connections to other rail lines would also be required for those sections of track. This work may need to be undertaken during scheduled maintenance possessions or other periods when existing rail lines are not operational. Commissioning would also require obtaining regulatory approval prior to the proposal commencing operation.

2.7 Finishing and rehabilitation

All disturbed areas not required for ongoing operations would be rehabilitated. Finishing and rehabilitation would be undertaken progressively and would include the following typical activities:

- demobilise or relocate construction compounds and facilities
- remove all materials, waste and redundant structures from the proposal site
- decommission all temporary work site signs
- establish permanent fencing
- remove temporary fencing
- decommission site access roads that are no longer required including reinstatement of topsoil and vegetation where required
- restoration of disturbed areas as required, including revegetation where required.

Site rehabilitation would be carried out in accordance with the rehabilitation strategy (described below).

Where there is benefit to the local community, the potential for retaining facilities installed for construction (eg bores and sedimentation basins) would be investigated and negotiated in consultation with relevant stakeholders (eg local councils). Any legislative approvals associated with retention and ongoing use of these facilities would be the responsibility of the party who takes ownership.

Rehabilitation strategy

A rehabilitation strategy would be prepared to guide rehabilitation planning, implementation, monitoring and maintenance of disturbed areas outside the operational footprint (such as compounds, access roads and other areas disturbed during construction within the proposal site that would not be the location of final operational infrastructure). The strategy would:

- identify rehabilitation objectives and criteria
- establish roles and responsibilities
- define rehabilitation actions and requirements
- define monitoring and maintenance requirements.

In general, rehabilitation would be undertaken in two stages. The first stage would involve stabilisation immediately following disturbance, such as at the completion of construction work in a particular area. The second stage would involve longer-term rehabilitation. This would be carried out on disturbed areas not required as part of the proposal's operational footprint.

The strategy would include:

- site-specific guidance and specifications
- requirements in relation to landform and soil/ground surface re-establishment
- reinstatement of natural drainage patterns
- rehabilitation of riparian areas disturbed during construction
- rehabilitation of temporary construction areas to agreed pre-existing conditions

- revegetation specifications and requirements
- establishment of appropriate native grass species within the rail corridor where practicable to minimise exposed surfaces
- opportunities to enhance local biodiversity and habitat value.

The rehabilitation strategy would integrate with the urban design and landscape plan (see section 1.5), which would define landscaping requirements.

The strategy would be prepared by a suitably qualified consultant, in consultation with relevant stakeholders (including councils and the community) and with consideration of:

- ARTC's Inland Rail Landscape and Rehabilitation Strategy and ARTC's Inland Rail Landscape and Rehabilitation Framework
- the borrow pit rehabilitation strategy (provided in Appendix K of the EIS)
- rehabilitation requirements described in Technical Report 1 – Biodiversity development assessment report (appended to the EIS)
- conditions of approval for the proposal.

2.8 Construction program and timing

2.8.1 Program

Subject to approval, the first phase of construction is anticipated to start in late 2022 and is expected to take about four years to complete.

Connections with existing rail lines (see section 1.2.6) would be undertaken during scheduled rail corridor possession periods.

2.8.2 Working hours

The *Interim Construction Noise Guideline* (DECC, 2009) recommends standard hours for construction work (see Table 2.1).

Table 2.1 Interim Construction Noise Guideline recommended standard hours for construction work

Work type	Recommended standard hours of work
Normal construction	Monday to Friday: 7am to 6pm Saturday: 8am to 1pm No work on Sundays or public holidays
Blasting	Monday to Friday: 9am to 5pm Saturday: 9am to 1pm No blasting on Sundays or public holidays

Primary proposal construction hours

To shorten the length of construction as far as practicable and minimise associated disruptions to the community, the following primary proposal construction hours are proposed:

- Monday to Friday: 6am to 6pm
- Saturday: 6am to 6pm
- Sundays: 6am to 6pm
- public holidays: no work.

No work would be undertaken every alternate week between the hours of 1pm on Saturday and 7am on Monday, except in the following circumstances:

- where potentially affected receivers agree that the work can be undertaken
- where construction noise levels do not exceed the rating background level by more than 5 dB(A) at residential receivers
- no more than the noise management levels specified in the *Interim Construction Noise Guideline* (DECC, 2009) (Table 3) at non-residential sensitive receivers.

It is estimated, at this stage of the design process, that constructing the proposal during the primary proposal construction hours would reduce the overall construction program by up to six months.

The following activities would only be undertaken during the recommended standard hours for blasting as per Table 2.1:

- blasting (only proposed at borrow pits C and D if hard rock is encountered at depth)
- rock breaking or crushing.

These activities would occur during the following hours:

- Monday to Friday: 9am to 5pm
- Saturday 9am to 1pm
- Sundays and public holidays: no work.

Relevant legal controls on work hours would also be considered in determining work schedules, including the possibility that work may be allowed outside these times in some situations.

Work outside the primary proposal construction hours

Discrete construction activities would also be undertaken outside the primary proposal construction hours as described below.

Work where there are no sensitive receivers

Where required, and where there are no sensitive receivers with the potential to be affected by noise and vibration impacts, work may be undertaken up to 24 hours a day, seven days a week.

Work during rail corridor possessions

Some works associated with connections/interactions with existing rail lines may be carried out during scheduled rail corridor possession periods (that is, the times that the movement of trains along the rail corridor are stopped for maintenance). This could include, for example, connecting tracks, abutment/pier works, girder installation, concrete deck installation and some finishing works. Rail corridor possessions are typically for a 72 hour period, four times a year. During possessions, works may need to be carried out on a 24 hour basis.

The proposed interactions with other rail lines are described in section 1.2.

Other out-of-hours construction activities

The following activities are also proposed to be undertaken outside the primary proposal construction hours:

- delivery of oversized plant or structures where required by the police or other authorities for safety reasons
- emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
- large concrete pours for the Macquarie River, Castlereagh River and Narrabri Creek/Namoi River bridges, to allow it to be completed in one pour and avoid high temperatures during the daytime
- girder/bridge deck installation at bridges on selected public roads, to minimise impacts on road users and workers
- utility works (such as connections) to minimise disruption to customers.

The above works are not expected to exceed 48 hours at any one location. The proposed locations of out-of-hours construction activities (where locations can currently be defined) are shown in Figure 2.4.

Managing out-of-hours work

Work outside the primary proposal construction hours would be undertaken in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework (see Appendix L of the EIS) and in accordance with an out-of-hours work protocol that would be prepared as part of the CEMP (described below).

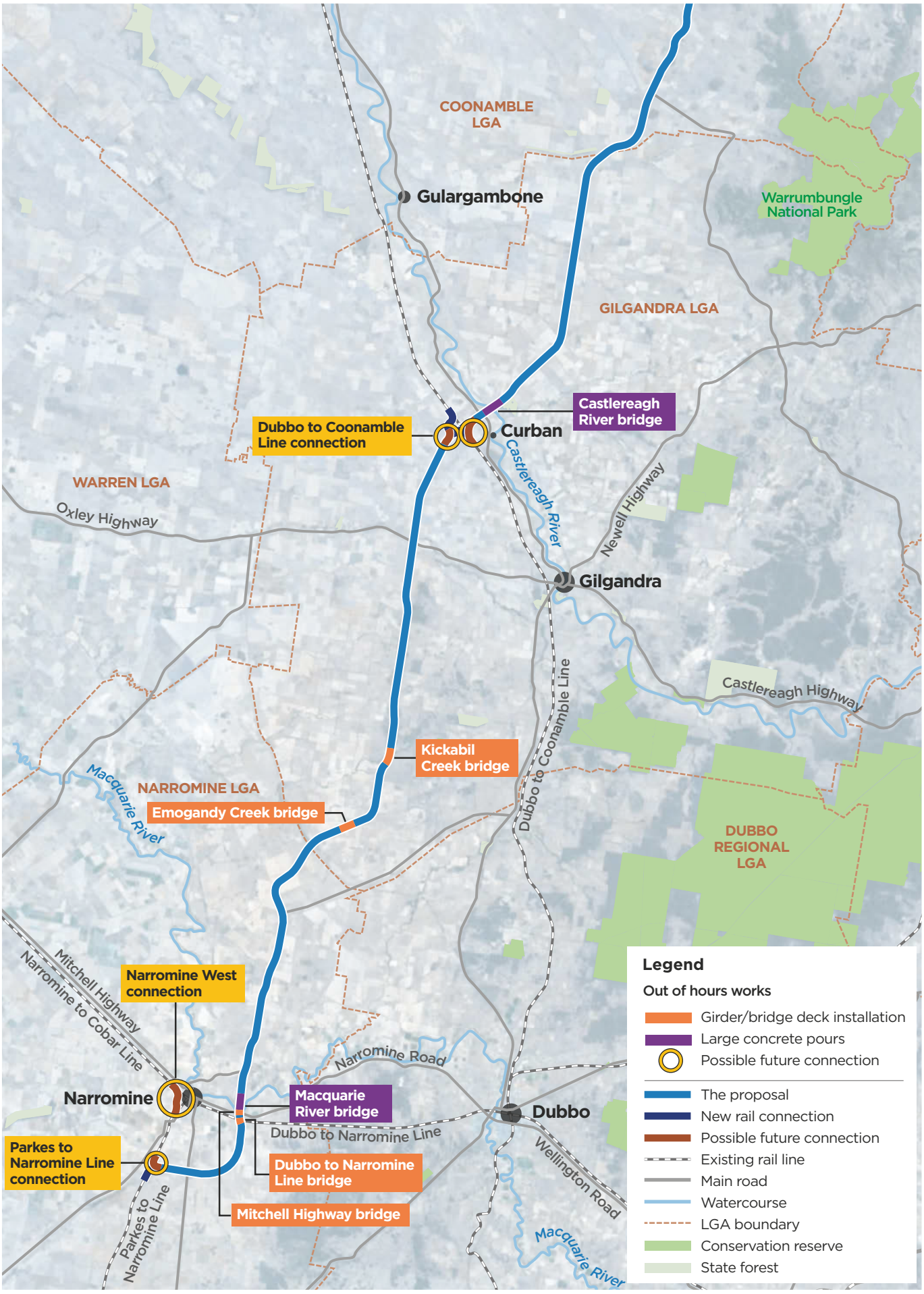


Figure 2.4 **Proposed location of out-of-hours works (map 1)**

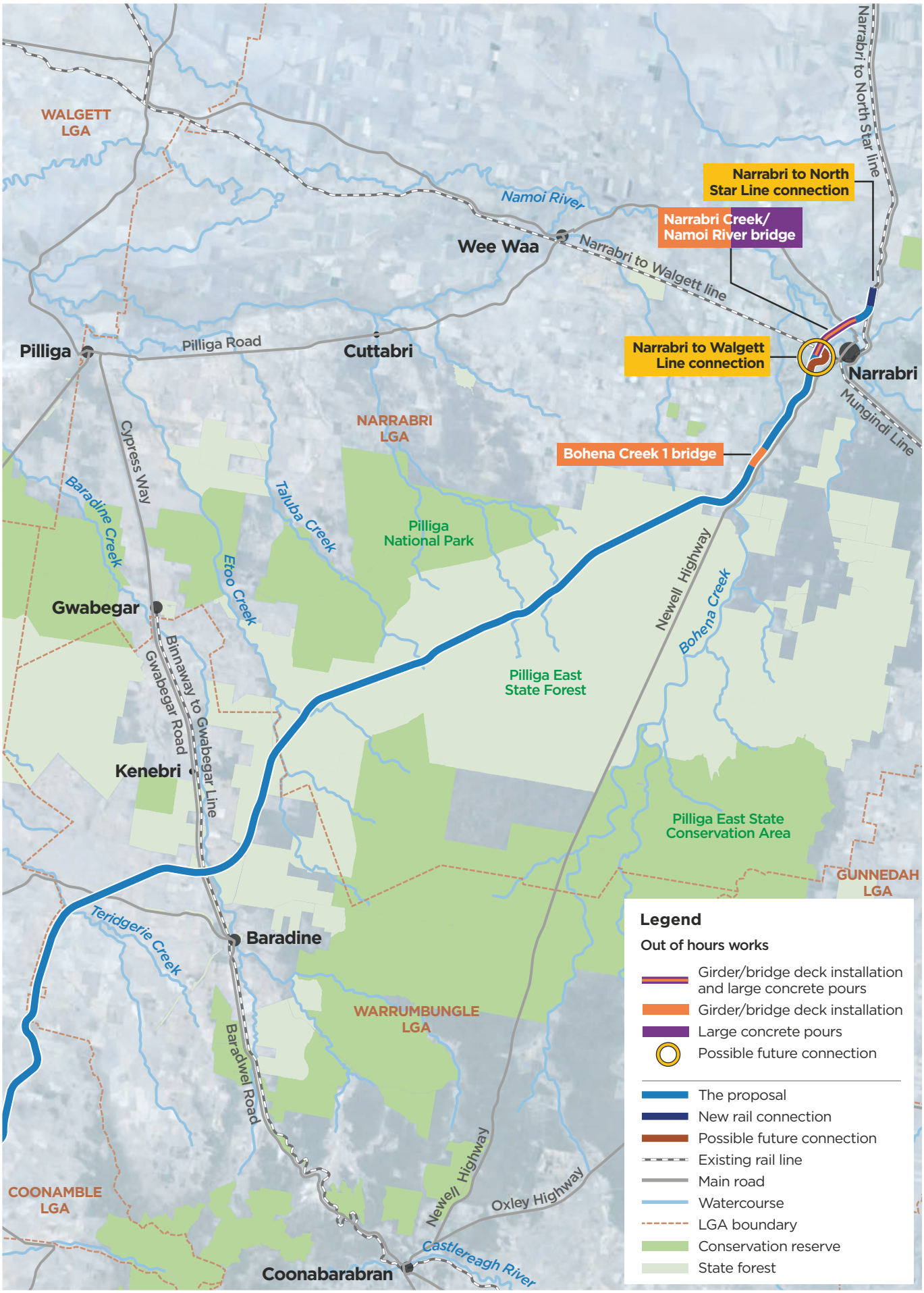


Figure 2.4 **Proposed location of out-of-hours works (map 2)**

Out-of-hours work protocol

An out-of-hours work protocol would be prepared to guide the assessment, management and approval of works outside of the primary proposal construction hours. The protocol would be developed to ensure that out-of-hours work are managed effectively during construction, to avoid incidents and reduce impacts on the community. The protocol would be prepared in consultation with key stakeholders (including the NSW EPA) and be approved prior to construction commencing. It would:

- be consistent with the Inland Rail NSW Construction Noise and Vibration Management Framework for the proposal (see Appendix L of the EIS)
- be prepared in accordance with the conditions of approval for the proposal
- take into account the results of the construction noise assessment and the recommended management measures described in chapter B8
- address the requirements of the environment protection licence for the proposal
- provide guidance for the preparation of out-of-hours work plans for each construction area and for key works (including for each bridge works location), which would be prepared in consultation with key stakeholders and the community
- document procedures to control potential impacts
- identify responsibilities for implementation and management, including managing complaints.

2.9 Construction infrastructure

Construction would require a range of supporting infrastructure as described in the following sections. The locations of key construction infrastructure are shown in Figure 2.5. Further detail is provided in the maps in the Map Book.

The following construction infrastructure would include, as relevant:

- erosion and sedimentation controls, such as sedimentation basins (see section 2.9.8)
- flooding protection measures and bunding to prevent inundation up to the five per cent AEP flood event
- appropriate bunding and storage of hazardous materials in accordance with relevant Australian standards
- connections to public roads, which would be designed in accordance with relevant standards and in consultation with the relevant road manager.

2.9.1 Borrow pits

Proposed locations and quantities

Four borrow pits are proposed to supply of general and structural fill. The borrow pits are proposed at the following locations (see Figure 2.5).

- borrow pit A – Tantitha Road, Narromine
- borrow pit B – Tomingley Road, Narromine
- borrow pit C – Euromedah Road, Narromine
- borrow pit D – Perimeter Road, Narrabri.

These are the borrow pits for which approval is being sought. However, following detailed design and construction planning, the contractor may decide on an alternative material supply strategy and/or additional borrow pits. Other borrow pits would be subject to additional assessment and approval.

The borrow pits have been selected based on preliminary geotechnical investigations, consultation with the landowners and fill requirements for the proposal. The rationale for each of the borrow pits is as follows:

- Borrow pits A and B – a large volume of fill is required south of the Macquarie River where there are no cuts along the alignment to supply this material. If the borrow pits were not established a significant number of truck movements would be required through Narromine from the north side of the Macquarie River resulting in unacceptable impacts.
- Borrow pit C – a large volume of fill is required in the area north of the Macquarie River where there are a limited number of cuts along the alignment to supply this material. In addition, preliminary geotechnical investigations have identified a substantial shortage of structural fill in this area, which can be obtained from this borrow pit. Haulage from other parts of the alignment to the north is economically unfeasible and would result in a significant number of truck movements on the public road network and unacceptable impacts.
- Borrow pit D – a large volume of fill is required in the northern parts of the proposal site where there are a limited number of cuts along the alignment to supply material. Haulage from other parts of the alignment to the south is economically unfeasible and would result in a significant number of truck movements on the public road network and unacceptable impacts.

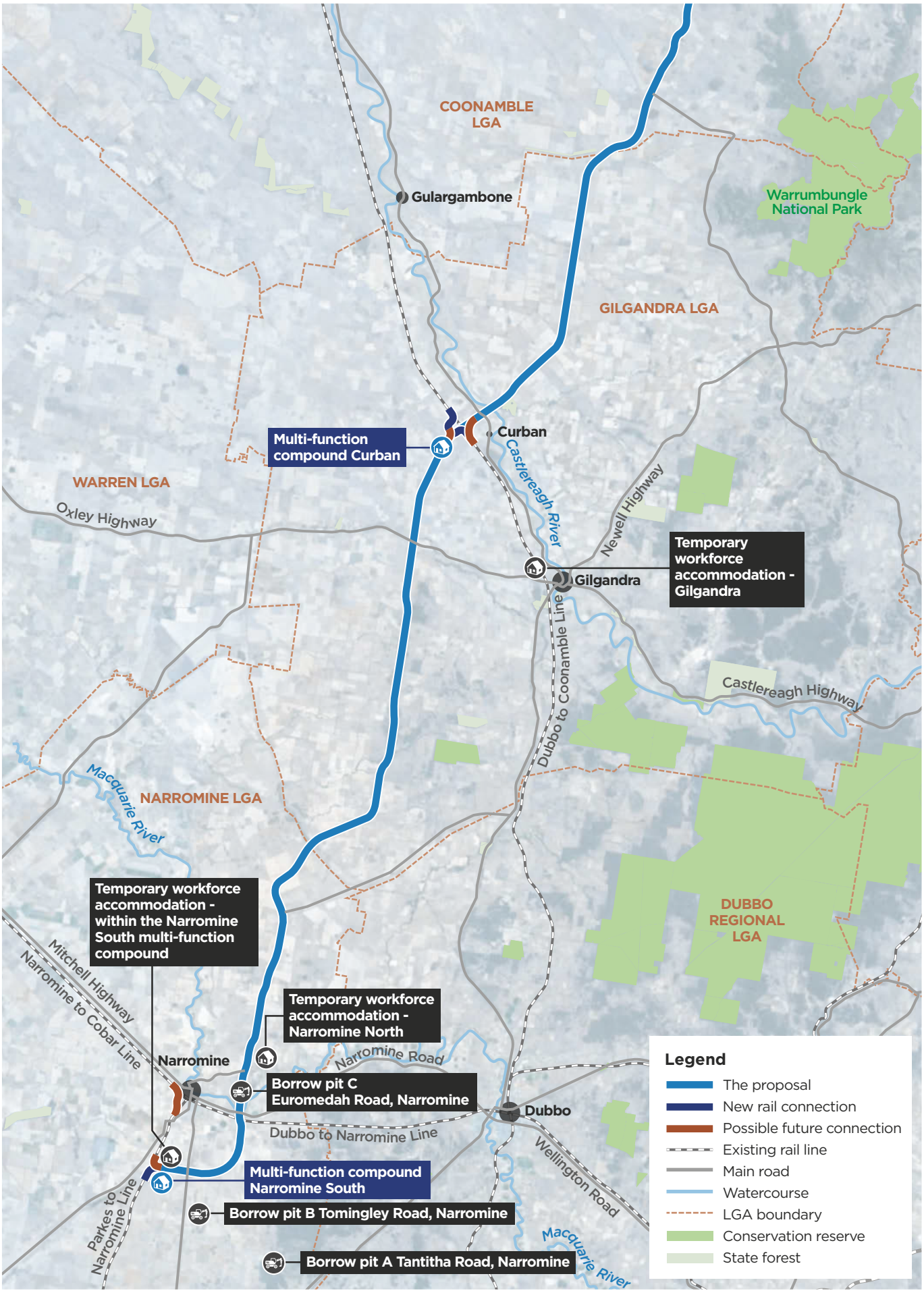


Figure 2.5 **Key construction infrastructure (map 1)**

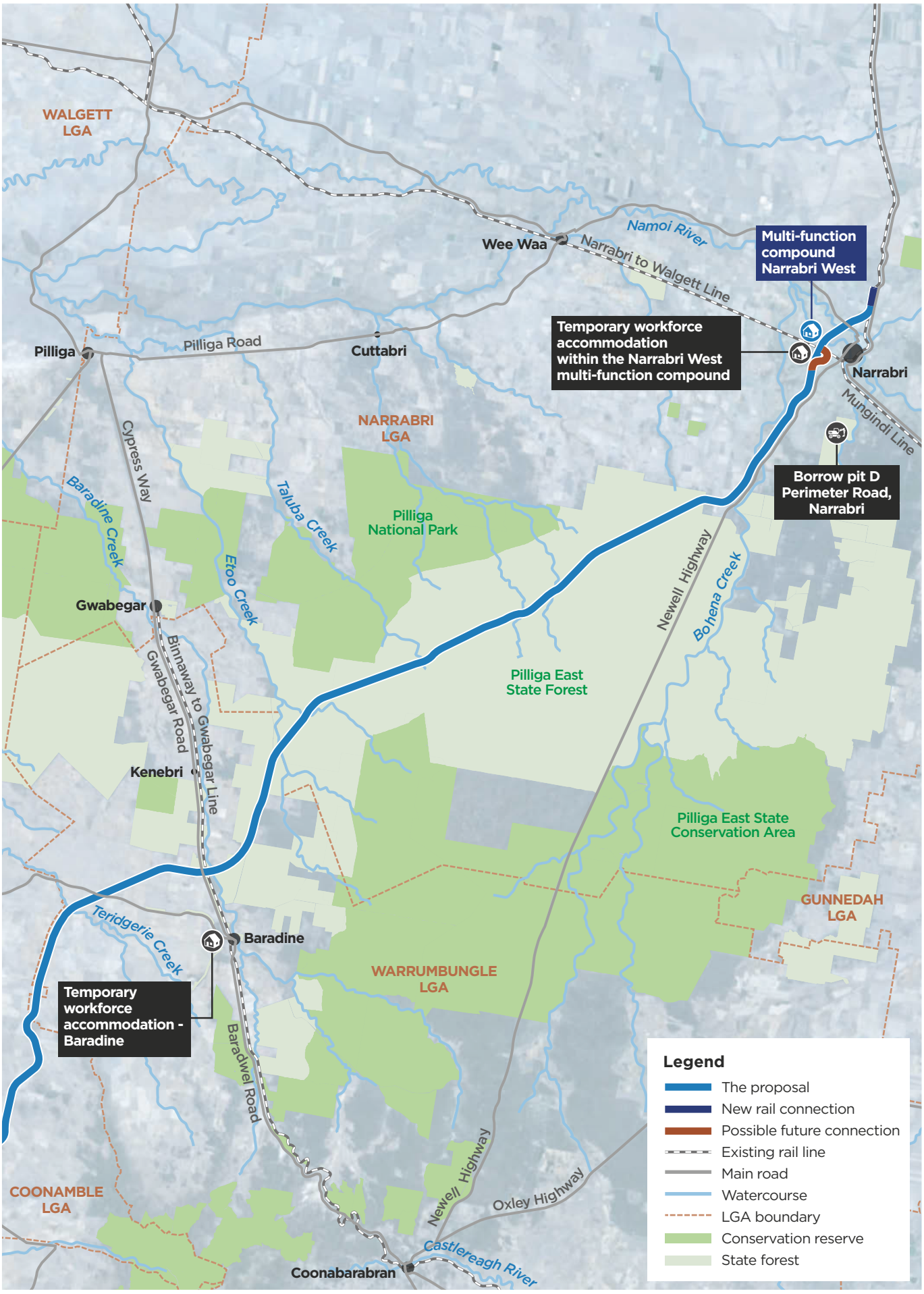


Figure 2.5 **Key construction infrastructure (map 2)**

The indicative volumes of fill proposed to be excavated from each borrow pit are summarised in Table 2.2. These volumes may not be excavated from all borrow pits, with final volumes likely to be lower in some pits subject to further geotechnical investigations during detailed design. As such, these indicative volumes represent the maximum potential size for each borrow pit. Extraction at each borrow pit would not exceed the volume requirements specified as part of the relevant environment protection licence.

Table 2.2 Indicative volumes of materials to be excavated from borrow pits

Location	Indicative depth (m)	Total general fill (m^3)	Total structural fill (m^3)	Other fill (m^3)	Total (m^3)
Borrow pit A – Tantitha Road, Narromine	2	85,000	200,000	25,000	310,000
Borrow pit B – Tomingley Road, Narromine	4.5	115,000	290,000	65,000	470,000
Borrow pit C – Euromedah Road, Narromine	13	45,000	340,000	280,000	665,000
Borrow pit D – Perimeter Road, Narrabri	10	135,000	600,000	220,000	955,000

As noted in section 2.8.2 blasting would be undertaken at borrow pits C and D if hard rock is encountered at depth.

Layout, access and facilities

Figure 2.6 shows an indicative layout for the borrow pits.

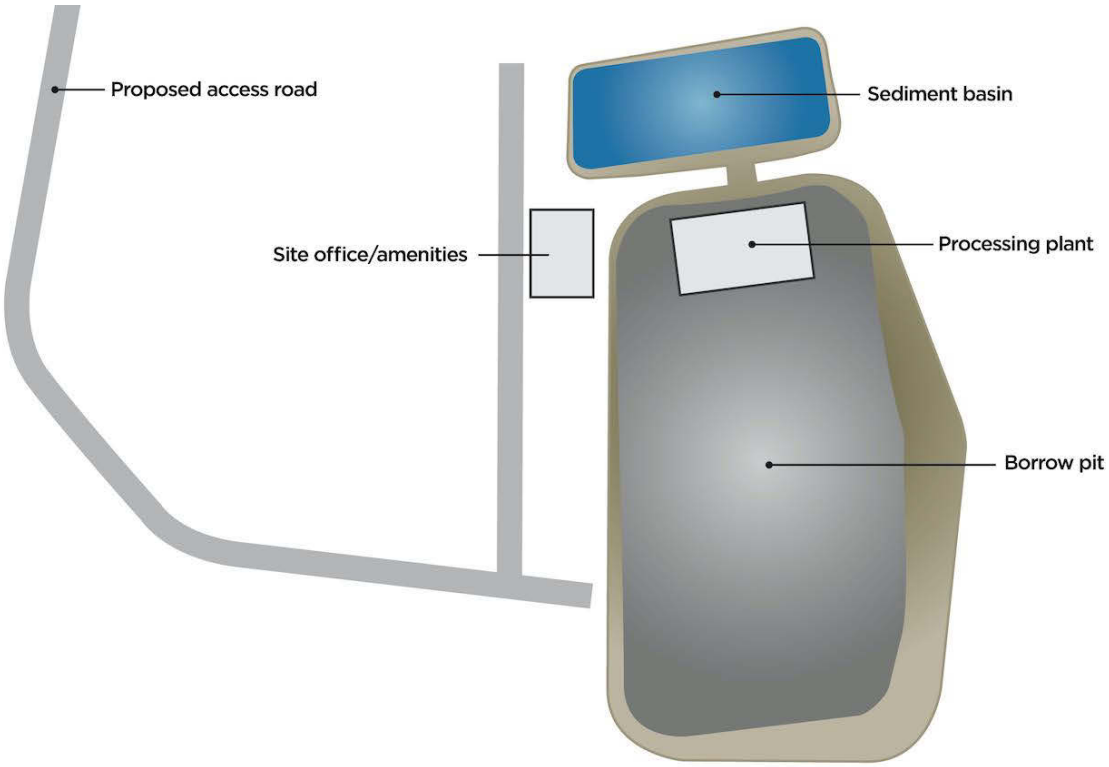


Figure 2.6 Borrow pit – indicative layout

Access from borrow pits to the proposal site would be via new access roads connecting the borrow pit to the nearest public road, then via the public road network to the proposal site, as shown in the maps in the Map Book.

The borrow pits would include the following typical facilities to support their operation:

- site offices
- staff and workforce amenities
- diversion drains (for up-slope surface flow) and sedimentation basins

- a crushing plant (for oversized excavated material)
- a screening plant.

Rehabilitation

Following extraction of all required material from the borrow pits, all facilities would be removed and the pits would be stabilised and rehabilitated. Rehabilitation of the borrow pits would be undertaken in accordance with the borrow pit rehabilitation strategy (provided in Appendix K of the EIS). It is proposed to use spoil (that does not meet design specifications or cannot be feasibly used within the rail formation) from the main construction works to assist with the reshaping of the borrow pits. The management of spoil is described in section 2.10.2.

2.9.2 Multi-function compounds

Overview

Three main compounds, known as multi-function compounds, would be established at Narromine South, Curban and Narrabri West (see Figure 2.5). The multi-function compounds would be located on land that has been, or would be, acquired or leased for the proposal by ARTC. The compounds would include a range of facilities to support construction (see Table 2.3) and would be used for the duration of construction (about 48 months).

Establishing these compounds would consolidate as many facilities as possible in discrete locations, minimising the potential for impacts compared with distributing required facilities throughout the proposal site.

All multi-function compounds would require new connections to public roads. The compounds would be powered by generators. Sewage would be captured into holding tanks and would be pumped out as required. Water would be stored in water tanks with fresh water delivered as required. It is expected the site communication would be via a dedicated satellite link or other connection. All stormwater captured on each of the multi-function compounds would be reused for irrigation, dust suppression or discharged via an on-site sedimentation basin.

Two of the compounds would also house temporary workforce accommodation (see section 2.9.4).

Key facilities and activities proposed to be undertaken at multi-function compounds are listed in Table 2.3. Further information on each compound is provided below.

Table 2.3 Key activities and facilities proposed at multi-function compounds

Features	Narromine south	Curban	Narrabri west
Office and amenities (eg office, crib facilities, parking, amenities)	✓	✓	✓
Laydown area	✓	✓	✓
Other materials storage	✓	✓	✓
Topsoil storage	✓	✓	✓
Fixed concrete batching plant (see section 2.9.5)	×	✓	✓
Mobile concrete batching plant (see section 2.9.5)	✓	×	×
Fuel/hazardous material storage and bunded refuelling area	✓	✓	✓
Vehicle wash bays	✓	✓	✓
Maintenance areas	✓	✓	✓
Temporary workforce accommodation (see section 2.9.4)	✓	×	✓
Welding yard (see section 2.9.6)	✓	✓	✓
Concrete precast yard (see section 2.9.7)	×	✓	×
Groundwater extraction bores	✓	×	×

Narromine South multi-function compound

The Narromine South multi-function compound is proposed to be located where the proposal would connect with the Parkes to Narromine section of Inland Rail, about eight kilometres south of Narromine. It would have an area of about 158 hectares.

This compound would mainly support construction activities undertaken to the south of Narromine, including construction of the Macquarie River bridge.

Access to the compound would be provided by a new access road, about 1.8 kilometres long, from Tomingley Road. Some bulk materials, such as rail and sleepers, may also be delivered to the compound by rail using the Parkes to Narromine Line, as described in section 2.2.

The compound would support a range of construction activities as listed in Table 2.3. In particular it would include a welding yard (see section 2.9.6) and temporary workforce accommodation (see section 2.9.4).

Curban multi-function compound

The Curban multi-function compound is proposed to be located where the proposal would connect with the Dubbo to Coonamble Line, about 20 kilometres north-west of Gilgandra. It would have an area of about 118 hectares.

This compound would mainly support construction activities between Leechs Creek Road and Baradine, including construction of the Castlereagh River bridge.

Access to the compound would be from Bardens Road and Wyuna Road, which border the compound and provide regional connectivity via the Castlereagh Highway. Some bulk materials, such as rail and sleepers, may also be delivered to the compound by rail using the Dubbo to Coonamble Line, as described in section 2.2.

The compound would support a range of construction activities as listed in Table 2.3. In particular it would include a welding yard (see section 2.9.6) and a concrete precast yard (see section 2.9.7). The workforce would mainly be accommodated in the temporary workforce accommodation in Gilgandra (see section 2.9.4).

Narrabri West multi-function compound

The Narrabri West multi-function compound is proposed to be located where the proposal would connect with the Narrabri to Walgett Line, about four kilometres south-west of the Narrabri town centre. It would have an area of about 102 hectares.

This compound would mainly support construction activities between the Pilliga East State Forest and the northern end of the proposal site, including the bridge over Narrabri Creek/Namoi River.

Access to the compound would be from Yarrie Lake Road, which borders the compound. Some bulk materials, such as rail and sleepers, may also be delivered to the compound by rail using the Narrabri to Walgett Line, as described in section 2.2.

The compound would support a range of construction activities as listed in Table 2.3. In particular it would include a welding yard (see section 2.9.6) a concrete precast yard (see section 2.9.7) and temporary workforce accommodation (if required – see section 2.9.4).

2.9.3 Other compounds

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

- structure compounds
- general compounds
- minor compounds.

Access to construction compounds would be provided via a new connection to the nearest public road or from within the construction footprint (where it is not located close to a public road).

The locations of compounds are shown in the Map Book.

Structure compounds

Structure compounds would be located at the Macquarie River, Castlereagh River and Narrabri Creek/Namoi River bridge sites. Construction of these larger bridges would require a specialised workforce and equipment such as barges (Macquarie River and Narrabri Creek/Namoi River only), piling rigs and large cranes. Laydown areas would also be required for larger items such as bridge girders.

Some features, such as crane pads, would need to be provided on either side of the watercourse due to reach and weight restrictions on equipment. Barge access at the Macquarie River would also be required due to the need to install bridge piles within the watercourse. It is proposed to crane the barge into the watercourse.

Key facilities and activities proposed to be undertaken at these compounds, the estimated size and proposed access points are listed in Table 2.4.

Table 2.4 Structure compounds – key activities and facilities

Features	Macquarie River	Castlereagh River	Narrabri Creek/ Namoi River
Size (hectares)	18	16	9
Office and amenities (eg office, crib facilities, parking, amenities)	✓	✓	✓
Barge and launch area	✓	×	✓
Pads for large cranes	✓	✓	✓
Laydown area	✓	✓	✓
Other materials storage	✓	✓	✓
Topsoil storage	✓	✓	✓
Fuel/hazardous material storage and bunded refuelling area	✓	✓	✓
Maintenance areas	✓	✓	✓
Fixed concrete batching plant (section 2.9.5)	✓	✓	✓
Primary access point	Mitchell Highway	Castlereagh Highway	Yarrie Lake Road

General compounds

General compounds would be located about every 10 kilometres along the proposal site to support general construction activities within the construction area.

General compounds would have an area of about four hectares and would include some or all of the following activities:

- office and amenities (eg office, crib facilities, parking, amenities)
- laydown area
- other materials storage
- topsoil storage
- mobile concrete batching plant (see section 2.9.5)
- fuel/hazardous material storage and bunded refuelling area
- maintenance areas
- mobile accommodation facilities (see section 2.9.4).

An indicative layout of a general compound is shown in Figure 2.7.

Minor compounds

Minor compounds would be located about every five kilometres along the proposal site between the general compounds and would support construction activities within the construction area.

Minor compounds would have an area of about one hectare and would include some or all of the following activities:

- office and amenities (eg office, crib facilities, parking, amenities)
- laydown area
- other materials storage.

In addition to the minor compounds, other small compounds would be established as required along the proposal site at various locations to support construction activities (eg at new level crossings). These would generally be limited to office/toilet facilities, parking and small laydown areas, and would be contained within the construction footprint.

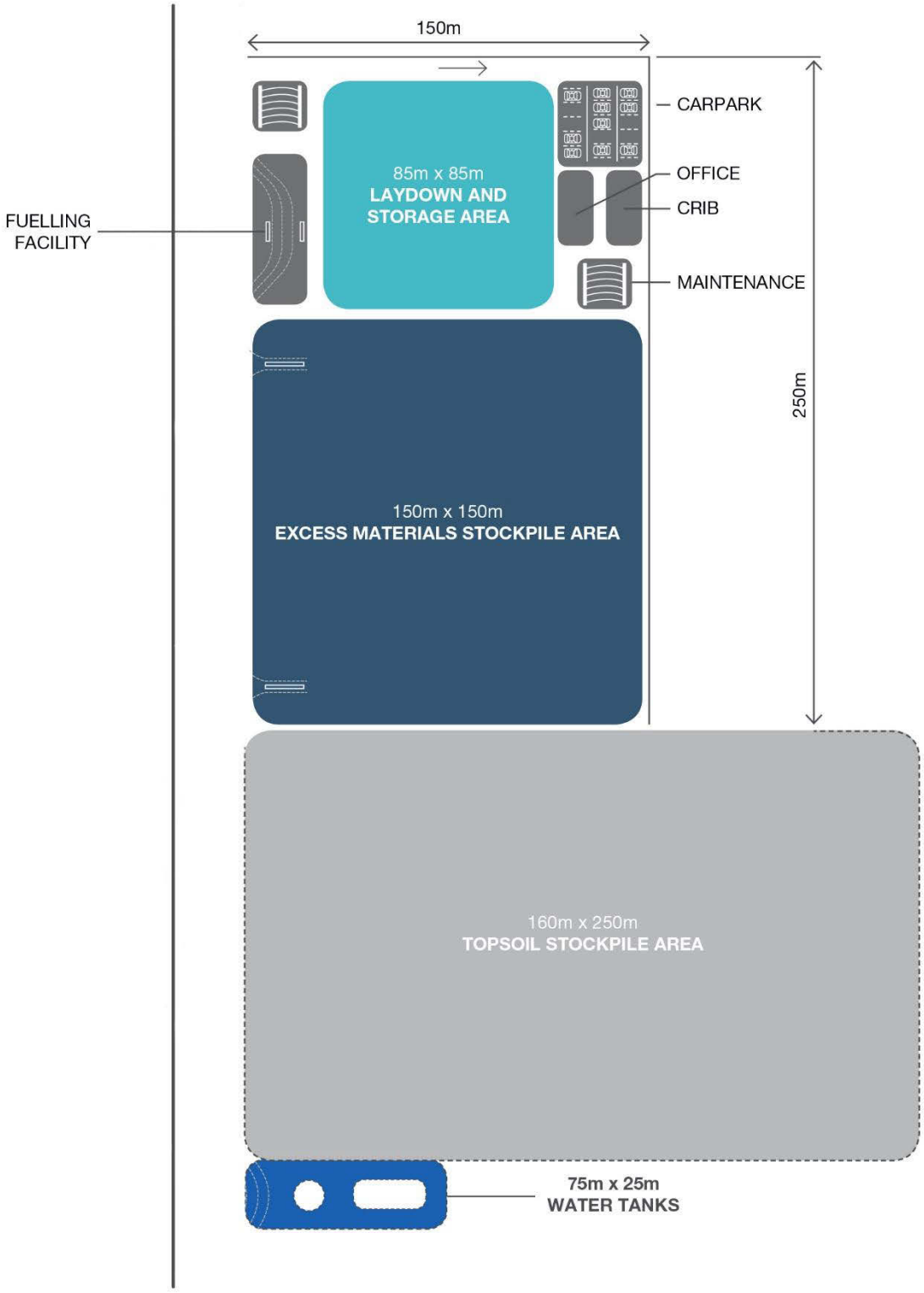


Figure 2.7 Typical layout of a general compound

2.9.4 Temporary workforce accommodation

Overview

To accommodate the construction workforce the proposal includes temporary workforce accommodation near the main towns along the proposal site. Temporary workforce accommodation would be established at the following locations:

- within the Narromine South multi-function compound
- Narromine North
- Gilgandra
- Baradine
- within the Narrabri West multi-function compound.

The proposed locations, which are shown in Figure 2.5 and in the Map Book, were identified in consultation with councils and with consideration of the following:

- access to the proposal site
- flood levels
- appropriate land zoning
- availability of suitable land
- availability of services (eg power, water and sewage) (as required).

Each temporary workforce accommodation is expected to operate for the duration of construction (about 48 months) and accommodate up to 500 people. The sites would incorporate facilities for workers and construction activities, generally including:

- accommodation
- recreational facilities, where required
- ablutions, laundry facilities and kitchen facilities, including waste disposal facilities
- construction support requirements including offices, line pipe laydown/stockpile sites, workshops, maintenance building and storage areas
- tanks for water and fuel storage
- generators (if required)
- sewage and water tanks
- parking.

The accommodation would take the form of standard relocatable remote camps that can be established in about 12 weeks and are transportable by road. Figure 2.8 shows an indicative layout for the temporary workforce accommodation.

It is proposed to supply potable water to the Narromine North and Baradine temporary workforce accommodation facilities by extracting groundwater from groundwater bores, and treating the water (as required) on site. For these facilities, it is proposed that wastewater generated by site amenities would be treated on site using package treatment plants. The package plants would generate treated wastewater, which could be reused at the accommodation facilities (for irrigation) or at other locations. The treatment plants would be expected to have membrane biological reactor technology, which produces high quality reclaimed water suitable for various beneficial reuses, including recycling and irrigation.

For the Narromine South, Gilgandra and Narrabri West temporary workforce accommodation facilities, it is proposed to provide potable water by connecting the facilities to the towns' existing water supply network. For these facilities, it is proposed that wastewater would be disposed of by connecting the facilities to the towns' existing wastewater collection and treatment systems.

The preferred option/s for the provision of potable water and disposal of wastewater at the temporary workforce accommodation facilities would be confirmed by the construction contractor during detailed construction planning, in consultation with the relevant councils.

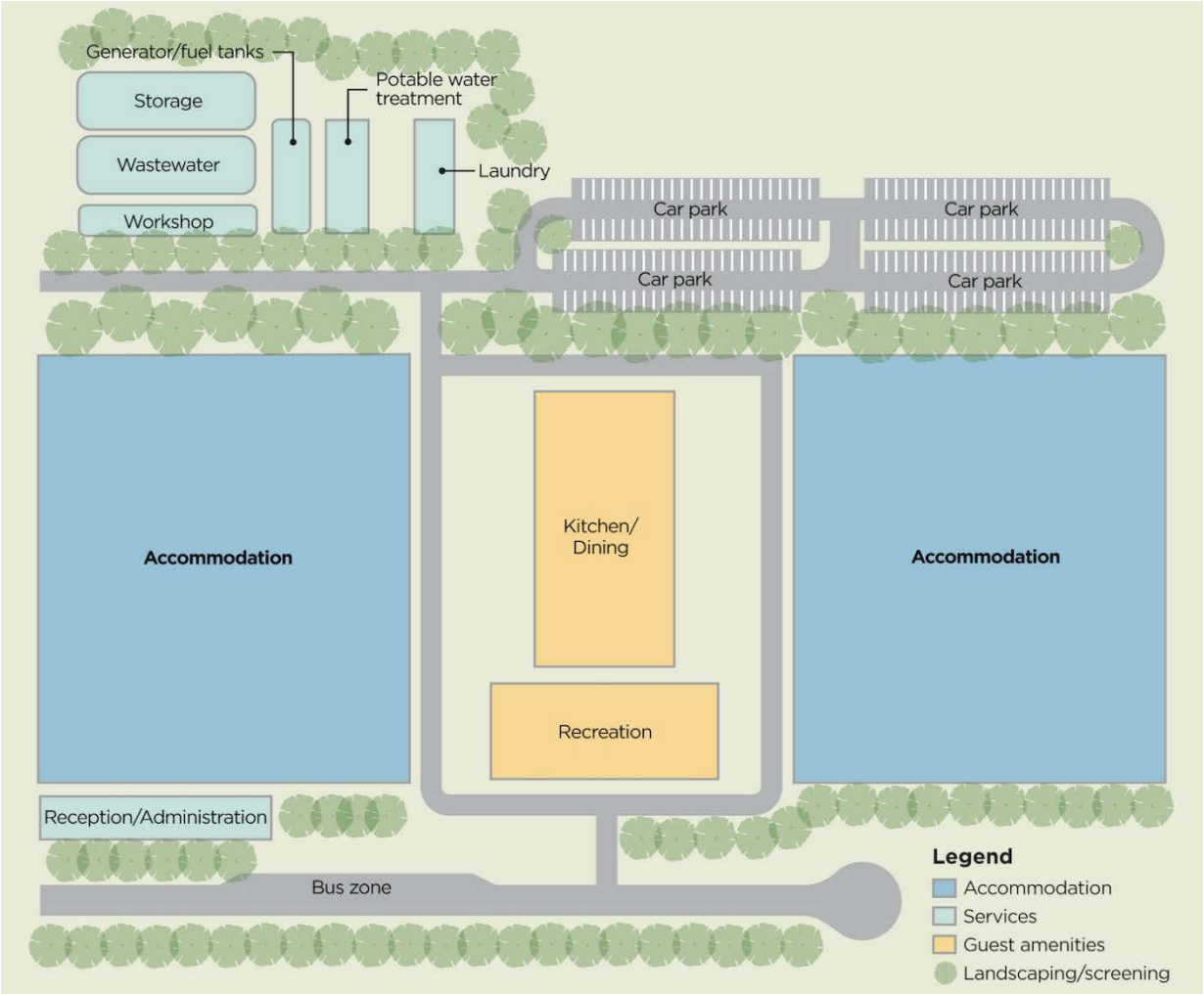


Figure 2.8 Temporary workforce accommodation – indicative layout

Narromine temporary workforce accommodation

Two temporary workforce accommodation locations are proposed at Narromine:

- Narromine North – located north-east of Narromine
- Narromine South – within the Narromine South multi-function compound.

In the event that both sites are established, they would have a combined capacity of up to 500 people.

Narromine North temporary workforce accommodation

The proposed site for the Narromine North temporary workforce accommodation is located on Euromedah Road about nine kilometres north-east of Narromine.

This site would mainly support construction activities to the north of Narromine, including the Macquarie River bridge. Access to the site would be provided by a new connection off Euromedah Road.

The site is not subject to flooding for events up to the one per cent AEP flood event.

Narromine South temporary workforce accommodation

The proposed site for the Narromine South temporary workforce accommodation is located within the Narromine South multi-function compound (see section 2.9.2), about eight kilometres south of Narromine.

This site would mainly support construction activities to the south of Narromine, including the Macquarie River bridge and other construction activities south of the Macquarie River.

The site is partially inundated during the one per cent AEP flood event and appropriate protection measures (such as elevating buildings on stilts) would be required.

Gilgandra temporary workforce accommodation

The proposed site for the Gilgandra temporary workforce accommodation is located on the north-western edge of Gilgandra on Federation Street, about 1.5 kilometres from the town centre.

This site would mainly support construction activities between Leechs Creek Road and Baradine, including the Castlereagh River bridge.

Access to the site would be provided by a new connection off Federation Street.

The site is not subject to flooding for events up to the one per cent an AEP flood event.

Baradine temporary workforce accommodation

The proposed site for the Baradine temporary workforce accommodation is located on the western edge of Baradine on Lachlan Street, about one kilometre from the town centre. The site is adjacent to an existing accommodation facility (Camp Cypress Cabin and Caravan Park), within the former Baradine Racecourse.

This site would primarily support construction activities between Black Hollow and Pilliga East State Forest.

Access to the site is available off Lachlan Street.

The site is not subject to flooding for events up to the one per cent AEP flood event.

Narrabri temporary workforce accommodation

There is an existing temporary workforce accommodation facility located at Narrabri. This facility, known as Narrabri Village, is operated by Civeo and is located at 96 Old Gunnedah Road, Narrabri, about two kilometres to the south of the town centre. Part or all of workforce may be able to be accommodated at this facility, which provides about 500 rooms.

In the event that accommodation at Narrabri Village is not available, temporary workforce accommodation would be provided within the Narrabri West multi-function compound (see section 2.9.2), located about four kilometres south-west of the Narrabri town centre.

This site would mainly support construction activities between the Pilliga East State Forest and the northern end of the proposal site, including the bridge over Narrabri Creek/Namoi River.

Access to the site would be provided by a new connection off Yarrie Lake Road.

The site is partially inundated during the one per cent AEP flood event and appropriate protection measures (such as elevating buildings on stilts) would be required.

Mobile accommodation facilities

In addition to the proposed temporary workforce accommodation, mobile accommodation facilities would be established within the general compounds to allow for short term use by workers where focus on a specific work activity is required and timely access to the main temporary workforce accommodations is more difficult. This will improve productivity for the workforce due to reduced travel times.

The facilities would be mobile or transportable and would consist of up to 30 self-contained small rooms with a capacity of up to 30 people. The facilities would be built on wheels or skids (see examples at Figure 2.9) and would be established where required for a period no greater than three months.

Supplies including potable water would be delivered to the facilities and wastewater would be pumped out at regular intervals by suitably licensed contractors. The facilities would be powered by portable generators.

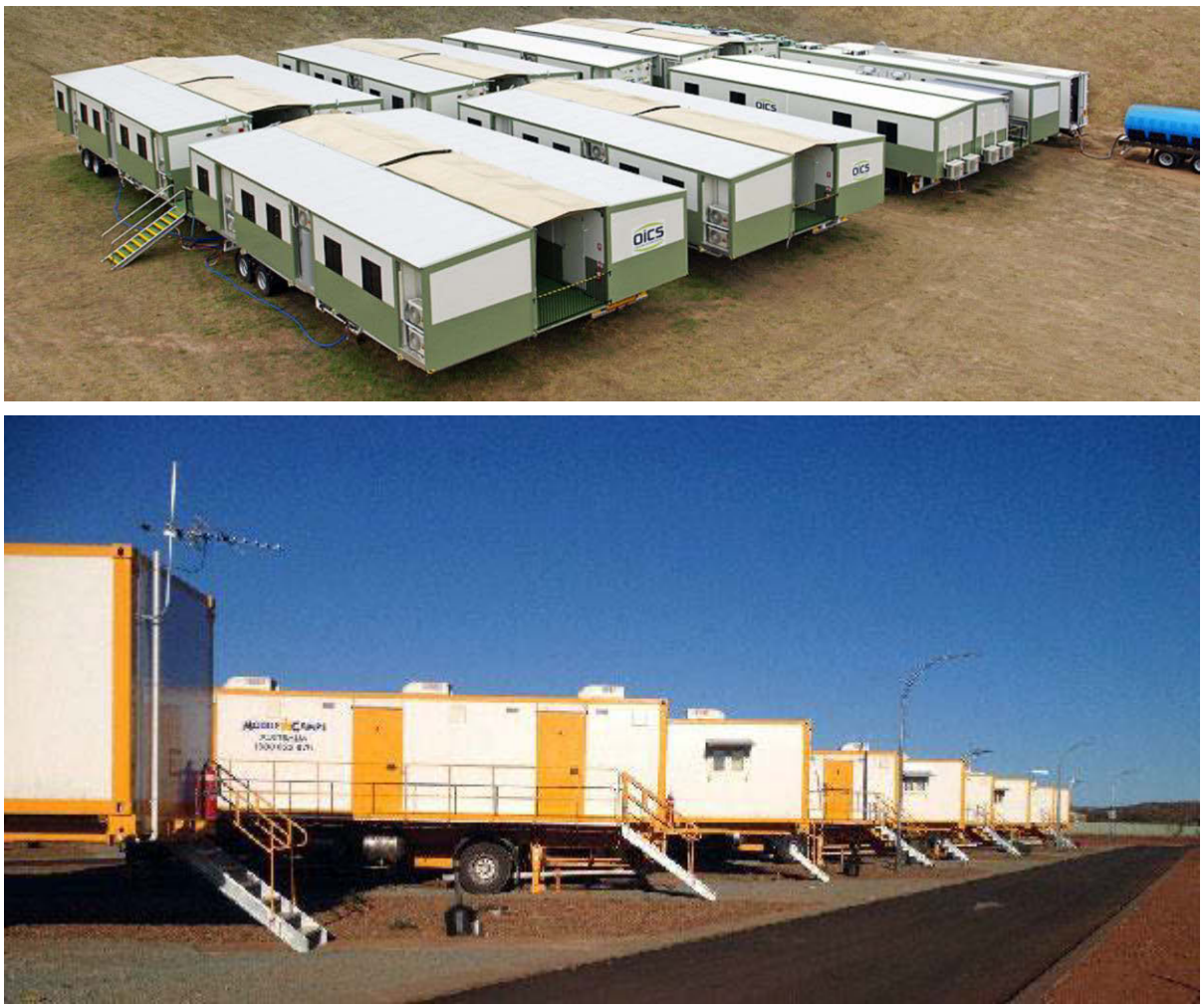


Figure 2.9 Examples of mobile accommodation facilities

2.9.5 Concrete batching plants

The proposal would predominantly be constructed using precast concrete modules as far as practicable. However, elements of the proposal (eg larger bridges at the Macquarie River, Castlereagh River and Narrabri Creek/ Namoi River) would require substantial volumes of concrete for which local supply capability is limited. In addition, parts of the proposal site are located in remote locations that are not supported by local suppliers or are too far for delivery of pre-batched concrete. As a result, fixed and mobile batching plants would be established as part of the proposal to meet the required concrete demands.

Concrete from the batching plants would be delivered to the required locations within the proposal site using the haul roads (as far as practicable) within the proposal site. Wastewater (including wash down water) from all batching plants would be captured, stored and reused/recycled as far as practicable in a sedimentation basin.

Fixed batching plants

It is proposed to establish fixed concrete batching plants within the following compounds:

- Curban multi-function compound (see section 2.9.2)
- structure compounds at the Macquarie River, Castlereagh River and Narrabri Creek/Namoi River bridges (see section 2.9.3)
- the general compound at the crossing of Gwabegar Road, given its remoteness to the other sites.

The batching plants would have an approximate area of to 40 metres by 170 metres, accommodating a water tanker, concrete trailer and storage of materials, including aggregate and sand.

The production capacity of the plants would be up to 200 cubic metres per hour.

Mobile batching plants

Mobile concrete batching plants would also be established within general compounds, where in situ concrete is required and road transport is not feasible. The need for a mobile batching plant would be determined by the construction contractor. These plants are expected to have a capacity of up to 50 cubic metres per hour, and a footprint up to 15 metres by 10 metres in area.

2.9.6 Welding yard

A welding yard would be established within the multi-function compounds at Narromine South, Curban and Narrabri West (see section 2.9.2). The yard would be used to weld short rail lengths into longer lengths (up to 400 metres long). The welding yards would include the following facilities:

- dedicated facilities for unloading short rail lengths
- automatic short rail feeder
- power roller line
- inspection stations
- long welded rail stockpile.

The welded lengths of rail would be transported along the haul roads to select locations within the proposal site on a progressive basis.

2.9.7 Concrete precast yard

Due to the large amount of concrete materials required, such as bridge girders, beams and piles and culverts, it is proposed to establish a concrete precast yard within the multi-function compound located at Curban (see section 2.9.2). This site has ready access to the Oxley Highway and Dubbo to Coonamble Line, to enable materials to be delivered to the site by major transport routes. Suitable services (power and water) are also available at this location. Wastewater from the facilities would be captured, stored and reused/recycled as far as practicable in a sedimentation basin.

The yard would have a footprint of about 500 metres by 200 metres to account for the precast facilities and laydown area, plus space for storage of materials including aggregate, lime, concrete and sand. It would also include a concrete batching plant as described in section 2.9.5.

2.9.8 Sedimentation basins

Sedimentation basins

Sedimentation basins would be provided at regular intervals along the proposal site, including at all key construction infrastructure, such as compounds and temporary workforce accommodation sites.

Water contained within sedimentation basins would be discharged to the nearest watercourse prior to or immediately following forecast rainfall events that are likely to produce watercourse flows. Appropriate scour protection would be provided at the outlets. The basins would include overflow bypass structures to enable stormwater discharge during heavy storm events where the design capacity of the sediment basins may be exceeded.

Alternatively, water may be reused (as a supplementary source to the primary water supply) during construction for activities such as dust suppression.

2.10 Construction resources

2.10.1 Workforce numbers

Construction would require an estimated workforce of up to about 2,000 people accumulative over the construction period. For the majority of the construction period, the workforce would average up to about 500 people in each of the four construction areas to suit staging of construction works. For some limited items of work, an additional short-term workforce may also be required.

During site establishment and preliminary activities, testing and commissioning, and finishing and rehabilitation the workforce numbers would vary, but would typically be up to 1,200 people across the four construction areas.

2.10.2 Construction materials

Ballast, capping and fill

Construction would require a range of materials. Preliminary volume requirements and sources are summarised in Table 2.5. All volumes have been estimated based on preliminary geotechnical investigations and would be subject to further refinement during detailed design.

Table 2.5 Preliminary estimate of construction material volumes

Earthworks	Estimated volume (m^3)	Source
Ballast and capping	1 million	Offsite commercial quarries
Structural fill	1.3 million	Proposal cuts and borrow pits
General fill	3.5 million	Proposal cuts and borrow pits

Subject to confirmation and the gaining of any necessary approvals, the following local quarries are proposed to be used for capping and ballast:

- Boral quarry in Talbragar, Dubbo
- Holcim quarry in Sheraton Road, Dubbo
- MAAS Group Warren's Quarry in Sheraton Road, Dubbo
- Wave Hill quarry in Narrabri.

Once the contractor confirms the quarries that would be used, any truck movements would be via existing heavy vehicle routes from these quarries to the construction footprint.

There would be an excess of 690,000 m^3 of general fill that would be generated during construction and is unable to be used to meet the proposal's fill requirements. It is proposed to use this excess material to reshape and rehabilitate the borrow pits. As the proposed borrow pits are located on private land and would be subject to lease agreements with the landowner, the extent to which this option could be used would be confirmed during detailed design and construction planning in consultation with the landowner.

The earthworks requirements for the proposal would be subject to further refinement during detailed design and construction planning, and following detailed geotechnical investigations. This would seek to minimise the final volume of spoil as far as practicable.

Water

Water is required over the length of the proposal site for a range of activities, including:

- earthworks and formation preparation and material conditioning
- haul road and access road maintenance
- dust suppression
- concrete production
- vehicle and equipment wash down
- temporary workforce accommodation and site services at compounds.

Final water requirements would be subject to weather conditions and the methodology selected by the construction contractor. Based on preliminary construction planning, it is estimated that a total of about 4,635 mega litres would be required (see Table 2.6). This would equate to an estimated average use of about 4.3 mega litres per day over the length of proposal site.

Table 2.6 Estimated total construction water requirements

Use	Volume (ML)
Earthworks and formation preparation and materials conditioning	1,850
Dust suppression (stockpiles and haul roads)	2,270
Concrete production	25

Use	Volume (ML)
Wash down	20
Potable water (the majority of which would be for the temporary workforce accommodation)	470
Total	**4,635**

Water for earthworks and dust suppression comprise the bulk of the water requirements. The volume required would varies along the proposal site based on the areas of cuts and fills. Generally there is limited opportunity to substantially reduce the need for water during construction. However, opportunities to reduce water use would be further explored during detailed design and construction planning, including the potential use of additives and use of different materials for haul roads.

The deep aquifers that underlie the proposal site have been identified as the preferred option for water supply.

A total of 12 bore fields are proposed to provide construction water. An indicative bore field layout is shown in Figure 2.10.

Groundwater would be extracted via these deep bores and pumped to the surface continuously (ie 24 hours per day and seven days per week) where it would be stored in large temporary water tanks with an adjacent overflow pond. Water trucks would then collect the water from a fill point for use in the proposal site.

It is anticipated that potable water for the temporary workforce accommodation and compounds would be provided by either connections to the existing potable water supply network or through the extraction and potential treatment of groundwater. The preferred option/s would be confirmed by the construction contractor during detailed construction planning.

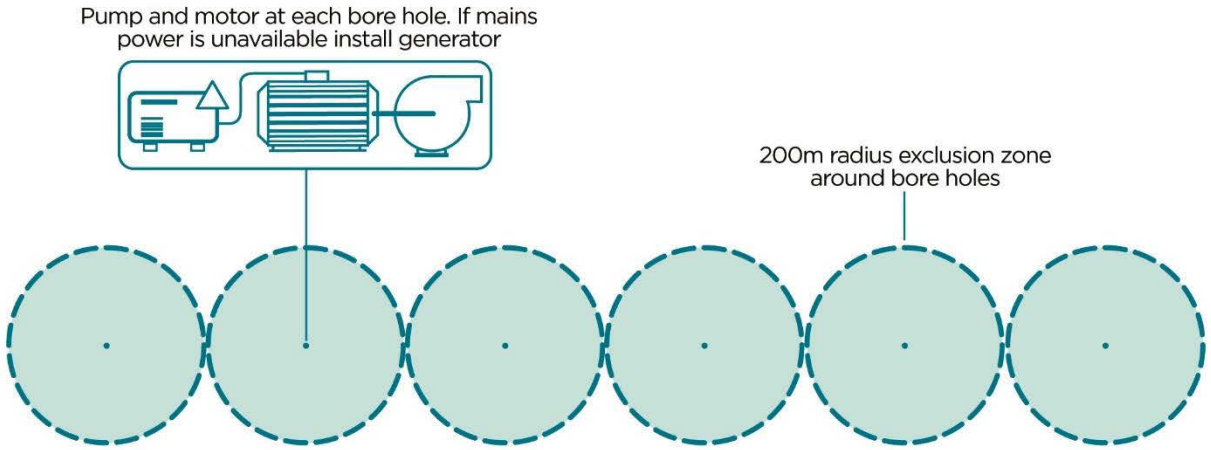


Figure 2.10 Indicative bore field layout

Other materials

Other materials required for construction include sleepers, rail and concrete, with estimated amounts provided in Table 2.7. Sleepers and rail are proposed to be delivered to the proposal site via existing rail lines during pre-construction (see section 2.2). Concrete would be supplied either by commercial suppliers or on-site batching plants (see section 2.9.5).

Table 2.7 Other materials required for construction

Type of material	Estimated amount
Sleepers	510,000
Rail (main line)	612 lineal kilometres
Concrete	220,000 cubic metres

2.10.3 Plant and equipment

A range of plant and equipment would be used as summarised in Table 2.8. The final equipment and plant requirements would be confirmed by the construction contractor.

Table 2.8 Indicative construction plant and equipment

Construction phase	Equipment type	
Pre-construction	▸ Trucks ▸ Water carts ▸ 25-30 tonne excavators ▸ Scrapers	▸ Cranes ▸ Dozers ▸ Light vehicles ▸ Ancillary equipment
Site establishment and preliminary activities	▸ Trucks ▸ Water carts ▸ 25-30 tonne excavators ▸ Scrapers ▸ Backhoes	▸ Cranes ▸ Dozers ▸ Light vehicles ▸ Ancillary equipment
Main construction works (general)	▸ 75-80 tonne excavators ▸ 40 tonne dump truck ▸ Compactors ▸ Water carts ▸ Lube truck ▸ Fuel truck ▸ Low loader ▸ Franna crane ▸ Road tippers	▸ Bulldozers ▸ Graders ▸ Vibratory compactors ▸ Backhoes ▸ Light vehicles ▸ Ancillary trucks ▸ Forklifts and loaders ▸ Large mobile crane
Main construction works – rail infrastructure (track works)	▸ Rail laying machine ▸ Dozer ▸ Excavator	▸ Mobile crane ▸ Graders ▸ Light vehicles
Main construction works – rail infrastructure (bridges)	▸ 750 tonne crane ▸ 250 tonne crane ▸ 100 tonne crane ▸ Franna cranes ▸ Barge (Macquarie River and Narrabri Creek/Namoi River only)	▸ Concrete agitators and pumps ▸ Piling rig ▸ Low loader ▸ Light vehicles ▸ Ancillary vehicles
Main construction works – road infrastructure	▸ Excavators ▸ Vibratory compactors ▸ 25-30 tonne excavators	▸ Water carts ▸ Graders ▸ Bulldozers
Testing and commissioning	▸ Light vehicles	▸ Ancillary vehicles
Finishing and rehabilitation	▸ Water carts ▸ Bulldozers ▸ Graders ▸ Road tippers	▸ 25-30 tonne excavators ▸ 40 tonne dump truck ▸ Light vehicles

2.10.4 Site services

Services such as water, sewer, electricity and telecommunications would need to be supplied to each of the work areas and construction compounds for use in site offices and amenities. Where these utilities are located close to the sites, opportunities to connect to existing sources would be explored with relevant providers. However, at this stage, it is proposed that all facilities would be self-sufficient for utilities due to the remoteness of the proposal site. Portable amenities blocks would be used that can be pumped out at regular intervals by suitably licensed contractors. Local power generation from portable generators would be installed, and diesel resupplied using mobile refueling services for construction plant and equipment.

2.10.5 Temporary land requirements

Construction would require temporary use of land for the duration of the construction period, referred to as the construction footprint. In addition to the indicative permanent land requirements described in section 1.4, some land would be required during construction only. These areas, which are listed in Appendix C of the Amendment Report and shown in the maps in the Map Book, would be required for some key construction infrastructure and compounds not located within the operational footprint, to provide access to construction work areas, and to facilitate manoeuvering of construction plant and machinery.

Lease agreements for temporary land requirements that are in addition to the permanent land requirements would be established with the relevant landowners.

2.11 Construction access

The general strategy for construction access to the proposal site is as follows:

- Rail – existing rail lines would be used to deliver bulk materials where possible. This would include delivery of rail and sleepers commencing during the pre-construction phase (see section 2.2).
- Road – the existing public road network would be used for external delivery of all materials from commercial suppliers and borrow pits, and for the movement of the workforce (eg to and from temporary workforce accommodation).
- Proposal haul roads – these would be established within the construction footprint and used for the movement of bulk earthworks between cuts and fills, and the movement of other materials and the workforce along the proposal site.

The following sections describe the proposed access routes to and within the proposal site and indicative construction traffic numbers.

2.11.1 Access to the proposal site

General

Indicative access routes to each construction work area are shown in the maps in the Map Book. Deliveries from the wider region would use the regional public road network to link with these access routes.

New access (where required) from public roads would be provided via a new temporary connection. All connections to public roads would be designed to the appropriate standard and in consultation with the road manager.

Borrow pits

Access from borrow pits to the proposal site would be via new access roads connecting the borrow pit to the nearest public road, then via the public road network to the proposal site. Indicative access routes for each borrow pit are listed in Table 2.9 and shown in the maps in the Map Book.

Table 2.9 Borrow pits

Location	Primary route	Secondary route	Tertiary route
Borrow pit A – Tantitha Road, Narromine	Tantitha Road	Pinedean Road	Tomingley Road
Borrow pit B – Tomingley Road, Narromine	Tomingley Road	n/a	n/a
Borrow pit C – Euromedah Road, Narromine	Euromedah Road	Eumungerie Road (crossing)	n/a
Borrow pit D – Perimeter Road, Narrabri	Newell Highway (crossing) Newell Highway (to north side of Narrabri)	n/a	n/a

2.11.2 Access within the proposal site

To minimise construction traffic movements and associated impacts on the public road network, haul roads would be constructed within the construction footprint. The haul roads would generally be located next to the final rail alignment with temporary public road crossings provided as required. All public road crossings would be designed to the appropriate standard and in consultation with the road manager.

The haul roads would generally allow for:

- safe separation of light and heavy vehicles within the proposal site
- heavy vehicle haulage (ie cut/fill movements) along the proposal site
- plant and equipment deliveries, including equipment relocation between work fronts and compounds)
- personnel movements between work fronts using both mini busses and light vehicles.

The haul roads may not be continuous along the proposal site and would vary depending on:

- the volume of material to be moved
- property boundaries
- environmental and other constraints (eg ecological and heritage features)
- geographical limitations (eg watercourses that cannot be easily traversed).

2.11.3 Construction traffic numbers

Construction vehicle movements would comprise both heavy and light vehicles and would vary across the proposal site depending on the construction activity being undertaken. Indicative construction traffic volumes are summarised in Table 2.10. To minimise construction traffic movements it is proposed to transport most of the workforce between the proposal site and the temporary workforce accommodation in buses. It is also proposed to transport construction materials along the proposal site (via the proposed construction haul roads – see 2.11.2) where practicable.

Table 2.10 Indicative construction traffic volumes

Vehicle type		Movements per day (two-way)	Indicative peak-hour movements (two-way)
Mobilisation/demobilisation			
Light vehicles	Cars and utilities	182	21.5
Heavy vehicles	Concrete delivery	34	3.6
	Capping/ and ballast	16	2
	Borrow pits	50	10.3
	Workforce	44	5.3
Main construction works			
Light vehicles	Cars and utilities	376	44.5
Heavy vehicles	Capping/ and ballast	171	20.4
	Borrow pits	103	12.2
	Borrow Pits	495	58.3
	Workforce	106	12.8

2.12 Utility relocation or protection

Preliminary investigations and consultation have identified that a number of utilities would need to be relocated, adjusted or protected, with affected utilities including:

- electricity (Essential Energy and TransGrid)
- gas (APA Group and Santos)
- telecommunications (Telstra, Nextgen and AARNet)
- water and wastewater (relevant councils).

These utility relocations and adjustments would generally be contained with the proposal site. However, consultation with utility providers is ongoing and confirmation of the final treatment solution would occur during detailed design.

Potential impacts and management framework

A utilities management framework (provided in Appendix J of the EIS) has been prepared, adopting a risk-based approach to avoiding and/or minimising impacts associated with the relocation and/or adjustment of public utilities affected by the proposal. The framework provides a consistent approach to the assessment and management of public utilities relocation/adjustment across all proposal activities. An outline of the framework is provided below.

The utilities management framework comprises the following activities:

- confirm affected utilities
- design response to potential conflict with a public utility including whether the utility can be avoided
- detailed assessment of requirements to meet utility owners specifications
- ongoing consultation with asset owners and relevant stakeholders
- environmental assessment, particularly for relocation works outside the proposal site using a risk based environmental assessment following the Australian Standard for risk management - *AS/NZS ISO 31000:2009, Risk management - Principles and guidelines*
- construction management which identifies typical mitigation measures
- rehabilitation and re-instatement protocols following utility relocation/adjustment in roadways, footpaths and open space areas
- communications and notifications that can be expected and how these would be managed.

2.13 Public safety

Potential risks to the health and safety of site workers, users, visitors, and the local community during construction include:

- working within an operating rail environment when undertaking rail connection works
- the operation of vehicles and construction equipment on site
- the transportation of equipment, excavated spoil and material to and from site
- construction failures or incidents resulting in flooding, inundation or excavation collapse.

In addition to the above, there is the potential for risks to pedestrian/public safety resulting from unauthorised access to construction work areas.

The potential for the above activities to cause health and safety impacts on the local community is considered to be minimal, based on the remote nature of the majority of the proposal site.

NSW workplace safety laws require construction sites to have adequate site security, which includes appropriate fencing. All construction work would be isolated from the general public. The construction contractor would need to ensure that construction sites are secure at all times, and take all practicable actions to prevent entry by unauthorised persons.

Health and safety risks during construction would be managed by the implementation of standard workplace health and safety requirements.

A work health and safety management plan and safe work method statements would be developed in accordance with regulatory requirements.

B

Route selection summary report

NARROMINE TO NARRABRI PREFERRED INFRASTRUCTURE/AMENDMENT REPORT

INLAND RAIL

Narromine to Narrabri Project
Route selection summary report

REV 2

ARTC

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

IR_1929

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1. Introduction

1.1 Background

Inland Rail has undergone a progressive route development and selection process since 2006, each stage refining the focus on what is required to deliver the Inland Rail program.

The *Melbourne to Brisbane Inland Rail Alignment Study* (ARTC, 2010) ('the alignment study') effectively established the Inland Rail route, although it has undergone further refinements in the years since. In developing the alignment study, ARTC was assisted by a number of Australia's leading business and engineering consultancies.

A critical component in developing the route in 2010 was work undertaken to understand the factors that freight firms and customers take into account when determining whether to send freight by road, rail or sea. These factors of price, reliability, availability and transit time were subsequently reaffirmed following consultation by ARTC and the Department of Infrastructure and Regional Development with freight forwarders, rail operators and customers. Customers included supermarkets and others requiring timely transportation of manufactured and packaged goods. As a result of this consultation, ARTC formalised the Inland Rail Service Offering.

The Inland Rail Service Offering (see Figure 1.1) provides for a transit time between Melbourne and Brisbane of less than 24 hours for the 'Inland Rail intermodal reference train' (which is a freight train up to 1,800 metres in length, 40 per cent double-stacked). The service offering also needs to achieve 98 per cent reliability and provide for freight availability when the market requires, at a cost that is competitive with road.

To be as competitive as possible with road, it is desirable that the Melbourne to Brisbane transit time for express trains should allow for freight delivery in a time as close to road transit time as feasible.

The Inland Rail Service Offering can only be achieved by routing Inland Rail across significant sections of greenfield areas where there is currently no existing rail line or rail corridor.

Figure 1.1 Inland Rail Service Offering

The planned Inland Rail route is about 1,715 kilometres between Melbourne and Brisbane. The Inland Rail route comprises about:

- 1,087 kilometres of track upgrades, enhancements or construction of new track within existing rail corridors (brownfield sections)
- 628 kilometres of track in new rail corridors (greenfield sections).

Along the entire route, track upgrades or enhancements, or use of existing rail corridors, account for 63 per cent of the route.

The longest section requiring a new rail corridor, and offering the greatest opportunity to save time and distance, lies between Narromine and Narrabri in New South Wales (NSW) (about 306 kilometres long and 50 per cent of the greenfield sections).

This report provides a summary of key route option development and assessment processes and outcomes for the Narromine to Narrabri section of Inland Rail.

1.1.1 Developing Inland Rail 2006 – 2020

The key steps in developing and identifying the preferred alignment for Inland Rail as a whole (including the Narromine to Narrabri section) over the last 15 years are summarised in Table 1.1.

Table 1.1 Developing Inland Rail 2006 – 2020

Year	Key step/ development task	Summary of key findings/developments
2006	*North–South Rail Corridor Study* (Department of Transport and Regional Services, 2006) (Available at: **North-South Rail Corridor Study**)	▸ The route selection process began in earnest with the *North–South Rail Corridor Study*, which identified a broad corridor for a future Melbourne to Brisbane freight railway. ▸ The study examined four broad alternatives between Melbourne and Brisbane, ranging from a far-western sub-corridor via western NSW through to a coastal sub-corridor via Sydney and the North Coast. ▸ The study identified that the far-western sub-corridor (via Albury and Parkes) would have the lowest capital cost, fastest transit time and the best economic cost-benefit performance.
2010	*Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010) (Available at: **IRAS_Final Report**)	▸ The far-western sub-corridor identified in the *North–South Rail Corridor Study* formed the starting point for the alignment study. ▸ The alignment study analysed a large number of alternatives within the far-western sub-corridor. ▸ It identified an alignment that sought to minimise construction and operational costs and maximise economic benefits, particularly freight user benefits flowing from operating cost savings, time savings and improved reliability. This drove identification of key greenfield sections such as Narromine to Narrabri. ▸ The original study area between Narromine and Narrabri (the base case) was identified in the alignment study (see section 2.2 of this report), which informed the development of the Inland Rail Business Case (see below). ▸ This work was later reaffirmed in the work undertaken in 2015 (see below) by the Inland Rail Implementation Group and formalised in the Inland Rail Service Offering.
2011–2013	Initial $300 million funding allocation	▸ Following the completion of the alignment study in 2010, the Australian Government approved an initial $300 million allocation in the 2011–12 Federal Budget forward estimates for Inland Rail pre-construction activities spanning the 2014/5–2018/9 period. ▸ Following the 2013 Federal Election, the incoming government committed to this $300 million funding, in conjunction with announcements regarding the formation of the Inland Rail Implementation Group.
2013	Inland Rail Implementation Group established (reported in 2015)	▸ In late 2013, the then Deputy Prime Minister Warren Truss announced the formation of the Inland Rail Implementation Group, chaired by the Hon John Anderson AO, with senior representatives from relevant Infrastructure departments within the Australia, Queensland, NSW and Victorian governments, and the ARTC CEO. ▸ The Inland Rail Implementation Group was tasked with preparing a 10-year delivery strategy and business case for Inland Rail.
2014	Inland Rail Service Offering formalised	▸ During 2014, ARTC worked with a Stakeholder Reference Group comprising key representatives from across the transport and logistics industries to understand if the factors affecting the ability of rail to attract freight that were developed as part of the 2010 alignment study remained valid. ▸ The Stakeholder Reference Group work validated the work undertaken in 2010 and culminated in the formal development of the Inland Rail Service Offering.

Year	Key step/ development task	Summary of key findings/developments
		▸ The Service Offering (see Figure 1.1) specified the key outputs Inland Rail would offer to the market – transit time, reliability, pricing and availability. Achievement of the Service Offering (in particular transit time and reliability) has been a critical consideration in route selection (see section 2.1 of this report).
2015	Inland Rail Implementation Group report (Inland Rail Implementation Group, 2015) (Available at: **Implementation Group report**)	▸ The Inland Rail Implementation Group Report was delivered to the Australian Government in August 2015. ▸ The report largely adopted the 2010 alignment, with certain variations and recommendations for further assessment.
2015	*Inland Rail Programme Business Case* (ARTC, 2015) (Available at: **Inland Rail Business Case**) Australian Infrastructure Priority List	▸ The *Inland Rail Programme Business Case* was the key supporting document for the Inland Rail Implementation Group Report. The Business Case demonstrated that Inland Rail could drive a significant shift in rail's share of freight transported and an increase in the total volume of freight moved. ▸ On receiving the Inland Rail Implementation Group Report, the Australian Government referred the Business Case to Infrastructure Australia for assessment. ▸ Following assessment of the Business Case, Infrastructure Australia added Inland Rail to the Australian Infrastructure Priority List as a Priority Project in May 2016.
2016–17	Federal Budget	▸ In the 2016–17 Federal Budget, the Australian Government announced that Inland Rail would be delivered by ARTC in partnership with the private sector, and that it would undertake market testing for private sector involvement in the program. ▸ The Budget allocated an additional $593.7 million, as an equity injection to ARTC, towards land acquisition, the continuation of pre-construction work and due diligence activities.
2016–17	Market testing for private sector involvement	▸ Flowing from the 2016–17 budget announcements, the Department of Finance led a market testing process in late 2016 and early 2017 to inform the Australian Government's consideration of the delivery and financing of Inland Rail. ▸ The outcomes of the market testing were considered by the Government in the identification of a delivery model for Inland Rail in the context of the 2017–18 Federal Budget.
2016–17	Narromine to Narrabri – Phase 1 – Confirming the study area and identifying a concept alignment	▸ Detailed review of the Narromine to Narrabri section based on the route selected in the alignment study (the base case) and endorsed (with certain variations and recommendations) by the Inland Rail Implementation Group in 2015. ▸ Identification of the Narromine to Narrabri study area and concept alignment, and announcement of the study area on 18 November 2017 by the (then) Australian Minister for Infrastructure and Transport.
2017–18	Federal Budget	▸ In the 2017–18 Federal Budget, the Australian Government committed to finance Inland Rail with a combination of an additional $8.4 billion equity investment in ARTC and a Public Private Partnership for the Gowrie to Kagaru section in Queensland. ▸ The 2017–18 Budget allocation brought total Australian Government financing of Inland Rail to $9.3 billion.
2018	Construction commencement	▸ A historic milestone was achieved on 13 December 2018 when the Deputy Prime Minister, Hon Michael McCormack MP, turned the ceremonial first sod on the Parkes to Narromine section of Inland Rail, accompanied by the ARTC Chairman, ARTC Managing Director and CEO, Inland Rail CEO and other dignitaries.

Year	Key step/ development task	Summary of key findings/developments
2018-20	Narromine to Narrabri – Phase 2 – Reference design option assessment	▸ Narrowing the Narromine to Narrabri study area to a focussed area of investigation for detailed investigations and further targeted consultation with directly affected landholders. ▸ Finalising the preferred alignment and developing the reference design (as described in the EIS) for approval.
2019 onwards	Finalising the route for greenfield projects (including Narromine to Narrabri)	▸ For each greenfield project a study area was identified, in some cases determined by the Australian Government. The study areas have been narrowed to focused areas of investigation (typically down to 100 to 400 metres wide) and a subsequent identification of preferred final rail corridors. ▸ Preferred rail corridors are subject to assessment and approval by respective state governments.

1.2 Purpose and scope of report

An environmental impact statement (EIS) was prepared to support ARTC's application for approval of the Narromine to Narrabri section of Inland Rail as critical State significant infrastructure in accordance with the requirements of Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Inland Rail Narromine to Narrabri EIS addressed the environmental assessment requirements of the Secretary of the Department of Planning, Industry and Environment ('the SEARs'), dated 9 September 2020.

The EIS was placed on public exhibition by the (then) Department of Planning, Industry and Environment (DPIE) for a period of 62 days, commencing on 8 December 2020, and concluding on 7 February 2021.

On 30 April 2021 the Planning Secretary of DPIE directed ARTC to prepare a preferred infrastructure report to provide additional information on the proposal, including justification and information on alternative rail alignments considered, particularly near the towns of Narromine and Narrabri, and how these alternatives were analysed to inform the selection of the preferred route. The request to provide additional information on the route options near the towns of Narromine and Narrabri is a result of the concern in relation to potential flooding impacts at these locations.

This report has been prepared to support the combined Preferred Infrastructure / Amendment Report for the proposal. It provides information on the alternative rail alignments considered and how these alternatives were analysed to inform the selection of the preferred option. It expands on the information presented in chapter A6 (Alternatives and options) of the EIS. The combined Preferred Infrastructure / Amendment Report and the updated Flooding and Hydrology Assessment Report provides further details on the justification for the preferred route and other information requested by DPIE as follows:

- Section 4.3 of the combined Preferred Infrastructure / Amendment Report summarises the key findings of the updated Flooding and Hydrology Assessment Report in relation to:
  - the flooding impacts of the proposal
  - residual flooding impacts in Narromine and Narrabri
  - measures to mitigate residual flooding impacts
  - design changes that have been adopted to mitigate flooding impacts across the proposal, including near Narromine and Narrabri.
- Section 7.5.5 of the updated Flooding and Hydrology Assessment Report provides details of alternative design options considered to reduce flood impacts in Narrabri.

As described in chapter A6 of the EIS, the route options process for the proposal involved two main phases outlined in Table 1.1:

- 2016 to 2017 – Phase 1 Confirming the study area and identifying a concept alignment
- 2018 to 2020 – Phase 2 Reference design option assessment.

These phases commenced following confirmation of the initial alignment and development of the base case (as detailed in Table 1.1).

This report provides a description of the key decisions that shaped the development of the proposal between 2016 and 2020, including the key locational decisions made during both route option development and assessment phases. It describes the process of confirming the study area and the options considered during phase 1 and the alternative alignments considered during phase 2.

The final preferred rail corridor (as described in the EIS) lies within the narrowed focused area of investigation that in turn lies within the study area (see Figure 1.2). The report focuses on the potential routes considered within the study area confirmed by the Australian Government and announced on 18 November 2017. The study area was formally acknowledged by the NSW and Australian Governments in 2018.

The report also includes information on the extent to which flooding and hydrological considerations were taken into account in determining the study area and subsequently the narrowed focused area of investigation. It describes how the route assessment process was undertaken, including the multi-criteria analysis (MCA) and consultation processes.

Further information on the results of the flooding assessment for the proposal is provided in the EIS, the Preferred Infrastructure / Amendment Report, and the updated flooding and hydrology assessment report (available separately).

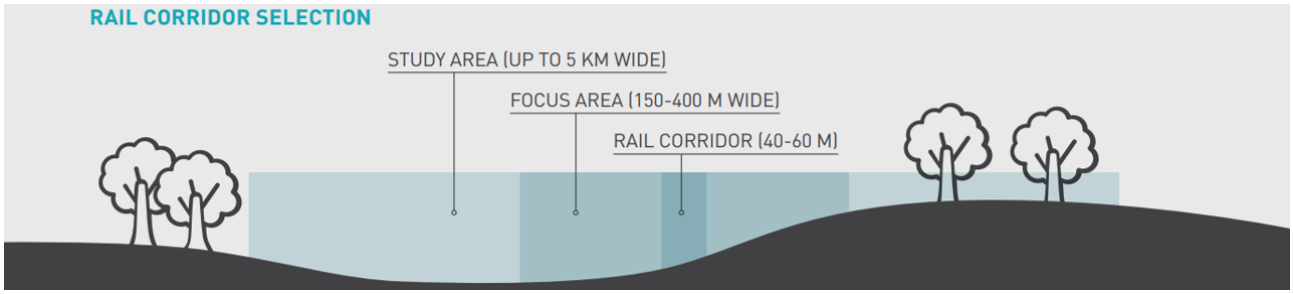

Figure 1.2 Relationship between the study area, focused area of investigation and rail corridor

The report has been prepared based on information provided in the publicly available reports described in Table 1.1, the *Inland Rail Route History 2006-2021* (ARTC, 2022), MCA reports, design information, and inputs from the proposal design team and ARTC. To document the process of route option selection that was undertaken prior to the EIS, the information presented in this report in relation to the route selection history and process is extracted from these publicly available reports, some of which date back several years. As such, some of the information does not necessarily directly match that presented in the EIS and supporting technical reports, which was based on more recent assessments undertaken during the EIS process.

Further information about the need and justification for Inland Rail, and consideration of the alternatives to Inland Rail as a whole, is provided in chapter A5 of the EIS.

1.2.1 Report structure

The report includes the following information:

- Section 1 – Provides an introduction to the report and background to developing Inland Rail (including the proposal).
- Section 2 – Provides a summary of the background to confirming the study area for the option development process (phase 1 of the route options process for the proposal) and a description of the key locational decisions made during this phase, including in the vicinity of Narromine and Narrabri.
- Section 3 – Describes the option development process within the confirmed study area (phase 2 of the route options process) and the key locational decisions made during this stage, including in the vicinity of Narromine and Narrabri.
- Section 4 – Describes how the identified route options within the study area were analysed and assessed, including the MCA and consultation processes, to inform selection of the preferred route.
- Section 5 – Provides a conclusion to the report.

2. Background to confirming the study area for route option development

2.1 Context

Inland Rail is a once-in-a-generation program that will complete the backbone of the national freight rail network, enabling Australia to have world-class supply chains, meeting the objectives of the *Inland Rail Implementation Group Report* (Inland Rail Implementation Group, 2015) and the *Inland Rail Programme Business Case* (the Business Case) (ARTC, 2015).

To achieve these objectives Inland Rail has to meet the needs of customers for a rail line that enables trains to carry freight between Melbourne and Brisbane:

- in a comparable timeframe to that achieved by trucks
- at less cost than provided by trucks
- with reliability and predictability comparable to that provided by trucks.

As an efficient supply chain backbone, Inland Rail will enable connections with regional and national rail lines. These connections will reduce costs and provide greater flexibility in the way producers are able to transport goods and freight to markets throughout Australia, including to ports in Queensland, NSW, Victoria, South Australia and Western Australia.

2.1.1 Transit time and distance are critical to route selection

Transit time

Adopting a route that is as direct as possible has been a critical consideration in route selection. The length of the route and overall transit time between Melbourne and Brisbane drive the key economic benefits that underpin the Business Case.

Transit time and distance drive operating costs, which in turn determines the price that Inland Rail can offer compared with transporting freight by road.

Together with improved operating parameters (train length and double stacking), these factors drive the cost saving per tonne for moving freight from road to Inland Rail. The Business Case estimated that Inland Rail will offer a price to the market giving a one-third saving compared to road transport. The Business Case estimated that freight operating cost savings represented nearly 50 per cent of the total economic benefits provided by Inland Rail.

Lower transit time generates ‘value of time’ savings for freight customers. This relates to the value placed by freight customers on having time-sensitive freight delivered earlier than delivery times offered by alternative options.

Market consultation during the development of the Inland Rail Service Offering (see Figure 1.1) highlighted the need to offer a range of transit times to meet market needs, with a Melbourne to Brisbane transit time of under 24 hours for the Inland Rail reference train necessary to compete with road in the time sensitive express market for intercapital city freight.

The Business Case estimated the ‘value of time’ savings represent a further 25 per cent of the total economic benefits provided by Inland Rail.

Role of upgrading existing rail lines

Capital cost is directly influenced by the length of the route. A shorter and more direct greenfield route will generally be less expensive than upgrading a longer brownfield route to meet the full Inland Rail performance specifications.

The decisions around where to construct greenfield versus redevelop existing lines were based on a wide range of factors that included considerations of length, transit time, constructability, construction cost, environmental impact and geotechnical considerations, as well as impacts on privately and publicly-owned properties (including the number of properties impacted).

ARTC has direct experience with upgrading existing low volume railway lines to meet Inland Rail mainline standards in the Parkes to Narromine project, which was commissioned in late September 2020 and is now operational. ARTC’s practical experience is that very little of an existing low volume line is salvageable. Rail, sleepers, ballast and load-supporting structures (such as underbridges) require complete replacement to meet the performance standards required for Inland Rail. In fact, even much of the underlying formation needs to be excavated and replaced to meet main line speed and axle load requirements and the much higher annual tonnages that will traverse Inland Rail.

As a result, there are few if any savings to be made in seeking to upgrade an existing low-volume line relative to the cost of greenfield construction, and the upgrade option can be more expensive when the costs of removal and disposal of the pre-existing infrastructure are taken into account.

Furthermore, routes that seek to re-use existing lines are often longer (and sometimes significantly so) than the direct greenfield routes and can also require significant greenfield connecting lines to be built.

Route selection and the importance of greenfield sections (particularly Narromine to Narrabri)

Because of the significance of the above factors, route selection has a major bearing on the overall performance of Inland Rail.

It is the principal reason why Inland Rail includes significant greenfield sections – the greenfield sections underpin the improved economic performance driven by the reduced distances and transit time.

The Narromine to Narrabri section of Inland Rail is the longest greenfield section. To attain the required 24-hour Melbourne to Brisbane transit time the travel time for this section needs to be as efficient and short as possible.

The alignment study considered a greenfield Narromine to Narrabri section compared to a route using existing corridors via Werris Creek (see section 2.2.2). The improvements in speed and associated reductions in transit time, and resulting reductions in operating costs flowing from the greenfield sections of Inland Rail are central to achieving the economic outcomes of Inland Rail.

Further information on the importance of time and distance in determining a route is available on pages 21 to 23 of the *Inland Rail Route History 2006 – 2021* (ARTC, 2022) (available at: **Route history of Inland Rail 2006-2021 - Inland Rail (artc.com.au)**).

2.2 Selecting the initial route and developing the base case (to 2010)

Alternative routes for Inland Rail as a whole were mainly considered by the following two studies:

- *North–South Rail Corridor Study* (Department of Transport and Regional Services, 2006) ('the corridor study') (available at: **North-South Rail Corridor Study**)
- *Melbourne–Brisbane Inland Rail Alignment Study* (ARTC, 2010) (the 'alignment study') (available at: **IRAS_Final Report**).

2.2.1 North–South Rail Corridor Study

Detailed consideration of Inland Rail by the Australian Government began with the North-South Rail Corridor Study in 2006. The purpose of the corridor study was to examine freight demand, capacity and route options for the Melbourne-Sydney-Brisbane rail corridor.

Corridor options considered

The corridor study considered potential corridors for the rail line to determine which route would deliver the best economic and financial outcome.

Potential options were identified within a 'north–south rail corridor', which comprises an elliptically-shaped area defined by the standard gauge rail line along the NSW coast, and a broad arc west of Shepparton, Jerilderie, Coonamble, Burren Junction, Goondiwindi and Toowoomba. This area covers all sections of the existing rail network in Victoria, NSW, and Queensland that currently form, or could potentially form, part of a freight route between Melbourne and Brisbane.

Within this corridor, four sub-corridors were identified for comparative analysis, each of which could be combined with alternative routes between Melbourne and Junee, via Shepparton or via Albury. The four sub-corridors comprised:

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

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

Preferred corridor

The study identified potential demand, financial issues, environmental issues, and infrastructure costs relevant to the four sub-corridors. The analysis undertaken for the corridor study concluded that the far-western sub-corridor (see Figure 2.1) was markedly superior to the other alternatives.

Figure 2.1 Far-western sub-corridor identified by the North-South Rail Corridor Study

Consideration of the Narromine to Narrabri section at this stage

The Narromine to Narrabri section forms part of the far-western sub-corridor. The corridor study identified a number of route options for the Narromine to Narrabri section, over a wide area ranging from Werris Creek in the east to Burren Junction in the west.

2.2.2 Melbourne–Brisbane Inland Rail Alignment Study

The purpose of the alignment study was to determine the optimum alignment for Inland Rail, generally within the far-western sub-corridor identified by the corridor study.

The alignment study short-listed and analysed a number of route options. The stages of route analysis involved the following:

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

Route options considered

The alignment study noted that, with the combination of numerous route options and sections, there were over 50,000 possible options for the route between Melbourne and Brisbane. As it was not feasible to analyse each option, two key criteria (capital cost and journey time) were used to establish a shortlist of route options in each of the three main sections – the northern section, central section and southern section (see Figure 2.2).

The central section (between Parkes and Moree) includes the Narromine to Narrabri study area. For the central section, the shortlist included four main options:

- Parkes to Moree via Werris Creek, using existing track (with a new section of track at Binnaway and Werris Creek to avoid reversals).
- Parkes to Moree via Binnaway and Narrabri, using existing track to Binnaway, and then a new section connecting to the existing track near Emerald Hill or Baan Baa.
- Parkes to Moree via Curban, Gwabegar and Narrabri, using existing track to Narromine, predominately new track between Narromine and Narrabri, and existing track from Narrabri to Moree.
- Parkes to Moree via Burren Junction, using existing track to Narromine, and predominately new track via Coonamble and Burren Junction to Moree.

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

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

- environmental and land issues (including property and community impacts)
- railway operations considerations
- engineering assessments
- capital cost estimates.

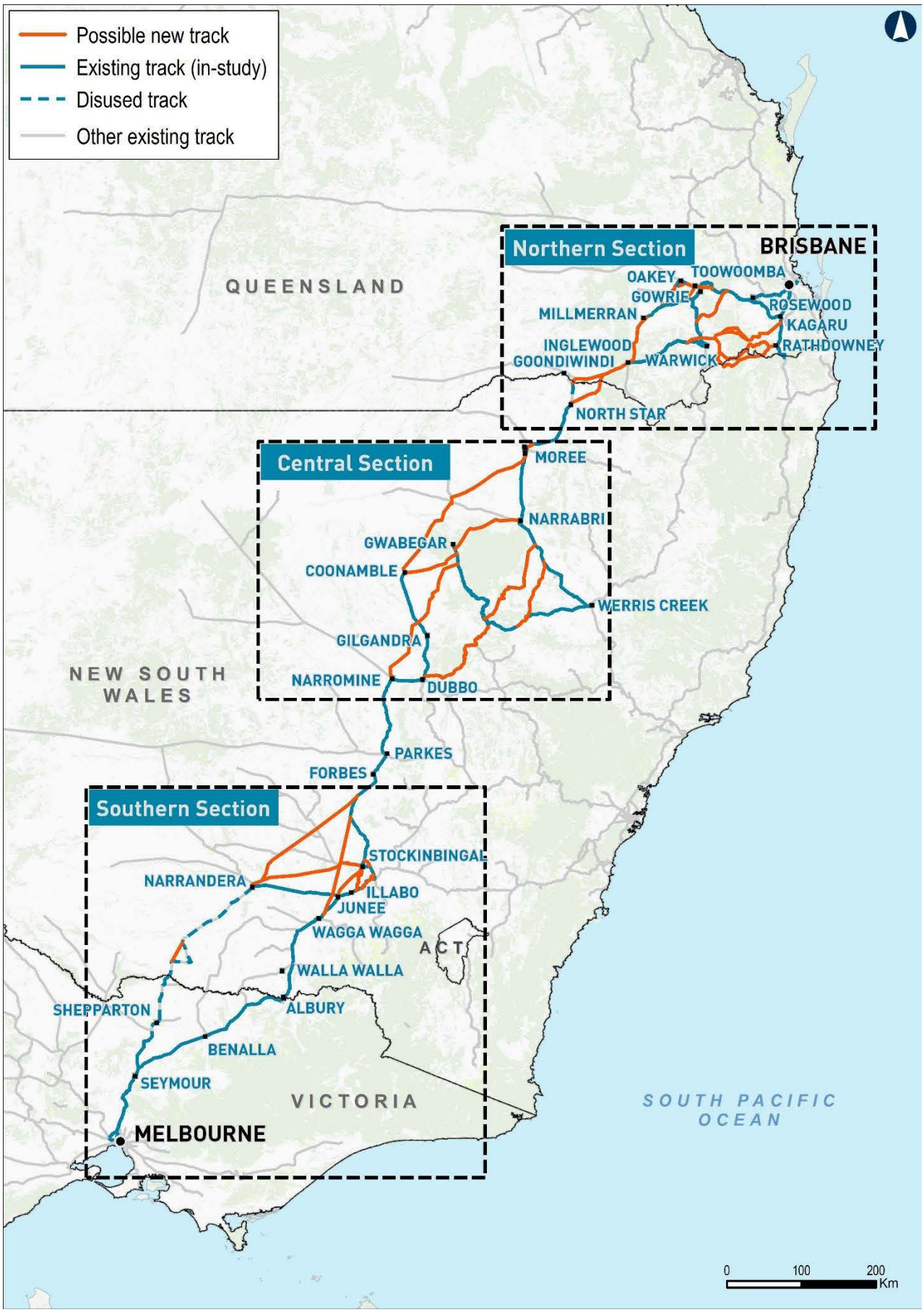

Figure 2.2 Main areas considered by the Melbourne-Brisbane Inland Rail Alignment Study (ARTC, 2010) and short-listed options

Preferred alignment

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

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

Consideration of the Narromine to Narrabri section at this stage

The key choice between Narromine and Narrabri (considered by the alignment study) was between an alignment via Werris Creek, largely or wholly using existing rail lines, or a more direct alignment involving a large proportion of new greenfield track (see Figure 2.3).

The study identified that the more direct route:

- was much shorter (about 150 kilometres)
- had higher capital costs but a faster transit time and higher potential demand.

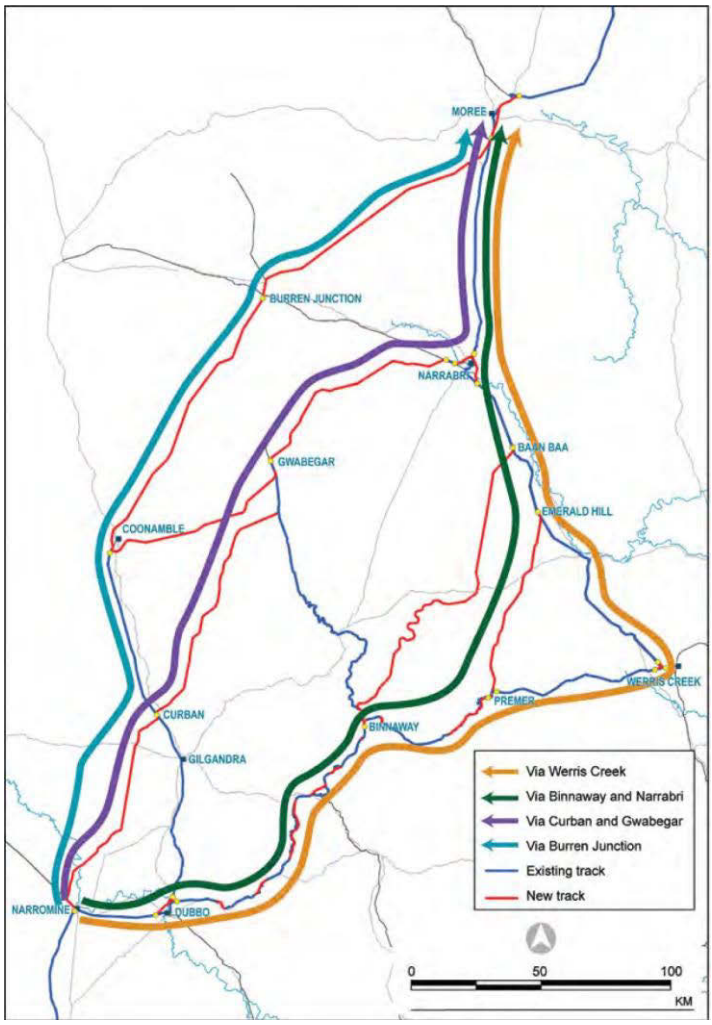

Figure 2.3 Routes between Narromine to Narrabri considered by the alignment study

The option involving the more direct route between Narromine and Narrabri (via Curban) had the fastest transit time for a reasonable capital expenditure. While the option via Coonamble and Burren Junction had a favourable transit time it was discounted due to the predicted high capital cost. The standard and alignment of the rail lines that would be used for a route via Werris Creek reduced average train speed to 53 kilometres per hour compared with the reference speed of 88 kilometres per hour for the shorter greenfield route. ARTC's current train modelling shows that the 88 kilometres per hour assumed for the alignment study remains valid.

It was concluded that the combination of shorter distance and higher average speed for the direct greenfield route between Narromine and Narrabri would reduce transit time for Inland Rail as a whole by five hours and 30 minutes.

In addition to the overall time benefit of the new greenfield route, the alignment study recommended the following benefits of individual sections:

- Narromine to Curban – this section was more cost effective than an upgraded route via Dubbo.
- Curban to Gwabegar – this required less capital expenditure than an upgrade from Curban to Coonamble plus new track from Coonamble to Gwabegar.
- Narrabri bypass – a bypass was preferred because of the significant speed constraints along the section of rail within Narrabri and the cost of an existing bridge and track on the existing route through Narrabri.

The adoption of a shorter greenfield route between Narromine and Narrabri increased the forecast demand and revenue of the total Inland Rail program and enhanced the economic benefits of the program.

2.3 Confirming the study area / concept alignment (phase 1 of the route selection process) (2016 – 2017)

The shorter greenfield route between Narromine and Narrabri was identified in the alignment study (as described in section 2.2.2), which informed the development of the Business Case. As noted in Table 1.1 the Inland Rail Implementation Group Report was delivered to the Australian Government in August 2015. The report largely adopted the 2010 alignment, with certain variations and recommendations for further assessment.

Phase 1 of the options assessment and design process for the proposal commenced in early 2016. The options analysis considered the preferred location for the route between Narromine and Narrabri. Once a feasible preferred route was identified for the various route sections (see section 2.4), a study area (of up to about five kilometres wide) was identified around the route to provide opportunities to further refine the route (during phase 2 – as described in section 3 of this report) to minimise flooding, community and environmental impacts.

During 2016 and 2017 ARTC carried out a review of the Narromine to Narrabri section of the Inland Rail route based on the route selected in the 2010 alignment study and confirmed by the Inland Rail Implementation Group Report (referred to as the 'base case').

This involved reviewing the base case to investigate potential deviation options for the route that could offer overall improvements, taking into account a range of factors, including flooding, property, environment and safety. The review included consultation with the community and stakeholders and some field investigations.

The outcome of this assessment was identification of a preferred alignment in 2016 (referred to as the 2016 concept alignment) around which the study area was established. The 2016 concept alignment, which is shown on Figure 2.4, informed initial discussions with the community and stakeholders, including local councils, landholders and farmers' representatives. Feedback from these discussions highlighted the expectation that ARTC should consider alternative options.

In response to community and stakeholder feedback, about fifty alternative options were developed during the phase 1 process. These included:

- South of Curban: options including use of sections of the existing Dubbo to Narromine and Dubbo to Coonamble rail lines.
- North of Curban: options incorporating sections of the existing Dubbo to Coonamble Line to reduce the length of greenfield corridor.
- direct routes through the Pilliga forests.

The options were refined and assessed at MCA workshops held in October 2016, December 2016 and May 2017 (see section 4). During the initial October 2016 workshop, 28 corridor options were assessed across five discrete geographic sections. Options were assessed using the Inland Rail MCA criteria (described in section 4.1.4), in addition to the service offering and value for money. Over 400 meetings were held with landholders, local councils, government agencies and other key stakeholders (see section 4.2 for further information). Additional field surveys were also completed (see section 4.3 for further information).

The short-listed options were subject to further refinements and were considered by the December 2016 MCA workshop. The purpose of this workshop was to determine the options that would define the study area, to take forward for further investigation and consultation. The short-listed options developed as an outcome of the assessment are shown in Figure 2.4. Further information about the assessment process is provided in section 4.

The locational decisions made during this stage of the options assessment process are described in section 2.4.

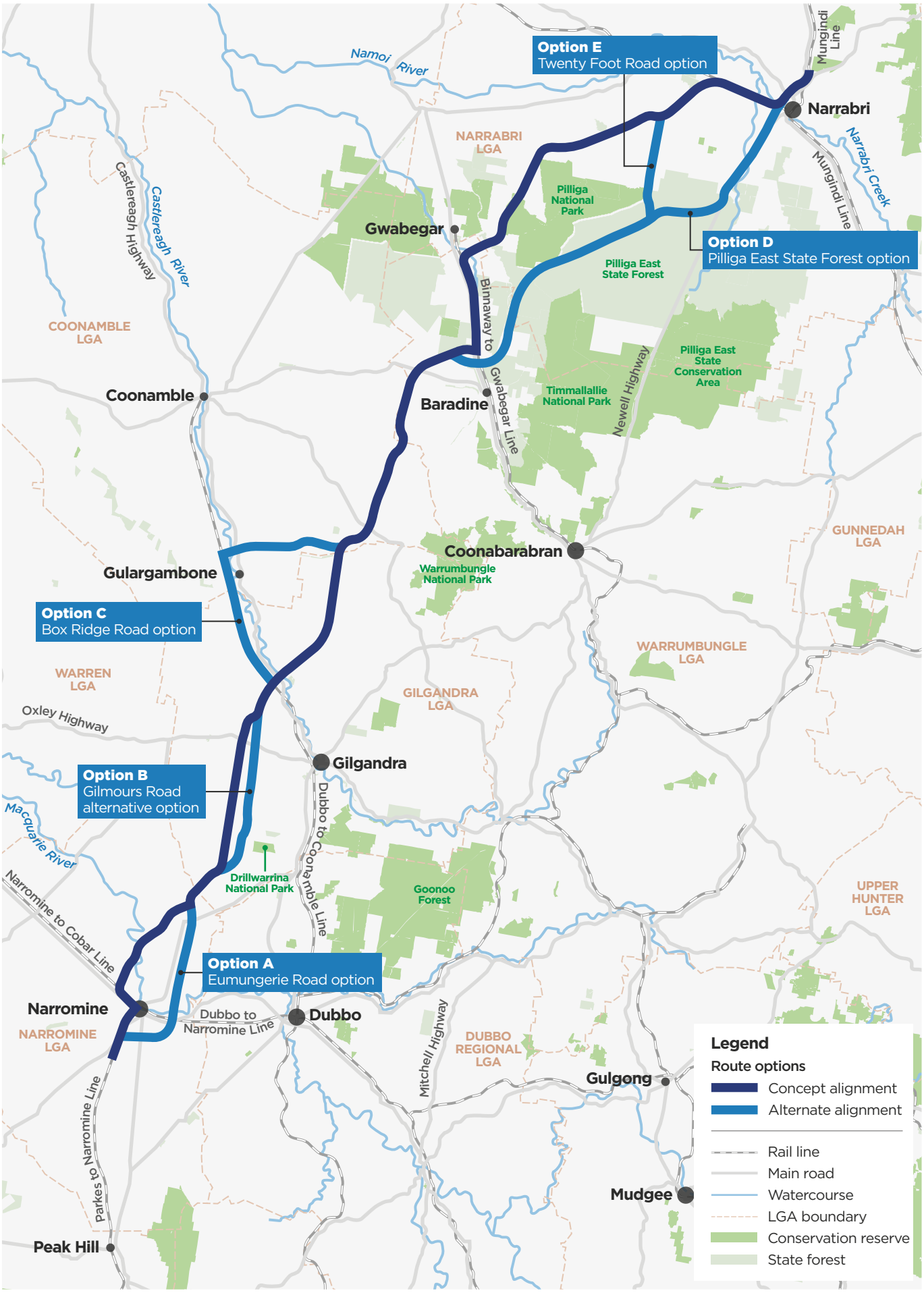

Figure 2.4 **Phase 1 - Shortlisted route options**

2.4 Locational decisions made during phase 1

2.4.1 Selection of study area near Narromine – west or east?

Overview

A number of options near Narromine were considered and assessed during 2016 and 2017. These were ultimately reduced to two options that were considered in the MCA workshop in May 2017:

- An option to the west of Narromine (the 2016 concept alignment).
- An option to the east of Narromine (referred to as the Eumungerie Road option).

Detailed advice and investigations relating to flooding and other factors (see sections 4.2 and 4.3 for further information) were taken into account by ARTC as part of the process of developing, analysing and assessing route options in Phase 1, including the route options near Narromine.

The process for determining the study area near Narromine is summarised in Figure 2.5. Further information is provided in the following sections.

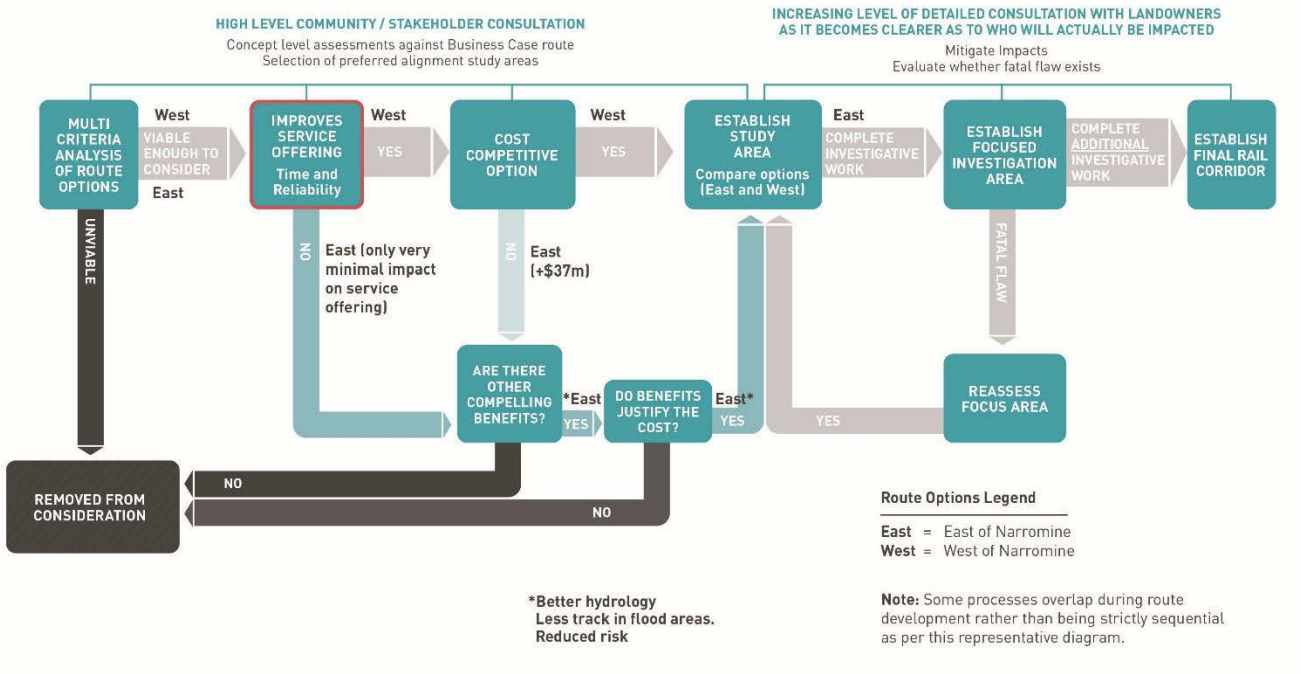

Figure 2.5 Route option analysis summary – east or west around Narromine

Consideration of flooding issues and other key constraints and opportunities

The main flooding considerations and other key constraints and opportunities for the two options are summarised below.

2016 concept alignment (the western option) – flooding issues

The 2016 concept alignment follows the Parkes to Narromine and Narromine to Cobar rail lines to the west of Narromine before heading in a northerly direction. As shown on Figure 2.6 the floodplain extents to the west (for the one per cent AEP event) are significantly greater (about 11 kilometres longer) than to the east of Narromine.

Eumungerie Road option (the eastern option) – flooding issues

The Eumungerie Road option leaves the Parkes to Narromine rail line and heads in an easterly direction across a floodplain area associated with the Backwater Cowal and Macquarie River. The entire area through to the northern side of the Macquarie River is subject to flooding in the one per cent annual exceedance probability (AEP) event (see Figure 2.6). Anecdotal advice from local landowners was that this area is also prone to flooding due to runoff from hills to the south-east.

It was noted that the section of track to the south of the Macquarie River (for an alignment based on this option) was likely require a number of flood relief culverts. However, the number and size of culverts were expected to be less than for the 2016 concept alignment, which crosses the larger floodplain associated with the Macquarie River.

Once the alignment crosses the Macquarie River, it rapidly gains higher ground along the ridge line that runs parallel to Eumungerie Road where, for a length of about 30 kilometres, it would not be at risk of flooding from the Macquarie River.

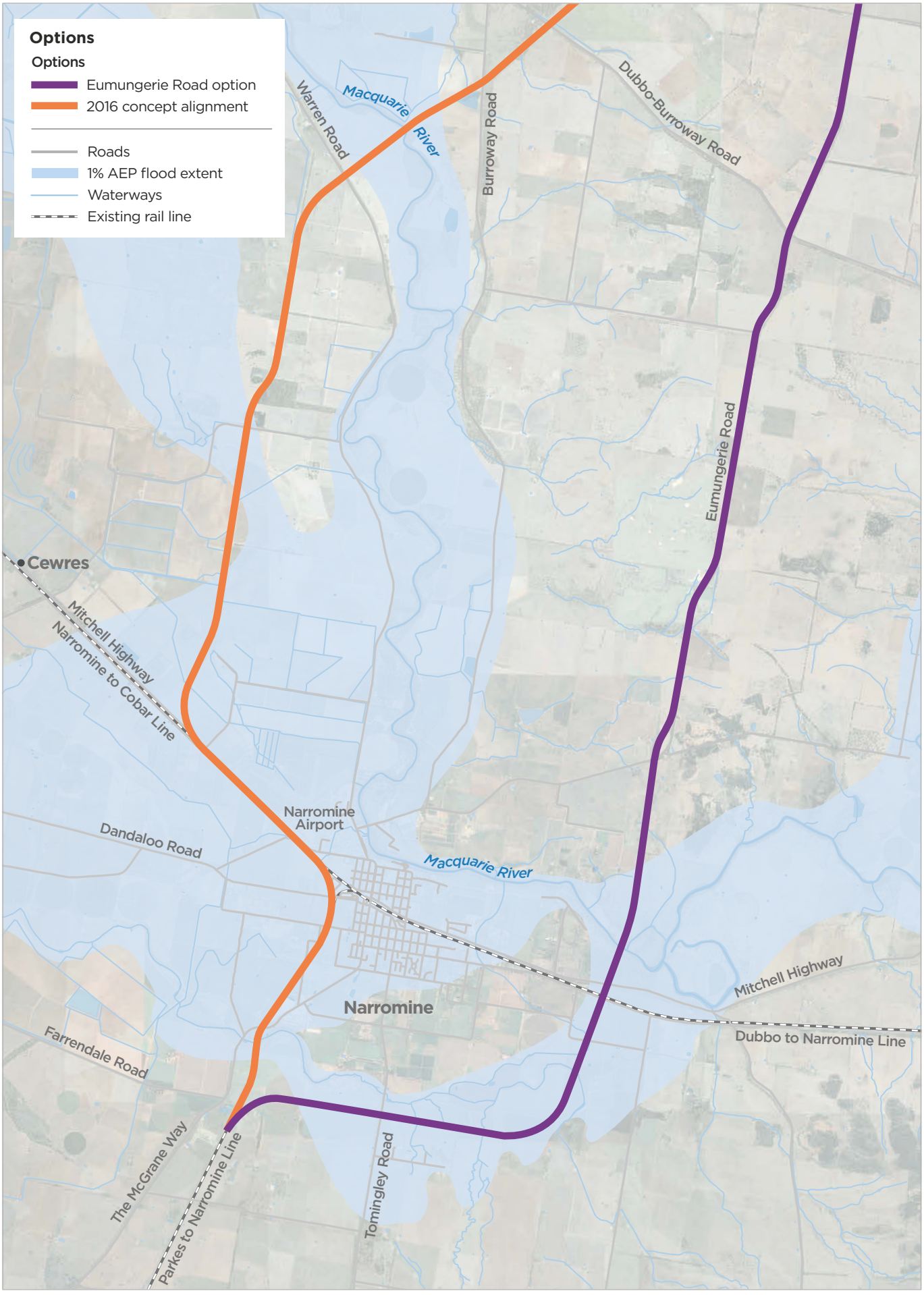

Figure 2.6 **Flooding extents near Narromine**

Key constraints for both options

Other key considerations included:

- poor geotechnical conditions associated with the Macquarie River floodplain, both to the east and west of Narromine
- interoperability with existing rail lines
- construction risks in areas prone to flooding
- property impacts
- potential Aboriginal heritage impacts, particularly to the east of Narromine near the Macquarie River
- Narromine Airport is located to the west of Narromine
- noise, vibration and other amenity impacts.

Options assessment

The options to the east and west of Narromine were considered by three separate MCA workshops held in October 2016, December 2016 and May 2017 (see section 4.1.3).

Based on the outcomes of the options assessment and considerations noted above, it was concluded that the eastern (Eumungerie Road) option was preferred. This option offered the following advantages:

- The eastern option would require about 11 kilometres less track (about 50 per cent less) in the floodplain (about 10 kilometres of track would need to cross the floodplain for the eastern option, compared with about 21 kilometres for the western option).
- As a result of the shorter distance of track in the floodplain, the eastern option would require about 14.3 kilometres less structures (bridges and culverts) (about 90 per cent less) that would otherwise be required to meet the required one per cent AEP event flood immunity (about 1.6 kilometres of structures would be required for the eastern option compared with 15.9 kilometres for the western option).
- Avoids construction within the floodplain downstream of Narromine, therefore removing the potential for backwater effects resulting in additional afflux within the town of Narromine.
- The eastern option crosses land with better geotechnical conditions allowing structural material to be sourced on site, which would improve safety outcomes by reducing the volume of material that would need to be moved by road.
- There would be savings in the order of $12.2 million compared with the earthworks requirements of the western option.
- The eastern option would require fewer private level crossings (seven compared with 13 for the western option).

While the eastern option was about one kilometre longer and added 24 seconds to transit time, this was not considered significant enough to outweigh the other advantages that this option offered.

The total cost of the eastern option was estimated to be about $37.1 million higher than the western option. However, this cost included $11.3 million for a rail over road grade-separation at Tomingley Road, which is no longer considered to be a requirement. The effect of not including this grade separation was to reduce the notional additional cost of going east of Narromine to about $25.8 million. This additional cost, which represents about 1.7 per cent of the estimated capital cost of the Narromine to Narrabri section, was not considered sufficient to outweigh the advantages of the eastern option.

The western option had a greater risk of flooding and/or poor geological conditions increasing the cost of structures to cross the floodplain which, if realised, would likely have reduced or even fully negated the apparent comparative cost advantage.

The eastern option also provided the opportunity to have an expanded study area (to about five kilometres). This would maximise the design flexibility to identify an alignment that avoided or minimised the flooding effects of the Backwater Cowal, minimised noise impacts within the town of Narromine, and targeted better crossing points of the Dubbo to Narromine rail line, the Mitchell Highway and the Macquarie River.

Preferred option

Selection of the study area followed significant assessment of broad route options during 2016 and 2017. Ultimately ARTC recommended, and the Australian Government determined, the study area should be to the east of Narromine. The Australian Government issued a media release announcing the study area on 30 November 2017 (see **https://inlandrail.artc.com.au/steady-progress-on-the-inland-rail-as-government-confirms-narromine-to-narrabri-corridor/**). Once the preferred locational option around Narromine was selected, a wider study area of up to about five kilometres was identified around the alignment (see Figure 2.21) to provide opportunities to further minimise flooding, community and environmental impacts. This study area formed part of the study area for the Narromine to Narrabri section as a whole (see section 2.5). Further information on consultation undertaken with stakeholders about the preferred option is provided in section 4.2.

2.4.2 Narromine to Curban

Overview

A number of options to the north of Narromine were considered and assessed during 2016 and 2017. The process of considering route options between Narromine and Curban comprised three key steps, with the options considered in the next step dependent on the outcome of the preceding step:

1. Options via Gilgandra (should the route go via Gilgandra)?
2. Options between Burroway and Curban.
3. Options near Gilmours Road.

The overall process for selecting the study area between Narromine and Curban is summarised in Figure 2.7. Further information is provided in the following sections.

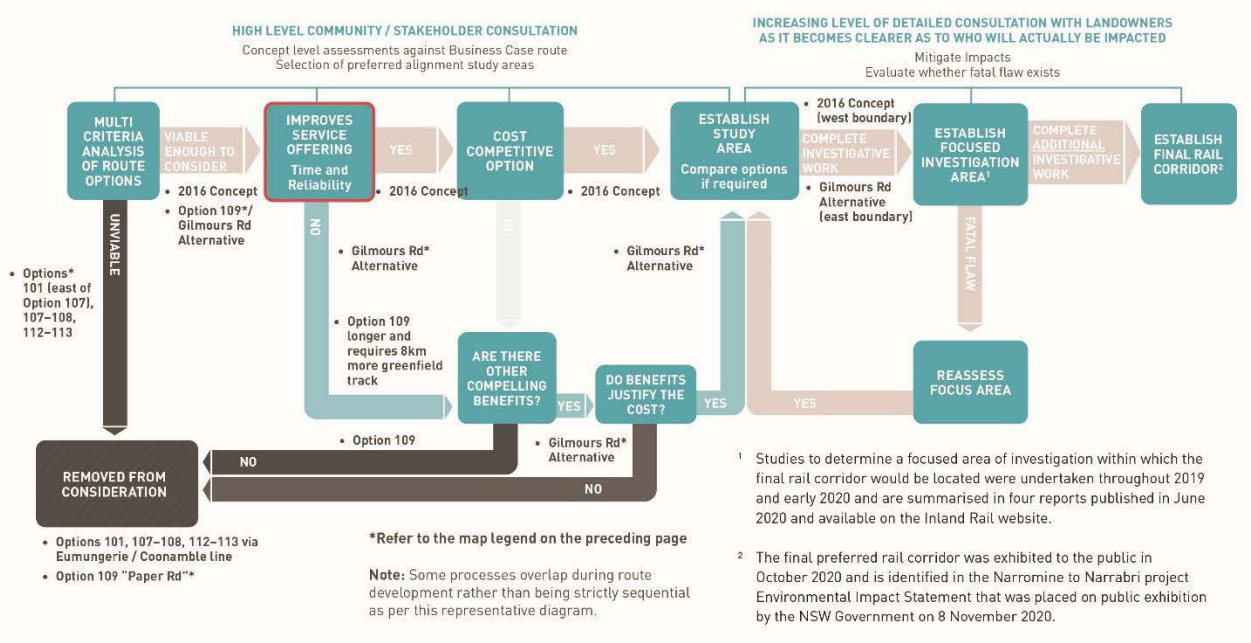

Figure 2.7 Route option analysis summary – Narromine to Curban

Step 1 – options via Gilgandra

During 2016, seven options that used various lengths of the Dubbo to Coonamble line south of Curban (options 101 to 107) were assessed against the 2016 concept alignment (see Figure 2.8).

Some of the alternative options joined the existing rail line in the vicinity of Eumungerie, while others joined it closer to Dubbo. The 2016 concept alignment went to the west of Narromine and used part of the existing Narromine to Cobar line, before travelling north to Curban via Burroway.

These options were considered at the MCA workshops in October 2016 and December 2016 (see section 4.1.3). The 2016 concept alignment performed best, with all other options being less desirable due to longer distances, higher construction costs, operational interface issues, and potential noise and vibration issues through Gilgandra. All options had similar flooding issues and as a result flooding was not a differentiator.

As such, the 2016 concept alignment was preferred and that the preferred location for a route was to the west of Gilgandra and not via Dubbo or similar.

Step 2 – options between Burroway and Curban

Following on from the decision to remain west of Gilgandra (as described above), seven options between Burroway and Curban (see Figure 2.9) were considered at the December 2016 workshop. These included a new option 109 that was identified based on community input from people living near Burroway. Option 109 was further to the east of the 2016 concept alignment and was identified as an alternative that would potentially reduce property impacts by following existing property boundaries and Crown 'paper' roads.

During the workshop option 107 was not assessed as it is only provided a possible connection between other options and would only be further investigated subject to selection of a preferred route. In addition, options 108 and 113 were not assessed as they were intermediate options relative to options 101 and 109 and would only be further investigated subject to the selection of a preferred route. The remaining four options were assessed in the workshop and compared to the 2016 concept alignment.

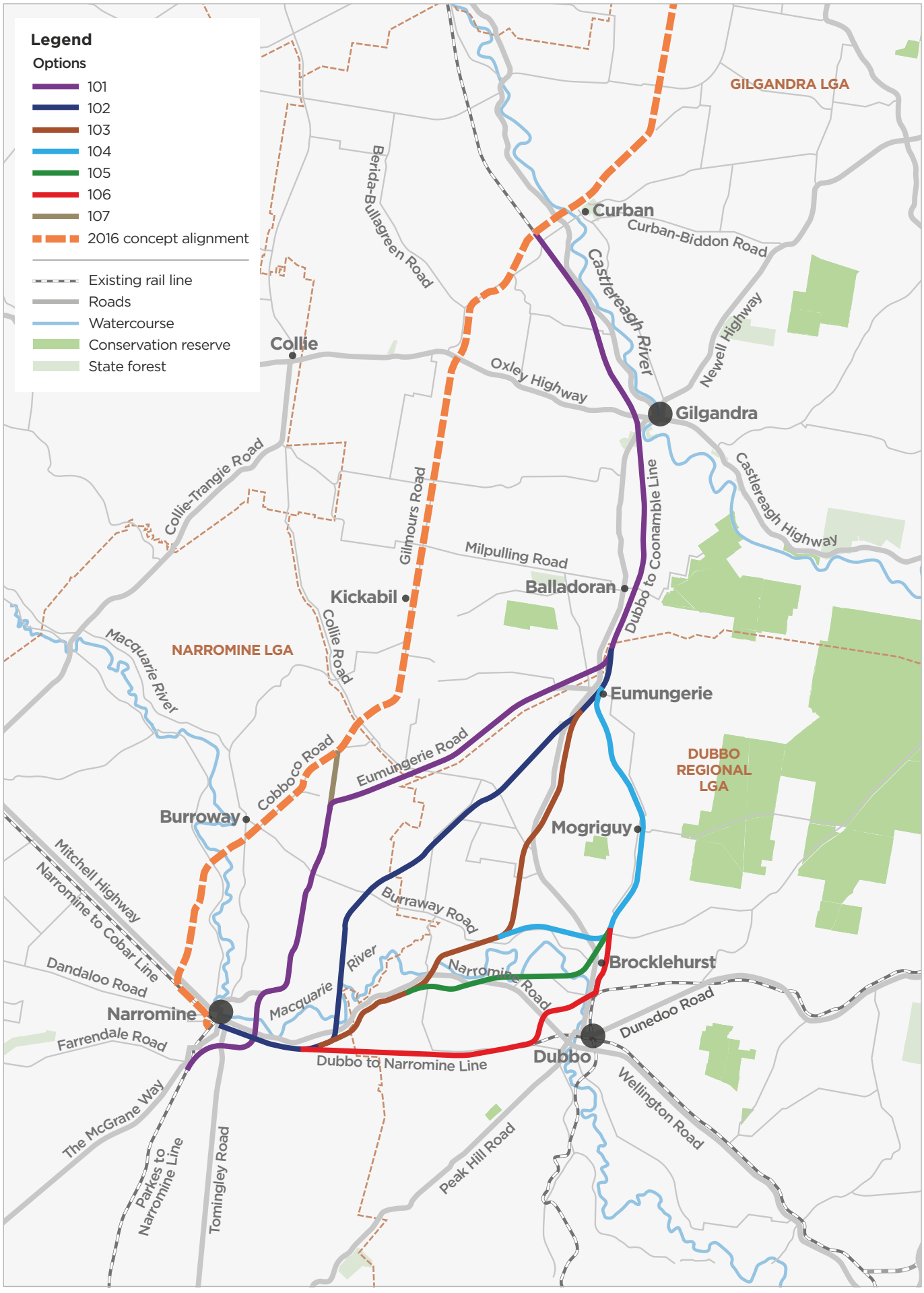

Figure 2.8 **Options via Gilgandra**

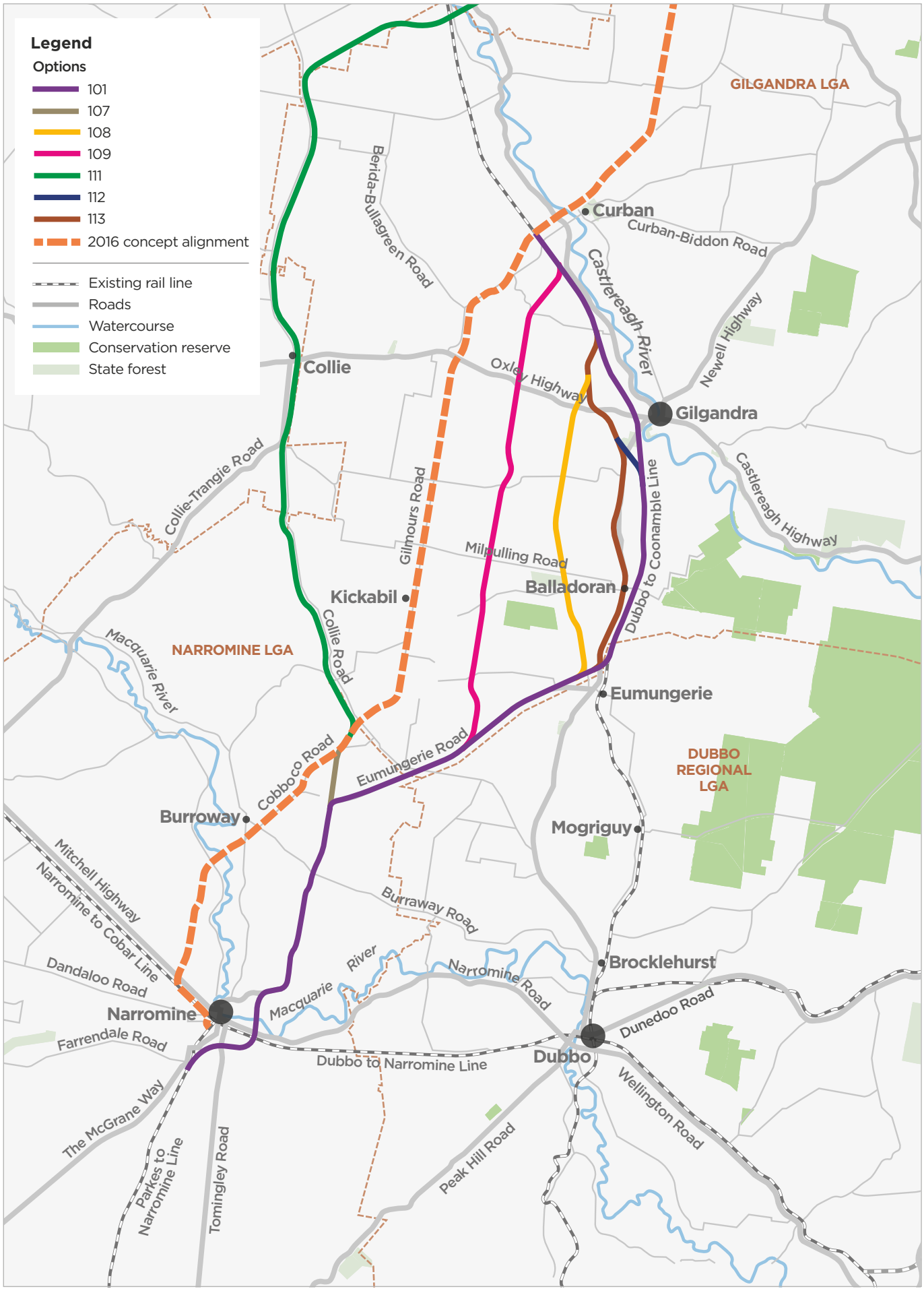

Figure 2.9 **Options between Burroway and Curban**

The workshop determined that the 2016 concept alignment and option 109 (with possible variations) would be retained for further investigation and consultation. Key reasons for eliminating the other options included, as relevant, increased transit time, higher construction complexity, increased complexity of interactions with existing roads and rail lines, and increased geotechnical and flooding risks.

Following further investigation and consideration, while option 109 did provide some benefits in terms of reduced property impacts, overall it was inferior to the 2016 concept alignment. Option 109 was longer, required an additional eight kilometres of greenfield route compared with the 2016 concept alignment, and presented more issues relating to constructability and environmental impacts (see analysis summary in Figure 2.10). As a result, the 2016 concept alignment remained the preferred option between Narromine and Curban.

Step 3 – options near Gilmours Road

In early 2017 a refinement of option 109 (as described above) was developed that maintained many of its advantages while being shorter. As a result, this new option was considered to present a reasonable alternative to the 2016 concept alignment. This option, which is shown on Figure 2.11, became known as the Gilmours Road alternative.

The Gilmours Road alternative was discussed with landowners and the community in March and April 2017. In general landowners did not support either the 2016 concept alignment (as modified to suit the decision to go east of Narromine described in section 2.4.1) or the Gilmours Road alternative. The Gilmours Road alternative and the 2016 concept alignment were assessed at the May 2017 MCA workshop. The assessment determined that while the Gilmours Road alternative was slightly longer (by about one kilometre) it offered several benefits, including following property boundaries to a greater extent compared with the modified 2016 concept alignment (see analysis summary in Figure 2.10). The options had similar flooding issues and as a result flooding was not a differentiator.

Accordingly, ARTC determined that the modified 2016 concept alignment and Gilmours Road alternative would be used as the western and eastern boundaries for the study area for this section, so that more detailed investigations to locate the preferred route could be undertaken during phase 2 of the options assessment process.

	Modified Concept Alignment Narromine to Curban (east around Narromine)		Narromine to Curban via Gilgandra (Option 101 (east of 109)), 112, 113)		Eumungerie Rd (Option 109)		Gilmours Rd Alternative (Option B)	
Distance	89km	○	105km 16km longer	●	90km 1km longer	○	90km 1km longer	○
Service Offering / Transit time	66 min	○	78 min 12 min longer	●	67 min <1 min longer	○	67 min <1 min longer	○
Construction Cost	$0m (for relativity)	○	+$64m	●	+$37m	●	+$37m	●
MCA Score (relative to Concept Alignment)	-	○	−3.56	●	+0.43 (Eumungerie Rd – Option 109)	●	+0.55 (Gilmours Rd Alternative – Option B)	●
Overall		○		●		○		○
Recommended		✓						✓

● Favourable ○ Neutral ● Unfavourable ● Highly unfavourable

Figure 2.10 Narromine to Curban – comparison of key options

Preferred option

Selection of the study area followed significant assessment of broad route options during 2016 and 2017. Ultimately ARTC recommended, and the Australian Government determined, that the study area between Narromine and Curban should be generally consistent with the 2016 concept alignment (as modified to suit the decision to go east of Narromine described in section 2.4.1). A wider study area near Gilmours Road (see Figure 2.21) was selected to provide opportunities to further minimise community and environmental impacts. This study area formed part of the study area for the Narromine to Narrabri section as a whole (see section 2.5). Further information on consultation undertaken with stakeholders about the preferred option is provided in section 4.2.

Figure 2.11 **Options near Gilmours Road**

2.4.3 Curban to Baradine / Gwabegar – should the route travel via Coonamble?

Overview

Another key decision was whether Inland Rail could make use of the northern section of the existing Dubbo to Coonamble line and travel via Gulargambone and/or Coonamble, noting that any existing rail line used would require significant upgrading to meet Inland Rail standards. The overall process for selecting the study area north of Curban is summarised in Figure 2.12. Further information is provided in the following sections.

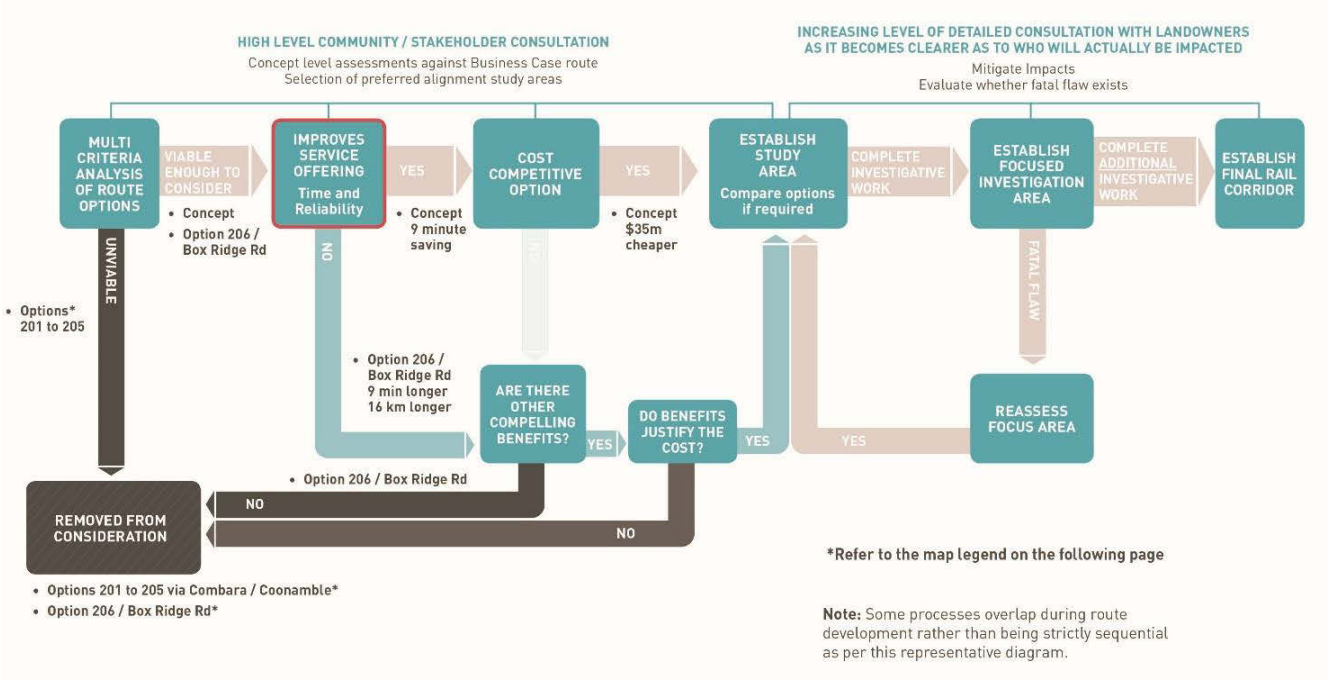

Figure 2.12 Route selection summary – via Coonamble

Routes via Coonamble

The MCA workshop in October 2016 considered a number of options that used the northern section of the Dubbo to Coonamble line (options 201 to 205 – see Figure 2.13).

These options were developed as alternatives to minimise private property impacts by using existing track if practicable. Flooding issues and other constraints in this section included:

- high productivity farmland immediately west of Curban
- interfaces with grain silos / sidings on the Dubbo to Coonamble line
- flooding from the Castlereagh River, particularly to the south of Coonamble
- areas of highly reactive (black) soils that are expected to increase in depth from east to west
- water volumes at creek crossings increase from east to west
- track possession requirements and impacts on grain movements to upgrade the Dubbo to Coonamble line to meet Inland Rail standards.

An option that used the Dubbo to Coonamble line as far as Combara (option 201) was assessed during the MCA workshop in October 2016 (see section 4.1.3). This option was ruled out as being inferior to the 2016 concept alignment, largely because of increased travel time (16 minutes) and the additional cost (estimated to be about $48 million) (see assessment summary in Figure 2.14).

On this basis, options 202 to 205, which were located closer to Coonamble, were also determined to be inferior to the 2016 concept alignment. As a result, these options were not assessed in detail as they all had at least the same time penalty or worse than option 201 and would all incur the same or higher added cost.

Each of these options also included a need for new greenfield sections to meet the 2016 concept alignment to the north of Curban (see section 2.4.4).

Accordingly, options 201 to 205 were discounted after the first MCA workshop in October 2016.

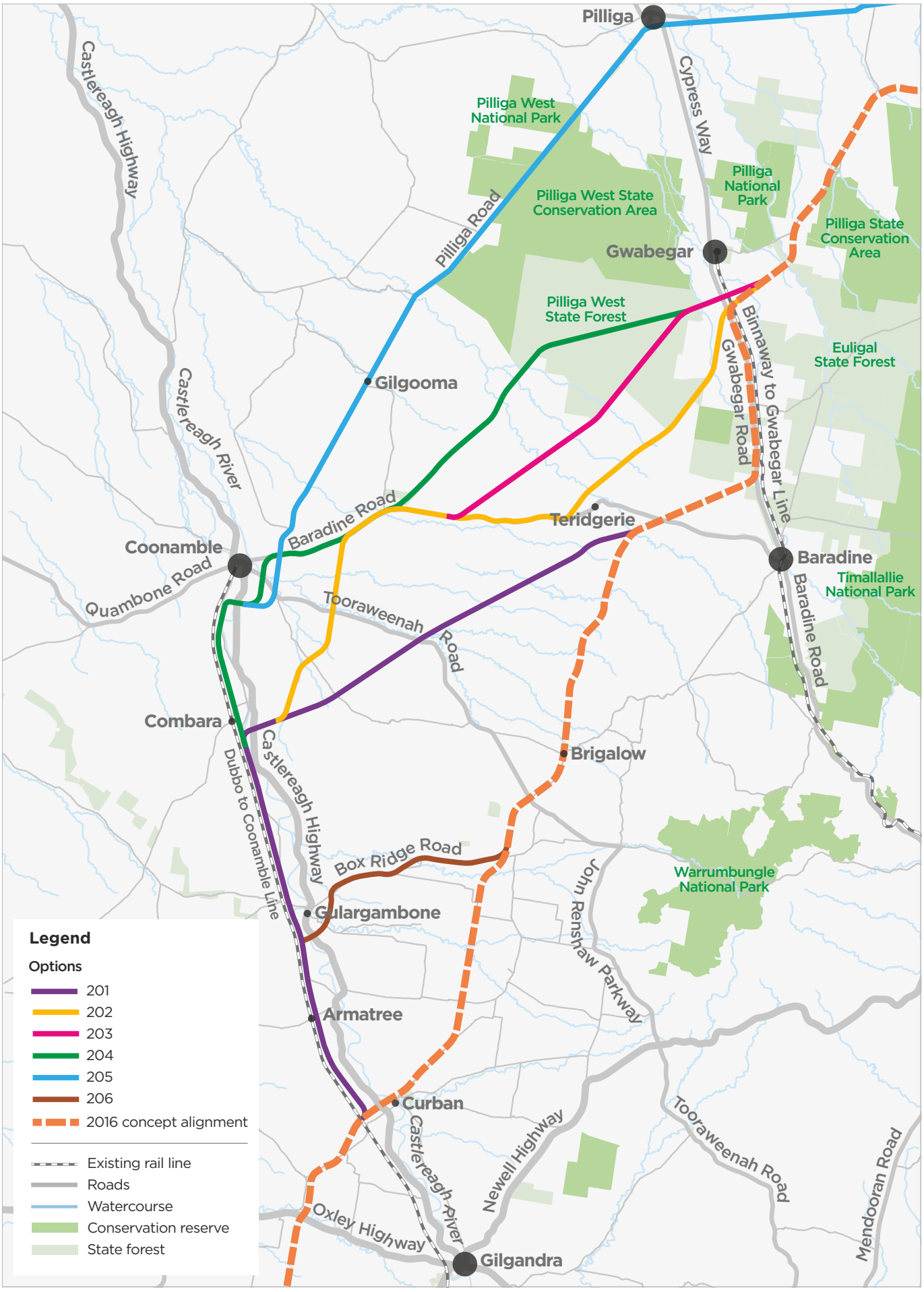

Figure 2.13 **Options via Coonamble**

Routes via Gulargambone

An option that used a shorter section of the Dubbo to Coonamble line as far as Gulargambone (option 206 – the Box Ridge Road option) remained under evaluation until the final MCA workshop in May 2017. This option is also shown on Figure 2.13.

Flooding issues and other constraints in this section are the same as described above for routes via Coonamble.

While the Box Ridge Road option performed better than options that used a greater length of the Dubbo to Coonamble line, the transit time benefit (nine minutes) and capital cost saving ($35 million) of the 2016 concept alignment were still significant, and the MCA score in the MCA workshop also favoured the 2016 concept alignment (see assessment summary in Figure 2.14).

Accordingly, the 2016 concept alignment was the preferred option for the Curban to Baradine / Gwabegar section.

	2016 Concept Alignment Curban to Gwabegar Rd		Via Combara (Option 201)		Via Gulargambone and Box Ridge Rd (Option 206)	
Distance	82km	○	104km 21km longer	●	98km 16km longer	●
Service Offering / Transit time	61 min	○	77 min 16 min longer	●	70 min 9 min longer	●
Construction Cost	$0m (for relativity)	○	+$48m	●	+$35m	●
MCA Score* (relative to Concept)	-	○	−1.32 (at best)	●	-0.27	○
Overall		○		●		●
Recommended		✓				

* Relative to 2016 Concept Alignment

- Favourable
- Neutral
- Unfavourable
- Highly unfavourable

Figure 2.14 Options via Coonamble – comparison of key options

Economic costs versus benefits of going via Coonamble

The analysis of options proposed for Inland Rail to go via Coonamble show that even relatively small increases in transit time and distance translate into significant economic disbenefit over the life of Inland Rail. Further information about the importance of transit time in the route selection process is provided in section 2.1.1.

In November 2017, the Australian Government announced the study area for the Inland Rail route between Narromine and Narrabri (see section 2.5). This included a direct alignment from Curban to near Baradine.

In July 2018, another alternative route for this section was proposed for Inland Rail to use the Dubbo to Coonamble line and go via or close to Coonamble and then (via a new section of greenfield route) near Gwabegar to join the 2016 concept alignment.

ARTC analysis of this option indicated that it would add 24 minutes in transit time and 39 kilometres in distance relative to the 2016 concept alignment and would cost an additional $56 million to construct.

ARTC undertook an assessment of the proposed alternative route using a benefit-cost approach to examine the impacts of incremental capital cost and added distance to the economic benefits or disbenefits of the Inland Rail route.

The assessment estimated that this additional 39 kilometres in distance would produce an economic disbenefit of about $450 million relative to the 2016 concept alignment, over an evaluation period to 2080 (Present Value at a four per cent discount rate, being the core discount rate in the Business Case). Based on the additional capital cost of $56 million, this represents a benefit-cost ratio of minus 8.2, meaning there is an economic loss of more than eight times the value of the investment in construction. Further information is provided in Appendix C.

ARTC also undertook additional analysis of existing freight volumes on the Dubbo to Coonamble line and the potential freight savings from upgrading the Dubbo to Coonamble line. Overall, the analysis showed that upgrading the existing line is more cost effective and delivers the benefits that would be achieved by routing Inland Rail via or close to Coonamble without incurring the $450 million economic disbenefit of doing so. Further information is provided in Appendix D and Appendix E.

Preferred option

Selection of the study area followed significant assessment of broad route options during 2016 and 2017. Ultimately ARTC recommended, and the Australian Government determined, that the study area between Curban and Baradine / Gwabegar would not go via Coonamble or Gulargambone, with the 2016 concept alignment being retained. This study area formed part of the study area for the Narromine to Narrabri section as a whole (see section 2.5). Further information on consultation undertaken with stakeholders about the preferred option is provided in section 4.2.

2.4.4 Curban to Baradine / Gwabegar via Mount Tenandra

Overview

Once the option of going via or towards Coonamble had been discounted (see section 2.4.3), the question remained as to how best to get from Curban to Baradine / Gwabegar. A route via Mount Tenandra was considered the most appropriate.

An alignment between Mount Tenandra and Baradine is constrained by the foothills of the Warrumbungle Range to the east and poor draining areas to the west. As such, there are few practical corridor options in this section and those that were identified broadly followed the 2016 concept alignment. Various alignment refinements were assessed within this section to target better ground conditions (see Figure 2.15). All options had similar flooding issues and as a result flooding was not a differentiator.

Preferred option

Selection of the study area followed significant assessment of broad route options during 2016 and 2017. Ultimately ARTC recommended, and the Australian Government determined, that the study area between Curban and Baradine / Gwabegar via Mount Tenandra would be generally consistent with the 2016 concept alignment. A wider study area of up to about four kilometres near Mount Tenandra and Black Hollow (see Figure 2.21) was identified to provide opportunities to further minimise community and environmental impacts. This study area formed part of the study area for the Narromine to Narrabri section as a whole (see section 2.5). Further information on consultation undertaken with stakeholders about the preferred option is provided in section 4.2.

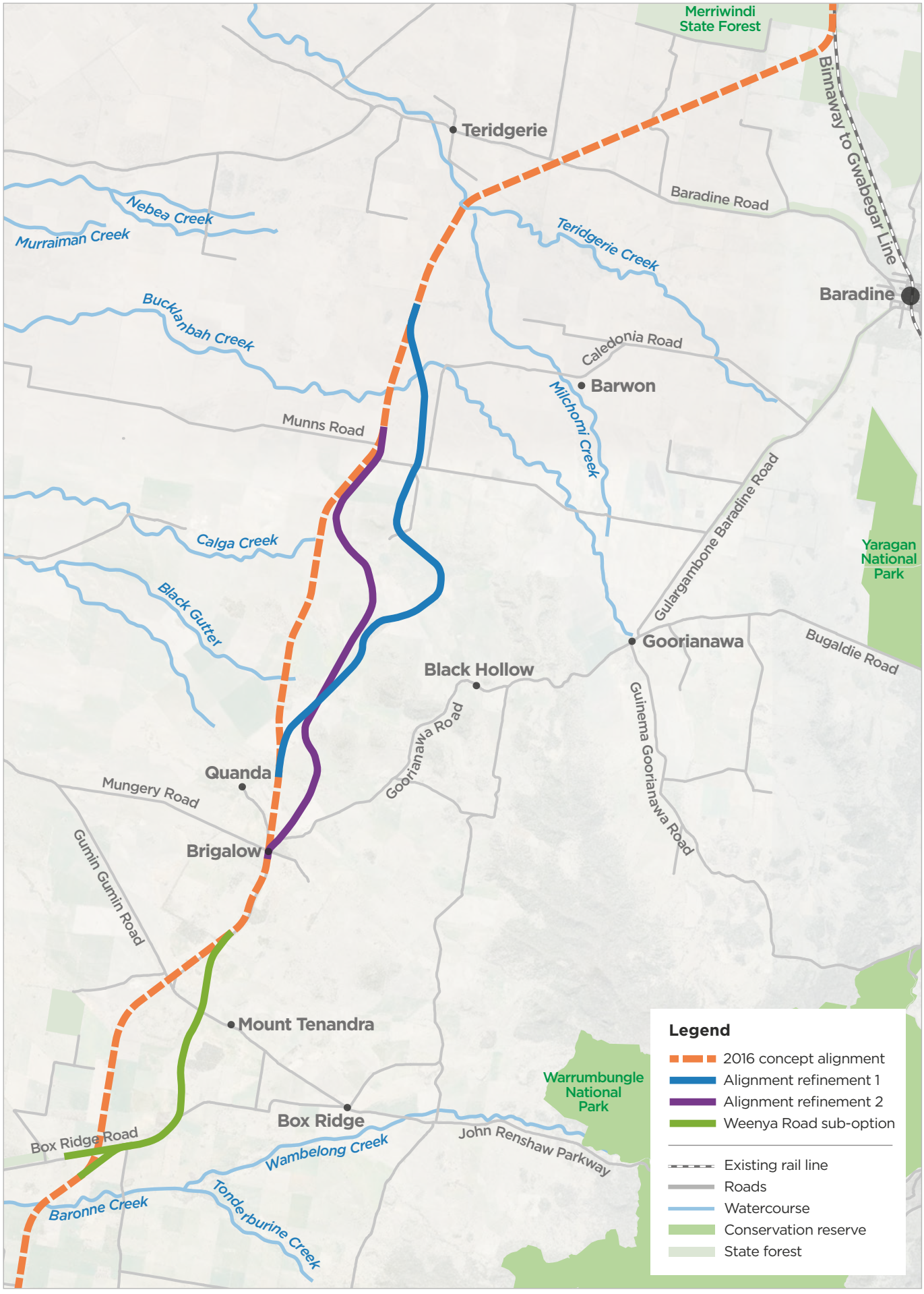

Figure 2.15 **Curban to Baradine and Gwabegar**

2.4.5 Baradine / Gwabegar to Narrabri – should the route travel through the Pilliga?

Overview

A key outcome of community (including landowner/landholder) consultation during 2016 was strong support for a route through the Pilliga forests, as this would significantly reduce private property impacts in surrounding areas (see section 4.2 for further information). As such, various options through the Pilliga forests were identified and considered compared with the 2016 concept alignment.

The overall process for selecting the study area for this section is summarised below. Further details on the route selection process, including stakeholder engagement, can be sourced from the MCA reports (see Table 4.1) and the *Inland Rail Route History 2006 – 2021* (ARTC, 2022) (available at: **Route history of Inland Rail 2006-2021 - Inland Rail (artc.com.au)**).

Consideration of key constraints and opportunities

From Baradine / Gwabegar, the 2016 concept alignment runs in a north-easterly direction across farmland and scattered forests towards Narrabri. To the west of Narrabri it interacts with numerous small properties, particularly along Yarrie Lake Road. The final 10 kilometres used the existing Narrabri to Walgett rail corridor to minimise impacts on properties (see Figure 2.17).

Based on community feedback on the 2016 concept alignment (see section 4.2 for further information), and following further consultation with key stakeholders (including the Forestry Corporation of NSW), various route options through the Pilliga forests were identified (options 401 to 409 – see Figure 2.17).

The identified advantages of a route through the Pilliga forests relative to the 2016 concept alignment included:

- reduction in level crossings and private property impacts
- reduction in noise and vibration impacts to residences
- property acquisition from one landowner over a length of about 80 kilometres (i.e. fewer properties subject to acquisition)
- improved geotechnical conditions on weathered sandstone
- reduced hydrology impacts, being higher in the catchment
- opportunities for balanced cut to fill earthworks through more undulating terrain.

The key constraints in this area included:

- cumulative environmental impacts from multiple activities within the Pilliga forests, including the proposed Santos coal seam gas project and forest operations
- biodiversity impacts through the Pilliga forests and proximity to state conservation areas and national parks
- potential bushfire risks through the Pilliga forests
- potential for unrecorded Aboriginal sites
- potential impacts to the CSIRO Compact Array telescope to the west of Narrabri
- need to avoid the Santos coal seam gas development and associated infrastructure
- property and amenity impacts to the numerous small properties located to the west of Narrabri
- effect on forestry operations
- potential flooding from Bohena Creek
- interaction with the Newell Highway
- complex interaction between highways and rail lines near Narrabri.

Options assessment

Various route options through the Pilliga forests were assessed compared to the 2016 concept alignment at the MCA workshops in October 2016, December 2016 and May 2017 (see section 4.1.3). All three assessments demonstrated that the Pilliga forest options performed strongly relative to the 2016 concept alignment as summarised below:

- At the October 2016 workshop, the options that generally followed Pilliga Forest Way (options 403 and 404) and those that took a more direct route through the forests (options 408 and 409) (see Figure 2.17) were identified as being the best performing options and would be retained for further investigation and consultation. In addition, it was also agreed to retain a variant of option 401 for further consideration, to provide an option to leave the Pilliga forests to the north and re-join the Narrabri to Walgett line to the west of Narrabri.
- At the December 2016 workshop, options 403a and 404a (minor variants options 403 and 404), options 408 and 409, and option 413 (a variant to option 401) were compared with the 2016 concept alignment (see Figure 2.17). All of the Pilliga forest options were identified as being favourable and were retained for further investigation and consultation.

- At the May 2017 workshop, following further investigation and consultation, two options based on those retained at the October 2016 workshop were identified and assessed with the 2016 concept alignment. These options were referred to as the Pilliga State Forest / Newell Highway option (a variant of options 403 and 403a) and the Pilliga State Forest / Twenty Foot Road option (a variant of option 413) (see Figure 2.18). The workshop determined that the Pilliga State Forest / Newell Highway option (option 403/403a) was preferred for the key reasons summarised in Figure 2.16.

In summary, while the options through the Pilliga forests were identified to generally perform worse against the environmental and heritage criteria, the key reasons why they performed better than the 2016 concept alignment (located to the west and north of the Pilliga forests) and were preferred at all workshops were a result of:

- shorter distance and improved transit time
- lower construction costs
- fewer public and private road interactions that would require level crossings
- less property impacts, particularly along Yarrie Lake Road where the 2016 concept alignment impacted numerous rural properties.

During 2020, further route refinement resulted in additional improvements to the alignment and a marginal further reduction in transit time of one minute, to give a total transit time saving of about seven minutes and 20 seconds relative to the 2016 concept alignment in this section.

	2016 Concept Alignment		Via Pilliga Forest/Newell Highway (Route 403 and 403a)	
Distance	132.6km	○	119.1km (13.5km shorter)	●
Service offering /Transit time	c. 75 min	○	c. 69 min (6min 20sec quicker)	●
Construction cost	$0m (for relativity)	○	-$83m	●
MCA score (relative to Concept Alignment)	-	○	+3.18	●
Number of private properties	66	○	31	●
Total number of lots impacted	88	○	76	●
Total impacted area	399ha	○	260ha	●
Total length in floodplain	6.8km	○	6.3km (500m less)	●
Total number of road crossings	57	○	54	●
Overall		○		●
Recommended				✓

● Favourable ● Unfavourable ○ Neutral ● Highly unfavourable

Figure 2.16 Baradine / Gwabegar to Narrabri options – comparison of key options

Preferred option

Selection of the study area followed significant assessment of broad route options during 2016 and 2017. Ultimately ARTC recommended that the study area between Baradine / Gwabegar and Narrabri should be through the Pilliga forests rather than to the west and north.

The study area was widened to about 4.5 kilometres near the northern end of the Pilliga forests (as shown in Figure 2.21) to provide opportunities to further minimise impacts to the Newell Highway and the proposed Santos project. This study area formed part of the study area for the Narromine to Narrabri section as a whole (see section 2.5). Further information on consultation undertaken with stakeholders about the preferred option is provided in section 4.2.

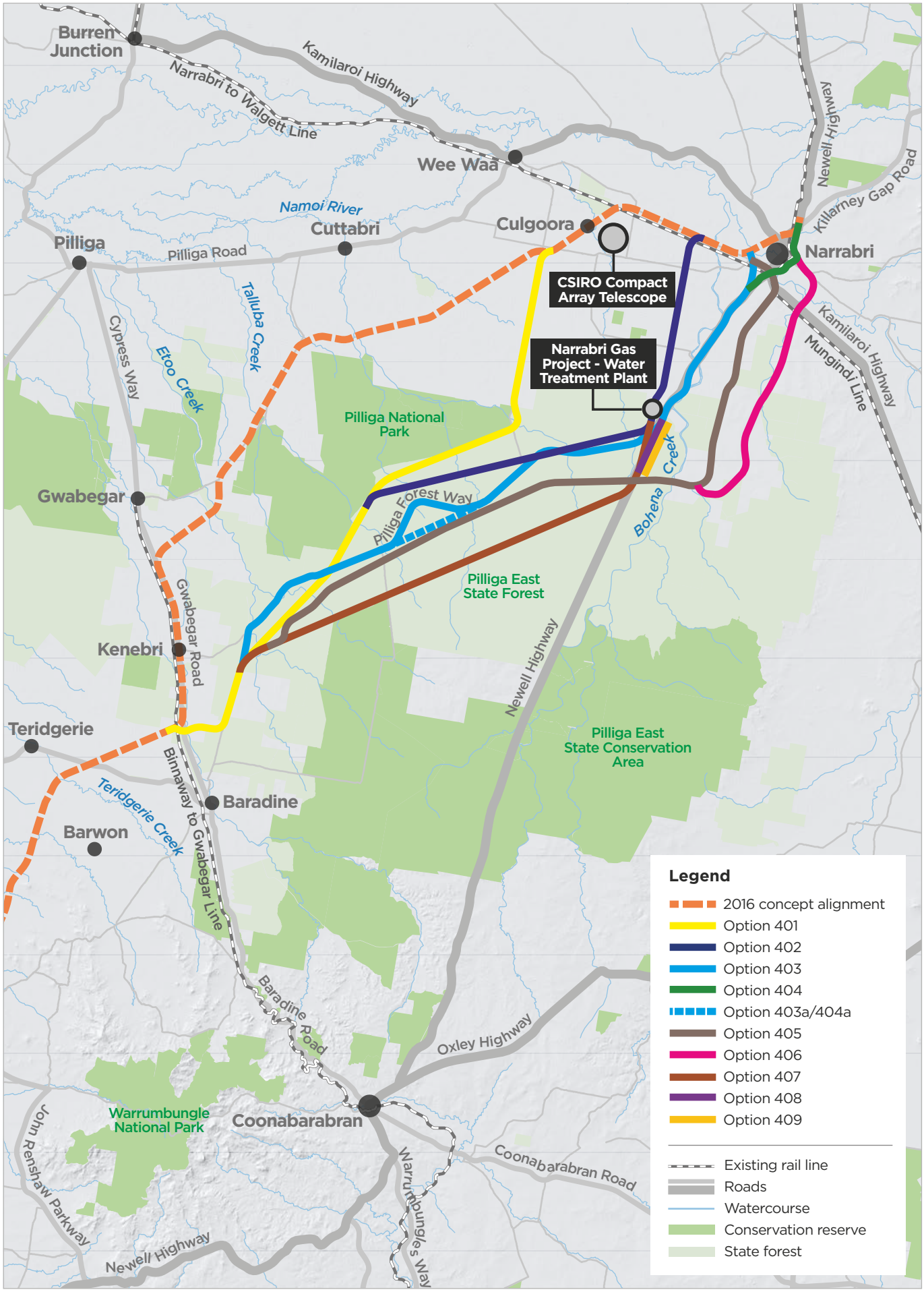

Figure 2.17 **Baradine / Gwabegar to Narrabri – initial options considered**

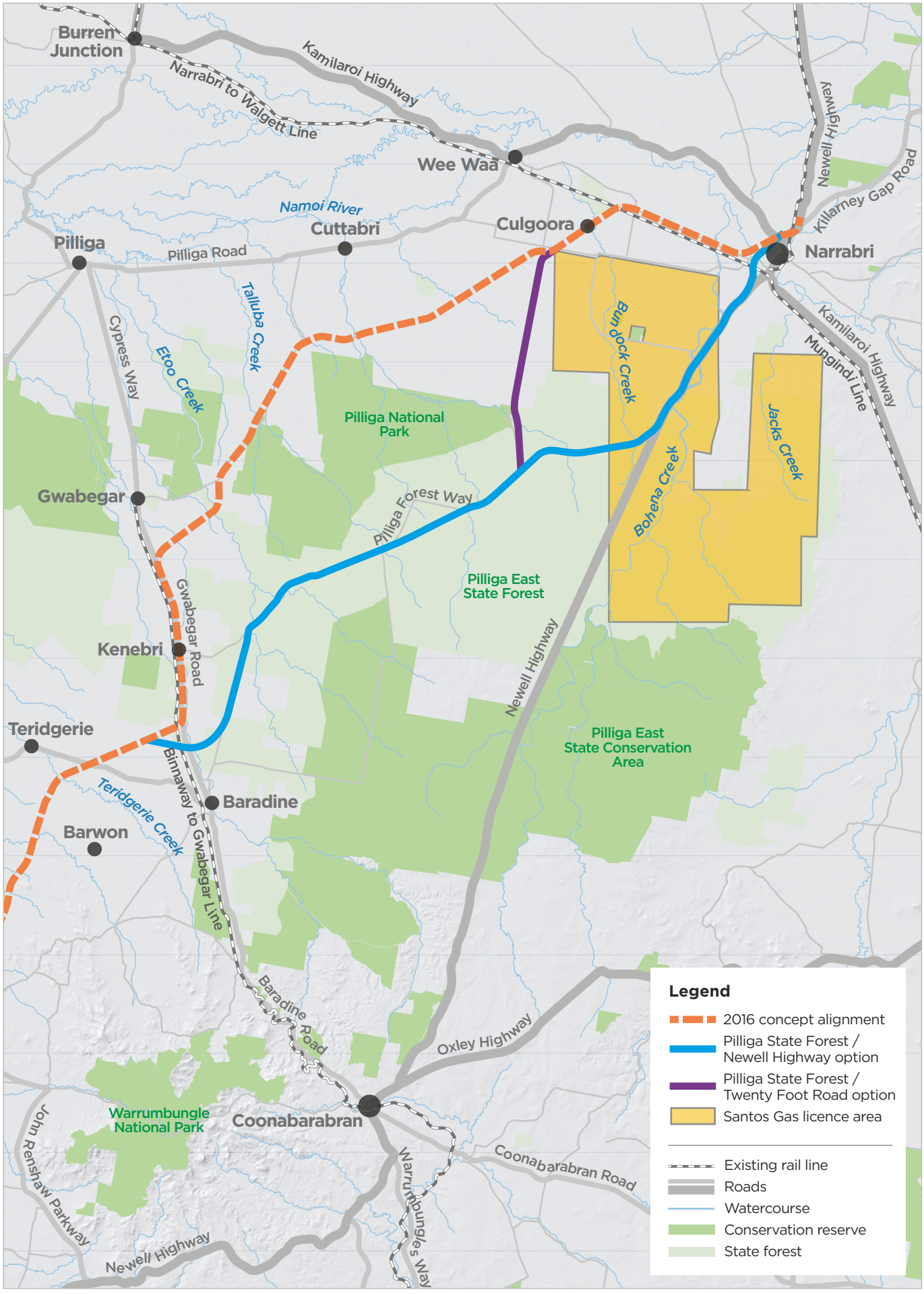

Figure 2.18 **Baradine / Gwabegar to Narrabri – final options considered**

2.4.6 Selection of study area near Narrabri

Overview

A number of options near Narrabri were considered and assessed during 2016 and 2017. Options to the east, west and through Narrabri were considered.

Detailed advice and investigations relating to flooding and other factors (see sections 4.2 and 4.3 for further information) were taken into account by ARTC as part of the process of developing, analysing and assessing route options in Phase 1, including the route options near Narrabri.

The process for selecting the study area near Narrabri is summarised in the following sections.

Consideration of flooding issues and other key constraints and opportunities

Flood levels and extents associated with the Namoi River, Narrabri Creek and associated tributaries were a key consideration. It was noted that there is an existing high flooding risk in the vicinity of Narrabri and that any options downstream of the town could exacerbate this risk. This would require a long bridge to traverse the floodplain and pass over the Kamilaroi Highway. It was also noted that Narrabri Shire Council was currently in the process of updating the flood management study for the town.

Other key constraints considered in the development and assessment of options near Narrabri included:

- proposed future growth area to the east of Narrabri
- potential noise and vibration impacts for residences and other sensitive receivers for all options
- severance issues and height clearances for existing structures for options through Narrabri
- visual impacts for all options
- interaction with Narrabri Airport for options to the east of Narrabri
- condition of existing rail assets for compliance with the Inland Rail Service Offering, including track condition, existing bridges and viaducts, and potential alignment constraints that may require speed restrictions for options through Narrabri
- grade separations (bridges) for the Newell and Kamilaroi highways and other major roads
- geotechnical and soil conditions that would affect the design of the track formation and structures and constructability where options cross the floodplain.

Options assessment

As described below, options around Narrabri were considered by the MCA workshops held in October 2016 and December 2016, and further investigations were undertaken during 2017.

MCA workshop – October 2016

At the October 2016 workshop it was noted that selection of a preferred option near Narrabri was dependent on the selection process between Baradine / Gwabegar and Narrabri (see section 2.4.5). As such, no separate MCA assessment was undertaken. However, the following three broad options (see Figure 2.19) were discussed:

- West Narrabri – crossing the floodplain to the west of town as per the 2016 concept alignment.
- Central Narrabri – use existing rail line through town and modify structures to meet increased clearances for trains carrying double stacked containers.
- East Narrabri – alignments on the eastern side of town.

All options were initially considered to be viable and would require further investigations and consultation to better understand the constraints and opportunities. However, following further investigations after the workshop, the central Narrabri option (using the existing rail line) was discounted and was not taken forward for further discussion with stakeholders and the community. This was mainly due to the existing alignment and level crossings resulting in speed restrictions in the order of 10 to 20 kilometres per hour, potential impacts on existing level crossings, and the modifications to infrastructure that would be required to accommodate Inland Rail traffic. Other issues included the potential for community amenity and land use severance impacts for an option through Narrabri.

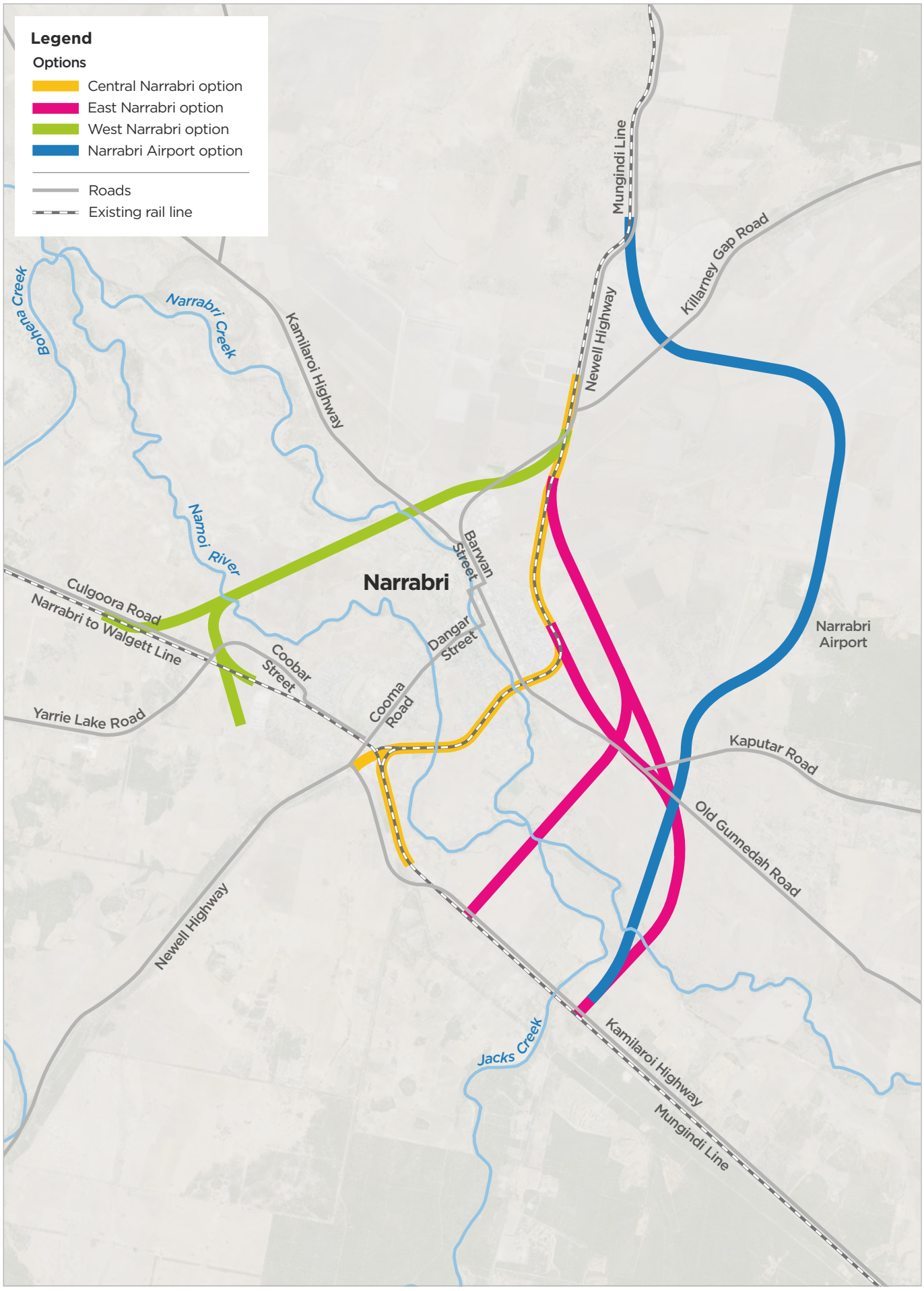

Figure 2.19 **Narrabri – initial options considered**

MCA workshop – December 2016

The following options (see Figure 2.19) were assessed at the MCA workshop:

- West Narrabri – an alignment crossing the floodplain to the west of Narrabri as per the 2016 concept alignment.
- East Narrabri – an alignment to the east of Narrabri between the airport and town.

The Narrabri Airport option was not assessed as it would be further considered if the east Narrabri option was preferred.

The west Narrabri option performed better than the east Narrabri option across all of the MCA criteria. While it was noted that the east Narrabri option would require less drainage infrastructure to mitigate potential flood impacts, the key factors influencing the performance of the east Narrabri option were that it would:

- require two additional grade separations of the Newell Highway
- impact on utilities
- require a potential grade separation of the Narrabri – Werris Creek rail line, which would reduce connectivity with Inland Rail
- affect future growth areas to the east of Narrabri.

The 2016 concept alignment included a four kilometre long bridge over the Namoi River and Narrabri Creek flood plains to the west of Narrabri. It was noted that this is a significant structure requiring further consideration of:

- flooding impacts
- geotechnical conditions
- topographical survey
- noise and vibration impacts
- Aboriginal heritage assessment and consultation
- continued consultation with landowners, the community and key stakeholders.

It was resolved to undertake this further investigation and it was noted that this may result in alternative alignments for crossing of the floodplain.

Further investigations during 2017 – options to the far west of Narrabri

Following the December 2016 MCA workshop, additional locations were investigated for a crossing of the Namoi River / Narrabri Creek to the west of Narrabri (options 501 to 505) in response to feedback from stakeholder consultation. These locations are shown in Figure 2.20, together with the extent of the area that would be covered in a one per cent AEP flood event.

The investigations resulted in the following conclusions:

- The modified 2016 concept alignment (as modified to suit the decision to go through the Pilliga forests as described in section 2.4.5) is located at the narrowest part of the one per cent AEP flood extent. Route options 501, 502 and 503 would involve longer crossings and consequently would be expected to require longer bridges.
- All options downstream of the modified 2016 concept alignment would be expected to have higher flood volumes as the catchment size increases, particularly after the confluence of Bohena Creek.
- Options 504 and 505 cross the floodplain at similar locations but connect to the existing Mungindi line about five kilometres further north than the modified 2016 concept alignment and had less opportunities to follow existing roads which would have resulted in property severance issues. As a result, they have greater property impacts.
- Options further to the west offer no significant advantages compared with the modified 2016 concept alignment.

On this basis, the modified 2016 concept alignment remained the preferred option for crossing the floodplain to the west of Narrabri.

Preferred option

Selection of the study area followed significant assessment of broad route options during 2016 and 2017. Ultimately ARTC recommended that the study area should be located to the west of Narrabri, consistent with the modified 2016 concept alignment.

The study area was widened to about 2.3 kilometres (see Figure 2.21) to provide opportunities to further minimise flooding, community and environmental impacts. This study area formed part of the study area for the Narromine to Narrabri section as a whole (see section 2.5). Further information on consultation undertaken with stakeholders about the preferred option is provided in section 4.2.

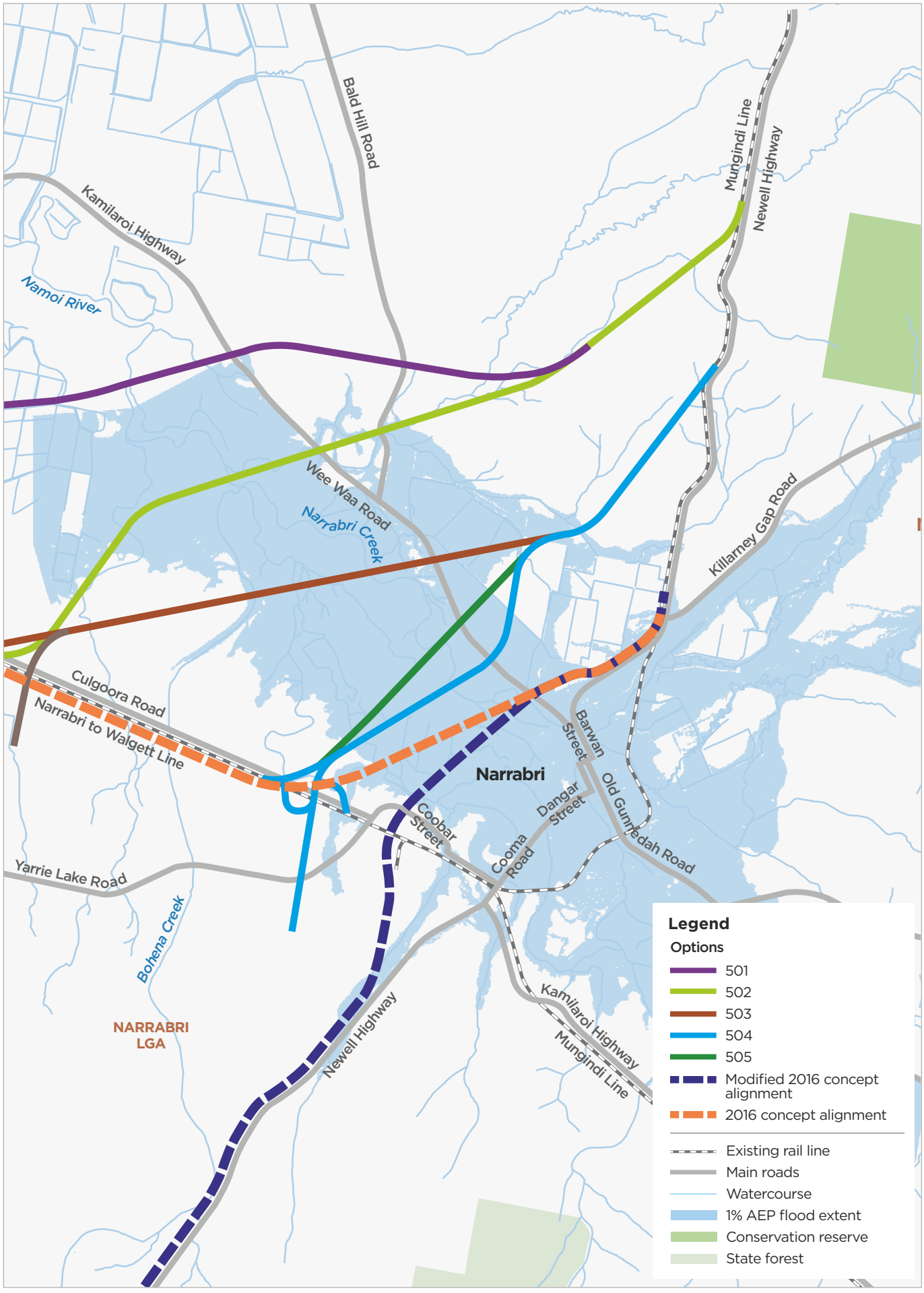

Figure 2.20 **Narrabri - far western options**

2.5 Government announcement of the study area

Confirmation of the study area followed significant assessment of broad route options during 2016 and 2017, as described in sections 2.3 and 2.4. At the end of phase 1, while a preferred option had been selected in some locations, a wide study area was defined to allow for a further phase of investigations to occur prior to finalising a preferred route (see Figure 2.21).

On 18 November 2017 the (then) Australian Minister for Infrastructure and Transport (Hon Darren Chester MP) announced the study area for the greenfield section of Inland Rail between Narromine and Narrabri. The study area was formally acknowledged by the NSW and Australian Governments in 2018.

The study area varied in width, from about five kilometres wide south and east of Narromine, to about 500 metres in other sections. The study area incorporated a combination of the 2016 concept alignment and various alternative options, as described in sections 2.3 and 2.4. The most significant variations from the concept alignment are that it included the eastern option around Narromine (with an expanded five kilometre wide study area) and the Pilliga forests option between Baradine and Narrabri.

Throughout 2019 and 2020 the study area was narrowed to the focused area of investigation (about 150 to 400 metres wide) and subsequently to the preferred final rail corridor described in the EIS. Further information about the options considered as part of these assessments is provided in section 3. Further information on consultation undertaken with stakeholders about the study area is provided in section 4.2.

Figure 2.21 **Study area confirmed by the Australian Government**

3. Alternative alignments considered for the preferred rail corridor

3.1 Reference design option assessment (phase 2) (2018-2020)

Following confirmation and announcement of the study area (as described in section 2.5), a necessary interim step was the identification of a narrowed 'focused area of investigation' (generally around 150 to 400 metres wide) within which the preferred rail corridor (generally a minimum of 40 metres wide) would ultimately be located as reference designs and investigations progressed.

During phase 2, further investigations were undertaken within the study area shown in Figure 2.21 where property access was available. This was supported by targeted consultation with stakeholders and landholders.

3.1.1 Option identification process

The process of identifying and assessing options during phase 2 generally involved three stages:

- Stage 1 considered sub-sections of the overall study area where there were no feasible alternatives for the route.
- Stage 2 comprised sub-sections where alternatives had been identified, but where no land access was available for site investigations to inform the route selection process.
- Stage 3 comprised sections where alternatives had been identified and land access was available to undertake further investigations. This stage also included sub-sections where there were no feasible alternatives; however, a focused area of investigation could not be defined until the focused area of investigation in the adjoining sub-sections had been determined.

In some parts of the study area there were no feasible route alternatives. In other parts of the study area a number of options were considered, including those assessed and retained for further consideration during phase 1 (as described in sections 2.3 and 2.4). In some parts of the study area, such as areas to the south and east of Narromine, additional options were identified following meetings with landholders and other stakeholders.

Options were identified and assessed across five discrete geographic sections, which were further divided into 14 discrete sub-sections, as shown in Figure 3.1.

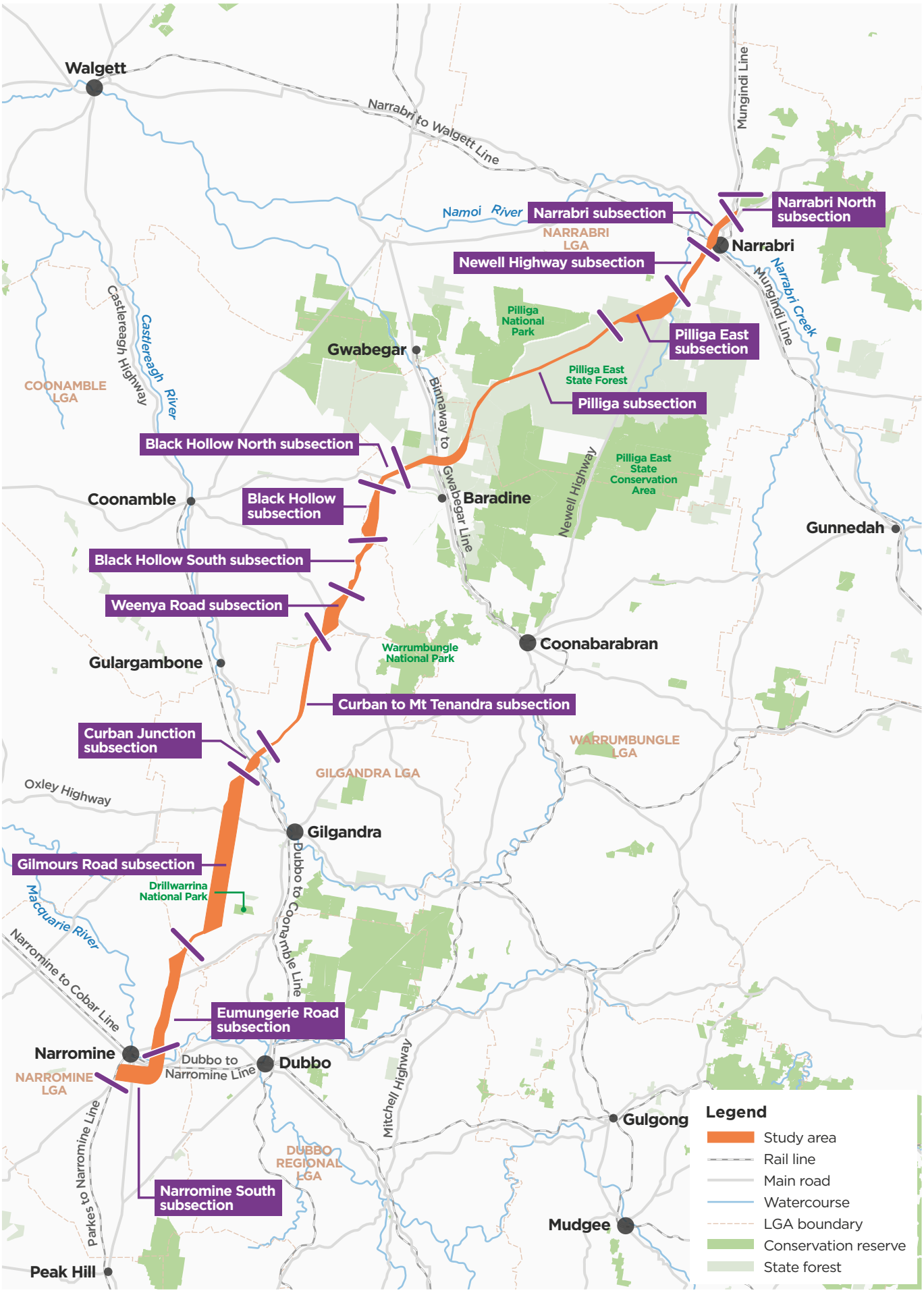

Figure 3.1 **Sections of the phase 2 option assessment**

3.1.2 Options assessment

The options for an alignment within the study area were refined and assessed during MCA workshops in 2019, with consideration of the assessment factors and criteria described in section 4. Feedback from consultation (described in section 4.2), including community information sessions and meetings with affected landholders, was considered in the MCA workshops. Additional environmental and engineering field surveys were also undertaken and considered in the MCA workshops (see section 4.3 for further information).

Table 3.1 summarises the route selection process undertaken during phase 2. The table shows (indicated by dots) what sub-sections were considered during each assessment stage (with each stage explained in section 3.1.1). For the majority of sub-sections, where there were feasible alternatives, the study area was relatively small and, as such, there were only minor differences between the options in relation to key considerations including flooding. Therefore, section 3.2 only provides further discussion in relation to Narromine and Narrabri.

Further information on the MCA workshops and processes undertaken during phase 2 is provided in section 4 and in the individual workshop reports. A detailed list of all options considered in each workshop/process is provided in Appendix A.

Table 3.1 Phase 2 options identification and assessment by sections

Section	Sub-section	Key considerations in identifying and assessing options	Stage 1 March 2019	Stage 2 Jan 2019	Stage 3 June 2019
Narromine to Burroway	Narromine South	Topography, length of bridge required to cross the Macquarie River, connectivity with the existing Parkes to Narromine Line, existing roads, geotechnical conditions, flooding, ecology, Aboriginal heritage, amenity (e.g. noise, air quality and visual) and property impacts (e.g. severance, access and acquisition).			●
	Eumungerie Road	Existing roads, property accesses, ecology, amenity and property impacts.			●
Burroway to Curban	Gilmours Road	Alignment, geotechnical conditions, availability of material for the rail formation, amenity and property impacts.		●	
Curban to Mount Tenandra	Curban Junction [1]	Geotechnical conditions, ecology, Aboriginal heritage, amenity and property impacts.			●
	Curban to Mount Tenandra	Minimising property severance and avoiding areas of poor geotechnical conditions.	●		
Mount Tenandra to Baradine	Weenya Road	Existing utilities, geotechnical conditions, construction complexity, availability of material for the rail formation, ecology, amenity and property impacts.		●	
	Mount Tenandra to Black Hollow	Minimising property severance and avoiding areas of poor geotechnical conditions.	●		
	Black Hollow	Existing utilities, construction complexity, ecology, amenity and property impacts.		●	
	Table Top Mountain to Baradine	Minimising property severance and avoiding areas of poor geotechnical conditions.	●		
Baradine to Narrabri	Pilliga Forest Way	Minimising property severance and avoiding areas of poor geotechnical conditions.	●		
	Pilliga East	Alignment length, travel time, ecology, amenity and property impacts.			●
	Newell Highway [1]	Geotechnical conditions, ecology, Aboriginal heritage, amenity and property impacts.			●

Section	Sub-section	Key considerations in identifying and assessing options	Stage 1 March 2019	Stage 2 Jan 2019	Stage 3 June 2019
	Narrabri	Length of bridge required to cross the floodplain, existing roads, connectivity with the existing Narrabri to Walgett Line, Narrabri waste management facility, geotechnical conditions, flooding, ecology, amenity and property impacts.			●
	Narrabri North [1]	Geotechnical conditions, ecology, Aboriginal heritage, amenity and property impacts.			●

Note 1: these sub-sections were considered in the Stage 3 report. While there were no viable alternatives, the focused area of investigation could not be defined until the preferred focused area of investigation in the adjacent sections were selected.

3.1.3 Confirming the preferred focus area for further investigations

As an outcome of the phase 2 assessment, a focus area for further investigations was confirmed. The focused area of investigation was typically 150 metres wide. It was wider in some areas to allow for design refinements to occur.

3.2 Key locational decisions made during this stage

3.2.1 Selection of rail corridor to the east of Narromine (2019-2020)

Overview

The study area determined by the Australian Government for the area to the east of Narromine (see section 2.5) was generally around five kilometres wide to enable location of the final preferred rail corridor in an area that met the Inland Rail Service Offering requirements and the design parameters set for the program relating to issues such as constructability and flood immunity.

Five options within the study area to the east or Narromine (see Figure 3.2) were considered at the MCA workshop in June 2019. The orange, green, light blue and yellow options were assessed against the dark blue option (referred to as the base case) using the MCA criteria (see section 4). The key differences between the options were the distance from Narromine and the point of crossing of the Macquarie River. The green and yellow options generally followed Pinedean Road on the southern edge of the study area before heading north and crossing the Macquarie River. The light blue and orange options generally followed Craigie Lea Lane before heading north and crossing the Macquarie River. The dark blue option (base case) traversed farmland closer to Narromine before heading north to cross the Macquarie River.

The workshop was informed by various desktop assessments, field investigations (including geotechnical, ecology and Aboriginal heritage), flooding and hydrology modelling, and feedback from community and stakeholder consultation (see sections 4.2 and 4.3 for further information).

Consideration of flooding issues and other key constraints and opportunities

Flooding, in particular the length of rail corridor that would be located within the one per cent AEP flood extent, was a key consideration in the assessment process. Mapping of the one per cent AEP flood extent relative to the options is provided in Figure 3.3.

Detailed consideration of options relative to one per cent AEP flood extent indicated that there were no significant differences between the options. The green option had the shortest length within the flood extent (about 9.5 kilometres), while the yellow option had the longest length within the flood extent (about 10.6 kilometres).

Other key considerations included utilities, geotechnical conditions, existing roads and rail lines, ecology, sensitive receivers, land use and property, and Aboriginal heritage.

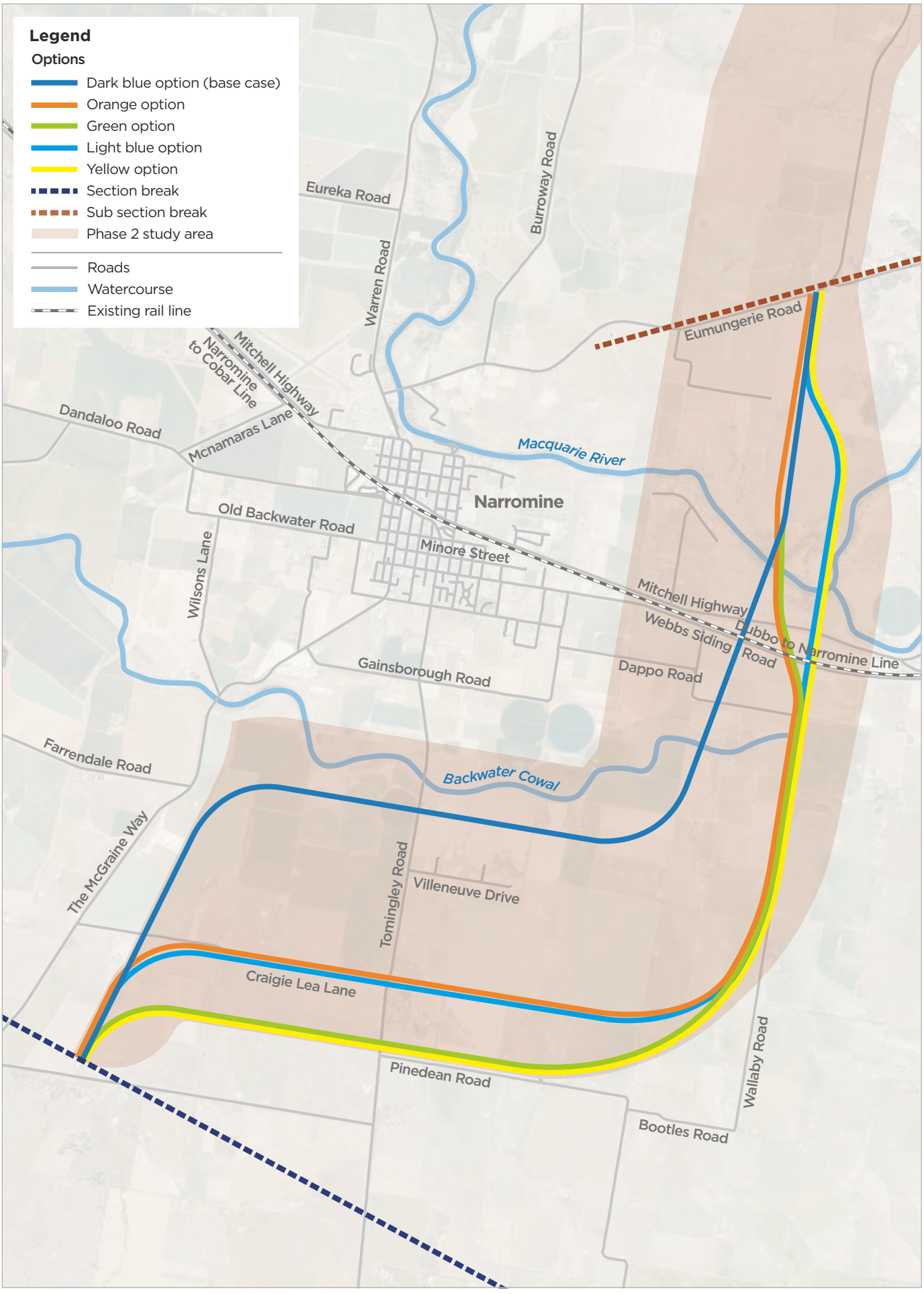

Figure 3.2 **Narromine - eastern options**

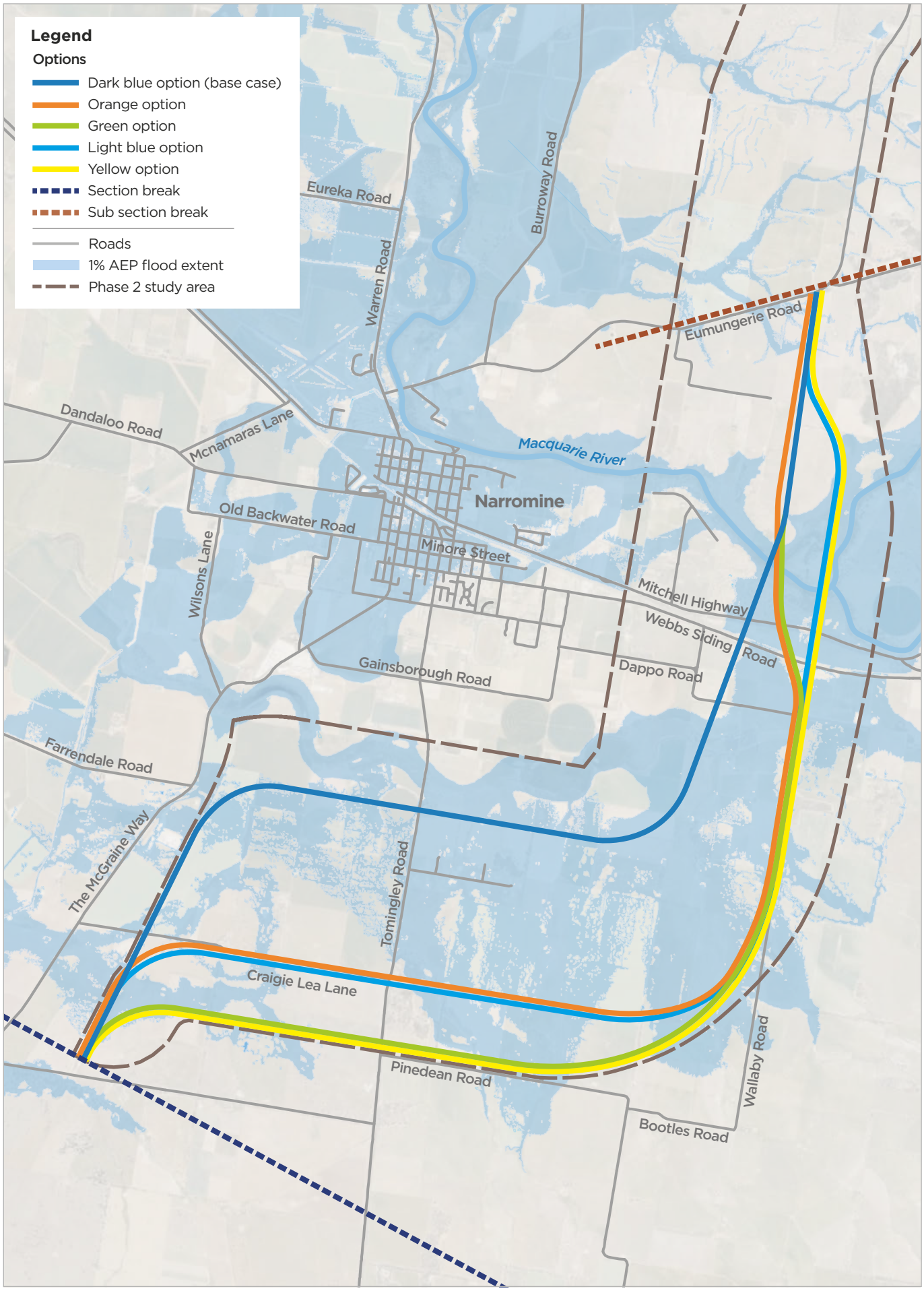

Figure 3.3 **Narromine eastern options – flood extents**

Options assessment

Key findings of the MCA workshop were as follows:

- All options scored positively relative to the base case (the dark blue option).
- The green option had the highest score followed by the orange option.
- The green and orange options crossed the Macquarie River with shorter bridge lengths, in the order of 1,200 metres long.
- The light blue and yellow options crossed the river further to the east, over flatter terrain. This would result in a longer structure, about 2,400 metres long. This additional structure length would result in additional cost and construction duration.
- The light blue and yellow options are further to the east of Narromine, with lower potential for amenity impacts on residential receivers.

The green and orange options were generally more desirable due to the shorter crossing of the Macquarie River. Given the closeness of the MCA scores the following factors were considered:

- The orange option followed Craigie Lea Lane and had about one kilometre more track located on the Parkes to Narromine line and one kilometre less greenfield track.
- The interfaces with the Parkes to Narromine railway were also considered. If a future rail connection were to be constructed from Inland Rail towards Narromine, Craigie Lea Lane may require closure, diversion and/or an active level crossing.
- Adopting the green option would result in the requirement for an active level crossing on Narwonah Siding Road.
- The green option had marginally better geotechnical conditions.
- The green option had less length within the one per cent AEP flood extent.

Preferred option

Based on the above considerations the green option was determined to be the preferred option to form the basis for the focused area of investigation near Narromine. The selected focused area of investigation for this section is shown in Figure 3.4. The area, which had a width of between about 200 and 550 metres, included a wider area at the crossing of the Macquarie River to allow for further investigations to minimise environmental and community impacts. Further information on consultation undertaken with stakeholders about the preferred option is provided in section 4.2.

Figure 3.4 **Narromine – eastern focused area of investigation**

3.2.2 Selection of rail corridor near Narrabri (2019 - 2020)

Overview

The study area determined by the Australian Government for the area to the west of Narrabri (see section 2.5) was generally around two kilometres wide to enable location of the final preferred rail corridor in an area that met the Inland Rail Service Offering requirements and the design parameters set for the program relating to issues such as constructability and flood immunity.

Five options within the study area to the west of Narrabri (see Figure 3.5) were considered at the MCA workshop in June 2019. The orange, green, purple and pink options were assessed against the dark blue option (referred to as the base case) using the MCA criteria (see section 4). The key differences between the options were the distance from the Newell Highway (south of Narrabri) and the point of crossing of the Narrabri Creek/Namoi River floodplain (west to Narrabri). The dark blue option (base case) generally followed the Newell Highway before heading around the western edge of Narrabri, while the other four options traversed farmland before crossing the floodplain at various distances from Narrabri. Across the floodplain most options were located relatively close to Narrabri while the purple option was located on the western edge of the study area.

The workshop was informed by various desktop assessments, field investigations (including geotechnical, ecology and Aboriginal heritage), flooding and hydrology modelling, and feedback from community and stakeholder consultation (see sections 4.2 and 4.3 for further information).

Consideration of flooding issues and other key constraints and opportunities

Flooding, in particular the length of the rail corridor that would be located within the one per cent AEP flood extent, was a key consideration in the assessment process. This included consideration of impacts to the rail line, safety of workers, construction complexity and duration, environmental features and communities and property (see section 4 for further information). Mapping of the one per cent AEP flood event relative to the options is provided in Figure 3.6.

Detailed consideration of options relative to one per cent AEP flood extent indicated that there were no significant differences between the options. The pink option had the shortest length within the flood extent (about 6.4 kilometres), while the purple option had the longest length within the flood extent (about 9.9 kilometres).

Other key considerations included utilities, geotechnical conditions, existing roads and rail lines, ecology, sensitive receivers, land use and property, and Aboriginal heritage.

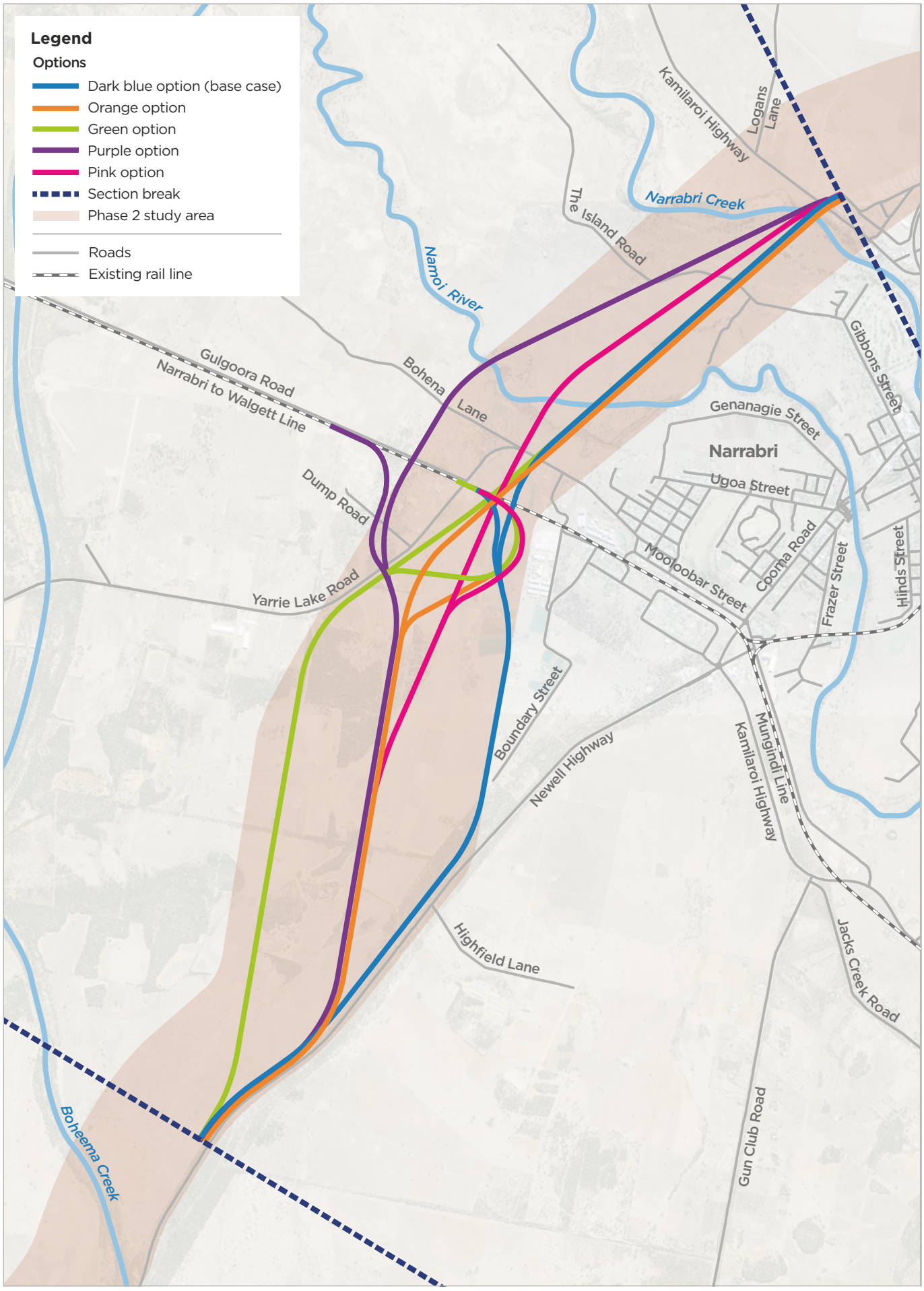

Figure 3.5 **Narrabri – western options**

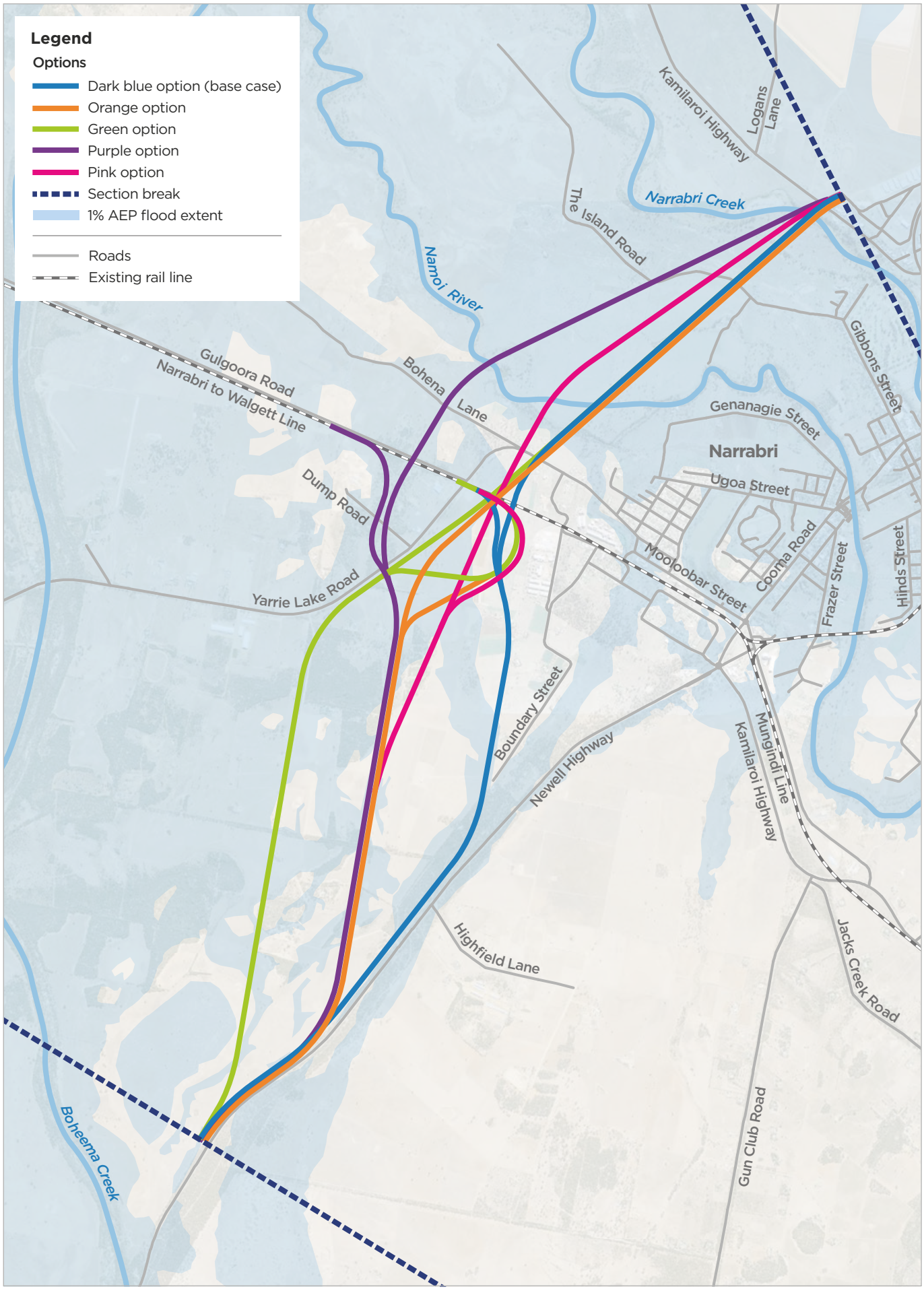

Figure 3.6 **Narrabri – western options – flood extents**

Options assessment

Key findings of the MCA workshop were as follows:

- All options except the green option scored positively relative to the base case (dark blue option).
- The options that ranked positively were close, with the pink option having the highest score, followed by the orange option and the purple option.
- The purple option was considered to have the lowest potential impact on residential receivers as it was the furthest away from residential areas in Narrabri, but was the longest option. It included an additional 450 metres of bridge to cross the Naomi River / Narrabri Creek floodplain. The purple option would also require an additional active level crossing on Yarrie Lake Road and construction of a new access road into Narrabri Shire Council's waste management facility. The proximity to the landfill area could also result in construction risks from historic dumping activities and leachate. The connection to the Narrabri to Walgett rail line would also have to be managed within the one per cent AEP flood extent. These issues were considered as part of the assessment, which concluded that the purple option was not preferred.
- The orange and pink options were similar, with the floodplain crossing for the pink option being slightly further to the west away from Narrabri. Key differences between these options were that the pink option:
  - had one less 22 kilo volt power line crossing than the orange option
  - would have a shorter connection to the Narrabri to Walgett rail line (about 600 metres shorter than the orange option)
  - is within 200 metres of 13 residences, compared to 11 residences for the orange option.

Having considered the above, the workshop consensus was that the pink option was preferred and would form the basis for the focused area of investigation. This was because it:

- scored highest
- is further to the west
- has a shorter connection to the Narrabri to Walgett rail line.

Preferred option

Based on the above considerations the pink option was determined to be the preferred option to form the basis for the focused area of investigation near Narrabri. The selected focused area of investigation for this section is shown in Figure 3.7. The area had a width of between about 200 and 540 metres. It included slightly wider areas to allow for further investigations to minimise potential environmental and community impacts, in particular property impacts near Yarrie Lake Road. Further information on consultation undertaken with stakeholders about the preferred option is provided in section 4.2.

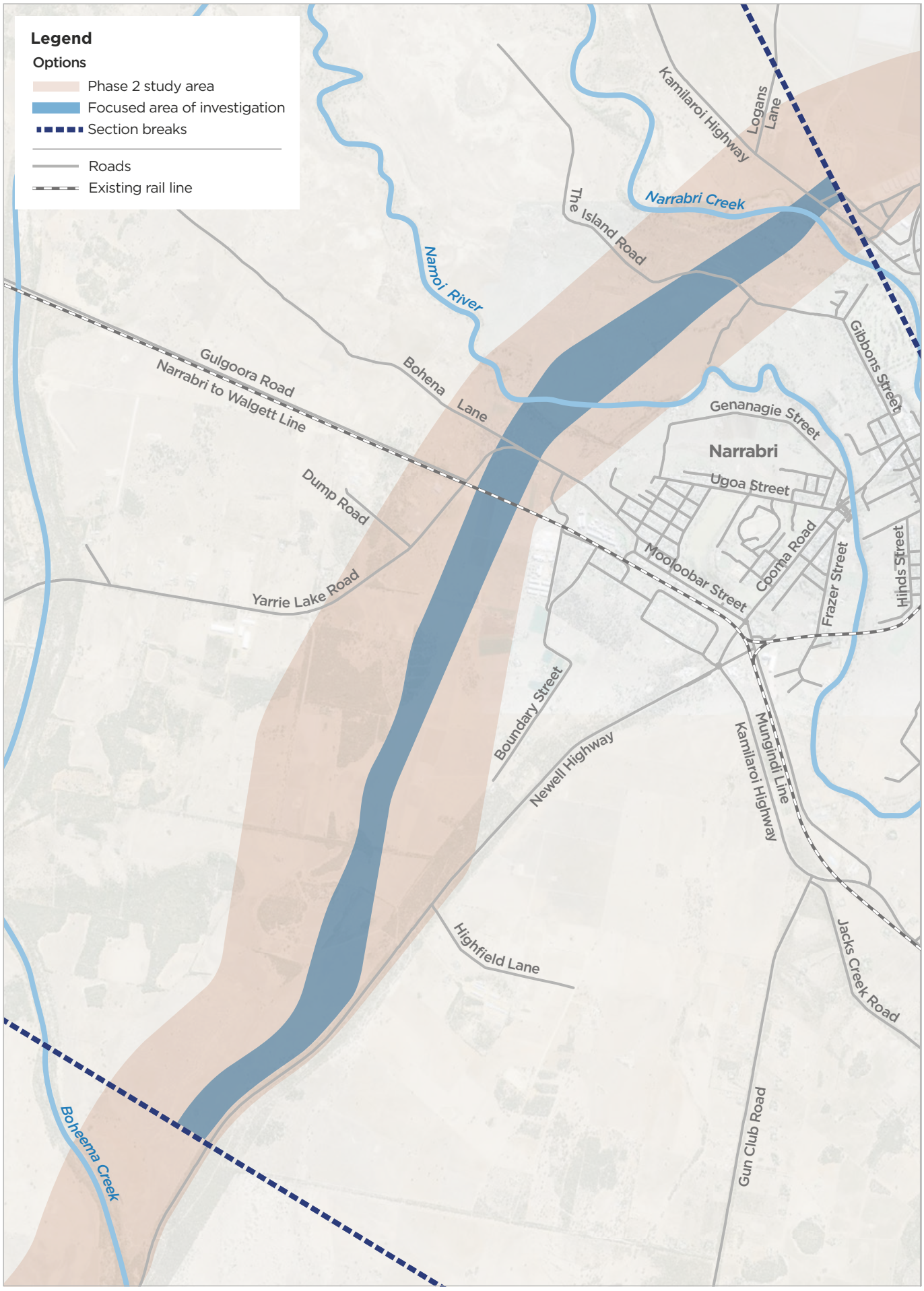

Figure 3.7 **Narrabri – western focused area of investigation**

3.3 Finalising the preferred alignment within the focused area of investigation

Following identification of the focused area of investigation as described above, ARTC undertook consultation with directly affected landholders and other key stakeholders. This consultation was used to inform identification and refinement of the reference design within the focused area of investigation. Further information on consultation undertaken is provided in section 4.2.

The following design refinements were undertaken as part of finalising the preferred alignment:

- The Macquarie River crossing was reviewed to identify opportunities to maximise shielding (e.g. for noise and visual impacts) behind natural topography on the north side of the river. Realignment at this location was not considered desirable due to engineering and environmental constraints at the crossing location, and because it would increase property impacts on the south of the Mitchell Highway.
- The alignment was moved along Eumungerie Road and Newell Highway to provide an offset of about 65 metres following further consultation between ARTC and Transport for NSW.
- The alignment was reviewed near Yarrie Lake Road to minimise property impacts. However, due to other engineering (e.g. location for crossing Yarrie Lake Road and connection with the Narrabri to Walgett Line) and environmental (e.g. native vegetation and Aboriginal heritage sites near the Namoi River) constraints, any feasible refinements would still not be aligned with property boundaries and result in similar property impacts.
- The alignment was refined where it meets the Newell Highway to minimise the length within the one per cent annual exceedance probability AEP flood event for Bohena Creek.
- Various adjustments were made to the horizontal alignment and rail corridor to reflect new survey adjusted cadastre and desired offsets to other infrastructure (e.g. roads and utilities) and residences.
- Various adjustments were made to the vertical rail alignment to manage earthwork quantities (i.e. desired cut/fill balance) and minimise grade changes for roads where level crossings would be provided.
- A grade-separated crossing would be provided at Kickabil Road.
- The rail alignment was adjusted near Cumbil Creek to avoid an Aboriginal heritage site.

During late 2021, another alignment near Narrabri was proposed, located about eight kilometres further to the west of the preferred alignment, outside of the study area. The proposed alignment is similar to route options 402 and 407. When crossing the Namoi River and Narrabri Creek floodplain it closely follows, for significant parts, route option 502. Options 402, 407 and 502 were all discounted in 2016/17 (see section 2.4.6). The proposed alternate route around Narrabri was reviewed, noting the outcomes of the 2016/17 assessments and new information gathered since that time. It was concluded that the proposed alignment did not offer any benefits that would warrant the preferred alignment being abandoned.

4. How alternatives were analysed

4.1 MCA assessment process

The key investigations and assessments undertaken to provide information on the constraints associated with the environment in which the route options are located (including flooding constraints) during the two options assessment phases are described in sections 2 and 3 for each route section. This section describes the MCA options assessment process that was used to assess identified options. The community and stakeholder consultation undertaken as part of the route option selection process is described in section 4.2.

4.1.1 Overview

From 2016, one of ARTC's tasks as the organisation delivering Inland Rail was to examine whether there were cost-effective opportunities to improve upon the alignment adopted by the Inland Rail Implementation Group to improve outcomes beyond the Inland Rail Service Offering.

The greenfield sections required assessment of options to determine alignment study areas within which the final rail corridor will be located.

The process for evaluating route options in greenfield sections (see Figure 4.1) and the factors affecting route selection (see Figure 4.2) were agreed upon in late 2016 and have been available on the Inland Rail website since 2017.

Outputs from this process have guided route option decisions.

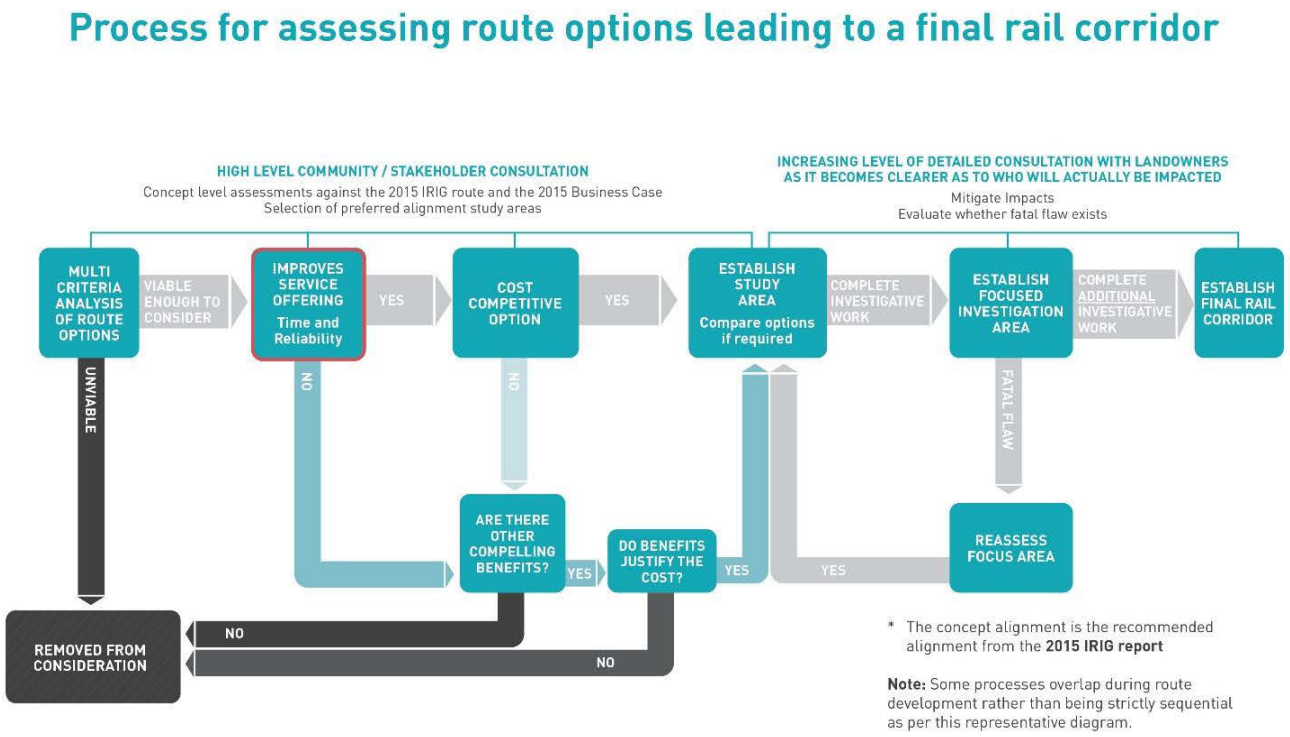

Figure 4.1 Route selection process summary

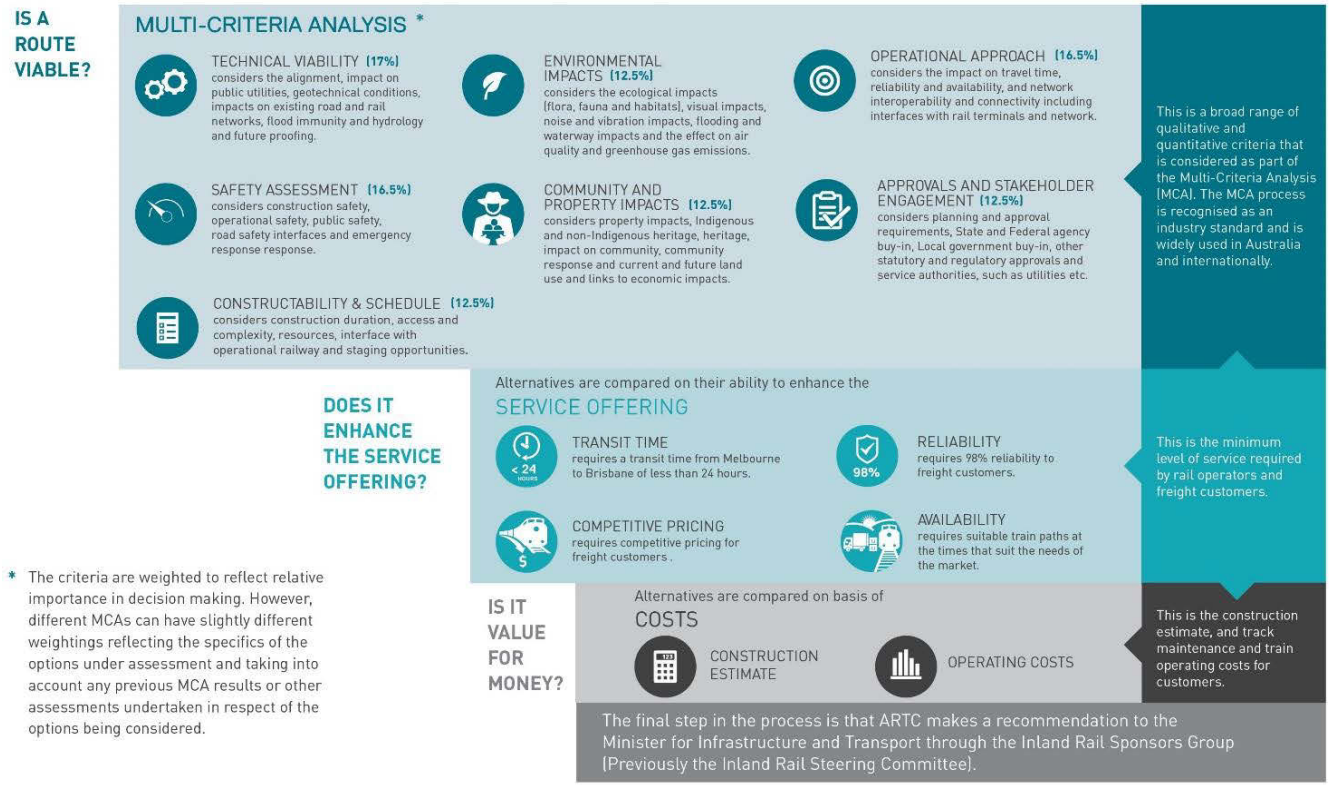

Figure 4.2 Factors affecting route selection

There are three key considerations in selecting any route:

- ability to enhance the Inland Rail Service Offering
- construction and operating costs
- outcomes from assessment of options in MCA workshops.

Since the end of 2016, the development of the Inland Rail route has been determined by a combination of comparative construction costs and the impact (positive or negative) of a route option on the Inland Rail Service Offering, together with the results of any MCA undertaken on a route option.

Development of the MCA framework

The MCA criteria and weightings used by ARTC were developed incrementally from 2014 by three of Australia's and the world's leading engineering and technical advisory firms. Initial work was undertaken by Parsons Brinckerhoff. The MCA criteria and relativity weightings were further developed by ARTC's technical advisors, SMEC and ARUP, over the course of 2015 and 2016. The criteria and relativity weightings were formally adopted by ARTC in 2016 and have been the standard used since then by ARTC and its consultants.

The role of MCA in route selection

MCA seeks to identify a balanced outcome that optimises the various factors to maximise the overall benefit of the recommended option.

MCA is an evaluation tool for complex problems, which provides a logical, structured process for the consideration of a broad range of criteria in the evaluation process. An MCA provides a mechanism for consideration of both quantitative and qualitative criteria within a consistent analytical framework: these include technical viability, environmental impact, constructability, operational implications, community/property impacts and any other relevant considerations, such as regulatory or legislative impacts.

The purpose of an MCA is to permit a comparative assessment of route options, resulting in an indication as to which option/s warrant further consideration.

Within a particular MCA, the agreed weightings are applied uniformly across all options considered in that workshop.

An MCA indicates whether a route option warrants further consideration. The option is then assessed for its ability to enhance the Inland Rail Service Offering and whether its estimated construction and operating costs are appropriate for any perceived benefits.

It is important to note that the outcome of any MCA is just one factor in choosing between competing route options and not a determining factor in its own right. An MCA in itself is not the sole framework for determining which route option is superior to others.

4.1.2 Route selection process summary

The process for assessment of options involves three key considerations as follows:

- Is a route viable? This is determined by a review of options through a multi criteria analysis (MCA) process (see section 4.1.3).
- Does it enhance the service offering? To be competitive Inland Rail must have a minimum level of service required by rail operators and freight customers as follows:
  - transit time from Melbourne to Brisbane of less than 24 hours
  - competitive pricing for freight customers
  - a reliability of 98 per cent for freight customers
  - availability of train paths at the times that suit the needs of the market.
- Is it value for money? This requires consideration of construction cost estimates and operating costs (comprised of track maintenance and train operating costs).

The final step in the process is that ARTC makes a recommendation to the Minister for Infrastructure and Transport through the Inland Rail Sponsors Group.

Further information on the Inland Rail Service Offering and why transit time and distance is critical to the route selection process is provided in sections 1.1 and 2.1.1.

The route selection process is summarised in Figure 4.1. This illustrates how viable options are initially considered to assist with defining the study area, followed by the focused area of investigation and ultimately the preferred route (final rail corridor). The process is informed by comprehensive community and stakeholder engagement and field investigations, with increasing targeted effort as the area of interest is narrowed down.

4.1.3 MCA workshops

As summarised in Table 4.1, between October 2016 and June 2019 a total of six separate MCA workshops / processes were undertaken.

The first three workshops undertaken during phase 1 contributed to development and selection of the study area (see Figure 2.21). These workshops considered key locational decisions, including:

- Narromine – east or west
- via Coonamble (or similar)
- Pilliga forests – through or around
- Narrabri – east or west.

The three workshops / processes undertaken during phase 2 resulted in selection of the focused area of investigation, and ultimately the preferred route. As there were no viable alternatives for parts of the study area, the March 2019 process was documented in a report and an MCA workshop was not undertaken.

The MCA criteria used in all workshops are described in section 4.1.4.

A detailed list of all options considered in each workshop / process is provided in Appendix A.

Table 4.1 MCA workshops / key activities

Timing	Purpose	Overview of options considered and key decisions	Link to report for further information
Phase 1 – confirming the study area and identifying a concept alignment			
October 2016	To assist with defining the study area by eliminating options unlikely to proceed and identifying options to present to the community for further comment.	A total of 30 options were considered across five sections between Narromine and Narrabri. Of these 17 were retained for further investigation and community consultation. Key locational considerations included: ▸ Narromine – east or west ▸ via Coonamble (or similar) ▸ Pilliga – through or around ▸ Narrabri – east or west.	**Oct 2016 MCA report**
December 2016	To assist with defining the study area by determining viable options that would be subject to further investigation and community consultation.	A total of 22 options were considered across six sections between Narromine and Narrabri. Of these 13 were retained for further investigation and community consultation. Key locational considerations included: ▸ Narromine – east or west ▸ via Coonamble (or similar) ▸ Pilliga – through or around ▸ Narrabri – east or west.	**Dec 2016 MCA report**
May 2017	To define the study area based on outcomes of further investigation and community consultation.	A total of 10 options were considered across five sections between Narromine and Narrabri. Key locational considerations included: ▸ Narromine – east or west ▸ via Coonamble (or similar) ▸ Pilliga – through or around. At the end of the workshop the study area was recommended, including the following key sections: ▸ Narromine – east ▸ direct route via Curban (not via Coonamble) ▸ Pilliga – through ▸ Narrabri – west.	**May 2017 MCA report**
Phase 2 – reference design option assessment			
Stage 1 March 2019	To confirm the focused area of investigation for those parts of the study area where there were no viable alternatives.	Four sections of the study area were considered as follows: ▸ Curban to Mt Tenandra ▸ Mount Tenandra to Black Hollow ▸ Table Top Mountain to Baradine ▸ Pilliga Forest Way.	**Phase 2 Stage 1 route refinement report**
Stage 2 January 2019	To confirm the focused area of investigation for those parts of the study area where there was insufficient property access to undertake field investigations.	A total of seven options were considered across three sections as follows: ▸ Gilmours Road ▸ Weenya Road ▸ Black Hollow.	**Phase 2 stage 2 focus area definition report**

Timing	Purpose	Overview of options considered and key decisions	Link to report for further information
Stage 3 June 2019	To confirm the focused area of investigation for those parts of the study area where property access was available to undertake field investigations.	A total of 16 options were considered across four sections as follows: ▸ Narromine South ▸ Eumungerie Road ▸ Pilliga East ▸ Narrabri. In addition, three additional areas were also considered where there were no viable alternatives. However, the focused area of investigation could not be defined until the preferred focused area of investigation in the adjacent sections were selected. These areas were: ▸ Curban ▸ Newell Highway ▸ Narrabri North.	**Phase 2 stage 3 focus area definition report part 1** **Phase 2 stage 3 focus area definition report part 2**

4.1.4 MCA criteria

All MCA workshops / processes adopted the same ARTC criteria and weightings to provide a consistent approach across the Inland Rail program. The criteria are summarised in Table 4.2 with a more detailed description provided in Appendix B.

The MCA framework seeks to ensure recommendations take into account a wide range of criteria including:

- engineering and technical factors
- social and community impacts
- number of properties directly impacted
- environmental impacts
- geotechnical and constructability related issues.

Flooding is a key consideration as part of the process. However, it is only one of many criteria (and sub-criteria) used to assess the options. For example, an option that may perform better from a flooding perspective could perform worse from a transit time or environmental and community (such as noise) impact perspective, resulting in that option not performing the best overall. In addition, the impacts of an option, such as flooding or noise, can often be resolved through engineering design and mitigation and, as such, do not necessarily mean an option will be discounted.

The process involved scoring each option relative to other options across all criteria. This produced a weighted outcome as a number. An option that relatively performs better than another option results in a positive score. Conversely, an option that relatively performs worse than another option results in a negative score.

However, as described above, the MCA criteria are only one of the key considerations in the route assessment process. As such, the option with the greatest positive score is not necessarily selected as the preferred option. Feedback from consultation (see section 4.2) was considered in the MCA workshops. Additional environmental and engineering field surveys were also undertaken and considered in the MCA workshops.

Table 4.2 MCA criteria

Criteria	Weighting (%)	Sub-criteria
Technical viability	17	▸ Alignment ▸ Impact on public utilities and other assets ▸ Geotechnical conditions ▸ Impact on existing road and rail network ▸ Flood immunity and hydrology ▸ Future proofing
Safety assessment	16.5	▸ Operational safety ▸ Public safety ▸ Road safety interfaces ▸ Emergency response ▸ Construction safety
Operational approach	16.5	▸ Effect/impact on travel time ▸ Effect on reliability and availability ▸ Network interoperability and connectivity
Constructability and schedule	12.5	▸ Construction duration ▸ Construction access ▸ Construction complexity ▸ Resources/ material sources ▸ Remediation and contamination ▸ Interface with operational railway ▸ Staging opportunities
Environmental	12.5	▸ Ecological impacts ▸ Offset liability ▸ Visual impacts ▸ Noise and vibration impacts ▸ Flooding and waterway impacts ▸ Effect on air quality ▸ Effect on greenhouse gas emissions
Community, heritage and property	12.5	▸ Property impacts ▸ Indigenous cultural heritage ▸ Non-Indigenous heritage ▸ Impact on communities ▸ Community response ▸ Current and future land use impacts ▸ Impact on business and agricultural viability
Approvals and stakeholder risk	12.5	▸ Other statutory and regulatory approvals ▸ Alignment with State/Australian Government objectives ▸ Alignment with local government objectives ▸ Service authorities (utilities / other)

4.1.5 Summary of outcomes

As described above, the route selection process occurred over a period of about two and a half years and was informed by six separate MCA workshops / processes and included consideration of the Inland Rail Service Offering and value for money. Numerous route options were considered across phases 1 and 2.

A number of key locational decisions (described in sections 2.4 and 3.2) were made throughout this process, as summarised in Table 4.3.

Table 4.3 Summary of outcomes

Key locational decision	Phase 1				Phase 2			
	October 2016	December 2016	May 2017	Study area defined	Stage 1– March 2019	Stage 2 – January 2019	Stage 3 – June 2019	Focused area of investigation defined
Narromine – east	Y	Y	Y		-	-	Y	
Narromine – west	Y	Y	Y		-	-	-	
Via Coonamble (or similar)	Y	Y	Y		-	-	-	
Pilliga – through	Y	Y	Y		-	-	Y	
Pilliga – around	Y	Y	Y		-	-	-	
Narrabri – east	Y	Y	-		-	-	-	
Narrabri – west	Y	Y	Y		-	-	Y	

4.2 Consultation and engagement on route options

Consultation with the community and key stakeholders commenced in 2015. Consultation has enabled local knowledge to be collected and considered in the options development and route selection processes.

ARTC conducted extensive rounds of public consultation for the Narromine to Narrabri section of Inland Rail, particularly in the periods March to May 2017, December 2017 to November 2018, and ongoing from August 2019 through to October 2020. The consultation, which focused significantly on understanding landowner and community concerns about the 2016 concept alignment and route options proposed, is summarised in Table 4.4.

Following the announcement of the study area (see section 2.5), ARTC ran a print and radio campaign and attempted to contact all landowners in the study area via either phone, email or letter. Community information sessions were held in mid-December 2017, which included a session in Narromine where 185 people attended. While all attempts were made, ARTC acknowledges that not all landowners within the study area or the previous concept alignment to the west of Narromine may have been contacted directly before the community information sessions in mid-December 2017. ARTC has since met with or offered to meet with all landowners within the study area as part of the route option assessment, with face-to-face meetings occurring between February 2018 and July 2019.

Further information about the consultation undertaken for the proposal as a whole is provided in section 3 of the Preferred Infrastructure / Amendment Report.

Table 4.4 Consultation for route options

Timing	Activity
June 2016	ARTC Inland Rail staff were asked to attend an annual meeting of local farmers in Coonamble – the meeting passed a resolution stating Inland Rail should travel via Coonamble.
June to July 2016	Workshops on the alignment options were held with selected stakeholders (councils, community organisations, state agencies).
November 2016	Three information sessions were held in Gilgandra, Narromine and Narrabri regarding the October 2016 MCA outcomes and as input into the December 2016 MCA workshop.

Timing	Activity
March to May 2017	ARTC Inland Rail staff met with more than 400 landowners (one-on-one and in small meetings) with concentrated effort between February and April 2017.
November 2017	About 17,000 flyers were mailed out advertising community meetings to be held in December. ARTC wrote to about 600 landowners along the various alignment options considered in the May 2017 MCA advising of the December meetings.
December 2017	Four information meetings were held in Gilgandra, Narrabri, Narromine and Coonamble, reaching between 500 and 600 attendees in total.
February to June 2018	ARTC Inland Rail staff resumed intensive one-on-one landowner meetings within the study area. By the end of June 2018, ARTC Inland Rail had met with more than 300 landowners.
September 2018	Four public meetings and four information sessions were held, attended by about 580 people.
November 2018	At the request of ARTC Inland Rail, three Community Consultative Committees for the proposal were established by the NSW Department of Planning, Industry and Environment, one each for the areas generally around Narromine, Gilgandra and Narrabri.
August 2019 to October 2020	Landowner and community consultation on the 150 to 400 metre wide focused area of investigation for the proposal commenced in August 2019. Landowners were individually consulted and, given the scale of the project, the consultation process continued into 2020. Further consultation with landowners was undertaken to provide an input to selection of the final preferred rail corridor during the second half of 2020.

4.3 Specialist assessments that informed the route selection process

A broad range of field investigations and specialist assessments were undertaken during the route option development and selection process described in sections 2 and 3 of this report. The assessments were undertaken in a staged manner to provide relevant information for the MCA criteria (see section 4.1.4), generally as follows:

- Desktop assessments were undertaken, including database searches and review of previous studies, aerial photography and existing mapping held by Commonwealth, NSW and local government agencies and other public sources.
- Site inspections were undertaken where private property access was available or from publicly accessible areas such as roads.

The assessments covered all relevant aspects as summarised in 5.

Table 4.5 Specialist assessments for route options

Phase	Assessment type
Phase 1 (2016-2017)	▸ Desktop assessments for noise and vibration, air quality, non-indigenous heritage, utilities, existing road and rail network, land use and property and agriculture. ▸ Targeted site surveys for biodiversity, indigenous heritage, flooding and hydrology and geotechnical and soils (including testing and laboratory analysis).
Phase 2 (2018-2020)	▸ Desktop assessments for noise and vibration, air quality, non-indigenous heritage, utilities, existing road and rail network, land use and property and agriculture. ▸ Further detailed surveys for biodiversity, indigenous heritage, flooding and hydrology, land use and property and geotechnical and soils (including testing and laboratory analysis).

5. Conclusion

Inland Rail has undergone a progressive route development and selection process since 2006, each stage refining the focus on what is required to deliver the Inland Rail program. This report summarises the key steps in developing and identifying the preferred alignment for Inland Rail as a whole (including the proposal) over the last 15 years.

The route options process for the proposal involved two main phases which commenced following confirmation of the initial alignment and development of the base case for Inland Rail in 2015. The process has been rigorous and involved a comprehensive review of options for a feasible route.

At the end of phase 1, while a preferred option had been selected in some locations, a wide study area was defined to allow for a further phase of investigations to occur prior to finalising a preferred route. Confirmation of the study area followed significant assessment of broad route options during 2016 and 2017 as described in sections 2.3 and 2.4.

On 18 November 2017 the (then) Australian Minister for Infrastructure and Transport (Hon Darren Chester MP) announced the study area for the greenfield section of Inland Rail between Narromine and Narrabri.

During phase 2, further investigations were undertaken within the study area. Following confirmation and announcement of the study area, a necessary interim step was the identification of a narrowed 'focused area of investigation' (generally around 150 to 400 metres wide) within which the preferred rail corridor (generally a minimum of 40 metres wide) would ultimately be located as reference designs and investigations progressed.

Further investigations were conducted within the focused area of investigation to determine the preferred alignment presented in the proposal.

As described in sections 2 and 3, selection of the study area, focused area of investigation and preferred rail corridor followed significant assessment of route options between 2016 and 2019. Key locational decision made throughout this period are summarised below.

Why is the preferred option east of Narromine?

- Overall the decision to go to the east of Narromine was based on better technical viability, constructability and safety outcomes. In particular, options to the east had about 11 kilometres less track (about 50 per cent less) in the floodplain – about 10 kilometres of track (including about 1.6 kilometres of structures) would need to cross the floodplain for the eastern option, compared with about 21 kilometres (including about 15.9 kilometres of structures) for the 2016 concept alignment to the west of Narromine). Options to the east would also avoid construction within the floodplain downstream of Narromine, and would cross land with better geotechnical conditions thus reducing the amount of structural material that would need to be brought to site.
- The eastern option also had improved overall community and safety outcomes – this option meant that Inland Rail trains would not need to travel through or as close to Narromine as the western option.

Why not via Gilgandra?

- Options that used various lengths of the existing Dubbo to Coonamble line south of Curban, or traversed farmland to the west of and close to Gilgandra, were discounted due to longer distances (increased transit time), higher construction costs, operational interface issues, and potential noise and vibration issues through Gilgandra.

Why not via Coonamble or Gulargambone?

- Options that used various lengths of the existing Dubbo to Coonamble line north of Curban (via Coonamble or Gulargambone) were discounted due to longer distances (increased transit time), higher construction costs and increased flooding issues. The options were located lower in the catchment and still required new greenfield sections to meet the 2016 concept alignment to the north of Curban.
- Additional economic analysis undertaken by ARTC also clearly demonstrates that the costs of Inland Rail travelling via Coonamble were far greater than the benefits. The analysis of options proposed for Inland Rail to go via Coonamble show that even relatively small increases in transit time and distance translate into significant economic disbenefit over the life of Inland Rail.
- Further analysis demonstrated that upgrades to the existing line (separate to the Inland Rail program) would be more beneficial for freight users.

Why via the Pilliga forests?

- Options that traversed the Pilliga forests were found to perform better than the 2016 concept alignment that ran to the west and north. This was mainly due to shorter distances (decreased transit time), lower construction costs and reduced property impacts (including fewer properties subject to acquisition). Other advantages of a route through the Pilliga forests relative to the 2016 concept alignment included improved geotechnical conditions and reduced hydrology impacts.

Why is the preferred option on the western edge of Narrabri?

- Options through Narrabri were discounted mainly due to operational and construction issues associated with the existing line through Narrabri, and the resulting potential for land use, community and amenity impacts (noise, air quality and visual) within Narrabri.
- Options to the east of Narrabri were discounted mainly due to issues with connectivity with existing lines, interfaces with the Newell Highway, and constraints on proposed future growth areas.
- Various options to the west of Narrabri were considered. Overall, those options that were similar to the 2016 concept alignment were favoured, mainly because they were located at the narrowest crossing of the one per cent AEP flood extent and had less property impacts in terms of the number of properties subject to acquisition, and potential access and amenity impacts.

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APPENDIX

B

Route selection summary report

Appendix A – MCA route selection process summary

NARROMINE TO NARRABRI PREFFERED INFRASTRUCTURE/AMENDMENT REPORT

MCA / route selection process summary

Table A.1 Summary of route assessments

Phase	Workshop	Sections considered	Options considered	Preferred / retained	Report link	Narromine – east	Narromine – west	Via Coonamble (or similar)	Pilliga – through	Pilliga –around	Narrabri – east	Narrabri – west
Phase 1 – concept design	October 2016	Narromine to Curban	▸ Concept alignment (2016 / IRAS) ▸ Option 101 ▸ Option 102 ▸ Option 103 ▸ Option 104 ▸ Option 105 ▸ Option 106 ▸ Option 107	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS) ▸ Option 101 ▸ Option 107	**https://inlandrail.artc.com.au/narromine-to-narrabri-multi-criteria-analysis-report-october-2016/**	●	●					
		Curban to Gwabegar	▸ Concept alignment (2016 / IRAS) ▸ Option 201 ▸ Option 202 ▸ Option 203 ▸ Option 204 ▸ Option 205 ▸ Option 206	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS) ▸ Option 206				●				
		Gwabegar to Narrabri (Pilliga Forest)	▸ Concept alignment (2016 / IRAS) ▸ Option 401 ▸ Option 402 ▸ Option 403 ▸ Option 404 ▸ Option 403a / 404a ▸ Option 405 ▸ Option 406 ▸ Option 407 ▸ Option 408 ▸ Option 409	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS) ▸ Option 401 (variant) ▸ Option 403 ▸ Option 404 ▸ Option 408 ▸ Option 409						●	●		
		Narrabri	▸ Central Narrabri option ▸ East Narrabri option ▸ West Narrabri option ▸ Narrabri Airport option	Options retained for further consideration: ▸ East Narrabri option ▸ West Narrabri option								●	●
	December 2016	Narromine	▸ Concept alignment (2016 / IRAS) ▸ Option 101 ▸ Option 107	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS) ▸ Option 101 ▸ Option 107	**https://inlandrail.artc.com.au/narromine-to-narrabri-multi-criteria-analysis-report-december-2016/**	●	●					
		Narromine to Curban	▸ Concept alignment (2016 / IRAS) ▸ Option 101 ▸ Option 107 ▸ Option 108 ▸ Option 109 ▸ Option 112 ▸ Option 113	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS) ▸ Option 109		●	●					

Phase	Workshop	Sections considered	Options considered	Preferred / retained	Report link	Narromine – east	Narromine – west	Via Coonamble (or similar)	Pilliga – through	Pilliga –around	Narrabri – east	Narrabri – west
		Curban to Mount Tenandra	▸ Concept alignment (2016 / IRAS) ▸ Option 206 ▸ Option 111/206	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS) ▸ Option 206				●				
		Mount Tenandra to Baradine	▸ Concept alignment (2016 / IRAS)	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS)								
		Baradine to Narrabri	▸ Concept alignment (2016 / IRAS) ▸ Option 403 ▸ Option 404 ▸ Option 408 ▸ Option 409 ▸ Option 413 (combination of 403, 404, 401 and concept alignment)	Options retained for further consideration: ▸ Option 403 ▸ Option 404 ▸ Option 413					●	●	●	●
		Narrabri	▸ Concept alignment (2016 / IRAS) ▸ West Narrabri option	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS) ▸ Develop further options for viaduct which may involve alternative alignments to the west of Narrabri							●	●
	May 2017	Narromine to Burroway	▸ Concept alignment (2016 / IRAS) ▸ Eumungerie Road option	Options retained for further consideration: ▸ Eumungerie Road option	**https://inlandrail.artc.com.au/narromine-to-narrabri-multi-criteria-analysis-report-may-2017/**	●	●					
		Burroway to Curban	▸ Concept alignment (2016 / IRAS) ▸ Gilmours Road alternative option	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS) ▸ Gilmours Road alternative option								
		Curban to Mount Tenandra	▸ Concept alignment (2016 / IRAS) ▸ Box Ridge Road option	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS)				●				
		Mount Tenandra to Baradine	▸ Concept alignment (2016 / IRAS)	Options retained for further consideration: ▸ Concept alignment (2016 / IRAS) with possible minor refinements								
		Baradine to Narrabri	▸ Concept alignment (2016 / IRAS) ▸ Pilliga State Forest / Newell Highway option ▸ Pilliga State Forest / Twenty Foot Road option	Options retained for further consideration: ▸ Pilliga State Forest / Newell Highway option					●	●		●
Outcome – Study area defined												

Phase	Workshop	Sections considered	Options considered	Preferred / retained	Report link	Narromine – east	Narromine – west	Via Coonamble (or similar)	Pilliga – through	Pilliga –around	Narrabri – east	Narrabri – west
Phase 2 – reference design	March 2019 (Stage 1 – sections with no feasible options)	Curban to Mount Tenandra	No feasible alternatives	No feasible alternatives	**https://inlandrail.artc.com.au/narromine-to-narrabri-phase-2-feasibility-assessment-stage-1-route-refinement/**							
		Mount Tenandra to Black Hollow	No feasible alternatives	No feasible alternatives								
		Table Top Mountain to Baradine	No feasible alternatives	No feasible alternatives								
		Pilliga Forest Way	No feasible alternatives	No feasible alternatives								
	January 2019 (Stage 2 – sections with no access)	Gilmours Road	▸ Base case (BC-GR-BC) ▸ Orange option (BC-GR-W) ▸ Green option (BC-GR-E)	Base case (BC-GR-BC)	**https://inlandrail.artc.com.au/narromine-to-narrabri-phase-2-feasibility-assessment-stage-2-focus-area-definition/**							
		Weenya Road	▸ Base case (TB-WR-BC) ▸ Green option (TB-WR-WR)	Green option (TB-WR-WR)								
		Black Hollow	▸ Base case (TB-B-BC) ▸ Orange option (TB-B-E)	Base case (TB-B-BC)								
	June 2019 (Stage 3 – sections with access)	Narromine South	▸ Base case (NB-NS-BCA) ▸ Orange option (NB-NS-CLL) ▸ Green option (NB-NS-PR) ▸ Light blue option (NB-NS-CE) ▸ Yellow option (NB-NS-PE)	Green option (NB-NS-PR)	**https://inlandrail.artc.com.au/narromine-to-narrabri-phase-2-feasibility-assessment-stage-3-focus-area-definition-part-1/** **https://inlandrail.artc.com.au/narromine-to-narrabri-phase-2-feasibility-assessment-stage-3-focus-area-definition-part-2/**	●						
		Eumungerie Road	▸ Base case (NB-ER-BC) ▸ Pink option (NB-ER-E) ▸ Purple option (NB-ER-BB)	Green option (NB-NS-PR)								
		Pilliga East	▸ Base case (BN-PE-BC) ▸ Green option (BN-PE-S) ▸ Purple option (BN-PE-SPB)	Purple option (BN-PE-SPB)					●			
		Narrabri	▸ Base case (BN-N-BC) ▸ Orange option (BN-N-C) ▸ Green option (BN-N-W) ▸ Purple option (BN-N-D) ▸ Pink option (BN-N-CRN)	Pink option (BN-N-CRN)								●
		Curban Junction	No feasible alternatives	No feasible alternatives								
		Newell Highway	No feasible alternatives	No feasible alternatives								
		Narrabri North	No feasible alternatives	No feasible alternatives								
Outcome – Focused area of investigation defined												

APPENDIX

B

Route selection summary report

Appendix B – MCA criteria

NARROMINE TO NARRABRI PREFFERED INFRASTRUCTURE/AMENDMENT REPORT

MCA criteria

Criteria (weighting)	Sub-criteria	Key considerations
Technical viability (17%)	Alignment	Comparison of the alignment geometry (e.g. grades and curves) and brownfield / greenfield lengths that may impact on consistency of operational speed).
	Impact on public utilities and other assets	Comparative consideration of: ▸ changes required to significant utilities (e.g. high voltage power, optic fibre) ▸ changes required to local utilities networks (e.g. Telstra, water, sewer and gas).
	Geotechnical conditions	Comparison of geotechnical conditions such as: ▸ ability to win better quality construction materials ▸ length across poor quality ground conditions (e.g. black soils) ▸ complexity of track formation design ▸ length of brownfield reconstruction of existing track formations.
	Impact on existing road and rail network	Comparative consideration of impact to existing road and rail networks such as: ▸ road closures and realignments ▸ connectivity and operability with existing rail lines ▸ impacts to existing infrastructure (e.g. road bridges) ▸ number of new road bridges required.
	Flood immunity and hydrology	Comparative consideration of the flood immunity (e.g. length across floodplains).
	Future proofing	Comparative consideration of the ability to readily upgrade the rail infrastructure in the future, including ▸ complexity of accommodating extended loops for 3,600 metre long trains ▸ ability of structures (e.g. bridges) to accommodate 30 tonne axle load trains at 80 km/h ▸ ability of track formation to accommodate 30 tonne axle load trains at 80 km/h.
Safety assessment (16.5%)	Operational safety	Comparison of operational safety for train operators and maintenance staff such as: ▸ track geometry ▸ height of rail above natural surface ▸ conflict points such as connections to existing rail lines.
	Public safety	Comparison of public safety issues such as: ▸ risk of trespass within the rail corridor ▸ risk of illegal access to bridges ▸ consideration of CPTED (crime prevention through environmental design) principles.
	Road safety interfaces	Comparative assessment of level crossings including number of new or impacts to existing: ▸ public road crossings ▸ private road crossings.
	Emergency response	Comparative assessment of the complexity of access to the rail corridor for emergency services, including in the scenario of a rail incident.

Criteria (weighting)	Sub-criteria	Key considerations
	Construction safety	Comparative assessment of higher risk construction activities, such as large cuttings, working in waterway areas, large bridges and high earthworks volumes requiring significant heavy vehicle movements.
Operational approach (16.5%)	Effect/impact on travel time	Comparison of train travel time.
	Effect on reliability and availability	Comparison of reliability including interactions with existing rail lines and sidings and flooding risks.
	Network interoperability and connectivity	Qualitative assessment of interoperability and connectivity to the existing rail network and effect on existing/ new customers.
Constructability and schedule (12.5%)	Construction duration	Assessment of the comparative difference in construction duration including consideration of earthwork volumes, construction complexity and size of structures.
	Construction access	Comparative assessment of complexity for site access during construction including: ▸ adjacent road access ▸ access from existing railway corridors ▸ access from properties.
	Construction complexity	Comparative assessment of the construction complexity and specialisation of workforce or equipment.
	Resources/ material sources	Comparative assessment of: ▸ fill material sources for track formation from quarries or within the site ▸ construction water availability and suitability ▸ potential for beneficial reuse of spoil (including from other projects).
	Remediation and contamination	Comparative consideration of extent of contaminated materials including existing rail corridors, registered contaminated sites and potential contaminated sites based on land use history.
	Interface with operational railway	Qualitative assessment of the number of interfaces with existing rail lines and sidings (ARTC and those managed or owned by others).
	Staging opportunities	Comparative assessment of staging opportunities for both construction and operation.
Environmental (12.5%)	Ecological impacts	Comparative assessment of ecological impacts including: ▸ native vegetation ▸ sensitive and threatened flora ▸ sensitive or threatened ecological communities ▸ sensitive and threatened fauna and habitats ▸ conservation reserves, state forest, national parks, protected areas and existing designated or protected offset areas.
	Offset liability	Comparison of likely ecological offset requirements and liabilities under State and Commonwealth offset policy requirements.
	Visual impacts	Comparative consideration of the extent to which the option would result in a landscape or visual change to sensitive receptors/ viewers (such as residential properties, conservation areas, open space, recreational areas and road users).

Criteria (weighting)	Sub-criteria	Key considerations
	Noise and vibration impacts	Comparative consideration of potential for construction and operational noise and vibration impacts measured as the number of: ▸ residential receptors within 200 metres of the corridor ▸ other sensitive receptors within 200 metres of the corridor ▸ commercial/ industrial receptors within 200 metres of the corridor.
	Flooding and waterway impacts	Comparative consideration of potential for: ▸ flooding impacts to the natural environment ▸ number of waterway crossings and impacts.
	Effect on air quality	Comparative consideration of potential for construction and operational air quality impacts measured as the number of: ▸ residential receptors within 200 metres of the corridor ▸ other sensitive receptors within 200 metres of the corridor ▸ commercial/ industrial receptors within 200 metres of the corridor.
	Effect on greenhouse gas emissions	Comparative consideration of construction and operational greenhouse gas emissions including: ▸ operational emissions such as lighting, ventilation and track grades (i.e. train emissions) ▸ construction emissions such as earthworks volumes and material transport.
Community, heritage and property (12.5%)	Property impacts	Comparative consideration of the number and type of impacts to: ▸ residential properties ▸ rural properties ▸ commercial/ industrial properties ▸ civic/ other properties ▸ severance of lots / properties. As relevant, the assessment includes consideration of: ▸ property ownership type (e.g. private, corporate and government) ▸ viability of severed properties / lots ▸ current and potential future use ▸ impacts to infrastructure, including sheds, silos, irrigation, drainage, dams and fencing.
	Indigenous cultural heritage	Comparative consideration of the potential impacts to Indigenous heritage, including recorded and potential sites and values based on database searches, survey and engagement with relevant Aboriginal representatives.
	Non-Indigenous heritage	Comparative consideration of the potential impacts to non-Indigenous heritage, including recorded and potential sites and values based on as relevant, database searches, survey and engagement with relevant organisation / historical societies.
	Impact on communities	Comparative consideration of the impact of the changes to the community including: ▸ accessibility through changes to the road network or town/ business/ suburb centres ▸ impact on community and civic facilities and businesses ▸ impact to emergency services provision.

Criteria (weighting)	Sub-criteria	Key considerations
	Community response	Comparative consideration of: ▸ feedback provided through community engagement activities ▸ issued raised through community and stakeholder engagement associated with that option ▸ anticipated community response.
	Current and future land use impacts	Comparative consideration of: ▸ supports long term development of the region ▸ impact on existing development ▸ impact on existing use (including agricultural viability) ▸ impact on future development.
	Impact on business and agricultural viability	Comparative consideration of the type of property impacts, and implications for the ongoing viability of agricultural holdings, businesses, communities or townships.
Approvals and stakeholder risk (12.5%)	Other statutory and regulatory approvals	Comparative consideration of required approvals (e.g. complexity, stakeholders involved, anticipated timeframes and any uncertainty).
	Alignment with State/ Federal objectives	Comparative consideration of key issues or concerns that State or Federal government agencies may require to be addressed.
	Alignment with local government objectives	Comparative consideration of key issues or concerns that local government may require to be addressed (e.g. impacts to local roads and infrastructure).
	Service authorities (utilities / other)	Comparative consideration of complexity of other approval process (e.g. relocation of significant utilities).

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Appendix C – Route option analysis: economic cost of going via Coonamble

NARROMINE TO NARRABRI PREFFERED INFRASTRUCTURE/AMENDMENT REPORT

Even relatively small increases in transit time and distance translate into significant economic disbenefit

In July 2018, an alternative route for the Narromine to Narrabri (N2N) section of Inland Rail via the Coonamble line was proposed, as an alternative to the 2017 Inland Rail route that runs on a direct alignment from Curban to near Baradine.

ARTC analysis of the proposed route via Coonamble indicated it would add 24 minutes in transit time and 39 kilometres in distance relative to the 2017 Inland Rail route.

The below set out the cost impact of this additional 39 kilometres over the likely first 55 years of Inland Rail operations.

A comparative assessment of the proposed alternative route and the Inland Rail study area can be found in the document entitled "Responses by Inland Rail to questions provided by NSW Farmers, 24 October 2018" which is available at **inlandrail.artc.com.au/narromine-to-narrabri-letter-of-response-to-new-south-wales-farmers-24-october-2018/**

Assessment of proposed alternative route via Coonamble

ARTC undertook an assessment of the proposed alternative route using a benefit-cost approach to examine the incremental capital costs versus the direct economic benefits or disbenefits of the change in scope to Inland Rail.

In relation to benefits and disbenefits, the methodology estimates the direct economic impacts on a range of factors:

- Capital cost: The additional capital cost relative to the Inland Rail Concept Alignment was estimated at $56 million.
- Rail freight operating costs: Changes in transit time and route distance have a direct impact across a broad range of cost factors:
  - Train crewing costs – directly affected by transit time
  - Fuel consumption – influenced by both distance and transit time
  - Locomotive and wagon maintenance
  - Locomotive and wagon utilisation (capital)–slower transit times reduce rolling stock utilisation and require a larger fleet to carry the same amount of freight
  - Track maintenance and network operations–a function of distance and train tonnage.
- Value of time' savings for freight users: This relates to the value placed by freight customers on having time sensitive freight delivered earlier than delivery times offered by alternative options. Lower transit times generates value within the relevant supply chain of decreased cost (e.g. through lower inventory requirements) and increased willingness by customers to pay for an earlier delivery.
- In relation to freight operating costs and 'value of time' impacts, these are variously determined by the increase in distance or transit time, as shown in the table below. Fuel consumption is predominantly determined by distance but also has a time-related component.

Factor	Driven by	
	Distance	Transit time
Train crewing		●
Fuel consumption	●	●
Locomotive and wagon maintenance	●	
Locomotive and wagon capital		●
Track maintenance / network operations	●	
Freight 'value of time'		●

The methodology does not include 'externality' effects such as changes in safety (accident rates) or greenhouse gas emissions, although these are included in the broader Inland Rail Business Case on a whole of program basis.

Unit rates used in the modelling are from ARTC's standard rail operating cost model used by ARTC for analysing above rail operations.

‘Value of time’ savings are derived using values from ARTC’s demand modelling that are also used across the ARTC network.

Unit rates are multiplied by the annual number of trains (consistent with the Inland Rail Business Case, including a transition from 1800 metre to 3600 metre trains after 2039-40) and the incremental change in either distance or time, as relevant to the specific factor. Present values of the future stream of benefits / disbenefits are calculated over an evaluation period to 2080 at a four per cent discount rate, being the core discount rate in the 2015 Inland Rail Program Business Case.

Results

The assessment estimated that the additional 39 kilometres in distance would produce an economic disbenefit of approximately $450 million relative to the Inland Rail Concept Alignment, over an evaluation period to 2080 (Present Value at a four per cent discount rate, being the core discount rate in the 2015 Inland Rail Program Business Case). This represents a benefit cost ratio of -8.2 meaning there is an economic loss of more than 8 times the value of the investment in construction.

Disaggregated results are below:

Item	Present value ($m)
Capital cost	56.14
Benefits (disbenefits)	
Freight operating cost increases	
Train crewing	-6.7
Fuel	-102.9
Locomotive and wagon maintenance	-30.5
Locomotive and wagon capital	-5.5
Track maintenance / network operations	-157.8
Sub-total	*-302.3*
Freight value of time impacts	**-99.3**
Total benefits (disbenefits)	**-401.7**
Net present value	**-457.8**
Benefit cost ratio	**-8.2**

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Appendix D – Analysis of freight volumes on the Coonamble line

NARROMINE TO NARRABRI PREFFERED INFRASTRUCTURE/AMENDMENT REPORT

The purpose of the below is to demonstrate that upgrading of the existing line is both more cost effective and delivers the benefits that would be achieved by routing inland rail via or close to Coonamble without incurring the $450 million economic disbenefit of doing so.

It has been suggested that the volume of grain and other freight moved on the Coonamble line warrants Inland Rail following the existing Coonamble line, particularly as doing so would result in (potentially significant) freight cost savings to farmers and others in the region.

Coonamble line: current status and use

The Coonamble-Dubbo rail line is part of the New South Wales Country Regional Rail Network. The Country Regional Network (CRN) is owned by Transport for NSW and is operated and maintained by rail infrastructure manager, John Holland Rail (JHR), under a 10-year contract that commenced in January 2012.

Currently the Coonamble line is used by trains on a seasonal basis to transport grain.

As at December 2019, the 2018 map of the Country Regional Network Capability available on the John Holland Rail website showed that the Coonamble line had a capability of 20.25 TAL (meaning it could cater for trains with loads equating to 20.25 tonnes per axle load). However, ARTC understands that the rail on the line is 50–53 kg/metre rail, which is suitable for 25 TAL trains subject to the load bearings of any bridges and culverts.

The New South Wales Government, through Transport for NSW, in 2017 also completed a $20.3 million upgrade program to the Coonamble -Dubbo line that replaced 66,000 life-expired timber sleepers with modern, long-life steel sleepers, provided an additional 17,000 tonnes of ballast and resurfaced 95 kilometres of track.

Grain freight and number of trains

ARTC undertook an analysis of utilisation of the Coonamble line in the period 01 January 2015 through to 31 December 2019. The analysis included examining loaded grain tonnages on a quarterly basis aligning with grain harvest seasons. In examining the figures in the following tables, it should be borne in mind that the figures are loaded gross tonnes which includes the weight of wagons.

The ARTC analysis shows that bulk grain movements in the five quarters from 01 July 2016 to 30 September 2017 totaled 437,804 loaded gross tonnes. This represents 51 per cent of the total loaded gross tonnes moved along the Coonamble line in five years (20 quarters).

In terms of numbers of trains loaded at Coonamble, the table below also shows there were an average of two trains per week over the five years, calendar year 2015 to 2019, inclusive of both bulk and containerised traffic.

There have been major year-to-year fluctuations reflecting the variations in harvest volumes, from a maximum of 4.5 trains per week during the bumper 2017 year to only a handful of trains during calendar year 2019.

Bulk train tonnages
Coonamble (including Gular and Armatree) – interfacing to the ARTC network at Troy Junction

01 January 2015 – 31 December 2019	**Loaded gross tonnes ('000s)**
Domestic (direct)	**483**
Staged via sub-terminal or regional location (may proceed to domestic or export)	**207**
Export (direct to port)	166
Total	**856**
Annual average (over 5 years)	171

Number of trains ex Coonamble				
Calendar year	Bulk	Containerised	Total	Average per week
2015	11	77	88	1.7
2016	70	59	129	2.5
2017	163	70	233	4.5
2018	24	29	53	1
2019	6	0	6	0.1
Total	**274**	**235**	**59**	
Annual average	55	47	102	2

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Appendix E – Potential freight savings from upgrading the Coonamble line

NARROMINE TO NARRABRI PREFFERED INFRASTRUCTURE/AMENDMENT REPORT

Upgrading the Coonamble line to 25 tonne axle load (TAL) offers the potential for reduced train operating costs which could potentially be passed on in reduced freight rates.

In a media release on 29 October 2019, the Deputy Prime Minister called for proposals for strategic business cases under the two-year Inland Rail Interface Improvement Program. One such business case that the Government has announced under the Program is an investigation of an upgrade to the Gilgandra-Coonamble line. The analysis in here is separate to that business case.

ARTC has modelled the potential impact on train operating costs (and potential freight rates) of the Coonamble line being upgraded to 25 TAL (the Inland Rail standard) compared with the current stated capability of 20.25 TAL.

The ARTC modelling shows the following potential savings per tonne. However, it must be noted that these results are from ARTC modelling based on certain assumptions as set out below and may not replicate real world freight rate impacts. They do, however, provide a useful guide.

The following factors should be noted in respect of potential per tonne savings which are indicated in the below table:

- Small trains have a higher dollar per tonne cost structure to begin with, so there is greater potential for savings given the higher initial cost base.
- In the case of Coonamble to Newcastle services, increasing train length from current (typically about 700 metres) to 1300 metres will involve additional locomotive requirements, which diminishes the cost savings.
- Services to Manildra are currently heavily length restricted because of yard / siding constraints at Manildra, such that the typical train length is about 370 metres.

The analysis in the below table demonstrates that the potential benefit in terms of reduced per tonne freight rates for grain growers who load grain trains at Coonamble lies in the Coonamble-Dubbo line being 25 TAL capable, hence offering potential operating cost savings that in theory may be passed on to growers. It is possible that the cost of production inputs, such as fertiliser, may also be reduced although this was not modelled by ARTC.

Inland Rail will not make a material difference to the distance travelled by freight trains from Coonamble to various destinations, whether it be Manildra, Sydney or Newcastle. However, if Inland Rail were to go via Coonamble, trains headed north to Brisbane or south to Melbourne would be required to take an extra 24 minutes as Coonamble lies west of the more direct route required for Inland Rail.

As such, the greatest benefit to grain growers remains likely to be realised from upgrading of the Coonamble line to a 25 TAL capability rather than to full Inland Rail specifications.

	Coonamble – Newcastle	**Coonamble – Newcastle**	**Coonamble – Newcastle (longer trains)**	**Coonamble – Newcastle (longer trains)**	**Coonamble – Manildra**	**Coonamble – Manildra**
Locomotives	20.25 TAL	25 TAL	20.25 TAL	25 TAL	20.25 TAL	25 TAL
Length limit	700 m	700 m	1300 m	1300 m	380 m	380 m
One-way distance	478 km	478 km	478 km	478 km	355 km	355 km
Annual round-trip services	61	61	61	61	61	61
Train length	659 m	656 m	1131 m	1190 m	359 m	365 m
Freight cost $ per tonne excluding wagon capital	$23.16	$19.72	$18.93	$16.84	$29.20	$23.79
Potential $ savings per tonne at 25 TAL		**$3.44 (14.9%)**		**$2.09 (11%)**		**$5.41 (18.5%)**

C

Changes to mitigation measures compared to the EIS

C.1 Updated mitigation measures

The full set of updated mitigation measures is provided in Table C-1 to Table C-3. These tables supersede the measures presented in the EIS.

New mitigation measures or additions to mitigation measures included in the EIS are shown in **red bold** text. Where a measure has been deleted or text has been deleted, it appears as ~~strikethrough~~ text. The measures are broadly grouped according to the main stage of implementation and the relevant key issues and impacts mitigated.

Table C.1 provides those measures that would be implemented during the design phase and prior to construction. It includes measures to guide how the proposal would be designed and measures relating to construction planning, including development of the strategies and plans that would be implemented during construction. Table C.2 provides those measures relevant to construction activities and the works proposed. Table C.3 provides those measures relevant to operation, which would be implemented during the operational stage to guide how the proposal is operated and maintained in the long term.

TABLE C-1: COMPILATION OF MITIGATION MEASURES FOR DETAILED DESIGN/PRE-CONSTRUCTION

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
Biodiversity		
BD1	*Impacts on biodiversity*	**Vegetation clearing would be limited to the minimum necessary to construct the proposal and allow for its effective operation.** ~~Detailed design and construction planning would avoid or minimise the need to remove and/or disturb native vegetation and fauna habitat as far as reasonably practicable.~~
BD2	*Impacts on biodiversity*	~~Vegetation clearing would be limited to the minimum necessary to construct the proposal and allow for its effective operation.~~ Where appropriate, facilities within the multi-function compounds and temporary workforce accommodation would be located to further minimise or avoid impacts on native vegetation, where practicable.
BD3	*Impacts on threatened species*	Additional threatened flora surveys would be undertaken (where suitable climatic conditions occur) prior to clearing for the **threatened** species likely to be impacted by the proposal, including: ▸ ***Diuris tricolor* in the Pilliga forests** ▸ ***Pterostylis cobariensis* in the Pilliga forests** ▸ ***Tylophora linearis* in the Pilliga forests.** ▸ ~~*Lepidium monoplocoides*~~ ▸ ~~*Tylophora linearis*~~ ▸ ~~*Commersonia procumbens*~~ ▸ ~~*Bertya opponens.*~~ **Surveys would include seed collection where possible.** The need for translocation options would be discussed with the Department of Planning~~, Industry~~ and Environment (Biodiversity, Conservation and Science Directorate), should these be required.
BD4	*Offsetting impacts on native vegetation and threatened species*	Biodiversity offsets would be finalised in accordance with the **NSW Biodiversity Offsets Scheme and in consultation with the NSW Department of Planning and Environment (Biodiversity, Conservation and Science Directorate)** ~~requirements of the *Biodiversity Assessment Method* (OEH, 2017~~). This **would** include retirement of like-for-like offsets for impacts on matters of national environmental significance.
BD5	*Impacts on fish passage*	Watercourse crossing structures would meet Inland Rail design standards and be designed in accordance with *Why do fish need to cross the road? Fish passage requirements for waterway crossings* (Fairfull, S. and Witheridge, G., 2003).

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
BD6	*Impacts on fauna connectivity*	A **detailed** fauna connectivity strategy would be prepared to guide detailed design **based on the preliminary fauna connectivity framework provided in Appendix J of the updated biodiversity development assessment report**. It would include investigation and design of: ▸ Locations for fauna crossing structures in the Pilliga ~~East State~~ forests, including bridges and **dedicated underpasses** ~~culverts~~ for threatened fauna (such as the koala and Pilliga mouse in areas of preferred habitat), **canopy** ~~glider poles~~ **bridges** at regular intervals, and wooden barrier poles at **selected** bridges ▸ The provision of localised fencing to direct fauna to crossing structures ▸ Fauna furniture to be included in the design of bridges and **dedicated underpasses** ~~culverts~~, where appropriate, to encourage crossings by koalas and other native fauna ▸ **Landscaping of the rail corridor to encourage movement of fauna across the gap**. The **detailed** connectivity strategy would include **threatened species management plans for key threatened species or groups identified in the preliminary fauna connectivity strategy, in addition to** monitoring and reporting requirements in relation to the operational performance of the final measures.
BD7	***Impacts on fauna connectivity***	**The fauna connectivity structures listed in the register of proposed connectivity structures in Appendix J of the updated biodiversity development assessment report would be further developed in detailed design and constructed as proposed. If any changes occur to the proposed number, type or location of connectivity structures, an appropriate level of assessment would be conducted, in consultation with BCS, to confirm any changes to credit liabilities for the proposal.**
Water resources		
WR1	*Construction and potable water supply*	Construction water supply options would continue to be explored during detailed design and could include reuse of excess water from the Narrabri Gas Project or other suitable facilities in the area, or lease and/or purchase of existing water access licences from surrounding landholders. Potable water supply options would continue to be explored during detailed design. **Water quality testing would be undertaken to confirm that the water sourced is suitable for its intended use. Any required approvals/agreements would be obtained prior to use.**
WR2	*Impacts on existing bores*	Where existing licensed bores are located within the proposal site, they would be decommissioned in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2020). **Where bores are decommissioned, compensation would be provided, or alternative water supply arrangements made, as agreed with the landowner/landholder.**
WR3	*Impacts on existing bores*	A bore census would be undertaken for existing licensed bores within 1 kilometre of the proposal's bore fields, where landholders permit. The census would collect baseline groundwater level data and information on a given bore's typical usage and characteristics (including bore construction, pump depth, yield, water level during pumping and water level outside of pumping periods).
WR4	*Impacts of extracting groundwater*	Test bores would be installed during detailed design, and further investigation would be undertaken by a qualified hydrogeologist, to confirm the depth and location of the proposed bore field bores. The **test bores and** bore fields would consider the ~~bore field~~ design considerations detailed in section 11.1 of Technical Report 4—Groundwater assessment**, as well as the potential for unidentified faults and other geological structures to connect shallow and deep-water tables.**

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
WR5	*Impacts of extracting groundwater*	Water volumes required to be extracted from groundwater **bores** for construction water and potable water **(for the Narromine North and Baradine temporary workforce accommodation facilities)** would be confirmed, and the appropriate approvals would be obtained, prior to extraction. Monitoring would be undertaken during extraction to ensure volumes stipulated by licence requirements are not exceeded. **Meters would be installed, and groundwater extraction recorded and reported, in accordance with the relevant requirements of the *Non-Urban Metering Policy* (DPIE, 2020f) and clause 21(6) of the Water Management (General) Regulation 2018.**
WR-CI1	*Groundwater drawdown impacts*	Further investigation would be undertaken to determine the potential for the bores associated with the Narromine North and Baradine temporary workforce accommodation facilities to cause **groundwater** drawdown impacts. This would include ensuring any impacts to existing bores are below the *NSW Aquifer Interference Policy* minimal impact considerations.
WR-CI2	*Suitability of groundwater*	The quality of groundwater from the proposed bores at the Narromine North and Baradine facilities would be assessed for the suitability of its intended use. Where required, treatment systems would be designed, and a monitoring program established, to ensure water quality ~~does not exceed~~ **complies with** relevant drinking water criteria from the *National Water Quality Management Strategy Australian Drinking Water Guidelines 6 2011* (National Health and Medical Research Council, 2017).
Flooding		
FH1	*Flooding impacts*	The design would continue to be refined, where practicable, to not worsen existing flooding characteristics ~~at sensitive buildings~~ **for flood events** up to and including the 1% AEP event. Detailed flood modelling would **assess** ~~consider~~ potential **impacts** ~~changes~~ to: ▸ Building and property inundation (including flood level surveys and consideration of existing inundation levels) ▸ Existing rail line, at rail connections ▸ Road flood levels and extent of flooding along roads ▸ Flood evacuation routes ▸ Overland flow paths and storage effects of construction and operational infrastructure. Flood modelling would have regard to the guidelines listed in section B3.1.1 of the EIS, and the revised quantitative design limits provided in the updated flooding and hydrology assessment report. Flood modelling, and any mitigation identified as an outcome of modelling, would consider floodplain risk management plans, and would be undertaken in consultation with the relevant local council and local emergency management committees, the Department of Planning~~, Industry~~ and Environment, the NSW State Emergency Service and potentially impacted landholders.
FH2	*Downstream watercourse stability*	Further modelling **and site-specific assessments** would be undertaken during detailed design to confirm the locations downstream of culverts **and within drainage control areas** that require erosion protection, and to confirm the extent and type of protection required.
Soils and contamination		
SC1	*Structural integrity*	Foundation and batter design would include engineering measures to minimise operational risks from shrink swell, dispersive and/or low strength soils.
SC2	*Structural integrity*	Soil salinity would be considered in the design of subsurface structures.

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
SC3	*Acid sulfate soils*	Prior to ground disturbance in high-probability acid sulfate areas, testing would be carried out to determine the presence of acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the *Acid Sulfate Soils Assessment Guidelines* (ASSMAC, 1998), and the *Waste Classification Guidelines—Part 4: Acid Sulfate Soils* (NSW EPA, 2014).
SC4	*Contamination*	Hazardous materials surveys would be undertaken during detailed design for all proposed demolition activities.
SC5	*Contamination*	An appropriately licensed asbestos removal contractor would be engaged to remove all asbestos identified at the illegal waste dump at which sample CS-21 was collected (easting 737305, northing 6617403) prior to works commencing. Asbestos would be removed in accordance with the requirements of applicable work health and safety legislation and codes of practice.
SC6	*Contamination*	Site investigations would be undertaken by a suitably qualified and experienced consultant, as defined in Schedule B9 of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC, 2013) to assess exposure risks to site workers and other receptors as a result of disturbances to the following areas considered to be at a higher risk of being contaminated: ▸ Narromine West connection ▸ Parkes to Narromine connection ▸ Dubbo to Coonamble Line connection ▸ Narrabri to Walgett Line connection ▸ Narrabri to North Star connection ▸ Where the proposal site borders the Santos Narrabri Operations Centre (directly west of the Narrabri West multi-function compound). The results of the site investigations would be assessed against the criteria contained within the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC, 2013) to determine the need for any remediation.
SC-CI1	*Soils and water quality*	The final approach to reusing wastewater from the Narromine North and Baradine temporary workforce accommodation facilities would be confirmed during detailed design.
SC-CI2	*Soils and water quality*	Any irrigation areas would be designed and operated in accordance with the risk framework and management principles contained in the *National Guidelines on Water Recycling* (Environment Protection and Heritage Council, 2006) and the *Environmental guidelines: Use of effluent by irrigation* (DEC, 2004). This would include the following design requirements: ▸ Irrigation area/s would be delineated based on the expected rate of irrigation and the drainage characteristics of the receiving soil ▸ The quality of treated water would be determined to prevent accumulation of contaminants, with reference to the relevant guidelines ▸ Irrigation area/s would be designed to include capacity to store treated water for the duration of typical wet weather events ▸ The rate of irrigation would be optimised to avoid waterlogging or ponding of reclaimed water Soil and groundwater conditions would be monitored to identify and correct trends in soil salinity or other potential effects of irrigation.
Water quality		
WQ1	*Water quality*	The design features listed in section B5.1.4 would continue to be refined and implemented to minimise the potential impacts on water quality.

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
Aboriginal heritage		
AH1	*Avoiding and minimising impacts on Aboriginal heritage*	Detailed design and construction planning would avoid direct impacts on identified items/sites of Aboriginal heritage significance, as far as reasonably practicable. ~~The location of~~ Construction compounds and associated access routes would ~~be reviewed to ensure, as far as practicable, that they are~~ not **be** located in areas of medium or high archaeological potential.
AH2	*Management of salvaged items*	A detailed salvage methodology would be prepared by a suitably qualified archaeologist in consultation with relevant registered Aboriginal parties. The methodology would be included in the Aboriginal cultural heritage management plan (mitigation measure AH10) to ensure any artefacts salvaged are managed in accordance with the requirements of the *National Parks and Wildlife Act 1974* (NSW). The methodology would include the process for consultation with **Heritage NSW** ~~the Department of Planning, Industry and Environment~~ and registered Aboriginal Parties in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a), and the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011). It would also include requirements in relation to the management of, and care and control plans for, salvaged objects. Registered Aboriginal parties would be engaged to assist in the salvage, which would be managed by an appropriately qualified archaeologist engaged to support the process. Detailed analysis and reporting of cultural material collected would be provided to the Department of Planning~~, Industry~~ and Environment.
AH3	*Management of salvaged items*	**Prior to construction**, a targeted archaeological survey would be undertaken for areas identified as culturally sensitive, requiring further investigation, including: ▸ Wallaby Creek ▸ Ewenmar Creek ▸ Marthaguy Creek ▸ Castlereagh River ▸ Gulargambone Creek ▸ Tenandra Creek ▸ Baradine Creek ▸ Namoi River ▸ Mungery Creek ▸ Caleriwi Creek. **In addition, a targeted archaeological survey would be undertaken at the location of the Narromine North temporary workforce accommodation.** The targeted survey would be undertaken with registered Aboriginal parties in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b). Additional mitigation and management measures would be developed, in consultation with the registered Aboriginal parties, for areas or items of Aboriginal cultural heritage significance identified during the targeted survey. The additional measures would be included in the Aboriginal cultural heritage management plan (mitigation measure AH10). If additional sites or items are identified that cannot be avoided, salvage of artefacts would be undertaken prior to construction, in accordance with the salvage methodology (mitigation measure AH2).

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
AH4	*Management of salvaged items*	A pre-construction survey would be undertaken to confirm the locations of the previously listed AHIMS sites that could not be located during the site survey. Surveys would be undertaken with registered Aboriginal parties in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b). If the sites are located, impacts would be avoided, as far as practicable, and protection measures put in place in accordance with the Aboriginal cultural heritage management plan (mitigation measure AH10). Any sites with the potential to be impacted would be managed in accordance with the salvage methodology (mitigation measure AH2).
AH5	*Impacts on PADs*	Detailed archaeological investigations would be undertaken at the following six PADs that may be directly impacted by the proposal: ▸ Ewenmar Creek 27-6-0036 ▸ Castlereagh River 28-4-0280 (and associated artefact scatter) ▸ Gulargambone Creek 28-1-0060 and 28-1-0090 (and associated artefact scatter) ▸ Calga and Looking Glass creeks 28-1-0059 (and associated artefact scatter) ▸ Baradine Creek 19-5-0230. Sub-surface archaeological test excavations would be undertaken to confirm the nature (and extent, if verified) of any archaeological deposits. The test excavations would be carried out in accordance with the approved methodology prepared for the proposal. If test excavation confirms that the PAD has heritage significance and has the potential to be impacted by the proposal, the site would be managed in consultation with **Heritage NSW** ~~DPIE~~ and registered Aboriginal parties. If salvage is required it would be managed in accordance with the agreed salvage methodology (mitigation measure AH2).
AH6	*Impacts on modified trees*	**Field validation of the following modified trees would be undertaken prior to construction, in accordance with *Aboriginal scarred trees in New South Wales: A field manual* (DEC, 2005):** ▸ Backwater Cowal 35-3-0175 ▸ Ewenmar Creek 27-6-0035 ▸ Boothaguy Creek **27-6-0042**~~, 27-6-0037 and 27-6-0041~~ ▸ Baronne Creek 28-1-0062, 28-1-0063 and 28-1-0064 ▸ Mungery Creek 28-1-0083, 28-1-0084, 28-1-0086 and 28-1-0087. Impacts on ~~the following modified trees~~ **those trees confirmed to be scarred trees** would be avoided, as far as practicable. If impacts are unavoidable, the tree would be photographed and catalogued prior to removal, in consultation with the registered Aboriginal parties, by an appropriately qualified archaeologist. The salvaged artefacts would be managed in accordance with the salvage methodology.
AH7	*Impacts on modified trees*	**The following modified trees would be protected in situ:** ▸ BCST6 (35-3-0270) ▸ Berida Road ST1 (28-4-0283). **During detailed design ARTC would identify opportunities to reduce or remove the need for drainage protection works in the vicinity of these trees.**

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
AH8	*Impacts on artefact scatters*	Surface collection (salvage) of the following artefact scatters would occur prior to construction, in accordance with the approved salvage methodology: ▸ Macquarie River 35-3-0276 ▸ Castlereagh River 28-4-0280 ▸ Gulargambone Creek 28-1-0090 and 28-1-0060 ▸ Calga and Looking Glass Creek 28-1-0059 and 28-1-0095 ▸ Noonbar Creek 28-1-0096 ▸ Baradine Creek 19-5-0226 ▸ Bohena Creek 19-6-0180. **Artefacts located outside the proposal site would not be salvaged and would remain in-situ.**
AH9	***Aboriginal heritage survey of biodiversity offset sites***	**Once biodiversity offset sites are secured (in accordance with mitigation measure BD4) an Aboriginal heritage survey of representative locations within the offset sites would be undertaken. The survey would record any evidence of Aboriginal land use occupation and identify appropriate management strategies.** **The approach to the survey, including selection of representative survey locations and reporting, would be determined in consultation with the registered Aboriginal parties.**
Non-Aboriginal heritage		
NAH1	*Impacts on non-Aboriginal heritage*	Detailed design and construction planning would avoid direct impacts on identified items/sites of non-Aboriginal heritage significance, as far as reasonably practicable. This would include small sections of the following listed items that overlap with the proposal site: ▸ Curban Inn site ▸ Convict Road, Baradine. The location of construction compounds and associated access routes would be reviewed to ensure, as far as practicable, they are not located in areas of medium or high archaeological potential.
NAH2	*Impacts on non-Aboriginal heritage*	The location of the graves at the Woodvale Park Private Cemetery listed item would be confirmed by an appropriately qualified archaeologist. Once confirmed, the location would be marked on plans, fenced onsite and avoided during construction.
NAH3	*Impacts on non-Aboriginal heritage*	In the event that the following items are unable to be avoided, an archaeological assessment, research design and methodology would be prepared. Test excavation would be undertaken by an appropriately qualified Excavation Director, in accordance with the NSW Heritage Council's Excavation Director criteria: ▸ Curban Inn site ▸ Convict Road, Baradine. **The archaeological assessment would be prepared in consultation with relevant stakeholders, including the local council and Heritage NSW.**
NAH4	*Heritage interpretation*	A Heritage Interpretation Strategy for non-Aboriginal heritage would be prepared in **consultation with the relevant local council and key stakeholders.** This would provide a framework for interpreting the heritage items (listed and potential) impacted by the proposal, set out the key interpretative themes and identify communication strategies. The strategy would include interpretation requirements for specific parts of the proposal; particularly, where heritage items are proposed to be removed or archaeological sites are proposed to be excavated. These may include approaches such as interpretive signage at heritage items that have been removed or excavated, historical/artefact displays at local museums or visitor centres, and online media about heritage items and history in the vicinity of the proposal. The strategy would be prepared with regard to *Interpreting Heritage Places and Items: Guidelines* (NSW Heritage Office, 2005), and the NSW Heritage Council's *Heritage Interpretation Policy*.

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
NAH5	*Archival recording*	Archival photographic recording of buildings to be removed would be carried out prior to removal, in accordance with *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Council of NSW, 2006) and *How to prepare archival records of heritage items* (NSW Heritage Office, 1998) at the following sites: ▸ Drinane Public School (former) ▸ Corrugated iron hut with chimney Two-storey barn/shed.
~~**NAH6**~~	~~*Graves of the Dingwell children*~~	~~Graves and human skeletal remains at the graves of the Dingwell children would be managed in accordance with the requirements of relevant legislation and guidelines, including the *Public Health Regulation 2012 (NSW), Heritage Act 1977 (NSW), Work Health and Safety Act 2011 (NSW), NSW Health Procedures Exhumation of human remains (NSW Health, 2013), and Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977 (NSW Heritage Office, 1998b).~~ ~~A plan of management for exhuming and re-interring the graves would be developed in accordance with these requirements and included in the heritage management plan (mitigation measure NAH8).~~ ~~Approval for exhuming the graves would be sought in accordance with the requirements of Division 4 of Part 8 of the Public Health Regulation 2012. The exhumation and re-interment process would be undertaken in accordance with the terms of the approval and the exhumation plan of management.~~ ~~The exhumation plan of management would also include:~~ ~~An archaeological assessment, research design and methodology to undertake archaeological investigation during removal of the graves. The methodology would be developed and implemented by an appropriately qualified Excavation Director, in accordance with the NSW Heritage Council's Excavation Director criteria.~~ ~~Strategies for appropriate reburial, memorialisation and interpretation signage developed in consultation with appropriate stakeholders, including Heritage NSW (Department of Premier and Cabinet), Narrabri and District Historical Society, Coonabarabran History Group, Narrabri Shire Council, NSW National Parks and Wildlife Service, and direct descendants of the Dingwell family.~~
NAH6	*Visual impacts at heritage items*	**The urban design and landscape plan would include vegetation screening, where practicable, to minimise visual impacts on homesteads identified as potential heritage items — 'Kickabil' homestead and woolshed, 'Allandale' homestead and 'Digilah' homestead.** ~~Opportunities to include plantings to screen the visual outlook from potential heritage homesteads would be considered during development of the urban design and landscape plan.~~
Noise and vibration		
CNV1	*Construction noise and vibration impacts*	Location and activity specific construction noise and vibration impact statements would be prepared 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, as required. The statements would confirm predicted impacts at relevant receivers to assist with the selection of feasible and reasonable management **measures (such as shielding plant and equipment, temporary noise barriers or provision of temporary alternative accommodation). The statements would also confirm noise and vibration auditing and monitoring requirements.**
CNV2	*Construction vibration (structural) impacts*	Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and vibration monitoring would be carried out in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework, to ensure vibration levels remain below appropriate limits for that structure.

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
ONV1	*Operation noise and vibration impacts*	An operational noise and vibration review would be undertaken **during detailed design** to review the potential for operational impacts and guide the approach to identifying feasible and reasonable mitigation measures to be incorporated in the detailed design.
ONV2	*Operation noise and vibration impacts*	Feasible and reasonable mitigation measures would be identified where exceedances of operational noise and vibration criteria are confirmed. Measures would be identified in accordance with the outcome of the operational noise and vibration review and the Inland Rail Noise and Vibration Strategy. Where at-property noise treatments are identified as the preferred mitigation option, these would be developed **and implemented** in consultation with individual property owners.
ONV3	*Operation structural vibration impacts*	If the operational noise and vibration review indicates that vibration levels are predicted to exceed the screening criteria at sensitive receivers, a more detailed assessment of the structure would be carried out. For any heritage items with the potential to be affected, the detailed assessment would determine any specific sensitivities, in consultation with a heritage specialist, to ensure risks are adequately managed. If a heritage structure is found to be structurally unsound following inspection, a more conservative cosmetic damage objective (e.g. 2.5 mm/s peak component particle velocity for long-term vibration) would be considered.
Traffic and transport		
TT1	*Impacts on existing infrastructure transport and access*	Detailed design and construction planning would avoid or minimise the potential for impacts on the surrounding road and transport network, and property accesses, as far as reasonably practicable.
TT2	*Impacts on existing infrastructure transport and access*	Input would be sought from relevant stakeholders (including local councils and Transport for NSW) prior to finalising the detailed design of those aspects of the proposal that affect the operation of road and other transport infrastructure under the management of these stakeholders. **This would include confirming ongoing operation and maintenance arrangements for those assets under the control of other stakeholders.**
TT3	*Road user safety at changes to the road network*	Road safety audits would be undertaken where changes to the road network are required, in accordance with relevant Austroads guidelines, to ensure the safety of all road users is considered in the design process.
TT4	*Road user safety at level crossings*	~~Public~~ Level crossings would be designed in accordance with relevant guidelines and standards, including *AS 1742.7:2016 Manual of uniform traffic control devices, Part 7: Railway crossings* ~~and~~ (Standards Australia, 2016), *Guide to Road Design Part 4: Intersections and Crossings* (Austroads, 2021a), ***Guideline: Lighting for railway crossings*** **(Roads and Maritime Services, 2013b)** and ARTC standards, including provision of warning signage, line marking and other relevant controls. Public level crossings with active controls would include boom gates and flashing lights. Where level crossings would provide access for travelling stock routes, consultation would be undertaken with Crown Lands and Local Land Services to determine appropriate controls.
TT5	***Road user safety at level crossings***	**A level crossing treatment report would be prepared to document the level crossing design and assessment process that has been undertaken. The report would be developed in consultation with Transport for NSW and the relevant councils.** **The report would provide an assessment of road risks consistent with the guideline *Establishing a Railway Crossing Safety Management Plan* (Roads and Traffic Authority, 2011).** **Justification would be provided where no works are proposed on existing level crossings.**

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
Land use and property		
LP1	*Land use and property impacts, including severance and other impacts on operations*	The design and construction planning would continue to be refined, to minimise potential impacts on land uses and properties, as far as reasonably practicable. Consultation with landholders would be ongoing to identify **feasible and reasonable measures** to minimise impacts on their operations**/properties** ~~where practicable~~.
LP2	*Acquisition and property impacts*	All property acquisitions would be undertaken in consultation with landowners**/landholders** and in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW). In line with *the Land Acquisition Act (Just Terms Compensation) Act*, ARTC's preference is for acquisition by agreement, where practicable.
LP3	*Acquisition and property impacts*	During the property acquisition process, ARTC would seek to secure agreement with affected landholders, to guide property-level design requirements and the management of construction on, or immediately adjacent to, private properties. **Each impacted property owner would be consulted to identify and understand the operational needs of their property and the activities conducted upon it, with tailored agreements prepared to document the agreed outcomes.** The agreements may include: ▸ Measures to minimise property impacts, including **impacts** on agricultural operations **(mitigation measure LP5)** ▸ Specific requirements to ensure that operations, including the movement of livestock and farm machinery, are able to be maintained as efficiently as possible **(mitigation measure LP7)** ▸ Measures to manage severance impacts **as they relate to each property**, where practicable, including appropriate **movement arrangements (mitigation measure LP6) such as new or adjusted accesses to the public road network or internal access networks, divestment or** ~~access solutions and~~ amalgamation opportunities ▸ Required adjustments **to and/or replacement of** ~~to~~ affected structures**, such as livestock handling yards, fencing, silos, holding pens, barns, etc** ▸ **Assistance to reconfigure farming operations to accommodate the alteration in land use.** Where land is acquired, compensation would be assessed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW) ~~and Determination of compensation following the acquisition of a business (NSW Government, undated)~~ **and the NSW Property Acquisition Process https://www.nsw.gov.au/housing-and-construction/property-acquisition**. Depending on the individual circumstances of each land/business owner and the proposed impacts on the land and to operations, compensation may take the form of money or land/works—as agreed by the parties.
LP4	*Acquisition and property impacts*	Property owners and occupants would be consulted in accordance with the communication management plan (mitigation measure SE1), to ensure that owners/occupants are informed about: ▸ The timing and scope of activities in their area ▸ Any potential property impacts/changes, particularly in relation to potential impacts on access, services or farm operational arrangements ▸ Activities that have the potential to impact on livestock. Feasible and reasonable property-specific measures would be identified in consultation with landholders, and implemented during construction, where construction is located on or immediately adjacent to private properties and has the potential to affect farm operational arrangements.

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
LP5	***Impacts of construction on private properties***	**Where construction is located on, or immediately adjacent to, private properties and has the potential to affect farm operational arrangements/properties, property-specific measures would be identified and implemented, in consultation with landholders, to address identified issues where feasible and reasonable. The measures would include, as appropriate, arrangements in terms of works timing and practices; any required adjustments to fencing, access, and farm infrastructure; and relocation or compensation for any impacted structures or improvements.**
LP6	*Maintaining permanent access to properties*	Where the proposal affects access **to and from a public road,** input would be sought from relevant landholders **regarding alternative access arrangements** prior to finalising the detailed design. Where any legal access to a property is permanently affected and a property has no other legal means of access, alternative access to and from a public road would be provided to an equivalent standard, where feasible and reasonable. Where an alternative access is not feasible or reasonable, and a property or part of a property is left with no access to a public road, consideration would be given to acquisition of the property or part of the property in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW). In accordance with the Land Acquisition Act, ARTC's preference is for acquisition by agreement, where practicable. ~~Where changes to access arrangements are required for individual properties, ARTC would advise relevant property owners/occupants and consult with them in advance regarding alternative access arrangements.~~
LP7	***Internal access arrangements***	**Where the proposal affects internal property access arrangements, input would be sought from relevant landholders prior to finalising the detailed design.** **Where changes to internal property access arrangements are required, ARTC would consult with relevant property owners/occupants regarding alternative access arrangements and identify feasible and reasonable measures to minimise impacts on existing operational arrangements/properties.** **Impacts and any proposed mitigations would be taken into account at the time compensation is assessed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW).**
LP8	*Impacts on Crown land*	The acquisition of Crown land would be undertaken in consultation with the Department of Planning~~, Industry~~ and Environment, and in accordance with the requirements of the *Crown Lands Management Act 2016* (NSW) and the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW).
LP9	*Impacts on livestock*	The need for additional stock management infrastructure on either side of level crossings, such as forcing yards and holding pens, would be identified in consultation with the relevant landholders.
LP10	*Impacts on livestock*	Livestock fencing would be provided in agricultural areas (as required) to minimise the risk of livestock–train collisions. The preferred fencing arrangements would be confirmed in consultation with landholders.
LP11	*Maintenance of fencing*	Maintenance agreements would be established for fencing along the rail corridor **where it adjoins** ~~located within~~ private properties. The agreements would include protocols for reporting damage and arranging repairs of shared boundary fencing.
LP12	*Minimising impacts on travelling stock reserves*	Local Land Services would continue to be consulted during detailed design to confirm how impacts on travelling stock reserves would be minimised during construction and operation. Alternative access arrangements would be made, as required, subject to maintaining rail safety.
~~**LP12**~~		~~Opportunities to refine the design to avoid construction footprint impacts on travelling stock reserve R9489 "Narrabri West" would be investigated.~~

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
LP13	*Impacts on services and utilities*	The location of all utilities, services and other infrastructure, and requirements for access to, diversion, protection and/or support, would be confirmed prior to construction. This would include (as required), undertaking utilities investigations, including intrusive investigations, and consultation and agreement with service providers, in accordance with the utilities management framework provided in Appendix J **of the EIS**.
LP14	*Impacts on, and construction within, State forests*	The Forestry Corporation of NSW would continue to be consulted in relation to: ▸ Those aspects of construction planning, programming, and work methodologies with the potential to affect forestry management practices ▸ **Measures to minimise** ~~minimising~~ the potential impacts on forestry management practices, including the need for exclusion zones in specific areas, where required Opportunities for beneficial reuse of forest products that would be removed during construction.
LP15	*Impacts on, and construction within, State forests*	Appropriate management measures and communication requirements for users of State forests in the vicinity of the proposal site would be defined in consultation with the Forestry Corporation of NSW and forest users.
Visual amenity		
LV1	*Minimising the potential for visual and landscape impacts*	Detailed design and construction planning would seek to minimise the construction and operation footprints, and avoid impacts on mature native vegetation, as far as reasonably practicable.
LV2	*Minimising the potential for visual and landscape impacts*	An urban design and landscape plan would be prepared to provide a consistent approach to design and landscaping. The urban design and landscape plan would include: ▸ Vegetation screening in strategic locations to visually mitigate impacts from new structures and rail operations, including around bridges and locations where the proposal would be visible from sensitive receivers, where the presence of screening does not impact safe rail operations ▸ Appropriate species that respond to the existing landscape character setting and environmental conditions ▸ Design guidelines to minimise the visual impacts of bridges, with consideration of the existing landscape and visual context and with regard to *Bridge aesthetics: design guidelines to improve the appearance of bridges in NSW* (Roads and Maritime Services, 2012). Detailed design would be undertaken in accordance with the urban design objectives developed for the design, and the urban design and landscape plan.
LV3	*Batter slopes in contrast with the existing landform*	Batter slopes would be integrated into the surrounding landscape, as far as practicable. Appropriate slope stabilisation would be integrated into batter design to ensure successful rehabilitation and stabilisation.
LV4	*Minimising light spill*	Temporary and any permanent lighting would be designed and sited in accordance with *AS/**NZS** 4282-~~1997~~**2019** Control of the Obtrusive Effects of Outdoor Lighting* **and** *Dark Sky Planning Guideline: Protecting the observing conditions at Siding Spring* (Department of Planning and Environment, 2016), **and in consultation with the Siding Spring Observatory Dark Sky Planning Committee.**

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
Socio-economic impacts		
SE1	*Social impacts, communication and engagement*	ARTC would continue to manage and deliver program-wide community and stakeholder engagement for Inland Rail in accordance with the Inland Rail Communications and Engagement Strategy. A **proposal-specific** communication management plan would be developed, in accordance with the Inland Rail Communications and Engagement Strategy, **and implemented prior to and during construction**, to ensure that: ▸ The community and key stakeholders are provided opportunities for input to the design and construction planning, where appropriate ▸ Landowners/landholders and community members with the potential to be affected by construction activities are notified in a timely manner about the timing of activities and potential for impacts**, and the measures (developed in accordance with mitigation measure LP5) that would be implemented to minimise the potential for impacts on individual properties** ▸ Enquiries and complaints are managed and a timely response is provided for concerns raised ▸ Accurate and accessible information is made available ▸ Feedback from the community is encouraged**.** ▸ opportunities for input are provided where appropriate. The communication management plan would define the requirements for the complaints management system to be implemented during construction.
SE2	*Social impacts, communication and engagement*	The communication management plan would include measures to ensure ongoing consultation with local emergency services providers, to inform providers about the locations of level crossings, and changes to access routes and road conditions.
SE3	***Social impacts, communication and engagement***	A detailed Aboriginal community and stakeholder engagement strategy and action plan would be prepared and implemented at the commencement of the detailed design phase to require that: ▸ Information about the proposal is shared with Aboriginal stakeholders and communities in a timely manner ▸ Strong relationships between ARTC and Aboriginal stakeholders and communities are built and maintained ▸ Local Aboriginal cultural and community values are identified and understood Opportunities to reflect Aboriginal community and cultural values in infrastructure or other outcomes of the proposal are identified and implemented.
SE4	***Socio-economic impacts***	**A social impact management plan (SIMP) would be prepared to manage the implementation of the proposed socio-economic mitigation measures, and to detail the specific management actions and targets that would be developed in response to these measures. The SIMP would define specific actions, roles and responsibilities, and a monitoring, reporting and adaptive management framework for construction.**
SE5	***Socio-economic impacts***	**Prior to construction, ARTC would confirm workforce requirements and the associated requirements for, and availability of, support services (including health, wellbeing and emergency services) to meet the needs of the non-resident construction workforce.** **ARTC would develop strategies and measures to meet these needs, as far as practicable, with minimal potential impacts on the local community. The measures would be developed in consultation with local councils and service providers (including health and emergency service providers), where relevant, and would be detailed in the workforce management plan.**
SE6	*Economic benefits and impacts on regional industries and businesses*	ARTC would continue to support local employment in accordance with the *Australian Jobs Act 2013* (Cth) and Australian Industry Participation National Framework, and through the Inland Rail Academy, to leverage training programs, upskill local residents and young people, and connect businesses with Inland Rail opportunities and key regional industries.

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
SE7	*Economic benefits and impacts on regional industries and businesses*	A proposal-specific industry participation plan would be developed and implemented to manage the potential employment and regional economic benefits of the proposal. The plan would address the requirements of the *Australian Jobs Act 2013* (Cth), the Australian Industry Participation National Framework, and the *Inland Rail Indigenous Participation Plan* (ARTC, ~~2019a~~ **2020c**). The industry participation plan would identify appropriate measures to achieve the objectives of the *Australian Jobs Act 2013* (Cth) and the *Inland Rail Indigenous Participation Plan*, including an achievable list of goods and services that could be subcontracted, as well as targets for local and Indigenous business participation.
SE8	*Impacts on the Narrabri Dirt Bike Club*	ARTC would continue to consult with the Narrabri Dirt Bike Club, Narrabri Council and the Department of Planning~~, Industry~~ and Environment (Crown Lands) in relation to: ▸ The temporary and permanent land requirements at the club site ▸ The potential impacts on the club's facilities Measures to address the identified impacts.
SE-CI1	*Impacts on the Baradine Showground*	ARTC would continue to consult with the Baradine Showground Trust to manage access and temporary land requirements at the showground.
SE-CI2	*Temporary workforce accommodation*	A temporary workforce accommodation plan would be prepared to guide the design and provision of temporary accommodation. The plan would be developed in accordance with ARTC's Inland Rail Program Accommodation Principles, relevant council development codes and guidelines, and the following overarching principles: ▸ Temporary workforce accommodation is designed to be integrated into**, and minimise the impacts on,** the existing communities ▸ Temporary workforce accommodation adequately provides for occupants and has a high level of onsite amenity. ▸ The plan would define: ▸ The arrangement and layout of facilities to minimise amenity impacts on surrounding sensitive receivers (including **noise,** visual amenity, lighting and privacy) ▸ Proposed built-form heights to ensure heights are appropriate within their surrounding context ▸ Opportunities for retention of screening vegetation (where present) and provision of additional landscaping as required ▸ How services (such as water, waste, stormwater, wastewater) would be provided and managed to ensure consistency with relevant codes and guidelines, and minimise potential impacts on local infrastructure networks and the environment ▸ Location, design, service and amenity requirements for mobile accommodation facilities, including amenities for workers ▸ Provision of adequate parking onsite ▸ How sites would be decommissioned and rehabilitated consistent with the rehabilitation strategy for the proposal. The plan would be developed in consultation with relevant key stakeholders, including the relevant local council.
Waste management		
WM1	*Excess waste generation*	Detailed design would include measures to minimise spoil generation. This would include a focus on optimising the design to minimise spoil volumes and the reuse of material onsite.

REF	Issue/impact	Mitigation measures—detailed design/pre-construction
WM2	*Management of spoil*	A spoil management strategy would be developed to define the preferred approach to managing spoil, including the use of spoil to rehabilitate borrow pits. The strategy would include: ▸ Confirming spoil quantities ▸ Undertaking appropriate investigations and surveys, including geotechnical investigations ▸ Consideration of the approvals and land application of waste exemptions required, associated lead time, and any associated sampling and reporting obligations ▸ Consultation with landholders on which borrow pits are located ▸ Defining the preferred option for reusing and/or disposing of any spoil not able to be reused at borrow pits. The outcomes of the strategy would inform the construction waste management plan.
Sustainability		
SU1	*Achieving the target sustainability rating*	A sustainability management plan would be developed to guide the proposal to achieve an 'excellent' design rating according to ISCA's Infrastructure Sustainability rating scheme. The sustainability management plan would incorporate sustainability objectives and targets consistent with Inland Rail program sustainability objectives and targets, roles and responsibilities, strategies for achieving the 'excellent' design rating, and review and reporting requirements.
SU2	*Sustainable procurement*	Procurement would be undertaken in accordance with the *Inland Rail Sustainable Procurement Policy* (ARTC, 2020**d**~~e~~).
SU3	*Reporting*	Monthly sustainability reporting (and corrective action, where required) would be undertaken during detailed design in accordance with the sustainability management plan.
Climate change		
CC1	*Climate change risk management*	The climate change risk assessment would continue to be refined as the design of the proposal progresses. The adaptation measures identified for the proposal would be reviewed and final measures would be incorporated into the design, where practicable.

TABLE C-2: COMPILATION OF MITIGATION MEASURES FOR CONSTRUCTION

REF	Issue/impact	Mitigation measures—construction
Biodiversity		
~~**BD7**~~ **BD8**	*Biodiversity impacts*	A biodiversity management plan would be prepared prior to construction and implemented as part of the CEMP. The plan would include measures to **protect** ~~manage~~ biodiversity and minimise the potential for impacts during construction. The plan would be prepared in accordance with relevant legislation, guidelines and standards. The plan would include but not be limited to: ▸ Locations and requirements for pre-clearing surveys ▸ Establishing protocols for the staged clearing of vegetation, and safe tree felling and log removal, to reduce the risk of fauna mortality ▸ Measures to avoid and minimise clearing of hollow-bearing trees, where practicable ▸ Measures relating to the provision and management of nest boxes, including reuse of hollows and monitoring protocols ▸ An unexpected finds protocol ▸ Measures to manage biosecurity risks in accordance with the *Biosecurity Act 2015* (NSW) ▸ Measures to reduce the risk of aquatic fauna mortality/injury.
~~**BD8**~~ **BD9**	Biodiversity impacts	Pre-clearing surveys would be undertaken, prior to construction, by a suitably qualified ecologist in accordance with the biodiversity management plan. Specific surveys would include: ▸ Surveys for roosting microbats and birds in structures **and habitats** that are proposed to be removed, including telegraph poles, buildings, **hollow trees and bark fissures** ▸ Searches for nest trees ▸ Identification of hollow-bearing trees and logs requiring fauna **rescue, relocation or other** management during removal ▸ Surveys for koalas, which may include trained detection dogs or other appropriate survey techniques ▸ Aquatic fauna salvage in watercourses or residual pools within 50 metres of the construction footprint, and in areas that would be enclosed by silt curtains (e.g. piling locations).
~~**BD9**~~ **BD10**	*Biodiversity impacts*	Compounds and stockpile sites would be located an appropriate distance from riparian habitat to avoid indirect impacts on aquatic habitat. This includes, where practicable, a minimum of 100 metres (m) for Type 1, Class 1 watercourses, 50 m for Type 2, Class 2 and 3 watercourses, and 10 to 50 m for Type 3, Class 2 to 4 watercourses. Direct impacts on in-stream vegetation and native vegetation on the banks of watercourses would be avoided, as far as practicable.
~~**BD10**~~ **BD11**	Biodiversity impacts	Exclusion areas would be established and maintained around native vegetation to be retained; particularly areas of **high** biodiversity value adjoining the proposal site **(e.g. threatened ecological communities, known threatened plant populations etc)** that are located in close proximity to work areas.
~~**BD11**~~ **BD12**	*Rehabilitation of vegetation subject to temporary disturbance*	A rehabilitation strategy would be prepared to guide rehabilitation planning, implementation, monitoring and maintenance of disturbed areas **within the construction footprint that are not required as part of** ~~outside~~ the operational footprint (such as compounds and temporary workforce accommodation). The strategy would include clear objectives for rehabilitation of native vegetation in temporary disturbances areas.

REF	Issue/impact	Mitigation measures—construction
BD13	***Habitat linkages***	**To improve fauna connectivity across the rail corridor, habitat linkages would be included in the rail corridor where practicable and consistent with the safe operation and maintenance of Inland Rail. Linkages would involve retaining or rehabilitating groundcovers and low shrubs, with a focus on those areas of the rail corridor within the Pilliga forests and other areas of connected vegetation.** **Rehabilitation or revegetation is to occur as soon as possible to minimise the lag between impact and mitigation.** **As part of construction planning, opportunities to minimise construction clearing within the rail corridor would be investigated for high value connectivity areas.**
Water resources		
WR6	*Sedimentation and erosion management*	A soil and water management plan would be prepared and implemented as part of the CEMP. The plan would include measures, processes and responsibilities to minimise the potential for soil and water impacts, **including impacts to groundwater,** during construction.
WR7	*Monitoring groundwater drawdown and quality*	A groundwater monitoring program would be developed **in consultation with DPE Water** and implemented, as part of the soil and water management plan, to monitor potential groundwater impacts. The program would define the following in accordance with chapter 10 of Technical Report 4—Groundwater assessment: ▸ Monitoring parameters ▸ Monitoring locations ▸ Frequency and duration of monitoring. The monitoring program would include baseline monitoring to determine the water quality of groundwater from the proposed bore field bores. Monitoring of groundwater levels would continue following the completion of groundwater pumping and extraction until water levels recover to baseline conditions. **A review would be undertaken six months and one year after the completion of groundwater pumping to assess the recovery rates and determine if further mitigation is required.**
WR8	*Bore field groundwater quality*	The quality of groundwater obtained from the proposed bore field bores would be assessed for the suitability of its intended use. Where required, treatment systems would be designed to ensure water quality ~~does not exceed~~ **is consistent with** the relevant water quality criteria from the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
WR9	*Impacts on existing bores*	Where groundwater monitoring identifies the potential for groundwater drawdown in existing bores to exceed the *NSW Aquifer Interference Policy* minimal impact considerations, make-good provisions would be triggered for those bores, in consultation with the relevant landholders **and DPE Water.**
WR10	*Proposal bore construction*	All bores required for the proposal would be constructed by appropriately licensed drillers in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2020) and the relevant requirements of each Water Sharing Plan.
WR11	*Works within watercourses*	Works within or near watercourses would be undertaken with consideration of the *Guidelines for watercourse crossings on waterfront land* (DPI, 2012) **and *Guidelines for controlled activities on waterfront land—Riparian corridors* (NRAR, 2018)**.
WR12	*Unforeseen water table penetration by bulk earthworks*	If bulk excavations unexpectedly intersect the water table, **works would be halted while the** potential impacts ~~would be~~ **are** assessed by a hydrogeologist and adaptive mitigation measures implemented, as required.
WR13	*Proposal bore fields*	Where there is benefit to the local community, the potential for retaining bores post-construction would be considered in consultation with relevant stakeholders (e.g. local councils). Any approvals, operating costs and maintenance associated with retaining and using these bores would be the responsibility of the party that takes ownership.

REF	Issue/impact	Mitigation measures—construction
WR14	***Proposal bore construction***	**A bore field extraction plan would be prepared as part of the soil and water management plan and provided to DPE Water prior to construction of the proposed bore field bores. The plan would include information about the locations, water source, depth and proposed volumes of water take per year for the proposed bore field bores, as well as any measures proposed to minimise the potential for impacts of extracting groundwater for use as construction water.** **The plan would also provide confirmation that any applicable water sharing plan rules have been met.**
WR-CI3	*Unforeseen water table penetration by borrow pits*	If excavations at borrow pits B, C and/or borrow pit D intersect the water table, **works would be halted while** the potential impacts ~~would be~~ **are** assessed by a hydrogeologist and additional management measures implemented as required.
WR-CI4	*Groundwater inflow rate (borrow pits)*	If the groundwater inflow rate at borrow pit A is higher than one mega litre per year, the inflow rate and implications would be assessed by a hydrogeologist and additional management measures implemented, as required. **If the groundwater inflow rate at borrow pit A has the potential to exceed 3 mega litres per year, sufficient entitlement would be obtained prior to any extraction or interception.**
Flooding		
FH3	*Flooding impacts*	Construction planning and the layout of construction work sites and compounds would be undertaken with consideration of overland flow paths and flood risk, avoiding flood liable land and flood events where practicable.
FH4	Flooding impacts	A flood and emergency response plan would be prepared and implemented as part of the CEMP. The plan would include measures, process and responsibilities to minimise the potential impacts of construction activities on flood behaviour, as far as practicable. It would also include measures to manage flood risks during construction and address flood recovery during construction. **The plan would be developed in consultation with Transport for NSW, local councils, emergency services and key affected landholders/managers (including Forestry Corporation of NSW).**
FH5	*Downstream watercourse stability*	A geomorphology monitoring program would be implemented in accordance with the soil and water management plan (mitigation measure WR6). The monitoring would observe ~~any~~ changes in the geomorphological stability of watercourses that may be attributable to the proposal, and inform appropriate management responses. The monitoring program would be developed in consultation with the Department of Planning~~, Industry~~ and Environment and with reference to the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
FH-CI1	*Flooding impacts (temporary accommodation facilities)*	The Narromine South and Narrabri West temporary workforce accommodation facilities would incorporate appropriate flood protection measures, such as elevating buildings on stilts and storing hazardous materials above the flood levels that inundate these sites.
Soils and contamination		
SC7	*General soil and erosion management*	The soil and water management plan (mitigation measure WR6) would include erosion and sediment controls appropriate for dispersive soils.
SC8	*Contamination*	A contamination and hazardous materials plan would be prepared and implemented as part of the CEMP. It would include measures, processes and responsibilities to minimise the potential for contamination impacts on the local community, workers and environment, and procedures for incident management and managing unexpected contamination finds (an unexpected finds protocol).
SC9	*Rehabilitation*	Disturbed areas would be rehabilitated following construction, in accordance with the rehabilitation strategy (mitigation measure ~~BD11~~ **BD12**).

REF	Issue/impact	Mitigation measures—construction
Water quality		
WQ2	*Discharge to surface water*	Discharge to surface water would be undertaken in accordance with the environment protection licence for construction of the proposal and would consider the hydrological attributes of the receiving waterbody.
WQ3	*Surface water monitoring*	A surface water monitoring framework would be developed and implemented as part of the soil and water management plan in the CEMP. It would identify: ▸ Monitoring locations at discharge points and selected watercourses where works are being undertaken ▸ Monitoring parameters ▸ Frequency and duration of monitoring. The monitoring framework would include the relevant water quality objectives, parameters and criteria from Technical Report 5. It would be developed in consultation with the Department of Planning~~, Industry~~ and Environment, and the NSW EPA.
WQ4	*Dewatering of farm dams that require relocation and/or decommissioning*	A dam dewatering protocol would be developed as part of the soil and water management plan. It would consider: ▸ Options for reuse of water in the dam ▸ Licensing and approval requirements, where relevant ▸ The quality and quantity of the water to be released and the location of potential discharge points of the water into watercourses, where relevant ▸ Strategies to minimise impacts on native, threatened or protected species ▸ Strategies to minimise spread of **pest** ~~nuisance~~ flora and fauna species.
Aboriginal heritage		
AH10	*Protecting Aboriginal heritage and minimising impacts during construction*	An Aboriginal cultural heritage management plan would be prepared prior to construction and implemented as part of the CEMP. The plan would include measures to minimise the potential for impacts and manage Aboriginal heritage, including: ▸ A salvage methodology (mitigation measure AH2) ▸ An unexpected finds procedure (mitigation measure AH12) ▸ Plans and installation procedures for fencing and protective coverings ▸ Induction package for construction workers and supervisors (mitigation measure AH11) ▸ Measures to protect sites close to the proposal site from inadvertent impacts ▸ Outcomes of further investigations (mitigation measures AH3 and AH4) ▸ Erosion and sediment controls in accordance with *Managing Urban Stormwater: Soils and construction – Volume 1* (Landcom, 2004) to minimise the potential for erosion impacts to Aboriginal sites located close to watercourses/drainage lines ▸ Measures to manage the potential for impacts to potential Aboriginal heritage items (including burial sites) located in sensitive landscapes (such as alluvium landscapes) ▸ Measures to minimise and mitigate potential impacts to plant species that hold medicinal and food value (guided by a cultural plant survey). The plan would be prepared in consultation with registered Aboriginal parties and **Heritage NSW** ~~the Department of Planning, Industry and the Environment.~~
AH11	Protecting Aboriginal heritage and minimising impacts during construction	A requirement for cultural and historic heritage awareness training would be included in the Aboriginal cultural heritage management plan. Cultural heritage awareness training would be provided by an Aboriginal representative at the commencement of substantial works for the proposal.

REF	Issue/impact	Mitigation measures—construction
AH12	*Unexpected finds*	An unexpected finds procedure would be developed and included in the Aboriginal cultural heritage management plan **(mitigation measure AH10)** to provide a consistent method for managing any unexpected Aboriginal heritage items discovered during construction, including potential heritage items or objects, and human skeletal remains. **The procedure would define the requirements for managing any human skeletal remains discovered during construction in accordance with mitigation measure NAH8.**
AH13	*Impacts on Aboriginal cultural values at Etoo Creek 19-5-0239*	Prior to construction commencing, and once rehabilitation is complete, a smoking ceremony would be undertaken at the location of Etoo Creek 19-5-0239. Prior to construction commencing, the age of the culturally modified (scarred) tree would be verified by an arborist.
Non-Aboriginal heritage		
NAH7	*Protecting non-Aboriginal heritage and minimising impacts during construction*	A heritage management plan would be prepared and implemented as part of the CEMP. It would include measures to manage non-Aboriginal heritage and minimise the potential for impacts during construction. The plan would be prepared in consultation with the relevant heritage agencies (local councils) and take into account the outcomes of further investigations and surveys during detailed design. The heritage management plan would define a requirement for non-Aboriginal historical heritage awareness training for site workers prior to commencement of construction works. The awareness training would promote an understanding of heritage items that may be impacted during the works and the requirements of the unexpected finds procedure.
NAH8	*Unexpected finds including human skeletal remains*	An unexpected finds procedure would be developed and included in the heritage management plan to provide a consistent method for managing any unexpected heritage or archaeological items and unexpected human skeletal remains. The procedure would define the requirements for managing any human skeletal remains discovered during construction, in accordance with relevant legislation and guidelines, including the Public Health Regulation 2012 (NSW), *Heritage Act 1977* (NSW), *National Parks and Wildlife Act 1974* (NSW), *Work Health and Safety Act 2011* (NSW), *Coroners Act 2009* (NSW), *NSW Health Procedures Exhumation of human remains* (NSW Health, 2013), and *Skeletal Remains—Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office, 1998b). Any human skeletal remains discovered during construction would be managed in accordance with the *Policy Directive—Exhumation of Human Remains* (NSW Health, 2013) and *Skeletal Remains—Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office, 1998b).
NAH9	*Avoiding impacts on heritage items*	The following heritage items would be fenced and marked on site plans within the CEMP as areas to be avoided during construction: ▸ Graves within the Woodvale Park Private Cemetery ▸ Curban Inn site ▸ 'Kickabil' homestead and woolshed ▸ 'Allandale' homestead ▸ 'Digilah' homestead ▸ Convict road, Baradine ▸ Rocky Creek Mill site ▸ Graves within 'The Aloes' homestead ▸ Graves of the Dingwell children.
Noise and vibration		
CNV3	*Noise and vibration impacts*	A construction noise and vibration management plan would be prepared and implemented as part of the CEMP, in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework. The plan would include measures, processes and responsibilities to manage **and monitor** noise and vibration, and minimise the potential for impacts during construction.

REF	Issue/impact	Mitigation measures—construction
CNV4	Noise and vibration impacts	The Inland Rail NSW Construction Noise and Vibration Management Framework would be implemented, and the proposal would be constructed, with the aim of achieving the construction noise management levels and vibration criteria identified by the noise and vibration assessment. All feasible and reasonable noise and vibration measures would be implemented. Any activities that could exceed the construction noise management levels and vibration criteria would be identified and managed in accordance with the framework, the noise and vibration management plan, and the construction noise and vibration impact statements. Notification of impacts would be undertaken in accordance with the communication management plan for the proposal.
CNV5	*Impacts of out-of-hours work*	An out-of-hours work protocol would be developed to define the process for considering, approving and managing out-of-hours work, including implementation of feasible and reasonable measures and communication requirements. Measures would be aimed at proactive communication and engagement with potentially affected receivers, provision of respite periods and/or alternative accommodation for defined exceedance levels. All work outside the primary proposal construction hours would be undertaken in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework and in accordance with the out-of-hours work protocol. The protocol would provide guidance for the preparation of out-of-hours work plans for each construction work location and for key works. Out-of-hours work plans would be prepared in consultation with key stakeholders, including the NSW EPA and the community **with the potential to be impacted**, and incorporated into the construction noise and vibration management plan.
CNV6	*Construction vibration (structural) impacts*	If vibration-generating activities are conducted within 18 m of a residence, attended vibration measurements would be undertaken at the commencement of vibration-generating activities to confirm that structural vibration limits are within the acceptable range. For piling, this distance is increased to 100 m. Where vibration levels are found to be unacceptable, alternative work methods would be implemented so the vibration impacts are reduced to acceptable levels.
CNV7	Construction vibration (structural) impacts	Building condition surveys would be completed before and after construction works where buildings or structures are within the minimum vibration working distances for cosmetic damage.
CNV8	*Construction vibration (structural) impacts on heritage items*	Prior to the commencement of vibration-intensive works within the minimum working distances for cosmetic damage for heritage items, the potential for damage to the item would be assessed. Where there is potential for damage, alternative methods that generate less vibration would be investigated and substituted, where practicable. Where residual cosmetic damage risks remain, condition surveys would be carried out and vibration monitoring with real-time notification of exceedance would occur during the activity. Site activities would be modified, where practicable, to avoid exceeding the cosmetic damage criteria. Any identified vibration-related damage to the items would be rectified.
CNV-CI1	*Impacts of blasting at borrow pits*	A blast management strategy would be prepared in accordance with relevant guidelines and in consultation with the NSW EPA. **The strategy would form part of the construction noise and vibration management plan** and would include: ▸ Sequencing and review of trial blasting to inform blasting ▸ Regularity of blasting ▸ Intensity of blasting ▸ Periods of relief Blasting program.
CNV-CI2	*Impacts of blasting at borrow pits*	Blasting would be undertaken during the recommended standard hours for blasting. Management measures defined by the blasting management strategy would be implemented.

REF	Issue/impact	Mitigation measures—construction
Air quality		
AQ1	*General air quality impacts*	An air quality management plan would be prepared and implemented as part of the CEMP. The plan would include measures, processes and responsibilities to minimise the potential for air quality impacts on the local community and environment during construction.
AQ2	*Construction activities and earthworks that may cause dust impacts*	Where sensitive receivers are located within the separation distances determined for each key activity, or visible dust is generated from vehicles using unsealed access roads, road watering and/or other stabilising approaches would be implemented.
AQ-CI1	*Impacts of blasting at borrow pits*	Blasting would be avoided when winds in excess of 5 metres per second could carry dust towards a sensitive receiver.
Traffic and transport		
TT6	*General impacts of construction on traffic, transport, access, pedestrians and cyclists.*	A traffic, transport and access management plan would be prepared and implemented as part of the CEMP. The plan would include measures, processes and responsibilities to minimise the potential for impacts on the community and the operation of the surrounding road and transport environment during construction. The plan would be developed in consultation with **relevant stakeholders, including** local councils, Transport for NSW, **Forestry Corporation of NSW, emergency services** and public transport/bus operators. **The plan would include, as appropriate, additional reasonable and feasible measures identified as an outcome of consultation (in accordance with mitigation measure TT7).**
TT7		Consultation with relevant stakeholders would be undertaken regularly to facilitate the efficient delivery of the proposal and to minimise impacts on road users and landholders. Stakeholders would include the relevant local council/s, bus operators, Transport for NSW, emergency services, the Forestry Corporation of NSW (in relation to access within State forests), Crown Land, Local Land Services and other affected property owners/occupants. ~~The community would be notified in advance of any proposed road and pedestrian network changes through signage, the local media, and other appropriate forms of communication.~~ ~~Any~~ Additional measures identified as an outcome of consultation would be implemented during construction, **where reasonable and feasible. This would include modifying work areas, activities and construction access arrangements to address traffic flow and access issues identified by key stakeholders, where practicable.**
TT8	Access impacts	**The community would be notified in advance of any proposed road and pedestrian network changes through signage, the local media, and other appropriate forms of communication.**
TT9	*Emergency vehicle access*	Emergency vehicle access routes that may be impacted by the proposal would be identified, and appropriate control measures would be implemented, in consultation with the relevant emergency services providers.
TT10	*Heavy vehicles damaging local roads*	A dilapidation survey would be undertaken of the made public roads within the proposed haulage routes, prior to and following completion of construction, and provided to the relevant road authority. Pavement condition monitoring would be carried out during works, as required. **Rectification measures would be implemented as needed, during and/or following completion of construction, to address any damage caused by construction.**
TT-CI1	*Construction traffic impacts (temporary workforce accommodation)*	The traffic, transport and access management plan would include measures to manage potential traffic impacts at and near temporary workforce accommodation facilities. The plan would include approved access routes and any restrictions on the use of residential streets.

REF	Issue/impact	Mitigation measures—construction
Land use and property		
LP16	*Biosecurity*	The biodiversity management plan included in the CEMP (mitigation measure ~~BD7~~ **BD8**) would include measures to minimise the potential for biosecurity risks during construction in accordance with the *Biosecurity Act 2015* (NSW).
LP17	*Access to properties*	Access to individual residences, services and businesses, and for livestock, **pedestrians and machinery** across the rail corridor, would be maintained during construction. The traffic, transport and access plan included in the CEMP (mitigation measure TT6) would include measures to ensure that access to properties would be maintained at all times during construction. Where alternative access arrangements need to be made, these would be developed in consultation with affected property owners/occupants, and Local Land Services for travelling stock reserves.
LP18	*Access within State forests*	The traffic, transport and access plan included in the CEMP (mitigation measure TT6) would include measures to ensure that access within State forests is retained to enable forestry operations to continue during construction.
LP19	*Rehabilitation*	The rehabilitation strategy (mitigation measure ~~BD11~~ **BD12**) would include measures to restore disturbed sites that do not form part of the operational footprint (such as compounds, temporary workforce accommodation) as close as practicable to the pre-construction condition or as agreed with the landholder. Rehabilitation of disturbed areas would be undertaken progressively, consistent with the rehabilitation strategy and property-level design requirements (where relevant).
LP20	*Water supplies for farm operations*	Farm water pipelines, dams and drainage channels would be replaced or reinstated **in consultation with landowners/landholders** to ensure continuity of stock and domestic water supplies prior to removal of existing impacted infrastructure.
LP21	*Bushfire risk in forest areas*	The flood and emergency response plan (mitigation measure FH4) would include measures to minimise the potential for bushfire risks.
Visual amenity		
LV5	*Visual impacts of construction compounds*	Construction compounds would be located, as far as practicable, within cleared areas and away from sensitive receivers. Compounds would be designed and orientated to minimise visual impacts. This would include locating areas of low visual amenity away from sensitive receivers, and erecting boundary screening around compounds, where appropriate.
LV6	*Protection of trees*	Trees to be retained would be protected, prior to the commencement of construction, in accordance with *AS4970-2009 Protection of trees on development sites* (Standards Australia, 2009).
LV7	*Landscape character and visual impacts*	Rehabilitation of disturbed areas would be undertaken progressively in accordance with the rehabilitation strategy (mitigation measure ~~BD11~~ **BD12**) and individual property agreements (mitigation measure LP3) (where relevant).
LV8	*Minimising light spill*	Lighting of work areas, compounds, and work sites would be **designed and sited in accordance with mitigation measure LV4, and** oriented to minimise glare and light spill impact on adjacent receivers.
LV-CI1	*Landscape character and visual impacts associated with (borrow pits)*	The borrow pits would be rehabilitated in accordance with the borrow pit rehabilitation strategy provided in Appendix K of the EIS.
LV-CI2	*Visual impact from construction activities (temporary accommodation facilities)*	The temporary workforce accommodation plan (mitigation measure SE-CI2) would include requirements for the design and visual screening of facilities, to minimise the potential for visual impacts, particularly where facilities are visible from sensitive receivers.
Socio-economic impacts		

REF	Issue/impact	Mitigation measures—construction
SE9	*Social impacts, communication and engagement*	Key stakeholders (including local councils, emergency service providers, public transport providers, the general community and surrounding landowners/occupants) would continue to be consulted in accordance with the communication management plan. Local residents, landholders, landowners, businesses, affected social and recreation facilities and other relevant stakeholders would be notified before work starts, in accordance with the communication management plan, and be regularly informed of construction activities.
SE10	Social impacts, communication and engagement	Complaints during construction would be managed in accordance with the complaints management system defined by the communication management plan. The complaints management system would be maintained throughout the construction period and for a minimum of 12 months after construction finishes.
SE11	*Workforce management*	A workforce management plan would be developed and implemented during construction to manage: ▸ Potential impacts of the non-resident construction workforce ▸ Local business and employment opportunities ▸ Health and wellbeing services needs of the temporary construction workforce, including medical, allied health and wellbeing services. **The plan would be developed in consultation with local councils and service providers, including local and regional health and emergency services providers.**
SE12	*Local employment and training opportunities*	The workforce management plan would include measures to manage local employment and procurement requirements, including but not limited to: ▸ Recruitment, skills and training measures, including identification of skills and qualifications required, and training targets ▸ How the contractor would work with regional stakeholders to upskill local residents.
SE13	*Impacts of non-resident workforce on local communities*	The workforce management plan would include measures to manage potential impacts of the non-resident construction workforce on local and regional communities, including: ▸ A code of conduct for workers, including a zero-tolerance policy relating to anti-social behaviour ▸ Strategies to promote wellbeing of the workforce ▸ A monitoring mechanism for use of local tourist accommodation and rental housing by workers ▸ ~~consultation with local health and emergency services to establish~~ Processes for managing potential increased demands due to the non-resident workforce.
SE14	*Temporary land requirements at the Narrabri Dirt Bike Club*	The area of land within the Narrabri Dirt Bike Club site, which is required during construction only, would be restored and returned to (as a minimum) the pre-existing condition.
Waste management		
WM3	*Construction waste management*	A construction waste management plan would be prepared and implemented as part of the CEMP. The plan would adopt the waste hierarchy principles contained in the *Waste Avoidance and Resource Recovery Act 2001* (NSW), and detail processes, responsibilities and measures to manage waste and minimise the potential for impacts during construction.
WM4	*Construction waste and spoil management*	All waste generated would be classified in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014) and disposed of in accordance with the relevant requirements of the Protection of the Environment Operations (Waste) Regulation 2014.

REF	Issue/impact	Mitigation measures—construction
Sustainability		
SU4	*Achieving the target sustainability rating*	A sustainability management plan would be developed to define the measures required to be implemented achieve an 'excellent' as built rating according to the ISCA's Infrastructure Sustainability scheme. The sustainability management plan would incorporate Inland Rail program-aligned sustainability objectives and targets, roles and responsibilities, strategies for achieving the 'excellent' as built rating, and review and reporting requirements.
SU5	*Reporting*	Monthly sustainability reporting (and corrective action where required) would be undertaken during construction, in accordance with the sustainability management plan.
Climate change		
CC2	*Climate change risk management*	The adaptation measures identified for the proposal would be reviewed, and final measures would be implemented during construction, as far as practicable.

TABLE C-3: COMPILATION OF MITIGATION MEASURES FOR OPERATION

REF	Issue/impact	Mitigation measures—operation
Biodiversity		
~~**BD13**~~ **BD14**	*Weed management*	Weed inspections would be undertaken and weed management would occur, in accordance with ARTC's standard operating procedures, to meet its obligations under the *Biosecurity Act 2015* (NSW).
~~**BD14**~~ **BD15**	*Fauna connectivity*	The operational performance of fauna connectivity measures, **including impacts on fauna as a result of train operations and maintenance activities**, would be monitored in accordance with the fauna connectivity strategy. This would include recording of wildlife collisions with trains. **ARTC would also** ~~and~~ monitor~~ing~~ **the** use of crossing structures by target species (including the Pilliga mouse, **squirrel glider, koala, rufous bettong** and eastern pygmy-possum) and feral predators. **The threatened species management plans (BD6) would include appropriate adaptive management measures to address situations where fauna connectivity and population impact thresholds are exceeded.** ~~The need for additional measures or modifications to existing measures would be identified to respond to any issues identified.~~
~~**BD15**~~ **BD16**	*Aquatic ecology*	Culverts that provide for the flow of watercourses would be inspected and maintained, in accordance with ARTC's standard operating procedures, to address any issues that may contribute to the blockage of fish passage.
Soils and contamination		
SC10	*Soil erosion and sedimentation*	During any maintenance work where soils are exposed, sediment and erosion control devices would be installed in accordance with *Managing Urban Stormwater: Soils and Construction*, Volume 1 (Landcom, 2004).
SC11	*Contamination*	ARTC's existing spill response procedures would be reviewed to determine applicability and suitability during operation. The adopted procedure would include measures to minimise the potential for impacts on the local community and the environment as a result of any leaks and spills.
Water quality		
WQ5	*General water quality management*	The proposal would be managed in accordance with the water quality management requirements specified in the environment protection licence.
Noise and vibration		
ONV4	*Operational noise and vibration*	The proposal would be operated with the aim of achieving the operational noise and vibration criteria identified by the operational noise and vibration review, the requirements of the conditions of approval, and the environment protection licence for Inland Rail.
ONV5	*Operational noise and vibration*	Operational noise and vibration compliance monitoring would be undertaken, once Inland Rail has commenced operation, at representative locations, to compare actual noise performance against that predicted by the operational noise and vibration review. Compliance monitoring requirements would be defined by the operational noise and vibration review. The results of monitoring would be included in an operational noise and vibration compliance report, prepared in accordance with the conditions of approval. The need for any additional feasible and reasonable mitigation measures would be identified as an outcome of the monitoring.
Air quality		
AQ3	*Locomotive emissions*	Locomotive emissions would be managed in accordance with the air quality management requirements specified in the rollingstock operator's environment protection licence.
AQ4	*Impacts during track maintenance*	Maintenance service vehicles and equipment would be maintained and operated in accordance with the manufacturer's specifications.

REF	Issue/impact	Mitigation measures—operation
Traffic and transport		
TT11	*Road user safety at level crossings*	The operation of all level crossings constructed on classified roads as part of the proposal would be reviewed after Inland Rail commences operation to confirm that the: ▸ Level of protection is appropriate ▸ Proposed infrastructure is appropriate for the traffic conditions.
TT12	*Road user safety at level crossings*	In accordance with National and State Rail Safety Law requirements, public road crossings would be subject to an Interface Agreement with the relevant road manager to ensure that safety risks are identified and minimised, as far as practicable, during operations.
Land use and property		
LP22	*Safe scheduling*	~~Guidance would be provided to agricultural landholders, at the commencement of operation, regarding the frequency of train movements to assist with safe scheduling of routine agricultural activities.~~ **ARTC would develop a 'Call Train Control' process to enable landowners to use levels crossings as stock crossings. Details of the 'Call Train Control' process will be provided to agricultural landholders prior to the commencement of operations.**
Visual amenity		
LV9	*Landscape character and visual impacts*	Vegetation provided in accordance with the rehabilitation strategy (mitigation measure ~~BD11~~ **BD12**), and urban design and landscape plan (mitigation measure LV2) would be subject to ongoing monitoring and maintenance in accordance with ARTC's standard operating procedures.
Socio-economic impacts		
SE15	*Increased safety risks due to new level crossings*	A rail safety awareness program would be developed and implemented prior to the operation of Inland Rail to educate the community regarding safety around trains. This would include landholders with properties that are intersected by the proposal.
Waste management		
WM5	*Operational waste management*	Operational waste, including general litter clean up, would be managed in accordance with ARTC's existing operational maintenance requirements and the waste hierarchy principles in the *Waste Avoidance and Resource Recovery Act 2001* (NSW)**.**
Sustainability		
SU6	*Sustainability*	Prior to operation commencing, a sustainability handover plan would be prepared, and relevant initiatives would be maintained and implemented, through operational management and maintenance procedures.
Climate change		
CC3	*Climate change risk management*	Operational management and maintenance procedures would address potential climate change risks and adaptation measures.

D

Updated preliminary land requirements

Appendix D – Updated preliminary land requirements

Permanent land requirements (acquisition)

Table D.1 Indicative permanent land requirements (preliminary – subject to confirmation)

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Type of requirement (partial/full)**	**Area required (ha)**	**% of lot required**	**Proposed future use**	**Change in public road access**	**Change in internal access**	**Severance**
Coonamble Shire Council											
2632395	12/754246	1052.13	Private	Coonamble	Partial	18.78	2%	Rail corridor, drainage control area	Y	N	N
2632396	69/754192	246.67	Private	Coonamble	Partial	2.45	1%	Rail corridor	Y	Y	Y
2632396	71/754192	97.37	Private	Coonamble	Partial	8.97	9%	Rail corridor			
2632396	7302/1151603	50.94	The State of NSW	Coonamble	Partial	11.26	22%	Rail corridor, drainage control area	n/a	n/a	n/a
2632399	82/820705	682.71	Private	Coonamble	Partial	8.09	1%	Rail corridor	N	N	N
2632401	2/252905	4.86	Private	Coonamble	Partial	0.28	6%	Rail corridor	N	Y	Y
2632401	79/754192	623.40	Private	Coonamble	Partial	14.66	2%	Rail corridor, drainage control area			
2634188	1/846191	634.58	Private	Coonamble	Partial	0.13	<1%	Rail corridor, drainage control area	N	N	N
2634188	66/754234	23.08	Private	Coonamble	Partial	2.75	12%	Rail corridor, drainage control area			
2634188	70/39583	121.44	Private	Coonamble	Partial	4.23	3%	Rail corridor, drainage control area			
2634191	13/754216	258.84	Private	Coonamble	Partial	7.89	3%	Rail corridor, drainage control area	N	N	N

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
2634191	14/754216	773.18	Private	Coonamble	Partial	3.84	<1%	Rail corridor, drainage control area			
2634191	34/562776	364.28	Private	Coonamble	Partial	6.15	2%	Rail corridor, drainage control area			
2634191	35/562776	143.08	Private	Coonamble	Partial	1.70	1%	Rail corridor			
2634197	33/562776	472.99	Private	Coonamble	Partial	2.66	1%	Rail corridor, drainage control area	Y	N	N
2634442	2/131246	2.31	Private	Coonamble	Partial	0.34	15%	Rail corridor	Y	N	N
2634444	25/754252	64.82	Private	Coonamble	Partial	0.40	1%	Drainage control area			
2634444	26/754234	38.59	Private	Coonamble	Partial	7.28	19%	Drainage control area	Y	N	N
2634444	26/754234	38.59	Private	Coonamble	Partial	0.06	<1%	Rail corridor			
2634444	26/754252	194.34	Private	Coonamble	Partial	0.05	<1%	Drainage control area			
2634446	2/570929	307.13	Private	Coonamble	Partial	1.14	<1%	Rail corridor, drainage control area	Y	N	N
2634451	36/721224	4.18	Private	Coonamble	Full	4.18	100%	Rail corridor			
2634451	51/754234	81.13	Private	Coonamble	Partial	0.92	1%	Drainage control area	Y	N	N
2634451	69/39583	244.62	Private	Coonamble	Partial	2.09	1%	Rail corridor, drainage control area			
2634520	1/218818	16.56	Private	Coonamble	Partial	1.64	10%	Rail corridor			
2634520	57/754246	517.91	Private	Coonamble	Partial	9.50	2%	Rail corridor, drainage control area	N	Y	Y
2634523	65/754246	73.70	Private	Coonamble	Partial	2.68	4%	Rail corridor, drainage control area	N	N	N
3447306	7003/1060845	1.61	The State of NSW	Coonamble	Partial	0.25	16%	Rail corridor	n/a	n/a	n/a
3447306	7004/1060845	6.96	The State of NSW	Coonamble	Partial	2.72	39%	Rail corridor	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
3591541	11/754234	118.97	Private	Coonamble	Partial	3.76	3%	Rail corridor, drainage control area	Y	N	N
3591541	46/754234	240.49	Private	Coonamble	Partial	2.53	1%	Rail corridor			
3591542	47/754234	766.80	Private	Coonamble	Partial	4.18	1%	Rail corridor, drainage control area	Y	N	N
3591542	B/100418	56.76	Private	Coonamble	Partial	0.24	<1%	Drainage control area			
3761187	7/754234	222.89	Private	Coonamble	Partial	9.53	4%	Rail corridor	N	Y	Y
3934328	10/754246	291.40	Private	Coonamble	Partial	21.55	7%	Rail corridor, drainage control area	N	Y	Y
3934328	14/754246	97.24	Private	Coonamble	Partial	1.16	1%	Rail corridor, drainage control area			
3934328	71/879744	149.48	Private	Coonamble	Partial	5.17	3%	Rail corridor			
3941931	1/1218318	6.42	Private	Coonamble	Partial	1.29	20%	Rail corridor, drainage control area	Y	N	N
3941931	15/754246	40.50	Private	Coonamble	Partial	1.72	4%	Rail corridor			
3941931	16/754246	121.59	Private	Coonamble	Partial	2.68	2%	Rail corridor			
3941931	61/754246	49.91	Private	Coonamble	Partial	1.24	2%	Drainage control area			
3975011	1/1221773	17.06	Private	Coonamble	Partial	0.24	1%	Rail corridor	Y	Y	Y
3975011	3/218818	11.29	Private	Coonamble	Partial	0.62	5%	Rail corridor			
3975011	4/218818	240.00	Private	Coonamble	Partial	6.05	3%	Rail corridor			
3975011	62/754246	70.82	Private	Coonamble	Partial	1.04	1%	Rail corridor			
4095150	1/1236922	4.52	Private	Coonamble	Partial	0.57	13%	Rail corridor, road corridor	Y	N	N
4095150	13/754246	406.78	Private	Coonamble	Partial	5.83	1%	Rail corridor, road corridor			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
4113621	1/504386	368.87	Private	Coonamble	Partial	10.11	3%	Rail corridor, road corridor, drainage control area	N	Y	Y
4113621	4/504368	133.83	Private	Coonamble	Partial	7.68	6%	Rail corridor, drainage control area			
4210089	29/754244	575.21	Private	Coonamble	Partial	0.84	<1%	Rail corridor, drainage control area	N	N	N
n/a	RD01/1060845	2.74	The State of NSW	Coonamble	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/39583	6.42	The State of NSW	Coonamble	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/562776	11.09	The State of NSW	Coonamble	Partial	0.10	1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/754192	46.29	The State of NSW	Coonamble	Partial	0.35	1%	Drainage control area	n/a	n/a	n/a
n/a	RD01/754192	12.24	The State of NSW	Coonamble	Partial	0.02	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/754192	6.00	The State of NSW	Coonamble	Partial	0.11	2%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/754234	23.34	The State of NSW	Coonamble	Partial	9.18	39%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/754246	3.96	The State of NSW	Coonamble	Partial	0.95	24%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD02/562776	3.48	The State of NSW	Coonamble	Partial	0.64	18%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD02/754192	0.02	The State of NSW	Coonamble	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD02/754192	15.18	The State of NSW	Coonamble	Partial	0.50	3%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD02/754216	0.07	The State of NSW	Coonamble	Full	0.07	100%	Rail corridor	n/a	n/a	n/a
n/a	RD02/754244	7.23	The State of NSW	Coonamble	Partial	0.02	<1%	Rail corridor	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Type of requirement (partial/full)**	**Area required (ha)**	**% of lot required**	**Proposed future use**	**Change in public road access**	**Change in internal access**	**Severance**
n/a	RD02/754246	3.66	The State of NSW	Coonamble	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD02/754246	6.89	The State of NSW	Coonamble	Partial	0.04	1%	Rail corridor	n/a	n/a	n/a
n/a	RD04/754246	4.06	The State of NSW	Coonamble	Partial	1.61	40%	Drainage control area	n/a	n/a	n/a
n/a	RD05/754246	0.26	The State of NSW	Coonamble	Partial	0.12	46%	Rail corridor	n/a	n/a	n/a
n/a	RD05/754246	1.25	The State of NSW	Coonamble	Partial	0.34	27%	Rail corridor	n/a	n/a	n/a
n/a	RD60/754246	7.74	The State of NSW	Coonamble	Partial	0.04	1%	Rail corridor	n/a	n/a	n/a
Coonamble Shire Council - totals		**11,294.8**				**229.2**					
Gilgandra Shire Council											
2636942	60/754192	125.44	Private	Gilgandra	Partial	8.78	7%	Rail corridor, drainage control area	Y	Y	Y
2636942	60/754192	125.44	Private	Gilgandra	Partial	0.82	1%	Road corridor			
2636968	38/752553	678.28	Private	Gilgandra	Partial	0.82	<1%	Drainage control area	N	N	N
2638452	37/752563	512.74	Private	Gilgandra	Partial	0.89	<1%	Rail corridor, drainage control area	N	N	N
2638454	39/752563	781.94	Private	Gilgandra	Partial	2.70	<1%	Rail corridor, road corridor, drainage control area	N	N	N
2638455	40/752563	589.32	Private	Gilgandra	Partial	1.67	<1%	Drainage control area	Y	N	N
2638530	20/753375	231.86	Private	Gilgandra	Partial	9.22	4%	Rail corridor, road corridor, drainage control area	Y	N	N
2638530	57/753375	172.94	Private	Gilgandra	Partial	8.55	5%	Rail corridor, road corridor, drainage control area			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
2638540	76/753375	166.88	Private	Gilgandra	Partial	5.43	3%	Rail corridor, road corridor, drainage control area	N	N	N
2638548	54/753375	355.19	Private	Gilgandra	Partial	6.57	2%	Rail corridor, road corridor	Y	N	N
2638548	77/753375	19.12	Private	Gilgandra	Partial	0.77	4%	Rail corridor			
2638554	63/754192	159.46	Private	Gilgandra	Partial	1.99	1%	Rail corridor, road corridor, drainage control area	N	N	N
2638558	74/754192	107.67	Private	Gilgandra	Partial	6.75	6%	Rail corridor, drainage control area	Y	Y	Y
2638558	80/754192	68.87	Private	Gilgandra	Partial	0.02	<1%	Rail corridor			
2638561	1/361771	714.21	Private	Gilgandra	Partial	11.89	2%	Rail corridor, road corridor, drainage control area	Y	Y	Y
2638561	6/753377	59.80	Private	Gilgandra	Partial	4.29	7%	Rail corridor, drainage control area			
2638561	9/131224	7.32	Private	Gilgandra	Partial	1.47	20%	Rail corridor, road corridor, drainage control area			
2638568	96/753377	443.44	Private	Gilgandra	Partial	8.55	2%	Rail corridor, drainage control area	N	N	N
2638568	97/753377	444.45	Private	Gilgandra	Partial	4.45	1%	Rail corridor, drainage control area			
2638572	99/753377	447.58	Private	Gilgandra	Partial	1.43	<1%	Rail corridor, road corridor, drainage control area	N	N	N

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
2638573	100/753377	458.88	Private	Gilgandra	Partial	21.72	5%	Rail corridor, road corridor, drainage control area	Y	Y	Y
2638582	C/24006	115.41	Private	Gilgandra	Partial	8.19	7%	Rail corridor, road corridor, drainage control area	N	N	N
2638582	E/24006	6.17	Private	Gilgandra	Partial	0.31	5%	Rail corridor			
2638586	18/752568	920.65	Private	Gilgandra	Partial	8.72	1%	Rail corridor	Y	N	N
2638588	21/752568	903.19	Private	Gilgandra	Partial	8.15	1%	Rail corridor	N	N	N
2638588	25/752568	302.22	Private	Gilgandra	Partial	3.90	1%	Rail corridor			
2638594	A/24006	156.34	Private	Gilgandra	Partial	8.31	5%	Rail corridor, drainage control area	N	N	N
2638822	39/753408	146.31	Private	Gilgandra	Partial	6.33	4%	Rail corridor, drainage control area	N	Y	Y
2638843	1/752585	16.06	Private	Gilgandra	Partial	0.56	3%	Rail corridor	N	Y	Y
2638843	31/752585	721.98	Private	Gilgandra	Partial	10.70	1%	Rail corridor			
2638843	38/752585	243.17	Private	Gilgandra	Partial	13.44	6%	Rail corridor			
2638843	47/752585	22.40	Private	Gilgandra	Partial	0.54	2%	Rail corridor			
2638854	44/752577	78.30	Private	Gilgandra	Partial	2.83	4%	Rail corridor, road corridor	N	Y	Y
2638875	1/657741	368.57	Private	Gilgandra	Partial	10.07	3%	Rail corridor, drainage control area	N	Y	Y
2638885	98/752589	542.81	Private	Gilgandra	Partial	19.18	4%	Rail corridor, drainage control area	N	Y	Y
2638886	99/752589	643.41	Private	Gilgandra	Partial	5.18	1%	Rail corridor, drainage control area	N	N	Y

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
2638887	101/752589	666.01	Private	Gilgandra	Partial	19.28	3%	Rail corridor, drainage control area	Y	Y	Y
2638897	1/752590	259.10	Private	Gilgandra	Partial	6.83	3%	Rail corridor	N	Y	Y
2638898	2/752590	1121.86	Private	Gilgandra	Partial	22.39	2%	Rail corridor	N	N	N
2638902	15/752590	276.32	Private	Gilgandra	Partial	11.58	4%	Rail corridor	N	N	N
2638902	6/752590	828.92	Private	Gilgandra	Partial	16.09	2%	Rail corridor			
2638903	7/752590	810.54	Private	Gilgandra	Partial	10.74	1%	Rail corridor	N	N	N
2639253	34/753408	258.05	Private	Gilgandra	Partial	11.73	5%	Rail corridor, drainage control area	Y	N	N
2639253	37/753408	228.31	Private	Gilgandra	Partial	13.48	6%	Rail corridor, drainage control area			
2639254	35/753408	303.77	Private	Gilgandra	Partial	0.97	<1%	Rail corridor, drainage control area	N	N	N
2639254	36/753408	161.13	Private	Gilgandra	Partial	1.17	1%	Rail corridor, drainage control area			
2639255	48/753408	200.25	Private	Gilgandra	Partial	10.39	5%	Rail corridor, drainage control area	N	Y	Y
3125849	1/657745	210.06	Private	Gilgandra	Partial	5.22	2%	Rail corridor	N	Y	Y
3125849	86/752589	125.79	Private	Gilgandra	Partial	0.86	1%	Rail corridor			
3312473	7001/1019983	3.70	The State of NSW	Gilgandra	Partial	0.12	3%	Rail corridor	n/a	n/a	n/a
3313024	36/752568	360.64	Private	Gilgandra	Partial	7.68	2%	Rail corridor	Y	Y	Y
3367978	1/1116532	12.71	Private	Gilgandra	Partial	0.02	<1%	Drainage control area	Y	Y	Y
3367978	1/131213	3.69	Private	Gilgandra	Partial	0.16	4%	Rail corridor, drainage control area			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
3367978	66/754192	104.63	Private	Gilgandra	Partial	5.26	5%	Rail corridor, drainage control area			
3367978	89/753377	176.61	Private	Gilgandra	Partial	8.31	5%	Rail corridor, drainage control area			
3408950	1/1125010	499.61	Private	Gilgandra	Partial	0.40	<1%	Rail corridor	N	N	N
3416147	49/752563	5.58	The State of NSW	Gilgandra	Partial	0.52	9%	Road corridor	n/a	n/a	n/a
3434719	2/1125010	789.46	Private	Gilgandra	Partial	10.17	1%	Rail corridor, drainage control area	Y	Y	Y
3575072	1/652272	7.86	Private	Gilgandra	Partial	0.18	2%	Rail corridor			
3575072	1/722900	7.07	Private	Gilgandra	Partial	0.70	10%	Road corridor			
3575072	120/46153	658.79	Private	Gilgandra	Partial	10.97	2%	Rail corridor, road corridor, drainage control area	Y	Y	Y
3575072	2/40494	1.52	Private	Gilgandra	Partial	1.36	89%	Road corridor			
3575072	84/752565	129.50	Private	Gilgandra	Partial	7.63	6%	Rail corridor, drainage control area			
3591259	54/43484	7.83	The State of NSW	Gilgandra	Partial	1.92	25%	Rail corridor	n/a	n/a	n/a
3619494	4/231639	423.31	Private	Gilgandra	Partial	10.54	2%	Rail corridor, road corridor	Y	Y	Y
3673753	19/753375	364.17	Private	Gilgandra	Partial	10.51	3%	Rail corridor, road corridor, drainage control area	Y	N	N
3688021	32/530062	181.87	Private	Gilgandra	Partial	6.21	3%	Rail corridor, road corridor	N	Y	Y
3688021	41/752568	112.49	Private	Gilgandra	Partial	2.13	2%	Rail corridor, road corridor			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
3690902	21/753375	503.25	Private	Gilgandra	Partial	8.06	2%	Rail corridor, road corridor	N	Y	Y
3690923	26/753408	233.25	Private	Gilgandra	Partial	9.19	4%	Rail corridor, drainage control area	N	Y	Y
3690923	3/1174318	1.70	Private	Gilgandra	Partial	0.25	15%	Rail corridor			
3713234	3145/1187393	14.14	Transport for NSW	Gilgandra	Partial	0.41	3%	Rail corridor, drainage control area	n/a	n/a	n/a
3714466	65/752565	256.85	Private	Gilgandra	Partial	2.85	1%	Rail corridor	N	N	Y
3743054	410/1157693	525.10	Private	Gilgandra	Partial	10.22	2%	Rail corridor, road corridor	Y	N	N
3743055	5/752568	352.76	Private	Gilgandra	Partial	7.68	2%	Rail corridor, drainage control area	Y	N	N
3773179	90/752565	180.92	Private	Gilgandra	Partial	9.41	5%	Rail corridor, drainage control area	N	Y	Y
3773953	2/1190854	1.28	Private	Gilgandra	Partial	0.18	14%	Rail corridor			
3773953	46/721216	557.29	Private	Gilgandra	Partial	2.43	<1%	Rail corridor, drainage control area	N	Y	Y
3773953	89/752565	74.32	Private	Gilgandra	Partial	10.60	14%	Rail corridor, drainage control area			
3843454	118/46153	0.83	The State of NSW	Gilgandra	Partial	<0.01	<1%	Drainage control area	n/a	n/a	n/a
3843454	119/46153	14.14	The State of NSW	Gilgandra	Partial	4.04	29%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
3843454	66/752565	20.25	The State of NSW	Gilgandra	Partial	1.57	8%	Rail corridor	n/a	n/a	n/a
3853206	7006/1026138	6.75	The State of NSW	Gilgandra	Partial	0.45	7%	Rail corridor	n/a	n/a	n/a
3854637	321/517481	223.04	Private	Gilgandra	Partial	8.17	4%	Rail corridor	N	N	N

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
3854637	322/517481	141.77	Private	Gilgandra	Partial	4.03	3%	Rail corridor			
3872355	7312/1141767	8.78	The State of NSW	Gilgandra	Partial	0.17	2%	Rail corridor	n/a	n/a	n/a
4040943	1671/1230894	99.22	Private	Gilgandra	Partial	4.27	4%	Rail corridor, drainage control area	Y	N	N
4040944	166/753385	260.16	Private	Gilgandra	Partial	4.88	2%	Rail corridor, drainage control area	Y	N	N
4040944	1672/1230894	191.66	Private	Gilgandra	Partial	7.51	4%	Rail corridor, drainage control area			
4093553	1/1235279	535.83	Private	Gilgandra	Partial	0.21	<1%	Drainage control area	N	N	N
n/a	RD01//24871-1603	4.17	The State of NSW	Gilgandra	Partial	0.80	19%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/1073845	4.18	The State of NSW	Gilgandra	Partial	0.33	8%	Rail corridor	n/a	n/a	n/a
n/a	RD01/1125010	5.84	The State of NSW	Gilgandra	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/1187393	6.32	The State of NSW	Gilgandra	Partial	0.66	10%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/1235279	4.64	The State of NSW	Gilgandra	Partial	0.04	1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/231639	4.47	The State of NSW	Gilgandra	Partial	0.19	4%	Rail corridor	n/a	n/a	n/a
n/a	RD01/24006	11.75	The State of NSW	Gilgandra	Partial	0.73	6%	Rail corridor, road corridor	n/a	n/a	n/a
n/a	RD01/361771	3.02	The State of NSW	Gilgandra	Partial	0.43	14%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/46153	4.95	The State of NSW	Gilgandra	Partial	0.50	10%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/517481	0.14	The State of NSW	Gilgandra	Partial	0.13	93%	Rail corridor	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
n/a	RD01/529484	0.18	The State of NSW	Gilgandra	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/657741	12.63	The State of NSW	Gilgandra	Partial	0.24	2%	Rail corridor	n/a	n/a	n/a
n/a	RD01/657745	5.76	The State of NSW	Gilgandra	Partial	0.22	4%	Rail corridor	n/a	n/a	n/a
n/a	RD01/752563	10.79	The State of NSW	Gilgandra	Partial	0.22	2%	Drainage control area	n/a	n/a	n/a
n/a	RD01/752563	34.46	The State of NSW	Gilgandra	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/752563	10.79	The State of NSW	Gilgandra	Partial	8.32	77%	Rail corridor	n/a	n/a	n/a
n/a	RD01/752563	20.33	The State of NSW	Gilgandra	Partial	14.87	73%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/752568	5.38	The State of NSW	Gilgandra	Partial	0.45	8%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/752568	2.79	The State of NSW	Gilgandra	Partial	<0.01	<1%	Rail corridor, road corridor	n/a	n/a	n/a
n/a	RD01/752577	1.25	The State of NSW	Gilgandra	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/752585	5.76	The State of NSW	Gilgandra	Partial	0.29	5%	Rail corridor	n/a	n/a	n/a
n/a	RD01/752589	8.66	The State of NSW	Gilgandra	Partial	0.16	2%	Rail corridor	n/a	n/a	n/a
n/a	RD01/752590	30.72	The State of NSW	Gilgandra	Partial	0.27	1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/753375	3.52	The State of NSW	Gilgandra	Partial	0.34	10%	Drainage control area	n/a	n/a	n/a
n/a	RD01/753375	1.69	The State of NSW	Gilgandra	Partial	<0.01	<1%	Rail corridor, road corridor	n/a	n/a	n/a
n/a	RD01/753375	4.56	The State of NSW	Gilgandra	Partial	0.22	5%	Rail corridor, road corridor	n/a	n/a	n/a
n/a	RD01/753377	1.70	The State of NSW	Gilgandra	Partial	0.18	10%	Rail corridor	n/a	n/a	n/a
n/a	RD01/753408	6.43	The State of NSW	Gilgandra	Partial	0.39	6%	Rail corridor, drainage control area	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
n/a	RD01/753408	5.01	The State of NSW	Gilgandra	Partial	0.07	1%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/754192	46.29	The State of NSW	Gilgandra	Partial	2.49	5%	Rail corridor, road corridor	n/a	n/a	n/a
n/a	RD02//1707-1890	14.54	The State of NSW	Gilgandra	Partial	0.30	2%	Rail corridor	n/a	n/a	n/a
n/a	RD02/1125010	12.47	The State of NSW	Gilgandra	Partial	0.05	<1%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD02/1157693	3.89	The State of NSW	Gilgandra	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD02/1235279	10.72	The State of NSW	Gilgandra	Partial	3.62	34%	Rail corridor	n/a	n/a	n/a
n/a	RD02/24006	14.04	The State of NSW	Gilgandra	Partial	0.19	1%	Rail corridor	n/a	n/a	n/a
n/a	RD02/361771	8.50	The State of NSW	Gilgandra	Partial	0.38	4%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD02/586202	25.70	The State of NSW	Gilgandra	Partial	0.24	1%	Rail corridor	n/a	n/a	n/a
n/a	RD02/752563	10.65	The State of NSW	Gilgandra	Partial	0.25	2%	Rail corridor	n/a	n/a	n/a
n/a	RD02/752568	4.59	The State of NSW	Gilgandra	Partial	0.80	17%	Drainage control area	n/a	n/a	n/a
n/a	RD02/752568	4.88	The State of NSW	Gilgandra	Partial	0.01	<1%	Rail corridor, road corridor	n/a	n/a	n/a
n/a	RD02/752585	2.38	The State of NSW	Gilgandra	Partial	0.17	7%	Rail corridor	n/a	n/a	n/a
n/a	RD02/752590	15.72	The State of NSW	Gilgandra	Partial	0.08	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD02/839664	8.61	The State of NSW	Gilgandra	Partial	0.04	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD03//1707-1890	13.89	The State of NSW	Gilgandra	Partial	0.21	1%	Rail corridor	n/a	n/a	n/a
n/a	RD03/1125010	8.22	The State of NSW	Gilgandra	Partial	0.07	1%	Rail corridor, drainage control area	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
n/a	RD03/24006	16.17	The State of NSW	Gilgandra	Partial	1.80	11%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD03/753375	6.64	The State of NSW	Gilgandra	Partial	0.01	<1%	Drainage control area	n/a	n/a	n/a
n/a	RD04/46153	0.77	The State of NSW	Gilgandra	Partial	<0.01	<1%	Road corridor	n/a	n/a	n/a
n/a	RD04/839664	14.56	The State of NSW	Gilgandra	Partial	0.17	1%	Rail corridor	n/a	n/a	n/a
n/a	RD05/1230894	5.79	The State of NSW	Gilgandra	Partial	0.18	3%	Rail corridor	n/a	n/a	n/a
n/a	RD05/46153	2.68	The State of NSW	Gilgandra	Partial	<0.01	<1%	Road corridor	n/a	n/a	n/a
n/a	RD05/752589	6.97	The State of NSW	Gilgandra	Partial	0.17	2%	Rail corridor	n/a	n/a	n/a
n/a	RD07/46153	0.62	The State of NSW	Gilgandra	Partial	<0.01	1%	Rail corridor	n/a	n/a	n/a
n/a	RD07/753377	12.21	The State of NSW	Gilgandra	Partial	1.67	14%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
n/a	RD07/753408	8.65	The State of NSW	Gilgandra	Partial	0.46	5%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD10/753375	6.09	The State of NSW	Gilgandra	Partial	0.17	3%	Drainage control area	n/a	n/a	n/a
n/a	RD11/225619	2.87	The State of NSW	Gilgandra	Partial	0.29	10%	Road corridor, drainage control area	n/a	n/a	n/a
n/a	RD11/753375	5.71	The State of NSW	Gilgandra	Partial	0.46	8%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
n/a	RD12/225619	1.63	The State of NSW	Gilgandra	Partial	0.26	16%	Drainage control area	n/a	n/a	n/a
n/a	RD22/529484	4.06	The State of NSW	Gilgandra	Partial	0.23	6%	Drainage control area	n/a	n/a	n/a
n/a	RD23/529484	6.34	The State of NSW	Gilgandra	Partial	0.27	4%	Drainage control area	n/a	n/a	n/a
n/a	RD24/529484	4.54	The State of NSW	Gilgandra	Partial	0.11	2%	Rail corridor, drainage control area	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Type of requirement (partial/full)**	**Area required (ha)**	**% of lot required**	**Proposed future use**	**Change in public road access**	**Change in internal access**	**Severance**
n/a	RD25/529484	0.49	The State of NSW	Gilgandra	Partial	0.08	17%	Rail corridor	n/a	n/a	n/a
n/a	WR01/1019983	3.28	The State of NSW	Gilgandra	Partial	0.14	4%	Rail corridor	n/a	n/a	n/a
n/a	WR01/657745	18.87	The State of NSW	Gilgandra	Partial	0.64	3%	Rail corridor	n/a	n/a	n/a
n/a	WR01/752563	10.99	The State of NSW	Gilgandra	Partial	0.17	2%	Rail corridor	n/a	n/a	n/a
n/a	WR02/1230894	6.86	The State of NSW	Gilgandra	Partial	1.03	15%	Rail corridor	n/a	n/a	n/a
n/a	WR05/753377	5.66	The State of NSW	Gilgandra	Partial	0.22	4%	Rail corridor, drainage control area	n/a	n/a	n/a
Gilgandra Shire Council - totals		**25,941.7**				**574.7**					
Narrabri Shire Council											
2654389	161/802977	446.55	Private	Narrabri	Partial	6.24	1%	Rail corridor	Y	N	N
2654392	5/790376	1.24	Private	Narrabri	Partial	0.40	32%	Rail corridor, road corridor	N	N	N
2654804	192/757093	16.64	Private	Narrabri	Partial	0.01	<1%	Road corridor	N	N	N
2654839	2/506645	102.24	Private	Narrabri	Partial	5.75	6%	Rail corridor	Y	N	N
2654884	1/874361	100.07	Private	Narrabri	Partial	3.74	4%	Rail corridor, road corridor	Y	Y	Y
2654920	4/757097	164.25	Private	Narrabri	Partial	4.53	3%	Rail corridor	N	N	N
2654927	62/804736	177.70	Private	Narrabri	Partial	0.28	<1%	Rail corridor, drainage control area	N	N	N
2654928	63/804736	131.81	Private	Narrabri	Partial	4.56	3%	Rail corridor, drainage control area	N	N	N
2655534	7/754944	24.48	Private	Narrabri	Partial	1.17	5%	Rail corridor	N	N	Y
2655693	1/976718	59.16	Private	Narrabri	Partial	2.17	4%	Rail corridor	N	Y	Y

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
2658603	10/757093	4.04	Private	Narrabri	Partial	0.11	3%	Rail corridor	N	N	N
2658604	12/757093	3.92	Private	Narrabri	Partial	1.12	29%	Rail corridor	N	N	N
2658606	119/757093	3.93	Private	Narrabri	Partial	2.23	57%	Rail corridor	N	Y	Y
2658606	120/757093	3.93	Private	Narrabri	Partial	0.55	14%	Rail corridor			
2658606	147/757093	4.79	Private	Narrabri	Partial	0.62	13%	Rail corridor			
2658606	148/757093	3.86	Private	Narrabri	Partial	0.14	4%	Rail corridor			
2660120	19/821	0.52	Private	Narrabri	Partial	<0.01	1%	Rail corridor	N	N	Y
2660120	20/821	0.54	Private	Narrabri	Partial	0.16	29%	Rail corridor			
2660120	21/821	0.55	Private	Narrabri	Partial	0.29	54%	Rail corridor			
2660120	22/821	0.55	Private	Narrabri	Partial	0.13	24%	Rail corridor			
2843288	1041/1024663	32.01	Private	Narrabri	Partial	1.72	5%	Rail corridor	N	Y	Y
2908271	2/538783	31.05	Private	Narrabri	Partial	1.16	4%	Rail corridor	N	Y	Y
2955424	22/1034651	100.08	Private	Narrabri	Partial	3.21	3%	Rail corridor, road corridor	Y	Y	Y
3072231	2/1065237	121.36	Private	Narrabri	Partial	4.85	4%	Rail corridor	N	Y	Y
3333180	7003/1032496	15.93	The State of NSW	Narrabri	Partial	4.84	30%	Rail corridor	n/a	n/a	n/a
3344962	7002/1118445	170.89	The State of NSW	Narrabri	Partial	32.16	19%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
3344964	7004/1118445	3.52	The State of NSW	Narrabri	Partial	0.51	14%	Rail corridor	n/a	n/a	n/a
3348935	701/866192	39.80	Private	Narrabri	Partial	2.67	7%	Rail corridor	N	N	N
3393127	101/1150105	134.81	Private	Narrabri	Partial	4.14	3%	Rail corridor	Y	Y	Y
3393127	102/1150105	100.06	Private	Narrabri	Partial	6.89	7%	Rail corridor			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
3393127	3/790376	100.11	Private	Narrabri	Partial	3.64	4%	Rail corridor			
3393127	4/790376	100.12	Private	Narrabri	Partial	5.27	5%	Rail corridor, road corridor			
3600727	1102/1169062	78.17	Country Rail Infrastructure Authority	Narrabri	Partial	0.16	<1%	Rail corridor	n/a	n/a	n/a
3654564	2/750266	767.41	The State of NSW	Narrabri	Partial	1.59	<1%	Rail corridor	n/a	n/a	n/a
3654564	21/750274	627.94	The State of NSW	Narrabri	Partial	5.73	1%	Rail corridor	n/a	n/a	n/a
3654564	22/750274	647.63	The State of NSW	Narrabri	Partial	10.34	2%	Rail corridor	n/a	n/a	n/a
3654564	23/750274	628.33	The State of NSW	Narrabri	Partial	7.19	1%	Rail corridor, drainage control area	n/a	n/a	n/a
3656210	1/771141	246.52	Private	Narrabri	Partial	<0.01	<1%	Rail corridor	N	N	N
3669573	1/750266	688.34	The State of NSW	Narrabri	Partial	9.24	1%	Rail corridor, drainage control area	n/a	n/a	n/a
3669604	23/750304	485.89	The State of NSW	Narrabri	Partial	10.63	2%	Rail corridor, drainage control area	n/a	n/a	n/a
3669604	24/750304	486.11	The State of NSW	Narrabri	Partial	11.72	2%	Rail corridor	n/a	n/a	n/a
3683918	4/750259	762.86	The State of NSW	Narrabri	Partial	5.87	1%	Rail corridor, drainage control area	n/a	n/a	n/a
3704459	1044/1182307	85.57	Private	Narrabri	Partial	3.20	4%	Rail corridor	N	Y	Y
3785536	111/1191019	2.23	Private	Narrabri	Partial	0.91	41%	Rail corridor	Y	N	N
3862622	4/1195493	0.72	The State of NSW	Narrabri	Partial	0.31	44%	Rail corridor	n/a	n/a	n/a
3862624	6/1195493	3.48	The State of NSW	Narrabri	Partial	1.56	45%	Rail corridor	n/a	n/a	n/a
3862625	7/1195493	5.29	The State of NSW	Narrabri	Partial	2.89	55%	Rail corridor	n/a	n/a	n/a
3862626	8/1195493	18.80	The State of NSW	Narrabri	Partial	1.58	8%	Rail corridor	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
3880074	3/526448	6.77	Private	Narrabri	Partial	0.03	1%	Rail corridor	N	N	N
3880074	4/526448	0.06	Private	Narrabri	Partial	0.01	18%	Rail corridor			
3905397	1/1195493	0.15	Private	Narrabri	Partial	0.07	48%	Rail corridor	N	N	N
3905397	11/1018627	6.14	Private	Narrabri	Partial	0.03	1%	Rail corridor			
3905397	2/1195493	2.16	Private	Narrabri	Partial	0.01	<1%	Rail corridor			
3905397	3/1195493	0.76	Private	Narrabri	Partial	0.25	33%	Rail corridor			
3924439	1/132397	99.27	Private	Narrabri	Partial	2.51	3%	Rail corridor	N	Y	Y
3924439	1/362939	1.64	Private	Narrabri	Partial	0.58	35%	Rail corridor			
3924439	266/754944	123.56	Private	Narrabri	Partial	3.81	3%	Rail corridor			
3924439	3/113372	2.81	Private	Narrabri	Partial	0.17	6%	Rail corridor			
3924667	7001/1122341	70.57	The State of NSW	Narrabri	Partial	0.38	1%	Road corridor	n/a	n/a	n/a
4058747	3/1222972	32.76	Private	Narrabri	Partial	4.07	12%	Rail corridor	N	N	N
4058750	2/1222972	4.78	Private	Narrabri	Partial	1.57	33%	Rail corridor	N	N	N
4217680	7313/1147165	20.64	The State of NSW	Narrabri	Partial	8.11	39%	Rail corridor	n/a	n/a	n/a
4288191	45/757093	59.21	Private	Narrabri	Partial	1.32	2%	Rail corridor	Y	N	N
4288191	5/757083	19.51	Private	Narrabri	Partial	2.11	11%	Rail corridor			
4288191	6/757083	59.37	Private	Narrabri	Partial	2.74	5%	Rail corridor			
4288193	112/1191019	20.71	Private	Narrabri	Partial	6.75	33%	Rail corridor	Y	N	N
n/a	110/1191019	13.35	The State of NSW	Narrabri	Partial	2.58	19%	Rail corridor	n/a	n/a	n/a
n/a	n/a	132139.34	The State of NSW	Narrabri	Partial	281.11	<1%	Rail corridor, drainage control area	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Type of requirement (partial/full)**	**Area required (ha)**	**% of lot required**	**Proposed future use**	**Change in public road access**	**Change in internal access**	**Severance**
n/a	RD01//29319-1603	175.10	The State of NSW	Narrabri	Partial	2.15	1%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/1222972	0.66	The State of NSW	Narrabri	Partial	0.13	20%	Rail corridor	n/a	n/a	n/a
n/a	RD01/132397	6.59	The State of NSW	Narrabri	Partial	0.32	5%	Rail corridor	n/a	n/a	n/a
n/a	RD01/750266	3.25	The State of NSW	Narrabri	Partial	0.33	10%	Rail corridor	n/a	n/a	n/a
n/a	RD01/757093	2.85	The State of NSW	Narrabri	Partial	0.24	8%	Rail corridor	n/a	n/a	n/a
n/a	RD01/757093	0.60	The State of NSW	Narrabri	Partial	<0.01	<1%	Road corridor	n/a	n/a	n/a
n/a	RD01/790376	10.46	The State of NSW	Narrabri	Partial	0.16	2%	Rail corridor	n/a	n/a	n/a
n/a	RD01/874361	7.76	The State of NSW	Narrabri	Partial	0.16	2%	Rail corridor	n/a	n/a	n/a
n/a	RD02/750266	9.07	The State of NSW	Narrabri	Partial	0.18	2%	Rail corridor	n/a	n/a	n/a
n/a	RD03/1222972	0.02	The State of NSW	Narrabri	Partial	0.01	36%	Rail corridor	n/a	n/a	n/a
n/a	RD03/750274	11.27	The State of NSW	Narrabri	Partial	0.19	2%	Rail corridor	n/a	n/a	n/a
n/a	RD05/790376	3.00	The State of NSW	Narrabri	Partial	0.22	7%	Rail corridor	n/a	n/a	n/a
n/a	WR01/1029959	15.55	The State of NSW	Narrabri	Partial	0.25	2%	Rail corridor	n/a	n/a	n/a
n/a	WR01/1118445	166.64	The State of NSW	Narrabri	Partial	0.22	<1%	Rail corridor	n/a	n/a	n/a
n/a	WR01/976718	24.59	The State of NSW	Narrabri	Partial	0.46	2%	Rail corridor	n/a	n/a	n/a
Narrabri Shire Council - totals		**140,856.8**				**501.4**					
Narromine Shire Council											
2672826	2/542487	675.16	Private	Narromine	Partial	8.52	1%	Rail corridor, drainage control area	Y	N	N
2672833	42/752566	554.00	Private	Narromine	Partial	10.72	2%	Rail corridor, road corridor, drainage control area	N	N	N

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
2672966	91/586202	722.99	Private	Narromine	Partial	15.51	2%	Rail corridor, road corridor	N	Y	Y
2672968	281/836737	769.75	Private	Narromine	Partial	0.65	<1%	Drainage control area	N	N	N
2672970	27/752577	825.82	Private	Narromine	Partial	7.84	1%	Rail corridor, road corridor, drainage control area	N	N	Y
2672970	42/752577	303.43	Private	Narromine	Partial	11.42	4%	Rail corridor, drainage control area			
2673008	41/752581	82.77	Private	Narromine	Partial	5.33	6%	Rail corridor	Y	N	N
2673008	46/752581	80.82	Private	Narromine	Partial	3.39	4%	Rail corridor			
2673008	6/752581	87.98	Private	Narromine	Partial	4.85	6%	Rail corridor			
2673021	57/752581	76.18	Private	Narromine	Partial	3.29	4%	Rail corridor, drainage control area	Y	N	Y
2673331	1/822490	2.39	Private	Narromine	Partial	<0.01	<1%	Rail corridor	N	N	N
2674202	1921/777518	318.08	Private	Narromine	Partial	6.72	2%	Rail corridor, drainage control area	Y	Y	Y
2674203	1922/777518	438.10	Private	Narromine	Partial	18.52	4%	Rail corridor, drainage control area	Y	Y	Y
2674218	214/755131	64.38	Private	Narromine	Partial	3.18	5%	Rail corridor	N	Y	Y
2674232	1/819468	2.64	Private	Narromine	Partial	<0.01	<1%	Drainage control area	N	N	N
3001710	4001/1168182	169.82	Private	Narromine	Partial	16.17	10%	Rail corridor, drainage control area	Y	N	N
3056653	43/752581	75.83	Private	Narromine	Partial	3.89	5%	Rail corridor, drainage control area	Y	Y	Y
3056653	48/752581	152.01	Private	Narromine	Partial	4.71	3%	Rail corridor			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
3173761	1/1063245	5.01	Private	Narromine	Partial	0.92	18%	Rail corridor	Y	N	N
3173761	22/1077442	38.50	Private	Narromine	Partial	1.13	3%	Rail corridor			
3173762	21/1077442	429.57	Private	Narromine	Partial	11.07	3%	Rail corridor, drainage control area	Y	N	N
3418082	51/233201	406.22	Private	Narromine	Partial	4.89	1%	Rail corridor, drainage control area	Y	N	Y
3448629	7005/1020143	117.91	The State of NSW	Narromine	Partial	2.61	2%	Rail corridor	n/a	n/a	n/a
3530213	33/752600	373.33	Private	Narromine	Partial	6.25	2%	Rail corridor, drainage control area	Y	Y	Y
3625826	55/752581	180.40	Private	Narromine	Partial	0.59	<1%	Rail corridor	N	N	N
3705677	37/752577	101.16	Private	Narromine	Partial	3.13	3%	Rail corridor, drainage control area	Y	Y	Y
3773065	282/1194700	525.70	Private	Narromine	Partial	0.71	<1%	Road corridor, drainage control area	N	N	N
3773066	283/1194700	518.91	Private	Narromine	Partial	9.91	2%	Rail corridor, road corridor, drainage control area	N	Y	Y
3773066	33/752577	208.46	Private	Narromine	Partial	8.26	4%	Rail corridor, drainage control area			
3800251	1/1198931	8.26	Private	Narromine	Partial	0.16	2%	Rail corridor	N	N	N
3800251	16/755131	255.20	Private	Narromine	Partial	6.44	3%	Rail corridor, drainage control area			
3800251	17/755131	270.17	Private	Narromine	Partial	9.03	3%	Rail corridor, drainage control area			
3800251	232/755131	250.24	Private	Narromine	Partial	5.89	2%	Rail corridor, drainage control area			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
3800251	233/755131	250.21	Private	Narromine	Partial	5.80	2%	Rail corridor, drainage control area			
3852790	4118/1208595	17.49	Transport for NSW	Narromine	Partial	1.13	6%	Drainage control area	n/a	n/a	n/a
3915793	1/1181773	6.28	Private	Narromine	Partial	0.18	3%	Rail corridor, road corridor, drainage control area	Y	N	N
3915793	235/755131	464.80	Private	Narromine	Partial	15.40	3%	Rail corridor, road corridor, drainage control area			
3915794	239/755131	23.60	Private	Narromine	Partial	3.25	14%	Rail corridor	N	Y	Y
3915794	240/755131	25.18	Private	Narromine	Partial	2.71	11%	Rail corridor			
3921283	1/209376	299.01	Private	Narromine	Partial	4.52	2%	Rail corridor, drainage control area	Y	N	N
3930053	234/755131	455.52	Private	Narromine	Partial	25.85	6%	Rail corridor, drainage control area	Y	N	N
3958065	1/1220867	2.19	Private	Narromine	Partial	0.20	9%	Rail corridor	N	Y	Y
3958065	52/661453	124.60	Private	Narromine	Partial	9.58	8%	Rail corridor, drainage control area			
4054162	202/1104792	518.94	Private	Narromine	Partial	4.14	1%	Rail corridor, drainage control area	N	N	N
4054162	203/1104792	389.67	Private	Narromine	Partial	0.84	<1%	Drainage control area			
4199207	1/651374	8.17	Private	Narromine	Partial	0.35	4%	Rail corridor	Y	Y	Y
4199207	451/1251855	106.99	Private	Narromine	Partial	12.72	12%	Rail corridor, drainage control area			
4199207	452/1251855	425.13	Private	Narromine	Partial	0.45	<1%	Drainage control area			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
4199207	70/1251856	492.04	Private	Narromine	Partial	1.64	<1%	Rail corridor, drainage control area			
n/a	RAIL/755131	20.87	The State of NSW	Narromine	Partial	0.65	3%	Rail corridor	n/a	n/a	n/a
n/a	RD01//29802-1603	7.24	The State of NSW	Narromine	Partial	0.67	9%	Rail corridor	n/a	n/a	n/a
n/a	RD01//3344-1603	27.31	The State of NSW	Narromine	Partial	0.26	1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/1025108	5.51	The State of NSW	Narromine	Partial	0.16	3%	Drainage control area	n/a	n/a	n/a
n/a	RD01/1168182	2.75	The State of NSW	Narromine	Partial	0.16	6%	Rail corridor	n/a	n/a	n/a
n/a	RD01/1251855	6.66	The State of NSW	Narromine	Partial	0.48	7%	Drainage control area	n/a	n/a	n/a
n/a	RD01/209376	15.96	The State of NSW	Narromine	Partial	0.17	1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/233201	12.68	The State of NSW	Narromine	Partial	0.43	3%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/542487	12.71	The State of NSW	Narromine	Partial	1.67	13%	Drainage control area	n/a	n/a	n/a
n/a	RD01/586202	13.70	The State of NSW	Narromine	Partial	0.02	<1%	Rail corridor, road corridor	n/a	n/a	n/a
n/a	RD01/752577	0.08	The State of NSW	Narromine	Partial	<0.01	2%	Rail corridor	n/a	n/a	n/a
n/a	RD01/752577	28.80	The State of NSW	Narromine	Partial	0.60	2%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/755131	11.68	The State of NSW	Narromine	Partial	0.17	1%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/755131	15.40	The State of NSW	Narromine	Partial	1.29	8%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/777518	11.33	The State of NSW	Narromine	Partial	1.70	15%	Rail corridor, drainage control area	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Type of requirement (partial/full)**	**Area required (ha)**	**% of lot required**	**Proposed future use**	**Change in public road access**	**Change in internal access**	**Severance**
n/a	RD02/1077442	8.55	The State of NSW	Narromine	Partial	0.23	3%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD02/1168182	2.54	The State of NSW	Narromine	Partial	0.19	7%	Rail corridor	n/a	n/a	n/a
n/a	RD02/1251855	3.38	The State of NSW	Narromine	Partial	0.07	2%	Rail corridor	n/a	n/a	n/a
n/a	RD02/661453	2.57	The State of NSW	Narromine	Partial	0.18	7%	Rail corridor	n/a	n/a	n/a
n/a	RD02/752577	7.14	The State of NSW	Narromine	Partial	0.23	3%	Drainage control area	n/a	n/a	n/a
n/a	RD02/752577	5.12	The State of NSW	Narromine	Partial	1.25	24%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
n/a	RD02/752577	20.40	The State of NSW	Narromine	Partial	0.26	1%	Rail corridor, road corridor, drainage control area	n/a	n/a	n/a
n/a	RD03/1168182	9.90	The State of NSW	Narromine	Partial	1.14	11%	Drainage control area	n/a	n/a	n/a
n/a	RD03/233201	2.99	The State of NSW	Narromine	Partial	0.52	17%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD03/755131	20.28	The State of NSW	Narromine	Partial	0.65	3%	Rail corridor	n/a	n/a	n/a
n/a	RD04/1104792	3.72	The State of NSW	Narromine	Partial	0.02	1%	Drainage control area	n/a	n/a	n/a
n/a	RD05/542487	26.34	The State of NSW	Narromine	Partial	0.30	1%	Rail corridor	n/a	n/a	n/a
n/a	WR01/1020143	73.48	The State of NSW	Narromine	Partial	0.50	1%	Rail corridor	n/a	n/a	n/a
Narromine Shire Council - totals		**13,080.1**				**298.4**					
Warrumbungle Shire Council											
2629047	23/721224	0.80	Private	Warrumbungle	Full	0.80	100%	Rail corridor	N	N	N
2629047	24/721224	3.86	Private	Warrumbungle	Full	3.86	100%	Rail corridor			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
2629047	31/721224	65.64	Private	Warrumbungle	Partial	0.21	<1%	Rail corridor, drainage control area			
2629047	32/721224	255.93	Private	Warrumbungle	Partial	3.95	2%	Rail corridor, road corridor, drainage control area			
2629054	1/219602	304.93	Private	Warrumbungle	Partial	13.10	4%	Rail corridor, drainage control area	Y	N	N
2629054	2/256036	2.68	Private	Warrumbungle	Partial	0.10	4%	Rail corridor			
2629054	86/750247	231.00	Private	Warrumbungle	Partial	5.34	2%	Rail corridor			
2629078	25/750248	833.62	Australian Rail Track Corporation	Warrumbungle	Partial	2.12	<1%	Rail corridor, drainage control area	n/a	n/a	n/a
2629085	2/219602	245.25	Private	Warrumbungle	Partial	2.96	1%	Rail corridor, drainage control area	N	N	N
2629089	54/750248	52.56	Australian Rail Track Corporation	Warrumbungle	Partial	2.22	4%	Rail corridor, drainage control area	n/a	n/a	n/a
2629089	60/750248	351.10	Australian Rail Track Corporation	Warrumbungle	Partial	12.86	4%	Rail corridor, drainage control area	n/a	n/a	n/a
2629090	57/750248	518.49	Private	Warrumbungle	Partial	11.14	2%	Rail corridor, drainage control area	N	Y	Y
2629093	64/750248	536.78	Private	Warrumbungle	Partial	9.57	2%	Rail corridor, drainage control area	N	Y	Y
2631570	6/750284	508.13	Private	Warrumbungle	Partial	5.41	1%	Rail corridor, drainage control area	N	Y	Y
2631795	31/750304	662.84	Private	Warrumbungle	Partial	6.52	1%	Rail corridor	N	Y	Y
2631795	34/750304	272.26	Private	Warrumbungle	Partial	5.46	2%	Rail corridor, drainage control area			

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
2840406	261/1025193	502.93	Private	Warrumbungle	Partial	9.47	2%	Rail corridor, drainage control area	Y	Y	Y
2888006	26/721224	727.23	Private	Warrumbungle	Partial	19.46	3%	Rail corridor, drainage control area	N	N	N
3359537	63/750248	540.25	Australian Rail Track Corporation	Warrumbungle	Partial	9.11	2%	Rail corridor, drainage control area	n/a	n/a	n/a
3411383	22/721224	4.86	Private	Warrumbungle	Full	4.86	100%	Rail corridor	N	N	N
3411383	29/721224	339.69	Private	Warrumbungle	Partial	1.74	1%	Rail corridor, drainage control area			
3411383	94/750247	31.50	Private	Warrumbungle	Partial	0.50	2%	Rail corridor, drainage control area			
3647253	33/750304	203.75	The State of NSW	Warrumbungle	Partial	2.51	1%	Rail corridor	n/a	n/a	n/a
3658865	22/750286	534.94	The State of NSW	Warrumbungle	Partial	8.49	2%	Rail corridor, road corridor	n/a	n/a	n/a
3658865	23/750286	505.57	The State of NSW	Warrumbungle	Partial	6.21	1%	Rail corridor	n/a	n/a	n/a
3658865	24/750286	506.22	The State of NSW	Warrumbungle	Partial	4.65	1%	Rail corridor	n/a	n/a	n/a
3658865	26/750286	485.99	The State of NSW	Warrumbungle	Partial	11.22	2%	Rail corridor, drainage control area	n/a	n/a	n/a
3680619	10/750284	144.94	The State of NSW	Warrumbungle	Partial	8.43	6%	Rail corridor	n/a	n/a	n/a
3681274	2739/1180978	33.54	Transport for NSW	Warrumbungle	Partial	0.18	1%	Rail corridor	n/a	n/a	n/a
3838830	47/1207500	3610.10	The State of NSW	Warrumbungle	Partial	12.66	<1%	Rail corridor, drainage control area	n/a	n/a	n/a
3847672	53/1208884	281.17	The State of NSW	Warrumbungle	Partial	1.71	1%	Rail corridor	n/a	n/a	n/a
4051938	1/1231685	27.54	Private	Warrumbungle	Partial	1.08	4%	Rail corridor, drainage control area	N	N	N

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
4051938	13/750284	566.98	Private	Warrumbungle	Partial	13.67	2%	Rail corridor, drainage control area			
4114991	14/750284	528.14	Private	Warrumbungle	Partial	9.30	2%	Rail corridor, drainage control area	Y	Y	Y
n/a	RD01//2976-1603	117.74	The State of NSW	Warrumbungle	Partial	1.35	1%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01//2976-1603	117.74	The State of NSW	Warrumbungle	Partial	1.78	2%	Road corridor	n/a	n/a	n/a
n/a	RD01/1025193	12.02	The State of NSW	Warrumbungle	Partial	0.22	2%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/219602	4.87	The State of NSW	Warrumbungle	Partial	1.35	28%	Drainage control area	n/a	n/a	n/a
n/a	RD01/750247	4.43	The State of NSW	Warrumbungle	Partial	0.10	2%	Rail corridor	n/a	n/a	n/a
n/a	RD01/750247	9.46	The State of NSW	Warrumbungle	Partial	0.25	3%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD01/750284	6.07	The State of NSW	Warrumbungle	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD01/750286	6.80	The State of NSW	Warrumbungle	Partial	0.19	3%	Rail corridor	n/a	n/a	n/a
n/a	RD01/750304	7.56	The State of NSW	Warrumbungle	Partial	0.18	2%	Rail corridor	n/a	n/a	n/a
n/a	RD01/750304	8.63	The State of NSW	Warrumbungle	Partial	0.16	2%	Rail corridor	n/a	n/a	n/a
n/a	RD01/754252	6.13	The State of NSW	Warrumbungle	Partial	0.05	1%	Drainage control area	n/a	n/a	n/a
n/a	RD01/754252	7.15	The State of NSW	Warrumbungle	Partial	1.28	18%	Drainage control area	n/a	n/a	n/a
n/a	RD02/39583	14.49	The State of NSW	Warrumbungle	Partial	7.14	49%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD02/721224	4.68	The State of NSW	Warrumbungle	Partial	0.19	4%	Drainage control area	n/a	n/a	n/a
n/a	RD02/750247	8.82	The State of NSW	Warrumbungle	Partial	0.21	2%	Rail corridor	n/a	n/a	n/a

Existing property details					Land requirements for operational features				Private property impacts		
Property ID	Lot details	Lot size (ha)	Landowner (private / public)	LGA	Type of requirement (partial/full)	Area required (ha)	% of lot required	Proposed future use	Change in public road access	Change in internal access	Severance
n/a	RD02/750248	15.49	The State of NSW	Warrumbungle	Partial	0.98	6%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	RD02/750284	2.87	The State of NSW	Warrumbungle	Partial	0.18	6%	Rail corridor	n/a	n/a	n/a
n/a	RD02/750286	8.56	The State of NSW	Warrumbungle	Partial	0.19	2%	Rail corridor	n/a	n/a	n/a
n/a	RD03/721224	1.69	The State of NSW	Warrumbungle	Full	1.69	100%	Drainage control area	n/a	n/a	n/a
n/a	RD04/750246	5.67	The State of NSW	Warrumbungle	Partial	<0.01	<1%	Rail corridor	n/a	n/a	n/a
n/a	RD04/750284	4.22	The State of NSW	Warrumbungle	Partial	0.18	4%	Rail corridor	n/a	n/a	n/a
n/a	RD05/750246	0.16	The State of NSW	Warrumbungle	Partial	0.16	98%	Rail corridor	n/a	n/a	n/a
n/a	WR01/1025193	23.40	The State of NSW	Warrumbungle	Partial	0.45	2%	Rail corridor	n/a	n/a	n/a
n/a	WR01/721224	13.22	The State of NSW	Warrumbungle	Partial	0.35	3%	Rail corridor, drainage control area	n/a	n/a	n/a
n/a	WR01/750284	22.29	The State of NSW	Warrumbungle	Partial	0.38	2%	Rail corridor	n/a	n/a	n/a
n/a	WR01/750286	49.17	The State of NSW	Warrumbungle	Partial	0.36	1%	Rail corridor	n/a	n/a	n/a
Warrumbungle Shire Council - totals		**14,904.5**				**230.2**					

Temporary land requirements

Table D.2 Indicative temporary land requirements (preliminary – subject to confirmation)

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
Coonamble Shire Council								
2632395	12/754246	1052.13	Private	Coonamble	Construction activities	3.10	<1%	Pre-existing land use
2632395	48/1079577	78.19	Private	Coonamble	Construction activities	<0.01	<1%	Pre-existing land use
2632396	7302/1151603	50.94	The State of NSW	Coonamble	Construction activities	3.65	7%	Pre-existing land use
2632396	69/754192	246.67	Private	Coonamble	Construction activities	0.49	<1%	Pre-existing land use
2632396	71/754192	97.37	Private	Coonamble	Construction activities	2.07	2%	Pre-existing land use
2632399	82/820705	682.71	Private	Coonamble	Construction activities	24.96	4%	Pre-existing land use
2632400	78/754192	618.94	Private	Coonamble	Construction activities	1.77	<1%	Pre-existing land use
2632401	2/252905	4.86	Private	Coonamble	Construction activities	0.22	5%	Pre-existing land use
2632401	79/754192	623.40	Private	Coonamble	Construction activities	4.44	1%	Pre-existing land use
2634188	70/39583	121.44	Private	Coonamble	Construction activities	0.70	1%	Pre-existing land use
2634188	66/754234	23.08	Private	Coonamble	Construction activities	4.81	21%	Pre-existing land use
2634188	1/846191	634.58	Private	Coonamble	Construction activities	0.81	<1%	Pre-existing land use
2634191	35/562776	143.08	Private	Coonamble	Construction activities	4.16	3%	Pre-existing land use
2634191	34/562776	364.28	Private	Coonamble	Construction activities	4.92	1%	Pre-existing land use
2634191	13/754216	258.84	Private	Coonamble	Construction activities	0.96	<1%	Pre-existing land use
2634191	14/754216	773.18	Private	Coonamble	Construction activities	1.18	<1%	Pre-existing land use
2634197	33/562776	472.99	Private	Coonamble	Construction activities	0.84	<1%	Pre-existing land use
2634442	2/131246	2.31	Private	Coonamble	Construction activities	0.78	34%	Pre-existing land use
2634444	26/754234	38.59	Private	Coonamble	Construction activities	1.10	3%	Pre-existing land use
2634444	25/754252	64.82	Private	Coonamble	Construction activities	0.04	<1%	Pre-existing land use
2634446	2/570929	307.13	Private	Coonamble	Construction activities	0.43	<1%	Pre-existing land use
2634451	51/754234	81.13	Private	Coonamble	Construction activities	10.15	13%	Pre-existing land use
2634451	69/39583	244.62	Private	Coonamble	Construction activities	2.98	1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
2634520	1/218818	16.56	Private	Coonamble	Construction activities	0.34	2%	Pre-existing land use
2634520	57/754246	517.91	Private	Coonamble	Construction activities	4.48	1%	Pre-existing land use
2634523	65/754246	73.70	Private	Coonamble	Construction activities	13.22	18%	Pre-existing land use
3447306	7003/1060845	1.61	The State of NSW	Coonamble	Construction activities	0.59	37%	Pre-existing land use
3447306	7004/1060845	6.96	The State of NSW	Coonamble	Construction activities	1.42	20%	Pre-existing land use
3447306	7002/1060845	32.14	The State of NSW	Coonamble	Construction activities	0.08	<1%	Pre-existing land use
3591541	11/754234	118.97	Private	Coonamble	Construction activities	0.73	1%	Pre-existing land use
3591541	46/754234	240.49	Private	Coonamble	Construction activities	1.57	1%	Pre-existing land use
3591542	47/754234	766.80	Private	Coonamble	Construction activities	3.25	<1%	Pre-existing land use
3761187	7/754234	222.89	Private	Coonamble	Construction activities	17.00	8%	Pre-existing land use
3934328	14/754246	97.24	Private	Coonamble	Construction activities	0.20	<1%	Pre-existing land use
3934328	10/754246	291.40	Private	Coonamble	Construction activities	7.35	3%	Pre-existing land use
3934328	71/879744	149.48	Private	Coonamble	Construction activities	1.20	1%	Pre-existing land use
3941931	15/754246	40.50	Private	Coonamble	Construction activities	2.38	6%	Pre-existing land use
3941931	11/754246	381.59	Private	Coonamble	Construction activities	0.44	<1%	Pre-existing land use
3941931	61/754246	49.91	Private	Coonamble	Construction activities	1.42	3%	Pre-existing land use
3941931	1/1218318	6.42	Private	Coonamble	Construction activities	0.34	5%	Pre-existing land use
3975011	62/754246	70.82	Private	Coonamble	Construction activities	0.35	<1%	Pre-existing land use
3975011	3/218818	11.29	Private	Coonamble	Construction activities	0.14	1%	Pre-existing land use
3975011	4/218818	240.00	Private	Coonamble	Construction activities	1.57	1%	Pre-existing land use
3975011	1/1221773	17.06	Private	Coonamble	Construction activities	0.16	1%	Pre-existing land use
4095150	13/754246	406.78	Private	Coonamble	Construction activities	1.99	<1%	Pre-existing land use
4095150	1/1236922	4.52	Private	Coonamble	Construction activities	0.09	2%	Pre-existing land use
4113621	4/504368	133.83	Private	Coonamble	Construction activities	2.02	2%	Pre-existing land use
4113621	1/504386	368.87	Private	Coonamble	Construction activities	2.81	1%	Pre-existing land use
4210089	29/754244	575.21	Private	Coonamble	Construction activities	0.79	<1%	Pre-existing land use
n/a	RD01/1060845	2.74	The State of NSW	Coonamble	Construction activities	0.06	2%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
n/a	RD01/39583	6.42	The State of NSW	Coonamble	Construction activities	0.88	14%	Pre-existing land use
n/a	RD01/562776	11.09	The State of NSW	Coonamble	Construction activities	0.02	<1%	Pre-existing land use
n/a	RD01/754192	46.29	The State of NSW	Coonamble	Construction activities	4.85	10%	Pre-existing land use
n/a	RD01/754192	12.24	The State of NSW	Coonamble	Construction activities	0.23	2%	Pre-existing land use
n/a	RD01/754234	23.34	The State of NSW	Coonamble	Construction activities	4.06	17%	Pre-existing land use
n/a	RD01/754246	1.57	The State of NSW	Coonamble	Construction activities	0.04	3%	Pre-existing land use
n/a	RD01/754246	3.96	The State of NSW	Coonamble	Construction activities	1.24	31%	Pre-existing land use
n/a	RD02/562776	3.48	The State of NSW	Coonamble	Construction activities	0.35	10%	Pre-existing land use
n/a	RD02/754192	15.18	The State of NSW	Coonamble	Construction activities	2.59	17%	Pre-existing land use
n/a	RD02/754244	7.23	The State of NSW	Coonamble	Construction activities	0.30	4%	Pre-existing land use
n/a	RD02/754246	3.66	The State of NSW	Coonamble	Construction activities	0.04	1%	Pre-existing land use
n/a	RD02/754246	6.89	The State of NSW	Coonamble	Construction activities	0.44	6%	Pre-existing land use
n/a	RD02/754246	3.10	The State of NSW	Coonamble	Construction activities	0.29	9%	Pre-existing land use
n/a	RD03/754192	11.46	The State of NSW	Coonamble	Construction activities	0.75	7%	Pre-existing land use
n/a	RD04/754246	4.06	The State of NSW	Coonamble	Construction activities	0.16	4%	Pre-existing land use
n/a	RD05/754246	0.26	The State of NSW	Coonamble	Construction activities	0.14	52%	Pre-existing land use
n/a	RD05/754246	1.25	The State of NSW	Coonamble	Construction activities	0.64	51%	Pre-existing land use
n/a	RD60/754246	7.74	The State of NSW	Coonamble	Construction activities	0.15	2%	Pre-existing land use
Coonamble Shire Council - totals		**12,000.2**				**157.8**		
Gilgandra Shire Council								
2636942	60/754192	125.44	Private	Gilgandra	Construction activities	5.40	4%	Pre-existing land use
2636968	38/752553	678.28	Private	Gilgandra	Construction activities	1.43	<1%	Pre-existing land use
2638452	37/752563	512.74	Private	Gilgandra	Construction activities	0.49	<1%	Pre-existing land use
2638454	39/752563	781.94	Private	Gilgandra	Construction activities	26.65	3%	Pre-existing land use
2638455	40/752563	589.32	Private	Gilgandra	Construction activities	3.94	1%	Pre-existing land use
2638530	20/753375	231.86	Private	Gilgandra	Construction activities	0.84	<1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
2638530	57/753375	172.94	Private	Gilgandra	Construction activities	13.23	8%	Pre-existing land use
2638532	22/753375	259.02	Private	Gilgandra	Construction activities	2.22	1%	Pre-existing land use
2638532	65/753375	144.12	Private	Gilgandra	Construction activities	0.37	<1%	Pre-existing land use
2638540	76/753375	166.88	Private	Gilgandra	Construction activities	0.57	<1%	Pre-existing land use
2638542	40/753375	331.10	Private	Gilgandra	Construction activities	3.14	1%	Pre-existing land use
2638543	5/231639	1.19	Gilgandra Shire Council	Gilgandra	Construction activities	0.03	2%	Pre-existing land use
2638548	54/753375	355.19	Private	Gilgandra	Construction activities	1.57	<1%	Pre-existing land use
2638548	77/753375	19.12	Private	Gilgandra	Construction activities	1.37	7%	Pre-existing land use
2638554	63/754192	159.46	Private	Gilgandra	Construction activities	1.11	1%	Pre-existing land use
2638558	74/754192	107.67	Private	Gilgandra	Construction activities	2.08	2%	Pre-existing land use
2638558	80/754192	68.87	Private	Gilgandra	Construction activities	0.21	<1%	Pre-existing land use
2638561	6/753377	59.80	Private	Gilgandra	Construction activities	0.71	1%	Pre-existing land use
2638561	9/131224	7.32	Private	Gilgandra	Construction activities	1.17	16%	Pre-existing land use
2638561	1/361771	714.21	Private	Gilgandra	Construction activities	1.29	<1%	Pre-existing land use
2638568	97/753377	444.45	Private	Gilgandra	Construction activities	4.06	1%	Pre-existing land use
2638568	96/753377	443.44	Private	Gilgandra	Construction activities	1.02	<1%	Pre-existing land use
2638572	99/753377	447.58	Private	Gilgandra	Construction activities	0.15	<1%	Pre-existing land use
2638573	100/753377	458.88	Private	Gilgandra	Construction activities	6.45	1%	Pre-existing land use
2638582	C/24006	115.41	Private	Gilgandra	Construction activities	1.35	1%	Pre-existing land use
2638582	E/24006	6.17	Private	Gilgandra	Construction activities	0.40	7%	Pre-existing land use
2638586	18/752568	920.65	Private	Gilgandra	Construction activities	4.26	<1%	Pre-existing land use
2638588	21/752568	903.19	Private	Gilgandra	Construction activities	2.93	<1%	Pre-existing land use
2638588	25/752568	302.22	Private	Gilgandra	Construction activities	1.43	<1%	Pre-existing land use
2638592	35/752568	360.14	Private	Gilgandra	Construction activities	1.42	<1%	Pre-existing land use
2638594	A/24006	156.34	Private	Gilgandra	Construction activities	2.32	1%	Pre-existing land use
2638822	39/753408	146.31	Private	Gilgandra	Construction activities	1.47	1%	Pre-existing land use
2638822	38/753408	259.05	Private	Gilgandra	Construction activities	1.69	1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
2638843	1/752585	16.06	Private	Gilgandra	Construction activities	0.13	1%	Pre-existing land use
2638843	47/752585	22.40	Private	Gilgandra	Construction activities	6.74	30%	Pre-existing land use
2638843	31/752585	721.98	Private	Gilgandra	Construction activities	1.38	<1%	Pre-existing land use
2638843	38/752585	243.17	Private	Gilgandra	Construction activities	2.06	1%	Pre-existing land use
2638854	7003/1020720	135.79	The State of NSW	Gilgandra	Construction activities	0.35	<1%	Pre-existing land use
2638854	44/752577	78.30	Private	Gilgandra	Construction activities	0.16	<1%	Pre-existing land use
2638875	1/657741	368.57	Private	Gilgandra	Construction activities	11.81	3%	Pre-existing land use
2638884	97/752589	651.01	Private	Gilgandra	Construction activities	0.09	<1%	Pre-existing land use
2638885	98/752589	542.81	Private	Gilgandra	Construction activities	123.63	23%	Pre-existing land use
2638886	99/752589	643.41	Private	Gilgandra	Construction activities	6.42	1%	Pre-existing land use
2638887	101/752589	666.01	Private	Gilgandra	Construction activities	14.48	2%	Pre-existing land use
2638895	20/819828	2.67	Private	Gilgandra	Construction activities	<0.01	<1%	Pre-existing land use
2638897	1/752590	259.10	Private	Gilgandra	Construction activities	3.94	2%	Pre-existing land use
2638897	3/752590	833.87	Private	Gilgandra	Construction activities	1.38	<1%	Pre-existing land use
2638898	2/752590	1121.86	Private	Gilgandra	Construction activities	10.77	1%	Pre-existing land use
2638901	5/752590	880.92	Private	Gilgandra	Construction activities	0.53	<1%	Pre-existing land use
2638902	6/752590	828.92	Private	Gilgandra	Construction activities	1.45	<1%	Pre-existing land use
2638902	15/752590	276.32	Private	Gilgandra	Construction activities	3.13	1%	Pre-existing land use
2638903	7/752590	810.54	Private	Gilgandra	Construction activities	1.53	<1%	Pre-existing land use
2638905	82/839664	820.70	Private	Gilgandra	Construction activities	1.65	<1%	Pre-existing land use
2639253	37/753408	228.31	Private	Gilgandra	Construction activities	1.06	<1%	Pre-existing land use
2639253	34/753408	258.05	Private	Gilgandra	Construction activities	3.32	1%	Pre-existing land use
2639254	35/753408	303.77	Private	Gilgandra	Construction activities	2.73	1%	Pre-existing land use
2639255	48/753408	200.25	Private	Gilgandra	Construction activities	7.15	4%	Pre-existing land use
3125849	86/752589	125.79	Private	Gilgandra	Construction activities	0.21	<1%	Pre-existing land use
3125849	1/657745	210.06	Private	Gilgandra	Construction activities	18.79	9%	Pre-existing land use
3312473	7001/1019983	3.70	The State of NSW	Gilgandra	Construction activities	0.18	5%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
3313024	36/752568	360.64	Private	Gilgandra	Construction activities	15.67	4%	Pre-existing land use
3367978	1/131213	3.69	Private	Gilgandra	Construction activities	0.66	18%	Pre-existing land use
3367978	89/753377	176.61	Private	Gilgandra	Construction activities	1.69	1%	Pre-existing land use
3367978	66/754192	104.63	Private	Gilgandra	Construction activities	8.20	8%	Pre-existing land use
3367978	1/1116532	12.71	Private	Gilgandra	Construction activities	<0.01	<1%	Pre-existing land use
3408950	1/1125010	499.61	Private	Gilgandra	Construction activities	2.47	<1%	Pre-existing land use
3416147	49/752563	5.58	The State of NSW	Gilgandra	Construction activities	5.06	91%	Pre-existing land use
3434719	2/1125010	789.46	Private	Gilgandra	Construction activities	7.39	1%	Pre-existing land use
3545857	7303/1158355	43.24	The State of NSW	Gilgandra	Construction activities	0.07	<1%	Pre-existing land use
3575072	1/722900	7.07	Private	Gilgandra	Construction activities	0.18	3%	Pre-existing land use
3575072	1/652272	7.86	Private	Gilgandra	Construction activities	0.02	<1%	Pre-existing land use
3575072	84/752565	129.50	Private	Gilgandra	Construction activities	1.70	1%	Pre-existing land use
3575072	2/40494	1.52	Private	Gilgandra	Construction activities	0.07	5%	Pre-existing land use
3575072	120/46153	658.79	Private	Gilgandra	Construction activities	2.56	<1%	Pre-existing land use
3591259	54/43484	7.83	The State of NSW	Gilgandra	Construction activities	0.06	1%	Pre-existing land use
3619494	4/231639	423.31	Private	Gilgandra	Construction activities	6.75	2%	Pre-existing land use
3673753	19/753375	364.17	Private	Gilgandra	Construction activities	3.82	1%	Pre-existing land use
3688021	32/530062	181.87	Private	Gilgandra	Construction activities	3.40	2%	Pre-existing land use
3688021	6/752568	368.60	Private	Gilgandra	Construction activities	0.82	<1%	Pre-existing land use
3688021	41/752568	112.49	Private	Gilgandra	Construction activities	0.51	<1%	Pre-existing land use
3690902	21/753375	503.25	Private	Gilgandra	Construction activities	1.97	<1%	Pre-existing land use
3690923	26/753408	233.25	Private	Gilgandra	Construction activities	2.76	1%	Pre-existing land use
3690923	3/1174318	1.70	Private	Gilgandra	Construction activities	0.05	3%	Pre-existing land use
3713234	3145/1187393	14.14	Transport for NSW	Gilgandra	Construction activities	9.44	67%	Pre-existing land use
3714466	65/752565	256.85	Private	Gilgandra	Construction activities	1.77	1%	Pre-existing land use
3743054	410/1157693	525.10	Private	Gilgandra	Construction activities	2.91	1%	Pre-existing land use
3743055	5/752568	352.76	Private	Gilgandra	Construction activities	6.90	2%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
3773179	90/752565	180.92	Private	Gilgandra	Construction activities	4.08	2%	Pre-existing land use
3773953	89/752565	74.32	Private	Gilgandra	Construction activities	9.96	13%	Pre-existing land use
3773953	46/721216	557.29	Private	Gilgandra	Construction activities	1.30	<1%	Pre-existing land use
3773953	2/1190854	1.28	Private	Gilgandra	Construction activities	0.02	2%	Pre-existing land use
3843454	66/752565	20.25	The State of NSW	Gilgandra	Construction activities	0.57	3%	Pre-existing land use
3843454	119/46153	14.14	The State of NSW	Gilgandra	Construction activities	0.67	5%	Pre-existing land use
3853206	7006/1026138	6.75	The State of NSW	Gilgandra	Construction activities	0.31	5%	Pre-existing land use
3854637	321/517481	223.04	Private	Gilgandra	Construction activities	1.44	1%	Pre-existing land use
3854637	322/517481	141.77	Private	Gilgandra	Construction activities	0.55	<1%	Pre-existing land use
3872355	7312/1141767	8.78	The State of NSW	Gilgandra	Construction activities	0.26	3%	Pre-existing land use
4040943	1671/1230894	99.22	Private	Gilgandra	Construction activities	1.19	1%	Pre-existing land use
4040944	166/753385	260.16	Private	Gilgandra	Construction activities	4.85	2%	Pre-existing land use
4040944	1672/1230894	191.66	Private	Gilgandra	Construction activities	4.92	3%	Pre-existing land use
4093553	1/1235279	535.83	Private	Gilgandra	Construction activities	0.55	<1%	Pre-existing land use
n/a	RD01//24871-1603	4.17	The State of NSW	Gilgandra	Construction activities	0.42	10%	Pre-existing land use
n/a	RD02//1707-1890	14.54	The State of NSW	Gilgandra	Construction activities	0.02	<1%	Pre-existing land use
n/a	RD03//1707-1890	13.89	The State of NSW	Gilgandra	Construction activities	0.86	6%	Pre-existing land use
n/a	RD01/1073845	4.18	The State of NSW	Gilgandra	Construction activities	2.39	57%	Pre-existing land use
n/a	RD01/1125010	5.84	The State of NSW	Gilgandra	Construction activities	0.46	8%	Pre-existing land use
n/a	RD01/1157693	2.77	The State of NSW	Gilgandra	Construction activities	0.26	9%	Pre-existing land use
n/a	RD01/1187393	6.32	The State of NSW	Gilgandra	Construction activities	4.08	65%	Pre-existing land use
n/a	RD01/1235279	4.64	The State of NSW	Gilgandra	Construction activities	0.02	<1%	Pre-existing land use
n/a	RD01/225619	0.16	The State of NSW	Gilgandra	Construction activities	0.05	32%	Pre-existing land use
n/a	RD01/231639	4.47	The State of NSW	Gilgandra	Construction activities	0.10	2%	Pre-existing land use
n/a	RD01/24006	11.75	The State of NSW	Gilgandra	Construction activities	0.73	6%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
n/a	RD01/361771	3.02	The State of NSW	Gilgandra	Construction activities	0.04	1%	Pre-existing land use
n/a	RD01/46153	4.95	The State of NSW	Gilgandra	Construction activities	2.21	45%	Pre-existing land use
n/a	RD01/517481	0.14	The State of NSW	Gilgandra	Construction activities	0.01	8%	Pre-existing land use
n/a	RD01/529484	0.18	The State of NSW	Gilgandra	Construction activities	0.02	12%	Pre-existing land use
n/a	RD01/657741	12.63	The State of NSW	Gilgandra	Construction activities	0.98	8%	Pre-existing land use
n/a	RD01/657745	5.76	The State of NSW	Gilgandra	Construction activities	0.16	3%	Pre-existing land use
n/a	RD01/752553	7.00	The State of NSW	Gilgandra	Construction activities	0.09	1%	Pre-existing land use
n/a	RD01/752563	34.46	The State of NSW	Gilgandra	Construction activities	0.01	<1%	Pre-existing land use
n/a	RD01/752563	20.33	The State of NSW	Gilgandra	Construction activities	4.11	20%	Pre-existing land use
n/a	RD01/752563	10.79	The State of NSW	Gilgandra	Construction activities	0.12	1%	Pre-existing land use
n/a	RD01/752568	6.45	The State of NSW	Gilgandra	Construction activities	0.03	<1%	Pre-existing land use
n/a	RD01/752568	5.38	The State of NSW	Gilgandra	Construction activities	0.40	7%	Pre-existing land use
n/a	RD01/752568	7.05	The State of NSW	Gilgandra	Construction activities	0.20	3%	Pre-existing land use
n/a	RD01/752568	2.79	The State of NSW	Gilgandra	Construction activities	0.18	6%	Pre-existing land use
n/a	RD01/752577	1.25	The State of NSW	Gilgandra	Construction activities	0.18	15%	Pre-existing land use
n/a	RD01/752585	5.76	The State of NSW	Gilgandra	Construction activities	0.50	9%	Pre-existing land use
n/a	RD01/752585	1.87	The State of NSW	Gilgandra	Construction activities	0.07	4%	Pre-existing land use
n/a	RD01/752589	8.66	The State of NSW	Gilgandra	Construction activities	3.13	36%	Pre-existing land use
n/a	RD01/752590	30.72	The State of NSW	Gilgandra	Construction activities	3.45	11%	Pre-existing land use
n/a	RD01/753375	1.69	The State of NSW	Gilgandra	Construction activities	0.02	1%	Pre-existing land use
n/a	RD01/753375	4.85	The State of NSW	Gilgandra	Construction activities	0.93	19%	Pre-existing land use
n/a	RD01/753375	4.56	The State of NSW	Gilgandra	Construction activities	0.46	10%	Pre-existing land use
n/a	RD01/753375	3.52	The State of NSW	Gilgandra	Construction activities	1.46	42%	Pre-existing land use
n/a	RD01/753377	1.70	The State of NSW	Gilgandra	Construction activities	0.02	1%	Pre-existing land use
n/a	RD01/753408	5.01	The State of NSW	Gilgandra	Construction activities	<0.01	<1%	Pre-existing land use
n/a	RD01/839664	11.68	The State of NSW	Gilgandra	Construction activities	0.48	4%	Pre-existing land use
n/a	RD02/1125010	12.47	The State of NSW	Gilgandra	Construction activities	0.07	1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
n/a	RD02/1235279	10.72	The State of NSW	Gilgandra	Construction activities	0.06	1%	Pre-existing land use
n/a	RD02/24006	14.04	The State of NSW	Gilgandra	Construction activities	0.04	<1%	Pre-existing land use
n/a	RD02/361771	8.50	The State of NSW	Gilgandra	Construction activities	0.47	6%	Pre-existing land use
n/a	RD02/529484	0.16	The State of NSW	Gilgandra	Construction activities	0.02	12%	Pre-existing land use
n/a	RD02/586202	25.70	The State of NSW	Gilgandra	Construction activities	2.32	9%	Pre-existing land use
n/a	RD02/752563	10.65	The State of NSW	Gilgandra	Construction activities	1.25	12%	Pre-existing land use
n/a	RD02/752568	2.92	The State of NSW	Gilgandra	Construction activities	<0.01	<1%	Pre-existing land use
n/a	RD02/752568	4.59	The State of NSW	Gilgandra	Construction activities	0.23	5%	Pre-existing land use
n/a	RD02/752568	4.88	The State of NSW	Gilgandra	Construction activities	1.19	24%	Pre-existing land use
n/a	RD02/752585	2.38	The State of NSW	Gilgandra	Construction activities	0.03	1%	Pre-existing land use
n/a	RD02/752590	15.72	The State of NSW	Gilgandra	Construction activities	2.60	17%	Pre-existing land use
n/a	RD02/753375	1.79	The State of NSW	Gilgandra	Construction activities	0.20	11%	Pre-existing land use
n/a	RD02/839664	8.61	The State of NSW	Gilgandra	Construction activities	1.33	15%	Pre-existing land use
n/a	RD03/1125010	8.22	The State of NSW	Gilgandra	Construction activities	0.02	<1%	Pre-existing land use
n/a	RD03/24006	16.17	The State of NSW	Gilgandra	Construction activities	0.97	6%	Pre-existing land use
n/a	RD03/752585	0.16	The State of NSW	Gilgandra	Construction activities	0.01	4%	Pre-existing land use
n/a	RD03/752590	8.98	The State of NSW	Gilgandra	Construction activities	0.59	7%	Pre-existing land use
n/a	RD03/753375	6.64	The State of NSW	Gilgandra	Construction activities	0.33	5%	Pre-existing land use
n/a	RD04/46153	0.77	The State of NSW	Gilgandra	Construction activities	0.25	33%	Pre-existing land use
n/a	RD04/752589	4.92	The State of NSW	Gilgandra	Construction activities	0.59	12%	Pre-existing land use
n/a	RD04/839664	14.56	The State of NSW	Gilgandra	Construction activities	1.00	7%	Pre-existing land use
n/a	RD05/1230894	5.79	The State of NSW	Gilgandra	Construction activities	0.02	<1%	Pre-existing land use
n/a	RD05/46153	2.68	The State of NSW	Gilgandra	Construction activities	0.43	16%	Pre-existing land use
n/a	RD05/752589	6.97	The State of NSW	Gilgandra	Construction activities	1.68	24%	Pre-existing land use
n/a	RD05/839664	0.18	The State of NSW	Gilgandra	Construction activities	0.18	100%	Pre-existing land use
n/a	RD06/753377	9.70	The State of NSW	Gilgandra	Construction activities	0.19	2%	Pre-existing land use
n/a	RD07/46153	0.62	The State of NSW	Gilgandra	Construction activities	0.01	1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
n/a	RD07/753377	12.21	The State of NSW	Gilgandra	Construction activities	2.75	23%	Pre-existing land use
n/a	RD07/753408	8.65	The State of NSW	Gilgandra	Construction activities	1.91	22%	Pre-existing land use
n/a	RD09/753375	5.93	The State of NSW	Gilgandra	Construction activities	0.18	3%	Pre-existing land use
n/a	RD10/753375	6.09	The State of NSW	Gilgandra	Construction activities	3.78	62%	Pre-existing land use
n/a	RD11/225619	2.87	The State of NSW	Gilgandra	Construction activities	0.13	5%	Pre-existing land use
n/a	RD11/753375	5.71	The State of NSW	Gilgandra	Construction activities	0.45	8%	Pre-existing land use
n/a	RD12/225619	1.63	The State of NSW	Gilgandra	Construction activities	0.66	41%	Pre-existing land use
n/a	RD12/231639	2.49	The State of NSW	Gilgandra	Construction activities	0.24	10%	Pre-existing land use
n/a	RD21/529484	0.81	The State of NSW	Gilgandra	Construction activities	0.10	12%	Pre-existing land use
n/a	RD22/529484	4.06	The State of NSW	Gilgandra	Construction activities	0.89	22%	Pre-existing land use
n/a	RD23/529484	6.34	The State of NSW	Gilgandra	Construction activities	1.19	19%	Pre-existing land use
n/a	RD24/529484	4.54	The State of NSW	Gilgandra	Construction activities	0.83	18%	Pre-existing land use
n/a	RD25/529484	0.49	The State of NSW	Gilgandra	Construction activities	0.05	10%	Pre-existing land use
n/a	WR01/1019983	3.28	The State of NSW	Gilgandra	Construction activities	0.03	1%	Pre-existing land use
n/a	WR01/657741	7.64	The State of NSW	Gilgandra	Construction activities	1.53	20%	Pre-existing land use
n/a	WR01/657745	18.87	The State of NSW	Gilgandra	Construction activities	0.16	1%	Pre-existing land use
n/a	WR01/752563	10.99	The State of NSW	Gilgandra	Construction activities	0.04	<1%	Pre-existing land use
n/a	WR02/1230894	6.86	The State of NSW	Gilgandra	Construction activities	0.10	1%	Pre-existing land use
n/a	WR05/753377	5.66	The State of NSW	Gilgandra	Construction activities	0.11	2%	Pre-existing land use
Gilgandra Shire Council - totals		**30,765.8**				**499.3**		
Narrabri Shire Council								
2653738	19/856826	944.30	Private	Narrabri	Construction activities	28.75	3%	Pre-existing land use
2654381	12/757084	447.35	Private	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
2654389	161/802977	446.55	Private	Narrabri	Construction activities	3.20	1%	Pre-existing land use
2654392	5/790376	1.24	Private	Narrabri	Construction activities	0.75	61%	Pre-existing land use
2654804	192/757093	16.64	Private	Narrabri	Construction activities	0.02	<1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
2654839	2/506645	102.24	Private	Narrabri	Construction activities	96.47	94%	Pre-existing land use
2654839	2/506645	102.24	Private	Narrabri	Construction activities	0.71	1%	Pre-existing land use
2654920	4/757097	164.25	Private	Narrabri	Construction activities	1.01	1%	Pre-existing land use
2654927	62/804736	177.70	Private	Narrabri	Construction activities	0.65	<1%	Pre-existing land use
2654928	63/804736	131.81	Private	Narrabri	Construction activities	0.68	1%	Pre-existing land use
2655534	7/754944	24.48	Private	Narrabri	Construction activities	0.29	1%	Pre-existing land use
2655568	1/261297	4.22	Narrabri Shire Council	Narrabri	Construction activities	0.93	22%	Pre-existing land use
2655596	1/718736	14.20	Private	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
2655604	1/566857	69.30	Private	Narrabri	Construction activities	0.79	1%	Pre-existing land use
2655606	2/586990	102.60	Private	Narrabri	Construction activities	0.10	<1%	Pre-existing land use
2655693	1/976718	59.16	Private	Narrabri	Construction activities	0.57	1%	Pre-existing land use
2658603	10/757093	4.04	Private	Narrabri	Construction activities	0.04	1%	Pre-existing land use
2658604	12/757093	3.92	Private	Narrabri	Construction activities	0.26	7%	Pre-existing land use
2658605	3/757093	3.35	Private	Narrabri	Construction activities	0.05	2%	Pre-existing land use
2658606	148/757093	3.86	Private	Narrabri	Construction activities	3.71	96%	Pre-existing land use
2658606	147/757093	4.79	Private	Narrabri	Construction activities	4.17	87%	Pre-existing land use
2658606	119/757093	3.93	Private	Narrabri	Construction activities	0.88	22%	Pre-existing land use
2658606	120/757093	3.93	Private	Narrabri	Construction activities	0.38	10%	Pre-existing land use
2658606	121/757093	3.93	Private	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
2658607	1221/867059	1.98	Private	Narrabri	Construction activities	0.01	1%	Pre-existing land use
2658610	3/1012567	2.94	Private	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
2659783	5821/844304	10.01	The State of NSW	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
2660111	1021/849024	0.71	Private	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
2660113	1/843	0.20	Private	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
2660120	17/821	0.47	Private	Narrabri	Construction activities	0.06	12%	Pre-existing land use
2660120	16/821	0.45	Private	Narrabri	Construction activities	0.06	12%	Pre-existing land use
2660120	21/821	0.55	Private	Narrabri	Construction activities	0.12	22%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
2660120	20/821	0.54	Private	Narrabri	Construction activities	0.04	8%	Pre-existing land use
2660120	19/821	0.52	Private	Narrabri	Construction activities	0.05	10%	Pre-existing land use
2660120	18/821	0.50	Private	Narrabri	Construction activities	0.06	11%	Pre-existing land use
2660120	22/821	0.55	Private	Narrabri	Construction activities	0.12	22%	Pre-existing land use
2660120	13/821	0.20	Private	Narrabri	Construction activities	0.03	16%	Pre-existing land use
2660120	12/821	0.41	Private	Narrabri	Construction activities	0.07	17%	Pre-existing land use
2660120	15/821	0.43	Private	Narrabri	Construction activities	0.06	13%	Pre-existing land use
2660120	14/821	1.14	Private	Narrabri	Construction activities	0.16	14%	Pre-existing land use
2660120	11/821	0.20	Private	Narrabri	Construction activities	0.03	18%	Pre-existing land use
2660121	10/821	0.18	Narrabri Shire Council	Narrabri	Construction activities	0.03	19%	Pre-existing land use
2843288	1041/1024663	32.01	Private	Narrabri	Construction activities	1.49	5%	Pre-existing land use
2859969	1392/1029895	17.26	Private	Narrabri	Construction activities	1.06	6%	Pre-existing land use
2908271	2/538783	31.05	Private	Narrabri	Construction activities	0.29	1%	Pre-existing land use
2955424	22/1034651	100.08	Private	Narrabri	Construction activities	2.57	3%	Pre-existing land use
2964627	14/757083	329.98	Private	Narrabri	Construction activities	1.32	<1%	Pre-existing land use
3072231	2/1065237	121.36	Private	Narrabri	Construction activities	1.76	1%	Pre-existing land use
3262830	11/1086653	102.68	Private	Narrabri	Construction activities	13.74	13%	Pre-existing land use
3333178	7001/1032496	61.52	The State of NSW	Narrabri	Construction activities	0.31	1%	Pre-existing land use
3333180	7003/1032496	15.93	The State of NSW	Narrabri	Construction activities	2.39	15%	Pre-existing land use
3344962	7002/1118445	170.89	The State of NSW	Narrabri	Construction activities	9.84	6%	Pre-existing land use
3344964	7004/1118445	3.52	The State of NSW	Narrabri	Construction activities	0.19	5%	Pre-existing land use
3348935	18/113371	2.54	Private	Narrabri	Construction activities	0.01	<1%	Pre-existing land use
3348935	701/866192	39.80	Private	Narrabri	Construction activities	0.52	1%	Pre-existing land use
3367644	7001/1068410	12.98	The State of NSW	Narrabri	Construction activities	0.25	2%	Pre-existing land use
3393127	4/790376	100.12	Private	Narrabri	Construction activities	2.02	2%	Pre-existing land use
3393127	3/790376	100.11	Private	Narrabri	Construction activities	2.64	3%	Pre-existing land use
3393127	102/1150105	100.06	Private	Narrabri	Construction activities	13.23	13%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
3393127	101/1150105	134.81	Private	Narrabri	Construction activities	3.80	3%	Pre-existing land use
3600727	1102/1169062	78.17	Country Rail Infrastructure Authority	Narrabri	Construction activities	3.21	4%	Pre-existing land use
3654564	21/750274	627.94	The State of NSW	Narrabri	Construction activities	2.01	<1%	Pre-existing land use
3654564	22/750274	647.63	The State of NSW	Narrabri	Construction activities	6.10	1%	Pre-existing land use
3654564	23/750274	628.33	The State of NSW	Narrabri	Construction activities	3.33	1%	Pre-existing land use
3654564	2/750266	767.41	The State of NSW	Narrabri	Construction activities	0.84	<1%	Pre-existing land use
3656210	1/771141	246.52	Private	Narrabri	Construction activities	0.86	<1%	Pre-existing land use
3669573	1/750266	688.34	The State of NSW	Narrabri	Construction activities	5.55	1%	Pre-existing land use
3669604	24/750304	486.11	The State of NSW	Narrabri	Construction activities	2.81	1%	Pre-existing land use
3669604	23/750304	485.89	The State of NSW	Narrabri	Construction activities	3.81	1%	Pre-existing land use
3683918	4/750259	762.86	The State of NSW	Narrabri	Construction activities	15.19	2%	Pre-existing land use
3695527	2/1154624	1.80	Private	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
3695528	6/1154624	0.23	Private	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
3704459	1044/1182307	85.57	Private	Narrabri	Construction activities	1.30	2%	Pre-existing land use
3785536	21/1034651	143.98	Private	Narrabri	Construction activities	0.12	<1%	Pre-existing land use
3785536	111/1191019	2.23	Private	Narrabri	Construction activities	0.62	28%	Pre-existing land use
3827041	7324/1145227	12.25	The State of NSW	Narrabri	Construction activities	3.90	32%	Pre-existing land use
3862622	4/1195493	0.72	The State of NSW	Narrabri	Construction activities	0.41	58%	Pre-existing land use
3862623	5/1195493	0.08	The State of NSW	Narrabri	Construction activities	0.08	100%	Pre-existing land use
3862624	6/1195493	3.48	The State of NSW	Narrabri	Construction activities	0.93	27%	Pre-existing land use
3862625	7/1195493	5.29	The State of NSW	Narrabri	Construction activities	0.38	7%	Pre-existing land use
3862626	8/1195493	18.80	The State of NSW	Narrabri	Construction activities	9.96	53%	Pre-existing land use
3880071	223/811798	91.69	Private	Narrabri	Construction activities	1.94	2%	Pre-existing land use
3880071	21/113371	0.16	Private	Narrabri	Construction activities	0.04	27%	Pre-existing land use
3880074	4/526448	0.06	Private	Narrabri	Construction activities	0.01	17%	Pre-existing land use
3880074	3/526448	6.77	Private	Narrabri	Construction activities	0.08	1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
3905397	11/1018627	6.14	Private	Narrabri	Construction activities	0.57	9%	Pre-existing land use
3905397	702/866192	0.31	Private	Narrabri	Construction activities	0.02	7%	Pre-existing land use
3905397	6/1204378	16.78	Private	Narrabri	Construction activities	0.34	2%	Pre-existing land use
3905397	2/1195493	2.16	Private	Narrabri	Construction activities	0.67	31%	Pre-existing land use
3905397	3/1195493	0.76	Private	Narrabri	Construction activities	0.50	66%	Pre-existing land use
3905397	1/1195493	0.15	Private	Narrabri	Construction activities	0.08	52%	Pre-existing land use
3924439	3/113372	2.81	Private	Narrabri	Construction activities	0.11	4%	Pre-existing land use
3924439	266/754944	123.56	Private	Narrabri	Construction activities	2.86	2%	Pre-existing land use
3924439	1/362939	1.64	Private	Narrabri	Construction activities	0.28	17%	Pre-existing land use
3924439	1/132397	99.27	Private	Narrabri	Construction activities	2.20	2%	Pre-existing land use
3924667	7001/1122341	70.57	The State of NSW	Narrabri	Construction activities	0.10	<1%	Pre-existing land use
4011502	13/1209149	2196.10	The State of NSW	Narrabri	Construction activities	0.01	<1%	Pre-existing land use
4058747	3/1222972	32.76	Private	Narrabri	Construction activities	1.55	5%	Pre-existing land use
4058750	2/1222972	4.78	Private	Narrabri	Construction activities	3.21	67%	Pre-existing land use
4124909	32/1184780	0.12	Private	Narrabri	Construction activities	0.03	28%	Pre-existing land use
4124912	31/1184780	6.29	Private	Narrabri	Construction activities	0.03	1%	Pre-existing land use
4217680	7313/1147165	20.64	The State of NSW	Narrabri	Construction activities	1.65	8%	Pre-existing land use
4273010	13/1261444	3.02	Private	Narrabri	Construction activities	0.02	1%	Pre-existing land use
4288191	9/757083	284.22	Private	Narrabri	Construction activities	0.15	<1%	Pre-existing land use
4288191	6/757083	59.37	Private	Narrabri	Construction activities	16.56	28%	Pre-existing land use
4288191	5/757083	19.51	Private	Narrabri	Construction activities	4.15	21%	Pre-existing land use
4288191	45/757093	59.21	Private	Narrabri	Construction activities	0.46	1%	Pre-existing land use
4288193	1/757086	40.75	Private	Narrabri	Construction activities	1.34	3%	Pre-existing land use
4288193	112/1191019	20.71	Private	Narrabri	Construction activities	1.38	7%	Pre-existing land use
n/a	RD01//29319-1603	175.10	The State of NSW	Narrabri	Construction activities	5.35	3%	Pre-existing land use
n/a	RD02//14562-1603	5.87	The State of NSW	Narrabri	Construction activities	0.03	<1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
n/a	RD01/1120041	5.55	The State of NSW	Narrabri	Construction activities	0.01	<1%	Pre-existing land use
n/a	RD01/1154624	0.54	The State of NSW	Narrabri	Construction activities	0.54	100%	Pre-existing land use
n/a	RD01/1195493	0.12	The State of NSW	Narrabri	Construction activities	0.09	79%	Pre-existing land use
n/a	RD01/1204378	1.51	The State of NSW	Narrabri	Construction activities	0.62	41%	Pre-existing land use
n/a	RD01/1222972	0.66	The State of NSW	Narrabri	Construction activities	0.46	70%	Pre-existing land use
n/a	RD01/132397	6.59	The State of NSW	Narrabri	Construction activities	0.54	8%	Pre-existing land use
n/a	RD01/718736	4.38	The State of NSW	Narrabri	Construction activities	0.08	2%	Pre-existing land use
n/a	RD01/750266	3.25	The State of NSW	Narrabri	Construction activities	0.08	3%	Pre-existing land use
n/a	RD01/757093	2.85	The State of NSW	Narrabri	Construction activities	2.25	79%	Pre-existing land use
n/a	RD01/757093	0.60	The State of NSW	Narrabri	Construction activities	0.01	2%	Pre-existing land use
n/a	RD01/757093	1.73	The State of NSW	Narrabri	Construction activities	0.17	10%	Pre-existing land use
n/a	RD01/790376	10.46	The State of NSW	Narrabri	Construction activities	0.60	6%	Pre-existing land use
n/a	RD01/846935	1.01	The State of NSW	Narrabri	Construction activities	0.04	4%	Pre-existing land use
n/a	RD01/874361	7.76	The State of NSW	Narrabri	Construction activities	0.50	6%	Pre-existing land use
n/a	RD02/1213601	2.76	The State of NSW	Narrabri	Construction activities	0.36	13%	Pre-existing land use
n/a	RD02/750266	9.07	The State of NSW	Narrabri	Construction activities	0.05	<1%	Pre-existing land use
n/a	RD03/1036154	0.02	The State of NSW	Narrabri	Construction activities	<0.01	<1%	Pre-existing land use
n/a	RD03/1222972	0.02	The State of NSW	Narrabri	Construction activities	0.02	64%	Pre-existing land use
n/a	RD03/750274	11.27	The State of NSW	Narrabri	Construction activities	0.26	2%	Pre-existing land use
n/a	RD04/790376	0.03	The State of NSW	Narrabri	Construction activities	0.03	100%	Pre-existing land use
n/a	RD05/790376	3.00	The State of NSW	Narrabri	Construction activities	0.05	2%	Pre-existing land use
n/a	WR01/1029959	15.55	The State of NSW	Narrabri	Construction activities	0.06	<1%	Pre-existing land use
n/a	WR01/1118445	166.64	The State of NSW	Narrabri	Construction activities	0.60	<1%	Pre-existing land use
n/a	WR01/976718	24.59	The State of NSW	Narrabri	Construction activities	0.10	<1%	Pre-existing land use
n/a	n/a	132139.34	The State of NSW	Narrabri	Construction activities	169.74	<1%	Pre-existing land use
n/a	n/a	0.94	The State of NSW	Narrabri	Construction activities	0.04	4%	Pre-existing land use
n/a	110/1191019	13.35	The State of NSW	Narrabri	Construction activities	0.57	4%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
Narrabri Shire Council - totals		**145,817.2**				**487.8**		
Narromine Shire Council								
2672826	2/542487	675.16	Private	Narromine	Construction activities	3.06	<1%	Pre-existing land use
2672829	24/752566	1101.06	Private	Narromine	Construction activities	2.40	<1%	Pre-existing land use
2672833	42/752566	554.00	Private	Narromine	Construction activities	3.79	1%	Pre-existing land use
2672966	91/586202	722.99	Private	Narromine	Construction activities	21.66	3%	Pre-existing land use
2672968	281/836737	769.75	Private	Narromine	Construction activities	0.41	<1%	Pre-existing land use
2672970	27/752577	825.82	Private	Narromine	Construction activities	2.81	<1%	Pre-existing land use
2672970	42/752577	303.43	Private	Narromine	Construction activities	2.53	1%	Pre-existing land use
2673008	6/752581	87.98	Private	Narromine	Construction activities	3.69	4%	Pre-existing land use
2673008	41/752581	82.77	Private	Narromine	Construction activities	0.26	<1%	Pre-existing land use
2673008	46/752581	80.82	Private	Narromine	Construction activities	1.02	1%	Pre-existing land use
2673021	57/752581	76.18	Private	Narromine	Construction activities	0.98	1%	Pre-existing land use
2673051	12/747703	102.43	Private	Narromine	Construction activities	0.02	<1%	Pre-existing land use
2674114	1/715156	4.27	Private	Narromine	Construction activities	<0.01	<1%	Pre-existing land use
2674202	1921/777518	318.08	Private	Narromine	Construction activities	1.52	<1%	Pre-existing land use
2674203	1922/777518	438.10	Private	Narromine	Construction activities	1.94	<1%	Pre-existing land use
2674218	214/755131	64.38	Private	Narromine	Construction activities	18.16	28%	Pre-existing land use
2674232	1/819468	2.64	Private	Narromine	Construction activities	0.67	25%	Pre-existing land use
2674257	52/710059	103.45	Private	Narromine	Construction activities	0.06	<1%	Pre-existing land use
2674287	15/752600	304.33	Private	Narromine	Construction activities	1.03	<1%	Pre-existing land use
2675022	18/261903	10.00	Private	Narromine	Construction activities	1.00	10%	Pre-existing land use
2675023	191/850169	11.04	Private	Narromine	Construction activities	1.01	9%	Pre-existing land use
2790053	312/1025108	25.31	Private	Narromine	Construction activities	0.95	4%	Pre-existing land use
3001710	4001/1168182	169.82	Private	Narromine	Construction activities	17.90	11%	Pre-existing land use
3056653	48/752581	152.01	Private	Narromine	Construction activities	10.82	7%	Pre-existing land use
3056653	43/752581	75.83	Private	Narromine	Construction activities	1.09	1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
3090650	511/1061120	123.96	Private	Narromine	Construction activities	1.31	1%	Pre-existing land use
3173761	1/1063245	5.01	Private	Narromine	Construction activities	0.95	19%	Pre-existing land use
3173761	22/1077442	38.50	Private	Narromine	Construction activities	1.87	5%	Pre-existing land use
3173762	21/1077442	429.57	Private	Narromine	Construction activities	3.56	1%	Pre-existing land use
3199026	223/1081087	89.01	Private	Narromine	Construction activities	2.08	2%	Pre-existing land use
3278679	2222/1101864	8.96	Private	Narromine	Construction activities	2.47	28%	Pre-existing land use
3418081	8/755121	207.34	Private	Narromine	Construction activities	18.49	9%	Pre-existing land use
3418082	51/233201	406.22	Private	Narromine	Construction activities	5.10	1%	Pre-existing land use
3418082	52/233201	206.07	Private	Narromine	Construction activities	0.01	<1%	Pre-existing land use
3418725	1/121096	508.13	Private	Narromine	Construction activities	0.37	<1%	Pre-existing land use
3424748	113/819704	3.25	State Rail Authority of NSW	Narromine	Construction activities	0.90	28%	Pre-existing land use
3448629	7005/1020143	117.91	The State of NSW	Narromine	Construction activities	5.95	5%	Pre-existing land use
3448975	7002/1032703	5.91	The State of NSW	Narromine	Construction activities	0.30	5%	Pre-existing land use
3530213	33/752600	373.33	Private	Narromine	Construction activities	5.28	1%	Pre-existing land use
3625826	55/752581	180.40	Private	Narromine	Construction activities	0.15	<1%	Pre-existing land use
3685154	1/1180438	11.52	Transport for NSW	Narromine	Construction activities	3.68	32%	Pre-existing land use
3688385	20/755119	24.38	Private	Narromine	Construction activities	1.17	5%	Pre-existing land use
3705677	37/752577	101.16	Private	Narromine	Construction activities	0.70	1%	Pre-existing land use
3773065	282/1194700	525.70	Private	Narromine	Construction activities	0.08	<1%	Pre-existing land use
3773066	33/752577	208.46	Private	Narromine	Construction activities	11.02	5%	Pre-existing land use
3773066	283/1194700	518.91	Private	Narromine	Construction activities	2.64	1%	Pre-existing land use
3800251	233/755131	250.21	Private	Narromine	Construction activities	5.57	2%	Pre-existing land use
3800251	232/755131	250.24	Private	Narromine	Construction activities	23.71	9%	Pre-existing land use
3800251	16/755131	255.20	Private	Narromine	Construction activities	35.13	14%	Pre-existing land use
3800251	17/755131	270.17	Private	Narromine	Construction activities	82.97	31%	Pre-existing land use
3800251	1/1198931	8.26	Private	Narromine	Construction activities	1.48	18%	Pre-existing land use
3852790	4118/1208595	17.49	Transport for NSW	Narromine	Construction activities	5.88	34%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
3915793	235/755131	464.80	Private	Narromine	Construction activities	5.51	1%	Pre-existing land use
3915793	1/1181773	6.28	Private	Narromine	Construction activities	0.02	<1%	Pre-existing land use
3915794	240/755131	25.18	Private	Narromine	Construction activities	0.64	3%	Pre-existing land use
3915794	239/755131	23.60	Private	Narromine	Construction activities	1.27	5%	Pre-existing land use
3921283	1/209376	299.01	Private	Narromine	Construction activities	1.23	<1%	Pre-existing land use
3930053	234/755131	455.52	Private	Narromine	Construction activities	5.49	1%	Pre-existing land use
3930053	102/792484	563.41	Private	Narromine	Construction activities	2.74	<1%	Pre-existing land use
3943981	31/752581	39.79	Private	Narromine	Construction activities	3.74	9%	Pre-existing land use
3943981	7/752581	182.30	Private	Narromine	Construction activities	24.85	14%	Pre-existing land use
3958065	52/661453	124.60	Private	Narromine	Construction activities	4.56	4%	Pre-existing land use
3958065	A/376726	37.17	Private	Narromine	Construction activities	1.09	3%	Pre-existing land use
3958065	1/1220867	2.19	Private	Narromine	Construction activities	0.02	1%	Pre-existing land use
3974702	2/1221388	2.39	Private	Narromine	Construction activities	0.11	5%	Pre-existing land use
3993326	4/808866	155.61	Private	Narromine	Construction activities	12.85	8%	Pre-existing land use
4054162	203/1104792	389.67	Private	Narromine	Construction activities	0.74	<1%	Pre-existing land use
4054162	202/1104792	518.94	Private	Narromine	Construction activities	3.88	1%	Pre-existing land use
4132581	2221/1101864	59.72	Private	Narromine	Construction activities	0.39	1%	Pre-existing land use
4199207	1/651374	8.17	Private	Narromine	Construction activities	0.37	4%	Pre-existing land use
4199207	70/1251856	492.04	Private	Narromine	Construction activities	1.33	<1%	Pre-existing land use
4199207	451/1251855	106.99	Private	Narromine	Construction activities	3.91	4%	Pre-existing land use
n/a	RD01//29802-1603	7.24	The State of NSW	Narromine	Construction activities	0.41	6%	Pre-existing land use
n/a	RD01//3344-1603	27.31	The State of NSW	Narromine	Construction activities	2.03	7%	Pre-existing land use
n/a	RD01//3906-1603	10.47	The State of NSW	Narromine	Construction activities	1.60	15%	Pre-existing land use
n/a	RAIL/755131	20.87	The State of NSW	Narromine	Construction activities	0.63	3%	Pre-existing land use
n/a	RD01/1025108	5.51	The State of NSW	Narromine	Construction activities	0.23	4%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
n/a	RD01/1061120	4.91	The State of NSW	Narromine	Construction activities	1.17	24%	Pre-existing land use
n/a	RD01/1168182	2.75	The State of NSW	Narromine	Construction activities	1.16	42%	Pre-existing land use
n/a	RD01/1251855	6.66	The State of NSW	Narromine	Construction activities	0.02	<1%	Pre-existing land use
n/a	RD01/209376	15.96	The State of NSW	Narromine	Construction activities	0.18	1%	Pre-existing land use
n/a	RD01/233201	12.68	The State of NSW	Narromine	Construction activities	2.11	17%	Pre-existing land use
n/a	RD01/261903	11.31	The State of NSW	Narromine	Construction activities	0.08	1%	Pre-existing land use
n/a	RD01/376726	1.48	The State of NSW	Narromine	Construction activities	0.30	20%	Pre-existing land use
n/a	RD01/542487	12.71	The State of NSW	Narromine	Construction activities	0.27	2%	Pre-existing land use
n/a	RD01/586202	13.70	The State of NSW	Narromine	Construction activities	0.60	4%	Pre-existing land use
n/a	RD01/752577	0.08	The State of NSW	Narromine	Construction activities	0.01	13%	Pre-existing land use
n/a	RD01/752577	28.80	The State of NSW	Narromine	Construction activities	0.23	1%	Pre-existing land use
n/a	RD01/752581	3.34	The State of NSW	Narromine	Construction activities	0.06	2%	Pre-existing land use
n/a	RD01/755131	11.68	The State of NSW	Narromine	Construction activities	0.10	1%	Pre-existing land use
n/a	RD01/755131	15.40	The State of NSW	Narromine	Construction activities	1.43	9%	Pre-existing land use
n/a	RD01/777518	11.33	The State of NSW	Narromine	Construction activities	0.11	1%	Pre-existing land use
n/a	RD01/808866	6.00	The State of NSW	Narromine	Construction activities	0.04	1%	Pre-existing land use
n/a	RD02/1077442	8.55	The State of NSW	Narromine	Construction activities	0.22	3%	Pre-existing land use
n/a	RD02/1104792	5.82	The State of NSW	Narromine	Construction activities	0.39	7%	Pre-existing land use
n/a	RD02/1168182	2.54	The State of NSW	Narromine	Construction activities	0.36	14%	Pre-existing land use
n/a	RD02/1251855	3.38	The State of NSW	Narromine	Construction activities	0.45	13%	Pre-existing land use
n/a	RD02/44869	0.50	The State of NSW	Narromine	Construction activities	0.10	21%	Pre-existing land use
n/a	RD02/661453	2.57	The State of NSW	Narromine	Construction activities	1.86	72%	Pre-existing land use
n/a	RD02/752577	5.12	The State of NSW	Narromine	Construction activities	2.17	42%	Pre-existing land use
n/a	RD02/752577	20.40	The State of NSW	Narromine	Construction activities	2.10	10%	Pre-existing land use
n/a	RD02/752577	7.14	The State of NSW	Narromine	Construction activities	0.61	8%	Pre-existing land use
n/a	RD02/808866	4.36	The State of NSW	Narromine	Construction activities	0.02	<1%	Pre-existing land use
n/a	RD03/1104792	0.54	The State of NSW	Narromine	Construction activities	0.03	6%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
n/a	RD03/1168182	9.90	The State of NSW	Narromine	Construction activities	0.30	3%	Pre-existing land use
n/a	RD03/233201	2.99	The State of NSW	Narromine	Construction activities	0.41	14%	Pre-existing land use
n/a	RD03/755119	2.75	The State of NSW	Narromine	Construction activities	0.07	3%	Pre-existing land use
n/a	RD03/755131	20.28	The State of NSW	Narromine	Construction activities	0.28	1%	Pre-existing land use
n/a	RD03/808866	1.21	The State of NSW	Narromine	Construction activities	0.02	2%	Pre-existing land use
n/a	RD04/1104792	3.72	The State of NSW	Narromine	Construction activities	0.31	8%	Pre-existing land use
n/a	RD04/1168182	0.99	The State of NSW	Narromine	Construction activities	0.02	2%	Pre-existing land use
n/a	RD05/542487	26.34	The State of NSW	Narromine	Construction activities	2.09	8%	Pre-existing land use
n/a	WR01/1020143	73.48	The State of NSW	Narromine	Construction activities	0.36	<1%	Pre-existing land use
n/a	2965 - 1603 R	12.38	The State of NSW	Narromine	Construction activities	0.04	<1%	Pre-existing land use
n/a	16/755121	756.27	Private	Narromine	Construction activities	13.47	2%	Pre-existing land use
Narromine Shire Council - totals		**17,365.8**				**434.7**		
Warrumbungle Shire Council								
2628589	37/750246	48.80	The State of NSW	Warrumbungle	Construction activities	6.77	14%	Pre-existing land use
2629047	31/721224	65.64	Private	Warrumbungle	Construction activities	0.63	1%	Pre-existing land use
2629047	32/721224	255.93	Private	Warrumbungle	Construction activities	8.89	3%	Pre-existing land use
2629054	86/750247	231.00	Private	Warrumbungle	Construction activities	0.70	<1%	Pre-existing land use
2629054	2/256036	2.68	Private	Warrumbungle	Construction activities	0.01	<1%	Pre-existing land use
2629054	1/219602	304.93	Private	Warrumbungle	Construction activities	2.45	1%	Pre-existing land use
2629078	25/750248	833.62	Australian Rail Track Corporation	Warrumbungle	Construction activities	4.37	1%	Pre-existing land use
2629085	2/219602	245.25	Private	Warrumbungle	Construction activities	1.82	1%	Pre-existing land use
2629089	60/750248	351.10	Australian Rail Track Corporation	Warrumbungle	Construction activities	6.75	2%	Pre-existing land use
2629089	54/750248	52.56	Australian Rail Track Corporation	Warrumbungle	Construction activities	1.10	2%	Pre-existing land use
2629090	57/750248	518.49	Private	Warrumbungle	Construction activities	10.25	2%	Pre-existing land use

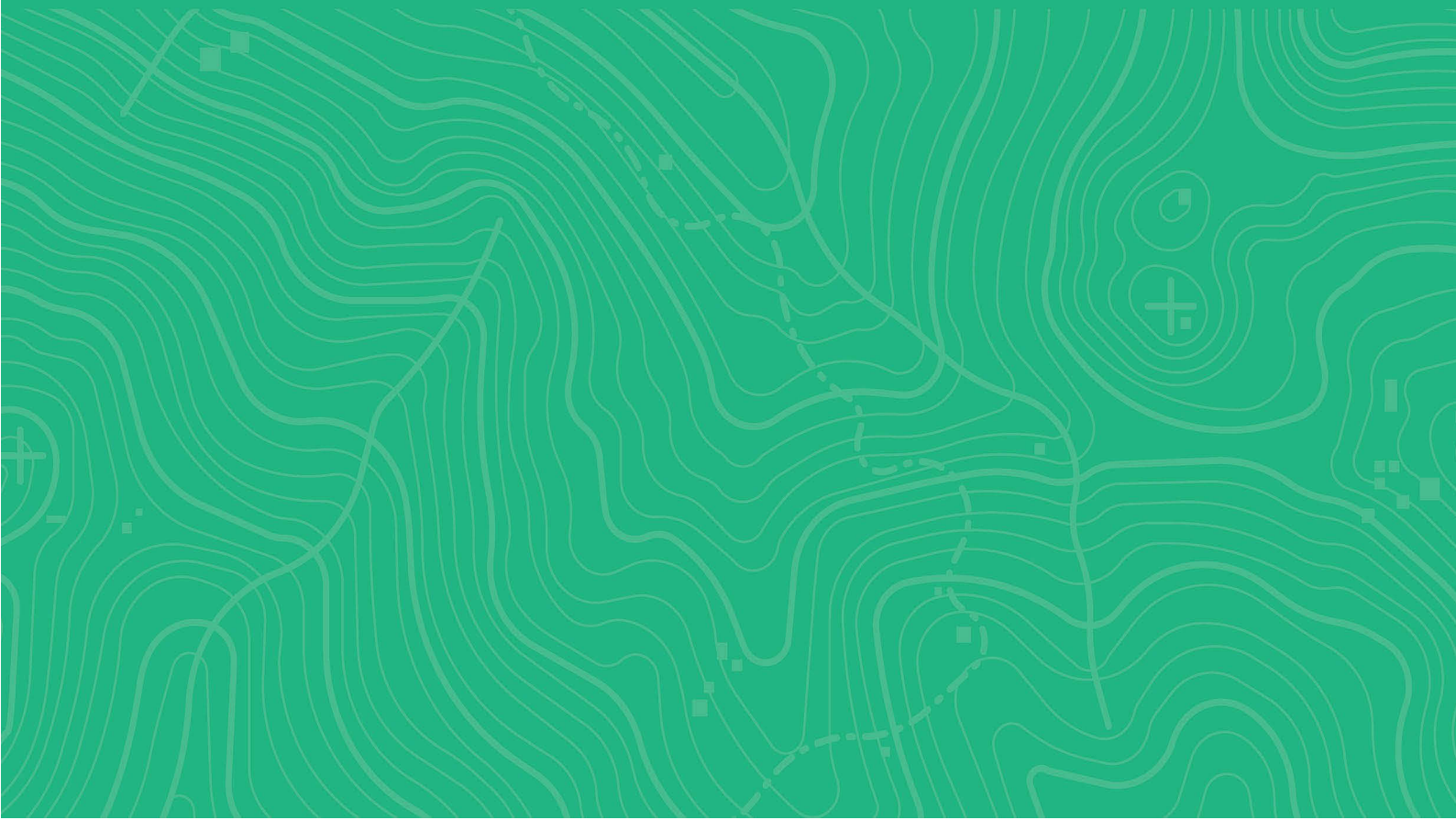
Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
2629093	64/750248	536.78	Private	Warrumbungle	Construction activities	8.99	2%	Pre-existing land use
2629703	16/750304	332.59	Private	Warrumbungle	Construction activities	0.01	<1%	Pre-existing land use
2631570	6/750284	508.13	Private	Warrumbungle	Construction activities	1.37	<1%	Pre-existing land use
2631795	34/750304	272.26	Private	Warrumbungle	Construction activities	16.25	6%	Pre-existing land use
2631795	31/750304	662.84	Private	Warrumbungle	Construction activities	2.73	<1%	Pre-existing land use
2840406	261/1025193	502.93	Private	Warrumbungle	Construction activities	2.46	<1%	Pre-existing land use
2888006	26/721224	727.23	Private	Warrumbungle	Construction activities	2.39	<1%	Pre-existing land use
3359536	56/750248	32.69	Australian Rail Track Corporation	Warrumbungle	Construction activities	0.08	<1%	Pre-existing land use
3359537	63/750248	540.25	Australian Rail Track Corporation	Warrumbungle	Construction activities	6.98	1%	Pre-existing land use
3411383	94/750247	31.50	Private	Warrumbungle	Construction activities	0.32	1%	Pre-existing land use
3411383	29/721224	339.69	Private	Warrumbungle	Construction activities	2.23	1%	Pre-existing land use
3647253	33/750304	203.75	The State of NSW	Warrumbungle	Construction activities	0.97	<1%	Pre-existing land use
3658865	22/750286	534.94	The State of NSW	Warrumbungle	Construction activities	2.78	1%	Pre-existing land use
3658865	23/750286	505.57	The State of NSW	Warrumbungle	Construction activities	9.79	2%	Pre-existing land use
3658865	24/750286	506.22	The State of NSW	Warrumbungle	Construction activities	0.56	<1%	Pre-existing land use
3658865	26/750286	485.99	The State of NSW	Warrumbungle	Construction activities	5.37	1%	Pre-existing land use
3680619	10/750284	144.94	The State of NSW	Warrumbungle	Construction activities	14.35	10%	Pre-existing land use
3681274	2739/1180978	33.54	Transport for NSW	Warrumbungle	Construction activities	0.27	1%	Pre-existing land use
3838830	47/1207500	3610.10	The State of NSW	Warrumbungle	Construction activities	5.54	<1%	Pre-existing land use
3847672	53/1208884	281.17	The State of NSW	Warrumbungle	Construction activities	2.28	1%	Pre-existing land use
4051938	13/750284	566.98	Private	Warrumbungle	Construction activities	1.50	<1%	Pre-existing land use
4051938	1/1231685	27.54	Private	Warrumbungle	Construction activities	1.56	6%	Pre-existing land use
4114991	14/750284	528.14	Private	Warrumbungle	Construction activities	3.42	1%	Pre-existing land use
n/a	RD01//2976-1603	117.74	The State of NSW	Warrumbungle	Construction activities	2.96	3%	Pre-existing land use
n/a	RD01/1025193	12.02	The State of NSW	Warrumbungle	Construction activities	0.05	<1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
n/a	RD01/1208884	0.89	The State of NSW	Warrumbungle	Construction activities	0.47	53%	Pre-existing land use
n/a	RD01/219602	4.87	The State of NSW	Warrumbungle	Construction activities	0.70	14%	Pre-existing land use
n/a	RD01/721224	8.77	The State of NSW	Warrumbungle	Construction activities	1.39	16%	Pre-existing land use
n/a	RD01/750247	9.46	The State of NSW	Warrumbungle	Construction activities	0.28	3%	Pre-existing land use
n/a	RD01/750247	4.43	The State of NSW	Warrumbungle	Construction activities	0.69	16%	Pre-existing land use
n/a	RD01/750248	26.88	The State of NSW	Warrumbungle	Construction activities	0.24	1%	Pre-existing land use
n/a	RD01/750284	6.07	The State of NSW	Warrumbungle	Construction activities	0.15	3%	Pre-existing land use
n/a	RD01/754252	0.17	The State of NSW	Warrumbungle	Construction activities	0.10	58%	Pre-existing land use
n/a	RD01/754252	6.13	The State of NSW	Warrumbungle	Construction activities	0.05	1%	Pre-existing land use
n/a	RD01/754252	7.15	The State of NSW	Warrumbungle	Construction activities	1.02	14%	Pre-existing land use
n/a	RD02/39583	14.49	The State of NSW	Warrumbungle	Construction activities	0.97	7%	Pre-existing land use
n/a	RD02/721224	4.68	The State of NSW	Warrumbungle	Construction activities	0.76	16%	Pre-existing land use
n/a	RD02/750247	8.82	The State of NSW	Warrumbungle	Construction activities	0.08	1%	Pre-existing land use
n/a	RD02/750248	15.49	The State of NSW	Warrumbungle	Construction activities	2.83	18%	Pre-existing land use
n/a	RD02/750284	2.87	The State of NSW	Warrumbungle	Construction activities	1.58	55%	Pre-existing land use
n/a	RD03/721224	1.69	The State of NSW	Warrumbungle	Construction activities	0.27	16%	Pre-existing land use
n/a	RD03/750248	0.24	The State of NSW	Warrumbungle	Construction activities	0.24	100%	Pre-existing land use
n/a	RD04/750248	0.81	The State of NSW	Warrumbungle	Construction activities	0.07	8%	Pre-existing land use
n/a	RD04/750284	4.22	The State of NSW	Warrumbungle	Construction activities	0.15	3%	Pre-existing land use
n/a	RD05/750246	0.16	The State of NSW	Warrumbungle	Construction activities	0.03	16%	Pre-existing land use
n/a	WR01/1025193	23.40	The State of NSW	Warrumbungle	Construction activities	0.20	1%	Pre-existing land use
n/a	WR01/721224	13.22	The State of NSW	Warrumbungle	Construction activities	0.32	2%	Pre-existing land use
n/a	WR01/750284	22.29	The State of NSW	Warrumbungle	Construction activities	0.54	2%	Pre-existing land use
n/a	WR01/750286	49.17	The State of NSW	Warrumbungle	Construction activities	0.18	<1%	Pre-existing land use
n/a	RD01/750286	6.80	The State of NSW	Warrumbungle	Construction activities	0.02	<1%	Pre-existing land use
n/a	RD01/750286	7.70	The State of NSW	Warrumbungle	Construction activities	0.01	<1%	Pre-existing land use
n/a	RD01/750304	7.56	The State of NSW	Warrumbungle	Construction activities	0.04	1%	Pre-existing land use

Existing property details					Land requirements for construction			
Property ID	**Lot details**	**Lot size (ha)**	**Landowner (private / public)**	**LGA**	**Proposed use during construction**	**Area required (ha)**	**% of lot required**	**Proposed future use**
n/a	RD01/750304	8.63	The State of NSW	Warrumbungle	Construction activities	0.04	1%	Pre-existing land use
n/a	RD02/750286	8.56	The State of NSW	Warrumbungle	Construction activities	0.10	1%	Pre-existing land use
Warrumbungle Shire Council - totals		**15,231.1**				**152.5**		

E

Drainage control areas—environmental constraints review



ARTC Inland Rail

Narromine to Narrabri (N2N)

Drainage Control Areas – Environmental Constraints Review

Revision 2

2-0001-250-EAP-00-RP-0019.doc

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1. Introduction

1.1 Overview

1.1.1 Inland Rail and the proposal

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

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

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

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

Australian Rail Track Corporation Ltd (ARTC) ('the proponent') has developed a program to deliver Inland Rail. ARTC was created after the Australian and state governments agreed in 1997 to the formation of a 'one stop shop' for all operators seeking access to the national interstate rail network.

Across its network, ARTC is responsible for:

- Selling access to train operators
- Developing new business
- Capital investment in the corridors
- Managing the network
- Infrastructure maintenance

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

The proponent is seeking approval to construct and operate the Narromine to Narrabri section of Inland Rail ('the proposal'). The proposal consists of about 306 kilometres of new single-track standard gauge railway with crossing loops. The proposal also includes changes to some roads to facilitate construction and operation of the new section of railway, and ancillary infrastructure to support the proposal.

The proposal would be constructed to accommodate double-stacked freight trains up to 1,800 metres long and 6.5 metres high. It would include infrastructure to accommodate possible future augmentation and upgrades of the track, including a possible future requirement for 3,600 metre long trains.

The land requirements for the proposal would include a new rail corridor with a minimum width of 40 metres, with some variation to accommodate particular infrastructure and to cater for local topography. The corridor would be of sufficient width to accommodate the infrastructure currently proposed for construction, as well as possible future expansion of crossing loops for 3,600 metre long trains. Clearing of the proposal site would occur to allow for construction and to maintain the safe operation of the railway.

1.1.2 Approval and assessment requirements

The proposal is critical State significant infrastructure and is subject to approval by the NSW Minister for Planning and Public Spaces under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposal is also determined to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and requires approval from the Australian Minister for the Environment.

An Environmental Impact Statement (EIS) was prepared to support ARTC's application for approval of the proposal in accordance with the requirements of Division 5.2 of the EP&A Act. The EIS addressed the environmental assessment requirements of the Secretary of the Department of Planning, Industry and Environment (DPIE) ('the SEARs'), dated 9 September 2020.

The EIS was placed on public exhibition by DPIE for a period of 62 days, commencing on 8 December 2020, and concluding on 7 February 2021. The EIS was also prepared to support ARTC's application for approval of the proposal under the EPBC Act.

ARTC are currently preparing a combined Preferred Infrastructure / Amendment Report (PIR/AR), Response to Submissions Report and updates to various technical reports that supported the EIS.

1.2 Flooding and hydrology assessment

The flooding and hydrology assessment report, which formed Technical Report 3 for the EIS, has been updated in consultation with DPIE, taking into account comments provided in submissions and the independent review undertaken on behalf of DPIE. ARTC have been consulting with DPIE regarding potential flooding impacts associated with the project following exhibition of the EIS. As part of this consultation, quantitative design limits (QDLs) have been defined against which the amended proposal is being assessed.

In order to provide sufficient space outside the rail corridor to undertake works (e.g. scour protection) to mitigate predicted velocity departures from the QDLs, ARTC are proposing to include drainage control areas in the operational footprint for the proposal.

A total of 200 drainage control areas are proposed (following this environmental constraints review) noting that a number of control areas cover multiple culverts. The standard control area size is:

- 50 metres wide downstream
- 15 metres wide upstream
- Variable length along the corridor to suit predicted velocity

Figure 1-1 shows a typical drainage control area.

Where a drainage control area is not provided at a culvert, it is expected that the flow velocities can be managed within the rail corridor.

The drainage control areas represent a conservative scenario in terms of additional land requirements. During detailed design these areas would be refined, with the aim of minimising property impacts as far as practicable, when further flood modelling is undertaken and the extent of works within each drainage control area is confirmed. The extent of works could include:

- No physical works, with erosion protection provided by either existing or planted vegetation
- Construction of drainage channels
- Construction of concrete aprons
- Installation of rock boulders (rip-rap)

The land required for each drainage control area would be finalised during detailed design in consultation with landowners as part of the property acquisition process.

For the purposes of the approval documentation, it is assumed that the entire drainage control area would be directly impacted.

1.3 Purpose of this report

This report has been prepared to document the environmental constraints review of the proposed drainage control areas and determine if the environmental impacts of the drainage control areas warrant changes to their location or scale.

NARROMINE TO NARRABRI Typical drainage control area Figure 1-1

0 0.2 0.4 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 2/02/2022 Paper: A4
Author: JacobsGHD Scale: 1:15,000
Data Sources: Basemap layers: NSWSS, esri;

LEGEND

- Alignment
- Drainage control area
- Rail corridor

INLAND RAIL ARTC

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

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2. Environmental screening

2.1 Approach

The addition of drainage control areas to assist with management of potential flooding impacts would require an increase to the construction and operational footprints.

Based on the predicted flood velocity departures from the flooding QDLs for velocity a number of drainage control areas were identified on the downstream and upstream sides of the proposed rail corridor.

An environmental screening assessment was then undertaken with reference to the EIS to identify key environmental issues that could result in consideration of a refinement of the drainage control areas in order to minimise impacts.

While any increase in the construction or operational footprint would result in increased impacts, only key issues were identified in this exercise as a balance between the need to provide drainage control areas to manage flood impacts relative to other increased environmental impacts.

Drainage control areas were individually reviewed to identify opportunities to avoid or reduce impacts to the key issues with consideration of potential engineering solutions during detailed design.

This report only provides commentary on these key issues. Assessment of the potential impacts associated with the drainage control areas is provided in the combined Preferred Infrastructure / Amendment Report and supporting technical reports.

2.2 Screening assessment

The environmental screening assessment and identification of key issues is detailed in Table 2-1.

Table 2-1 Environmental screening assessment

Aspect	Comparison to the EIS	Key issues (to trigger a review of the proposed drainage control areas)	Further assessment required?
Biodiversity	Changes to the construction and operational footprints mean that there would be changes to the vegetation and fauna habitats affected. Overall, the changes are relatively minor and represent a minor increase in biodiversity values that were already impacted.	With the opportunity for a reduction in the extent of drainage control areas during detailed design that would minimise impacts, the following key issues have been identified: • Clearing of threatened ecological communities (TEC) • Clearing of species and vegetation communities that are classified as serious and irreversible impact (SAII) entities under the *Biodiversity Conservation Act 2016*	Yes – refer to Section 3.1
Water resources	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No
Flooding	The proposed changes are being undertaken to manage predicted flooding impacts.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No
Soils and contamination	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No

Aspect	Comparison to the EIS	Key issues (to trigger a review of the proposed drainage control areas)	Further assessment required?
Water quality	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No
Aboriginal heritage	Changes to the construction and operational footprints mean that there would be potential changes to Aboriginal sites affected.	With the opportunity for a reduction in the extent of drainage control areas during detailed design that would minimise impacts, the following key issues have been identified: • Impacts to known Aboriginal heritage sites	Yes – refer to Section 3.2
Non-Aboriginal heritage	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No
Noise and vibration (construction)	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No

Aspect	Comparison to the EIS	Key issues (to trigger a review of the proposed drainage control areas)	Further assessment required?
Noise and vibration (operation)	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No
Air quality	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No
Traffic and transport	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No
Land use and property	Changes to the construction and operational footprints mean that there would be changes to the land uses and properties affected. Overall, the changes are relatively minor and represent a minor increase in land use and property that were already impacted.	With the opportunity for a reduction in the extent of drainage control areas during detailed design that would minimise impacts, the following key issues have been identified: • Impacts to landowners not previously impacted by the construction or operational footprints	Yes – refer to Section 3.3

Aspect	Comparison to the EIS	Key issues (to trigger a review of the proposed drainage control areas)	Further assessment required?
Visual amenity	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No
Socio-economic assessment	While there have been changes to the construction and operational footprints, these are only relatively minor, and the construction methodology and operation of the proposal have not changed. As such, impacts associated with the drainage control areas would generally be consistent with those assessed in the EIS.	No key issues that would trigger a review of the proposed drainage control areas have been identified.	No

3. Environmental constraints review

3.1 Biodiversity

3.1.1 Key issues

Based on the screening assessment (Table 2-1), the following key issues that would trigger a review of the proposed drainage control areas have been identified.

- Clearing of threatened ecological communities (TEC).
- Clearing of species and vegetation communities that are classified as serious and irreversible impact (SAII) entities under the *Biodiversity Conservation Act 2016*.

3.1.2 Review of key issues

A review of the key issues for biodiversity is summarised in Table 3-1, Table 3-2 and Table 3-3 along with the proposed changes and/or management actions.

Table 3-1 Biodiversity – threatened ecological communities

PCT	BC Act (PCT community name)	EPBC Act (TEC community name)	SAII?	Extent in proposal site (ha) EIS [1]	Additional extent in drainage control area (ha) Pre review of key issues [2]	Action
27	Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Weeping Myall Woodlands	N	3.05	0.95	Limited opportunity to reduce impacts until further detailed design and flood modelling undertaken. No change to drainage control area. In accordance with proposed mitigation measures, trees will be retained as far as practical (to assist in soil stabilisation).
35	Brigalow - Belah open forests / woodland on alluvial often gilgaied clay from Pilliga scrub to Gondiwindi, Brigalow Belt South bioregion	Brigalow (*Acacia harpophylla* dominant and co-dominant)	Y	0.61	0	n/a (no impact - subject to refined BDAR mapping).
202	Fuzzy Box woodland on colluvium and alluvial flats in the Brigalow Belt South and Nandewar bioregions (including Pilliga)	No	Y	3.59	0	n/a (no impact - subject to refined BDAR mapping).
81 and 248	Western Grey-Box – Cypress Pine grass shrub tall woodland in the Brigalow Belt South bioregion Mixed box eucalypt woodland on low sandy-loam rises on alluvial plains in central western NSW	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and derived native grasslands of South-eastern Australia	N	14.71	0.46	Minor impact on PCT 81. No change to drainage control area. In accordance with proposed mitigation measures, trees will be retained as far as practical (to assist in soil stabilisation).
56	No		N	31.94	3.02 (PCT 56)	Chainage 637 to 643.

PCT	BC Act (PCT community name)	EPBC Act (TEC community name)	SAII?	Extent in proposal site (ha) EIS [1]	Additional extent in drainage control area (ha) Pre review of key issues [2]	Action
244	No	Poplar Box grassy woodland on alluvial plains			1.38 (PCT 244)	Review drainage control areas to identify opportunities to minimise impacts (refer to Table 3-3).
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 Grassy Woodland and Derived Native Grassland	Y	8.32 (PCT 435 6.11 ha, PCT 599 2.21 ha)	0	n/a
599	Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South and Nandewar bioregions	White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Y		2.25	Chainage 558.75. Review drainage control area to identify opportunities to minimise impacts (refer to Table 3-3).

Notes:

1 Extent in proposal site (ha) EIS – the area that was directly impacted in the EIS proposal site.

2 Additional extent in drainage control area (ha) Pre review of key issues – the additional area within a drainage control area (relative to the EIS proposal site) prior to undertaking a review to identify potential reductions to minimise impacts.

Table 3-2 Biodiversity – SAII threatened flora

Species	BC Act status	EPBC Act status	SAII?	Extent in proposal site (ha) EIS [1]	Additional extent in drainage control area (ha) Pre review of key issues [2]	Action
Coolabah Bertya *Bertya opponens*	V	V	Y	5 previously recorded individuals (not located during surveys) (about chainage 830.5) About 80.3 ha of assumed habitat (PCT 148, 398 and 399) between chainage 807 and 819	Nil confirmed individuals About 7.6 ha of assumed habitat (PCT 148, 398 and 399) between chainage 807 and 819	Chainage 807 to 819. Noted existing proposed mitigation measure to conduct further surveys and identify appropriate mitigations with BCS if any individuals identified. Review drainage control areas to identify opportunities to minimise potential impacts (refer to Table 3-3).

Notes:

1 Extent in proposal site (ha) EIS – is the area that was directly impacted in the EIS proposal site.

2 Additional extent in drainage control area (ha) Pre review of key issues – is the additional area within a drainage control area (relative to the EIS proposal site) prior to undertaking a review to identify potential reductions to minimise impacts.

Table 3-3 Biodiversity – detailed drainage control area review

Chainage	Culvert number	Action	Outcome
558.75	250-Clvrt558539 250-Clvrt558586 250-Clvrt558694 250-Clvrt558754 250-Clvrt558802 250-Clvrt558879	Review drainage control area for potential reductions to TEC (PCT 599) impacts	Engineering solution possible during detailed design. Boundary of drainage control area adjusted to minimise biodiversity impacts
637.5	250-Clvrt637403	Review drainage control areas for potential reductions to TEC (PCT 56) impacts	No change – drainage control area required until detailed design and further flood modelling undertaken
638.5	250-Clvrt638350		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.
639.8	250-Clvrt639831		No change – drainage control area required until detailed design and further flood modelling undertaken
640.1	250-Clvrt640116		No change – drainage control area required until detailed design and further flood modelling undertaken
641.5	250-Clvrt641484		No change – drainage control area required until detailed design and further flood modelling undertaken
642	250-Clvrt641977		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.
643.1	250-Clvrt643100		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.
807	250-Clvrt807082	Review drainage control areas for potential reductions to Coolabah Bertya habitat impacts	No change – drainage control area required until detailed design and further flood modelling undertaken
807.1	250-Clvrt807151		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.
808.2	250-Clvrt808220		No change – drainage control area required until detailed design and further flood modelling undertaken

Chainage	Culvert number	Action	Outcome
808.3	250-Clvrt808364		No change – drainage control area required until detailed design and further flood modelling undertaken
808.8	250-Clvrt808806		No change – drainage control area required until detailed design and further flood modelling undertaken
808.95	250-Clvrt808953		No change – drainage control area required until detailed design and further flood modelling undertaken
808.99	250-Clvrt808996		No change – drainage control area required until detailed design and further flood modelling undertaken
809.05	250-Clvrt809053		No change – drainage control area required until detailed design and further flood modelling undertaken
811.13	250-Clvrt811135		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.
811.18	250-Clvrt811182		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.
811.277	250-Clvrt811277		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.
814.16	250-Clvrt814166		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.
814.2	250-Clvrt814201		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.
814.2	250-Clvrt814240		No change – drainage control area required until detailed design and further flood modelling undertaken
818.177	250-Clvrt818177		No change – drainage control area required until detailed design and further flood modelling undertaken
819.648	250-Clvrt819648		Extent of predicted exceedance is minor and engineering solution during detailed design will be possible. Drainage control area removed.

3.1.3 Outcome

The review of key issues for biodiversity identified the drainage control areas will result in a minor increase in impacts to threatened ecological communities and threatened SAII flora as summarised in Table 3-4. A number of drainage control areas were reduced in size or removed in order to minimise impacts, with an overall reduction of about three hectares in threatened ecological communities and Coolabah Bertya habitat (see Figure 3-1 for a typical outcome). An additional one hectare of other native vegetation was also avoided due to reductions in drainage control areas to minimise property impacts (see Section 3.3).

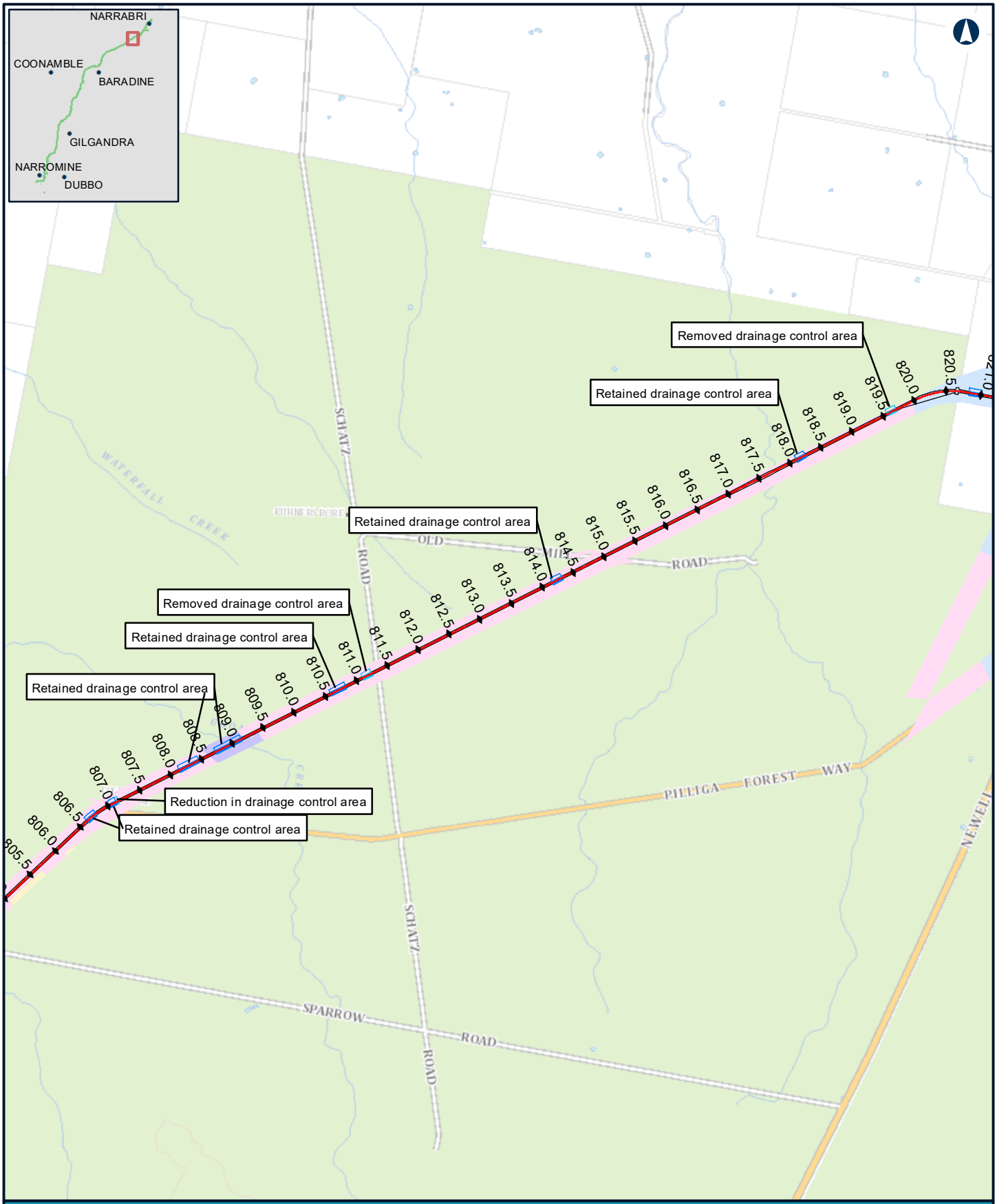
Table 3-4 Biodiversity – summary of impacts

Feature	EIS (ha)	Additional extent in drainage control areas (ha) Pre review of key issues	Additional extent in drainage control areas (ha) Post review of key issues
Threatened ecological communities	62	8.1	6.1
Coolabah Bertya (*Bertya opponens)* habitat	80.3	7.6	6.6

3.1.4 Mitigation

Further refinement would be undertaken to minimise impacts in accordance with proposed mitigation measures, in particular:

- BD1 and BD2 – isolated trees and vegetation patches (including TECs) would be retained where practical (noting that they would assist with soil stabilisation).
- BD3 - surveys would be undertaken for *Bertya opponens* prior to clearing.



NARROMINE TO NARRABRI Biodiversity outcome example Figure 3-1

0 1 2 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 13/01/2022 Paper: A4
Author: JacobsGHD Scale: 1:75,000
Data Sources: Extended veg - OEH; Basemap layers: NSWSS, esri;

LEGEND

- Alignment
- Drainage control area - current
- Drainage control area - initial
- Rail corridor

PCT mapping

- 404;Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests
- 399;Red gum - Rough-barked Apple +/- tea tree sandy creek woodland (wetland) in the Pilliga - Goonoo sandstone forests, Brigalow Belt South Bioregion
- 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
- 88;Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion

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3.2 Aboriginal heritage

3.2.1 Key issues

Based on the screening assessment (Table 2-1), the following key issues that would trigger a review of the proposed drainage control areas have been identified.

- Impacts to known Aboriginal heritage sites.

3.2.2 Review of key issues

A review of the key issues for Aboriginal heritage is summarised in Table 3-5 along with the proposed changes and/or management actions.

Table 3-5 Aboriginal heritage

Chainage	Feature	Outcome
628.11	New impact to a Modified Tree (Carved or Scarred) (AHIMS: 27-6-0042)	No change to drainage control area Commit to tree being retained (to assist in soil stabilisation). An engineering solution will be possible with no impact to the tree.
641.52	New impact to a Modified Tree (Carved or Scarred) (AHIMS: 28-4-0283)	No change to drainage control area Commit to tree being retained (to assist in soil stabilisation). An engineering solution will be possible with no impact to the tree.
714	Increased impact to a buffer area for a registered artefact scatter and potential archaeological deposit at Calga Creek (AHIMS: 28-1-0059)	No change to drainage control area The artefact scatter was already impacted by the EIS construction footprint and will be subject to further assessment and salvage. This will also apply to the extent of this site within the drainage control area if any material is identified to be present

3.2.3 Outcome

The review of key issues for Aboriginal heritage identified the drainage control areas will impact three known sites (see Figure 3-2 for a typical outcome). The review identified that there are no current opportunities or avoid or minimise impacts through a reduction in the drainage control area due to predicted velocity departures at these locations.

These sites will be managed in accordance with existing and updated mitigation measures and no changes to the drainage control areas are proposed.

3.2.4 Mitigation

During detailed design further refinement would be undertaken to minimise impacts in accordance with proposed mitigation measures, in particular:

- AH6 – will be updated to ensure additional scarred trees are retained as far as practical (noting that they would assist with soil stabilisation).
- AH7 – artefact scatter and potential archaeological deposit will be subject to further assessment and salvage.

NARROMINE TO NARRABRI Aboriginal heritage outcome example Figure 3-2

0 0.025 0.05 Km

Coordinate System: GDA 1994 MGA Zone 55

LEGEND

- Aboriginal heritage site
- Alignment
- Culvert drainage control area - current
- Rail corridor

Date: 13/01/2022 Paper: A4
Author: JacobsGHD Scale: 1:2,000
Data Sources: AHIMS: OEH; Basemap layers: NSWSS, esri;

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3.3 Land use and property

3.3.1 Key issues

Based on the screening assessment (Table 2-1), the following key issues that would trigger a review of the proposed drainage control areas have been identified.

- Impacts to landowners not previously impacted by the construction or operational footprints.

3.3.2 Review of key issues

A review of the key issues for property is summarised in Table 3-6 along with the proposed changes and/or management actions.

Table 3-6 Property

Chainage	Feature	Outcome
547.5	New property impact to grain silo (property ID 2674232)	Reduce drainage control area to avoid impact to this property. Engineering solution will be possible within proposed rail corridor, existing rail corridor and adjacent land.
728 to 730	New property impact to private landowner (property ID 2634584)	Reduce drainage control area to avoid impact to this property. Engineering solution will be possible within proposed rail corridor and adjacent paper road.

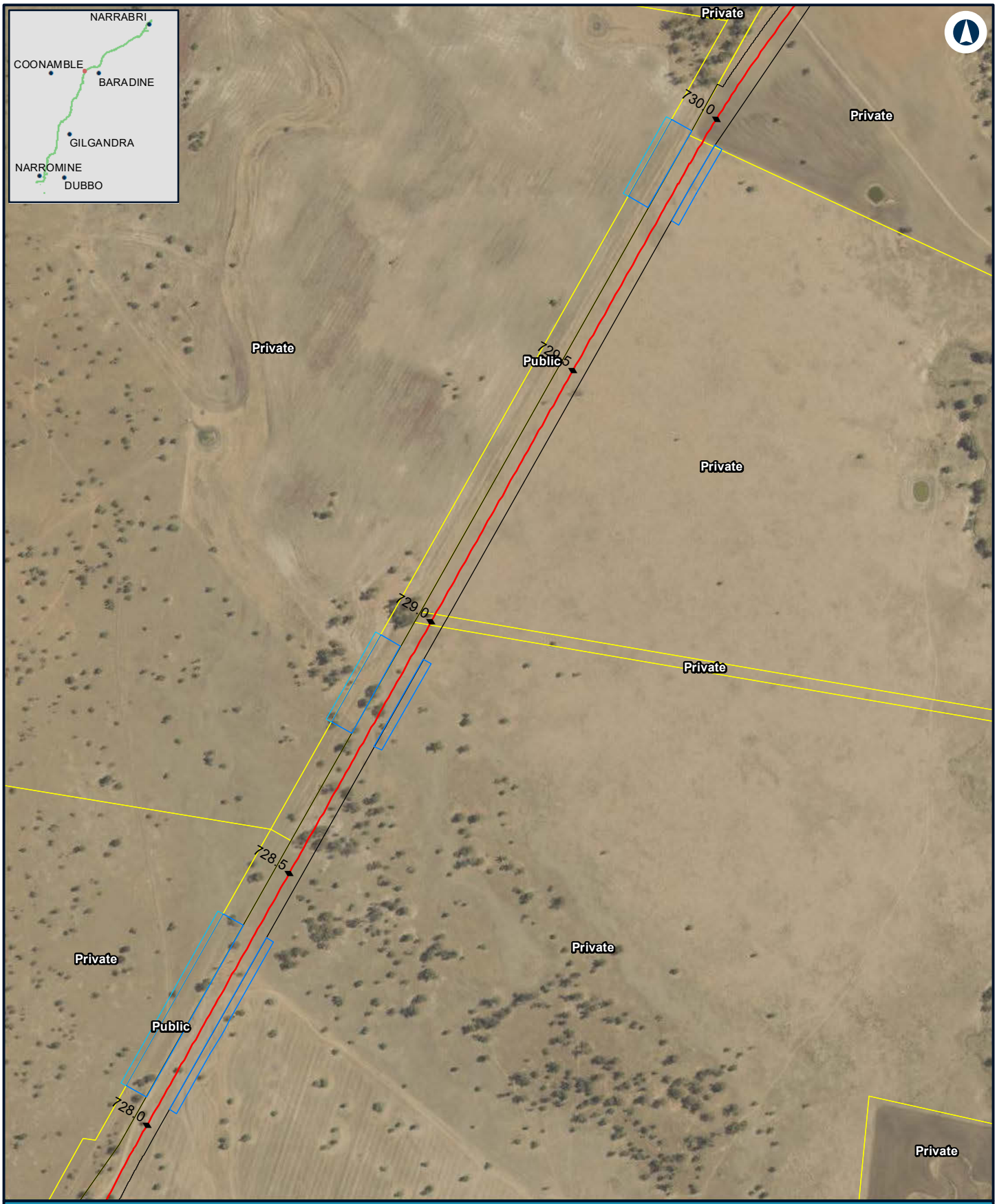
3.3.3 Outcome

The review of key issues for land use and property identified the drainage control areas would result in impacts to two new property owners not previously directly impacted by the construction and operational footprints. A number of drainage control areas were reduced in size to avoid impacts to these two properties (see Figure 3-3 for a typical outcome).

3.3.4 Mitigation

During detailed design further refinement would be undertaken to minimise impacts in accordance with proposed mitigation measures, in particular LP1. In addition:

- The drainage control areas will be included in title deeds of affected properties and form part of overall property negotiations between ARTC and landowners.
- ARTC would undertake ongoing engagement with landholders through property acquisition discussions.
- ARTC intends to minimise and avoid environmental and property impacts wherever possible.
- Retaining vegetation and minimising land take will be key considerations during detailed design when designing measures to reduce flood impacts.



NARROMINE TO NARRABRI Land use and property outcome example Figure 3-3

0 0.1 0.2 Km

Coordinate System: GDA 1994 MGA Zone 55

LEGEND

- Alignment
- Culvert drainage control area - current
- Culvert drainage control area - initial
- Rail corridor
- Lot boundary

Date: 13/01/2022 Paper: A4
Author: JacobsGHD Scale: 1:9,000
Data Sources: AHIMS: OEH; Basemap layers: NSWSS, esri;

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4. Conclusion

The environmental constraints review identified key issues in relation to biodiversity, Aboriginal heritage and land use and property.

A number of proposed drainage control areas were reduced in size or removed in order to minimise impacts, while balancing the need for management of predicted flooding impacts.

During detailed design further refinement will be undertaken to minimise the number and size of drainage control areas required, with any impacts managed through mitigation measures and property acquisition discussions.

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Use impact assessment —Narrabri TSR

NARROMINE TO NARRABRI PREFERRED INFRASTRUCTURE/AMENDEMENT REPORT

PROTEIN PRODUCTION

— VETS —

Use Impact Assessment

North Narrabri Section of Travelling Stock Route and Proposed Route of Inland Rail (N2N)

June 15 2020

Dr Lachlan Strohfeldt BVSc
PROTEIN PRODUCTION VETS | P.O. BOX 11443 CENTENARY HEIGHTS QLD 4350

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Use Impact Assessment- North Narrabri Section of Travelling Stock Route and Proposed Route of Inland Rail (N2N)

Foreword:

I have been instructed by Tucker Environmental to prepare an assessment of the impacts of the proposed Inland Rail route (IRR) on the Travelling Stock Route (TSR) at the section north of Narrabri (TSR map reference 27999 – "Sewerage Treatment Works" section). I provide this preliminary assessment based on the information made available to me, information collected during a site visit on 27 April 2020, and documents that have been made available to me by the Australian Rail Track Corporation (ARTC). Recommendations put forward in this impact assessment are my own professional opinion, and pertain to this section of the rail corridor only. It must be noted that these recommendations may not be suitable for all sections of TSR/ARTC interaction, and that further sites should be assessed for impact on a case by case basis. As the situation evolves, recommendations may need to be amended or altered in response to additional information.

Scope:

The following enquiries were to be addressed in the response:

- **Conduct a Site Visit**
- **Comparison of current and future (post-Inland Rail) situation, indicating if the TSR would suffer impacts that may reduce its operation, and recommended mitigation measures.**
- **Recommended new stock underpass dimensions**
- **Photographic report**

Section 1: Site Visit

A site visit to the North Narrabri section of the TSR occurred on 27 April 2020 with John Willcox of Inclusive Engagement Pty Ltd. The TSR was examined (see figure 1-1) to develop understanding of its use, construction, and to physically identify the impact of the rail corridor on its function. The area in question (see figure 1-1) is a mostly-straight pastured stock route that runs parallel to the Newell highway. A lightly used rail shunt line exists on the south-east edge and the stock route borders private property on the north-west. At the most northern end of the stock route there is an existing underpass providing thoroughfare beneath the Newell highway. The dimensions of this existing underpass are

approximately nine metres wide by three metres high by eight metres long (these were not precisely measured during the site visit) (see figure 1-3). After moving through the existing underpass animals must walk over the existing shunt railway line into a small holding pen before continuing on to laneway itself.

Current Dimensions:

The dimensions of the TSR in the survey area that was provided is approximately 80m wide x 650m (based on dimensions derived from the scale bar of Figure 1-1. The actual length is closer to 1km). The approximate area of the survey area is 5.2 hectares. The area is well-grassed and at the time of site visit appeared to not have been grazed for some time.

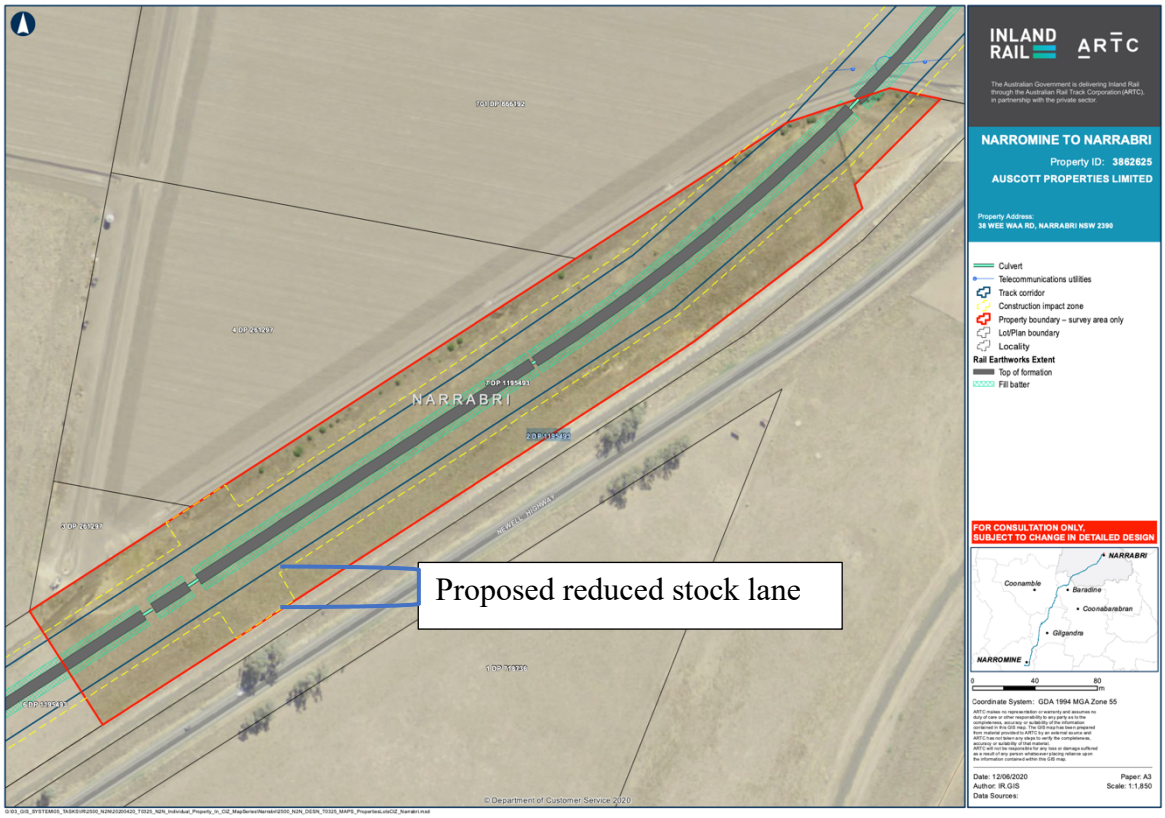

Figure 1-1: Satellite map indicating proposed Inland Rail Route and position of boundary fencing.

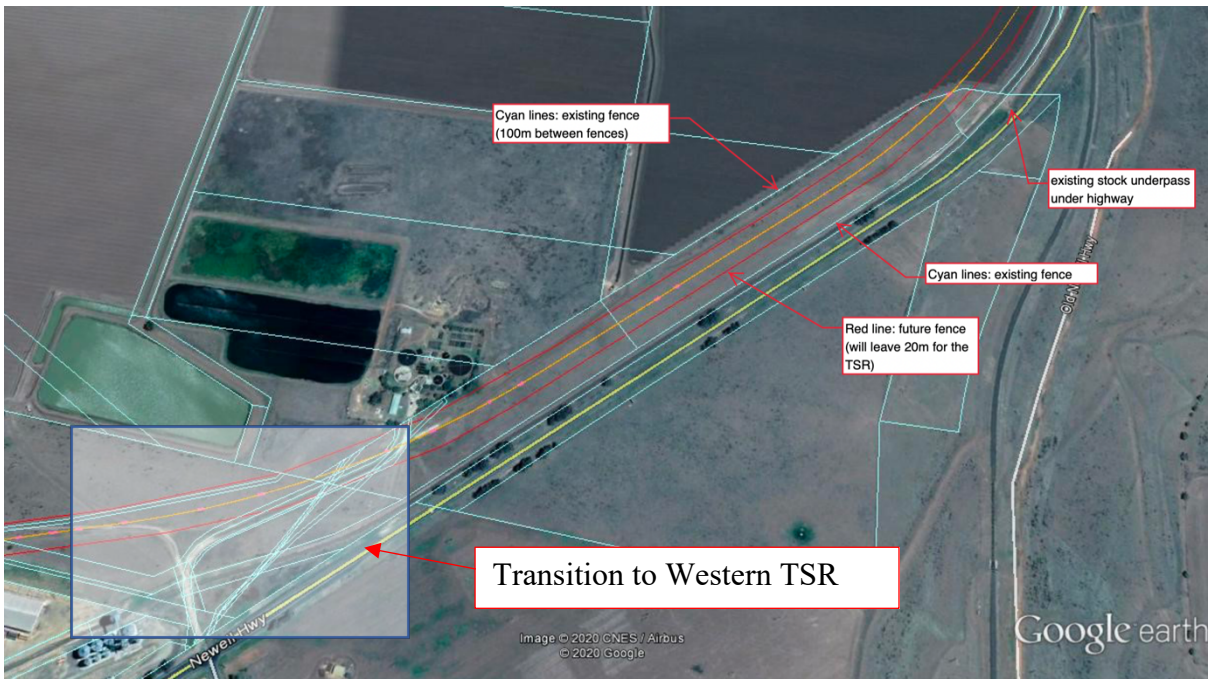

Figure 1-2: Satellite map indicating proposed Inland Rail Route (entire laneway to Austcott Sheds).

Figure 1-3: Current stock underpass under the Newell highway (Orientation: West)

Current infrastructure condition:
The current underpass is in good repair although holding pens on the western side of the highway are in need of maintenance (fences with holes in them, gates bent out of shape). The current laneway is comprised of a light wire fence and runs in parallel with the highway to the south-west. This fence has been pushed down in places and would not handle stock pressure in large amounts.

Figure 1-4: Shunt rail line on western exit of existing under pass (Orientation: North)

Section 2: Comparison of current and future (post-Inland Rail) situation, indicating if the TSR would suffer impacts that may reduce its operation, and recommended mitigation measures

Potential impacts affecting the use of the TSR post-inland rail:
This list of potential issues and subsequent recommendations was developed in a risk-management approach, with the aim to reduce impacts on human and animal health and safety, as well as limiting disruption to rail movements.

1. **Cattle and sheep on the TSR could be scared/spooked by increased noise and vibration from passing trains.**

   The addition of the Inland Rail line to the North Narrabri section of the TSR will potentially create a higher-pressure area through which animals must move. Train movements and associated noise and vibration have the potential to increase the amount of pressure on cattle and sheep and the subsequent responses to increased pressure could be exacerbated by having less flight area to escape to.

Recommendation 1:
Change the purpose of the area from holding/grazing paddock to shuttle/movement area where cattle and sheep must transit through expediently.

2. **Current TSR infrastructure is not capable of withstanding all but a very low level of sustained animal pressure.**

Recommendation 2:

All fencing and handling facility infrastructure must be appropriately constructed to resist some animal pressure to avoid a zero tolerance such as a railway track incursion. The width restriction of the TSR will likely reduce the working/flight zone of animals. If pressured and having nowhere to go cattle and sheep may rush to escape. High pressure reactionary movements will stress fencing infrastructure. More detailed records of TSR stock movements (number of head per mob, frequency of use) will help determine requirements.

A further mitigating factor to increased pressure on animals would be to stage movements through close contact areas so that animals transit the area in between train movements.

3. **Stock movements may be interrupted by train movements, resulting in increased stress to animals.**

There is potential for stock to be frightened/spooked by train movements. Once the noise/vibration levels and effects on stock of the trains are known procedures can be put in place to limit startling. Effects on moving stock are variable and will depend on individual animal circumstances. For example, stock that have been droving for long periods of time will generally become desensitised to various stimuli such as passing traffic and train movements. Meanwhile animals that have not seen these pressures before may react unpredictably. As a result the construction of the lane and planning of stock movements should be tailored to be as risk-averse as possible.

Recommendation 3:

Limit stock movements to gaps in train order.

4. **Large mobs of cattle and sheep may not move through the proposed laneway in the time allocated in the train schedule.**

Recommendation 4:

Large groups of cattle and sheep will need to be appropriately managed (e.g. split into smaller groups) to facilitate expedient passage through the proposed shuttle area.

The splitting of mobs will require construction of appropriate holding yards to split up groups.

5. **Any changes to the use of the TSR, or alterations to cattle handling and movement timing and technique may require education and awareness activities for end-users.**

Recommendation 5:

Train TSR users in cattle handling requirements for this area. This may be done through stakeholder engagement meetings, or development of a broader “Best-Practice” manual and training program that details the safety aspects of moving cattle around/over/under the Inland Rail and demonstrates some practical solutions to common animal handling problems. When moving through tunnels/underpasses animal behaviour responses must be thought of application of stockmanship

principles to enable safe transit of stock. Another aspect to consider is implementation of signage to notify people of the upcoming area.

6. **The total area available for grazing will be reduced dramatically.**

Invariably, the total area for grazing of stock will be dramatically reduced by up to 80%. There is no recommendation to be made as this cannot be altered without selecting a different route.

Section 3: Recommended new stock underpass dimensions

After extensive research it was concluded that there is no 'perfect' underpass solution that can be implemented across all locations spanning the Inland Rail route. Instead it must be recognised that underpass designs must fit with and work around complexities that are unique to each individual site. Designs of underpasses must take into account practical engineering considerations (note: no engineering advice is being provided in this report), animal behaviour and handling responses to underpasses, and human considerations of safety and workability when moving stock through underpasses.

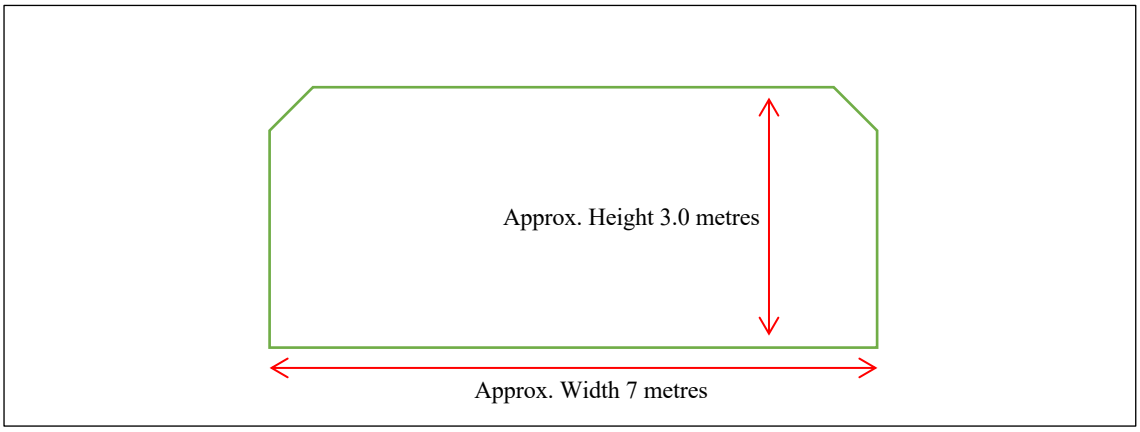

Figure 3-1: A basic diagram of proposed cattle underpass dimensions for Narrabri North TSR. (Note: Not to scale).

Width

Through research it is apparent that there is no published evidence on the ideal width for a stock underpass in this particular situation. The stock underpass must be wide enough to enable several animals to walk side by side to maintain cattle flow once it is initiated. In the case of TSR's where large volumes of cattle and sheep are expected to be moving at one time additional width would be beneficial. A width of approximately 7.0 metres would likely be sufficient. The width of the current TSR underpass at North Narrabri (beneath Newell Highway) is desirable as it comprises one main opening/tunnel.

Widths over 7 to 10 metres can present difficulties to the handler if stock decide to come back quickly (more area to cover). Where wide and long underpasses are planned installation of backing gates is recommended. Widths over 3 metres also allow for passage of most motor vehicles, whilst allowing the doors to open and passengers to escape if required.

Increases in width should not be achieved by adding more box culverts (see figure 3-2), especially where cattle flow is required as each box culvert operates independently. Cattle that enter one culvert cannot see their herd mates in another leading to refusals and baulking in the culvert.

Figure 3-2: A cattle underpass/causeway (Carnarvon Highway, QLD) demonstrating what to avoid in building wide underpasses with multiple culverts. Cattle flow is difficult to maintain unless animals are well trained. Note use of wing walls funnels animal attention and movement towards the culvert.

Height

The stock underpass must be tall enough to enable transit of animals, but also of stock handlers on motorbikes, vehicles and on horseback[1,3,4]. Queensland Department of Transport and Main Roads (2019) suggest that heights should be no less than 2.4 metres [3]. Other publications indicate that heights over 3 metres provide more safety, and better tunnel lighting [1]. A minimum suggested height of 3.0 metres is recommended.

Riding horses through long underpasses is not advised due to safety risks, however rider safety is improved where head room is greater (in event of horse rearing/ going over backwards).

Length

Length of underpasses has been indicated to be not more than approximately 10 metres. For underpass length it is widely accepted that shorter is better (more light, and improved openness ratio) [2,5]. Lengths of 10-12 metres will be sufficient. Openness ratios have been used to describe the amount of light available to the eye of large mammals (particularly wildlife) [2,5]. The greater the openness ratio, the greater the chance a ruminant would likely attempt entry and passage without be forced by a handler [2,5].

Flooring

The lead up areas to stock underpasses have significant impacts on how animals approach and flow through the underpass. Flooring considerations:

- The floor must provide traction and reduce slip and fall risk for stock and handlers
- Must not have sharp or rough finish edges that induce hoof injury and lameness.

- Smooth trowelled and domed concrete should be avoided, as animals tend to 'skate' across it.
- Bar mesh should also be avoided as it is abrasive, and the noise would amplify in the tunnel and cause baulking issues.
- **Solution**: impression pressed/stencilled concrete with appropriate drainage.
    - **Less lifetime maintenance costs.**
    - **More likely to maintain all weather access versus gravel/dirt base.**

Wing Walls

The use of wing walls in culvert construction is beneficial as they funnel animal attention and movement towards the culvert.

Gradient

Where possible underpasses should not have an entry (ramp) gradient of more than 3:1 [3]. If underpasses are to be cut in, then drainage becomes a primary concern. Runoff water that collects in stock culverts will prevent animal thoroughfare and must be addressed where drainage is an issue. Active drainage solutions (e.g. pumping) should be avoided due to lack of appropriate infrastructure and low levels of maintenance. Drainage issues should be addressed in design if all-weather access is required between properties/paddocks.

Holding pens/handling facilities

Due to the loud and noisy nature of the stock underpass crossings, it is advisable to cross stock when there is a gap between the trains. This could be achieved through the use of a timetable with indications on train movement frequency. The noise generated by overhead trains in the culverts may result in dangerous and unpredictable flight reactions from the cattle/ sheep resulting in human injury, animal injury (broken legs, smothering risk), and damage to the facilities. Handling yards/holding pens should be considered in each underpass design. Designs do not need to be elaborate but secure and scaled to the size of the enterprise. In many circumstances a one-size fits-all approach may not be practical, and input from landholders would be beneficial. For example, a 500m2 holding yard would be extreme for a herd of 25 cattle, whilst enterprises wishing to move 400 head at a time may require several holding pens.

Holding pens should be designed so that they may be filled easily from the paddock. Construction of a solid well-braced 'wing' would be beneficial, as they can be used to funnel the cattle towards the intended gate way. Square pens perpendicular to the stock movement laneway would be sufficient.

Summary

In my opinion it is not unreasonable for stock to move in a 20 metre laneway over this distance. Stock underpasses are installed because there is often no safe alternative for safe crossing of stock and their handlers. It is not unreasonable for there to be a second stock underpass installed on this route. The location of the second underpass should be viewed in conjunction with its interaction with the feeding stock lane, and how animal movement is affected by existing (unmoveable) obstacles such as the rail shunt line.

With the reasoning outlined above it is my opinion that proposed Inland Rail route one is suitable. Important factors for the successful function of this area include the provision for holding pens, and design of fencing and laneway terminations (these areas have not yet been discussed). The

functionality of stock movements in the area will also rely upon the appropriate siting and construction of the proposed stock underpass.

It must also be noted that there are significant animal handling considerations that need to be addressed too (recommendations in Section 2.0). The interaction of animals, people and infrastructure is complex and multifactorial and in order to maintain animal and human safety a multi-faceted approach should be implemented.

References:

1. Casburn & Cumming (2009) NSW Government Department of Primary Industries Primefact "Underpasses for moving livestock under expressways" Primefact 823 1st Edition

2. Donaldson, B.M. (2005) "The Use of Highway Underpasses by Large Mammals in Virginia and Factors Influencing their Effectiveness". Virginia Transportation Research Council VTRC 06-R2

3. Northland Regional Council – New Zealand (2011)"Farm management Issues - Chapter 6: Structures, Earthworks and Races – 6.3.1: Stock Underpasses" URL: https://www.nrc.govt.nz/media/11169/chapter66065structuresearthworksandraces.pdf

4. Queensland Government Department of Transport and Main Roads (2019). "Manual – Road Drainage Chapter 9: Culvert Design" URL: https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Road-drainage-manual

5. Reed, D.F., Woodward, T.N., and Pojar, T.M. (1975) Behavioral Response of Mule Deer to a Highway Underpass. Journal of Wildlife Management, Vol. 39 pp. 361-167.

Appendix

Appendix 1: Rough indication of width of proposed laneway. Person standing approximately 20m away. (Orientation: West).

Appendix 2: View of TSR facing south (Auscott sheds in distance). Shunt rail line present on the left of the photograph.

Appendix 3: View of the fencing of the pen leading into the Newell Highway underpass at the crossing of the existing shunt rail line. Currently low points such as this provide escape opportunity for moving stock. (Orientation: North)

Appendix 4: View of the approach to existing underpass under the Newell Highway from the shunt railway track. Note that fencing in this section is mostly sound, with the exception of light wire gates at entry points.

Appendix 5: Shunt rail line and TSR interaction facing south.

Appendix 6: Fencing type on eastern side of existing underpass. Holding pen on this side of underpass is in good condition.

Appendix 7: Holding paddock east of existing underpass. (Orientation: South)