PART A
Introduction, project background and description

INLAND RAIL

CHAPTER A7
Proposal features and operation

Narromine to Narrabri
Environmental Impact Statement

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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A7. Proposal features and operation

This chapter provides a description of the Narromine to Narrabri project's (the proposal) features and operation for the purposes of the EIS. It includes a description of the approach to design development, the infrastructure proposed, land requirements for the proposal, and how the proposal would operate. The proposed approach to construction is described in chapter A8.

A7.1 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 (km) 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 a reference/concept design. Flexibility has been provided in the design to allow for refinement during detailed design in response to submissions received following exhibition and/or if opportunities arise to minimise environmental impacts. The final design may therefore vary from the concept design described in this chapter. Further refinements may be identified in the preferred infrastructure report and the project approval.

A7.1.1 Key design features

The key design features of the proposal are listed below and shown in Figure A1.2. Maps showing the proposal features are provided in Part E.

Rail infrastructure

- A new 306-metre (m) 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, Curban, Black Hollow/Quanda, 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-km 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 km
- Limited road closures.

The key design features are described in sections A7.3 and A7.4.

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

A7.2 Design development

A7.2.1 Approach

Design work to date has involved producing a reference (also known as a concept) design. The purpose of a reference/concept design is to provide sufficient information about a proposal as the basis for environmental assessment, consultation and future, more detailed, planning and design work.

The approach to design development (shown in Figure A7.1) has included a focus on avoiding and/or minimising the potential for impacts during all key phases of the design process. In this regard, a feedback process has enabled findings from the various technical specialist studies to be captured and shared, allowing a collective understanding of the receiving environment to be built up, and leading to elements of the design being refined or changed to respond to these findings.

Various detailed investigations and assessments have been undertaken, including site visits and modelling. These investigations included a broad study area to identify key constraints early in the design process and assist with avoiding and minimising impacts as far as reasonably practicable.

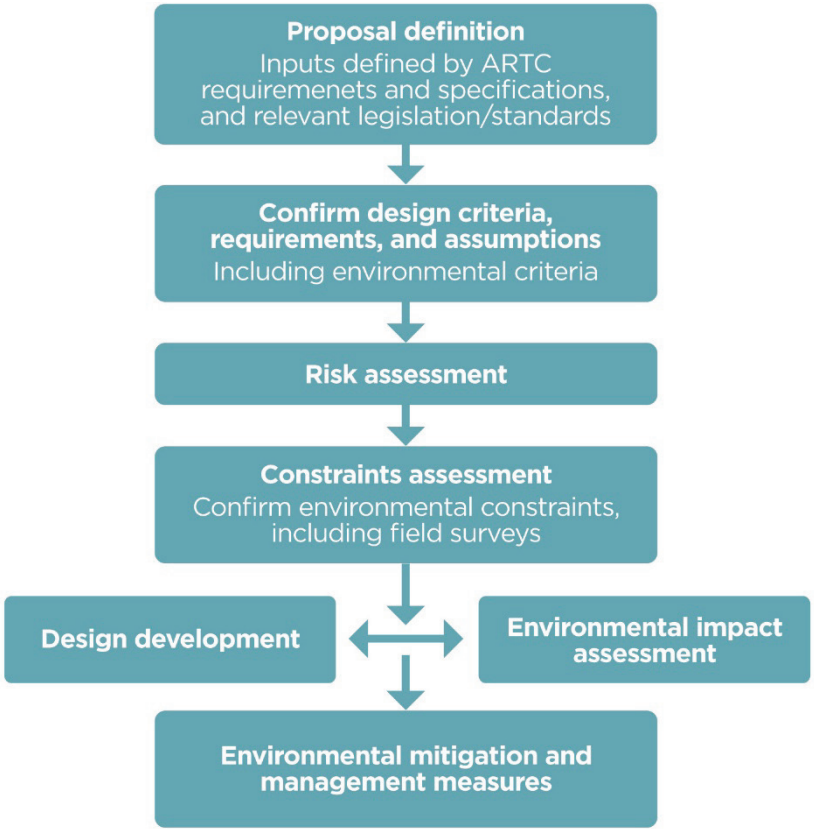

FIGURE A7.1 APPROACH TO AVOIDING AND MINIMISING IMPACTS DURING THE DESIGN PROCESS

As described in chapter A6, the multi-criteria assessments undertaken during the route option selection and design process for key infrastructure included consideration of environmental and social impacts. Various options assessments have been undertaken and the preferred option chosen based on the outcome of the assessments. The options assessment process also included assessment of opportunities and risks. The options considered and key design refinements are described in chapter A6.

Further information about how the proposal has avoided/minimised potential impacts is provided in the chapters in Part B.

Detailed design (the next stage of the design process) would include further engineering, construction planning and detailed assessment work, and would be subject to further input from key stakeholders and the community.

A7.2.2 Design standards

The design has been prepared in accordance with relevant standards and design requirements for rail and road infrastructure, including the following:

- ARTC Track and Civil Code of Practice
- Other ARTC specifications, standards, guidelines and technical directions
- Office of the National Railway Regulator and Transport for NSW level crossing policies
- Austroads Guide to Road Design, A Guide to the Structural Design of Road Pavements and other relevant publications and supplements
- Local council requirements
- Australian Standards
- Utility authority design standards.

A7.3 Rail infrastructure

A7.3.1 Rail corridor

The proposal comprises about 306 km 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 (m), 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-m 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 A7.3.8.

A7.3.2 New railway

About 306 km 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 Part E.

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 A7.2.

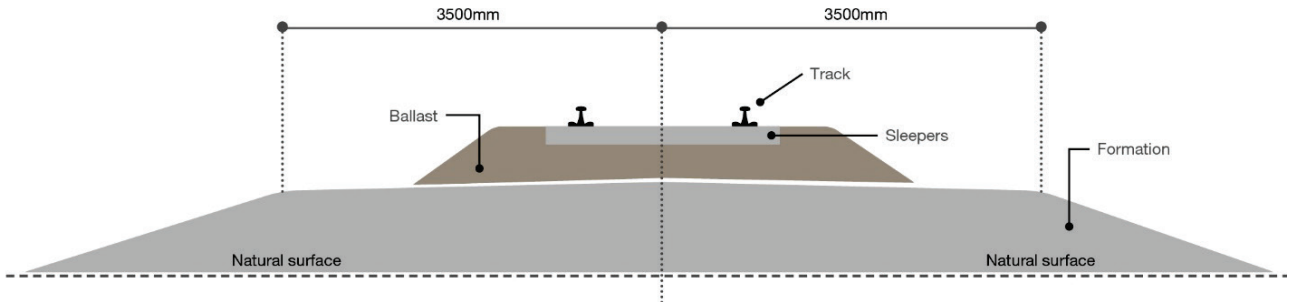

FIGURE A7.2 INDICATIVE RAILWAY DESIGN

A7.3.3 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 A1.2):

- Burroway
- Balladoran
- Curban
- Black Hollow/Quanda
- 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-km long, to fit the design length of the trains (1,800 m).

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

An indicative crossing loop design is shown in Figure A7.3. Maps showing the proposed crossing loop arrangements are provided in Part E.

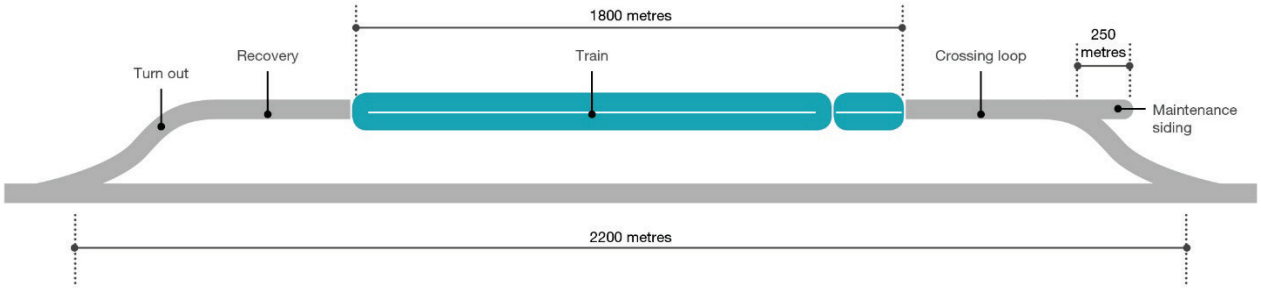

FIGURE A7.3 INDICATIVE CROSSING LOOP DESIGN

A7.3.4 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 amount of culverts would be provided to minimise impacts on fauna (see chapter B1).

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.

The design has been informed by a hydrologic and hydraulic assessment of the proposal site, geotechnical assessments, and assessment of existing structures (where relevant). An assessment of flooding events has also been undertaken for each structure.

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, 2013c) 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 m to 3,940 m. 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 1% annual exceedance probability (AEP) flood event with a 500-millimetre (mm) freeboard and navigational clearance
- Existing rail lines—clearance of 7.1 m for ARTC controlled rail lines and 5.1 m for other lines
- Existing roads—where practicable, a minimum clearance of 5.4 m for classified main roads and 4.6 m for local roads.

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 A1.2):

- Dubbo to Narromine Line—the Dubbo to Narromine Line bridge would also cross Webbs Siding Road and have a length of about 150 m
- 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 m
- Emogandy Creek—the Emogandy Creek bridge would also cross Old Mill Road and have a length of about 330 m
- Kickabil Creek—the Kickabil Creek bridge would also cross Kickabil Road and have a length of about 255 m
- Marthaguy Creek—the Marthaguy Creek bridge would have a length of about 1,150 m
- Castlereagh River—the Castlereagh River bridge would also cross two travelling stock reserves (R48903 and R23332) and have a length of about 610 m
- Baradine Creek—the Baradine Creek bridge would have a length of about 250 m
- 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 m; and the Bohena Creek 2 bridge, which would cross one travelling stock reserve (R941) and have a length of about 760 m
- 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 m
- Figures showing the bridge locations are provided in Part E.

Culverts

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.

A7.3.5 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 A7.4). The Narromine West connection would include about 1.2 km 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 A8.4.6.

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 A7.4 **Narromine West connection**

A7.3.6 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 (see section A2.3.2). The connections are described in Table A7.1. Constructing the connections would involve some works to existing rail lines, as described in section A8.4.6.

TABLE A7.1 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 km south of Craigie Lea Lane (see Figure A7.5). Providing this connection would involve adjusting about 500 m 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 A7.6). 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 km 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 km of new track would be provided to allow trains from the west to access the proposal and travel south (see Figure A7.7). 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 2 km north of the intersection between the Newell Highway and Killarney Gap Road (Figure A7.8). Providing this connection would involve adjusting about 600 m 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 A7.5 **Connection with the Parkes to Narromine section of Inland Rail**

Figure A7.6 **Connection with the Dubbo to Coonamble**

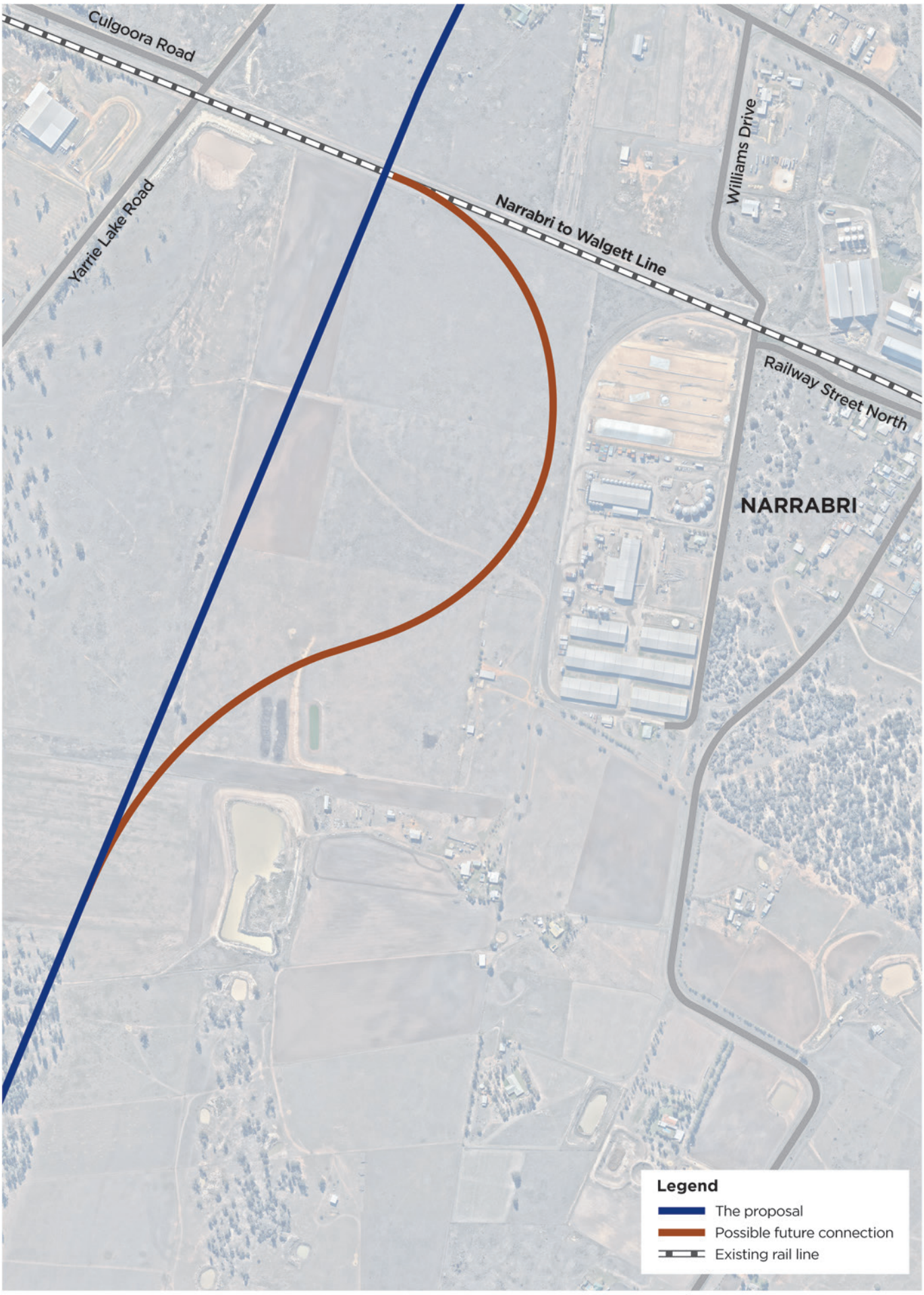

Figure A7.7 **Connection with the Narrabri to Walgett Line**

Figure A7.8 **Connection with the Narrabri to North Star section of Inland Rail**

A7.3.7 Level crossings

About 51 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 A7.9). Of these, it is proposed that 12 would have active controls, which involve providing warning devices in the form of flashing lights and bells, and boom barriers for motorists. 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 (e.g. 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 A7.4.

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 Part E.

A7.3.8 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 m shoulder at the top of capping
  - Batters with a slope of 3:1 (horizontal:vertical).
- Cuttings:
  - 3.5 m shoulder at the top of capping
  - Cess drain in the base of the cutting
  - 2:1 (horizontal:vertical) cutting slope
  - Benching at 7 m where the depth of the cut exceeds 10 m
  - Construction of top drains where the local topography results in overland flow entering a cutting.

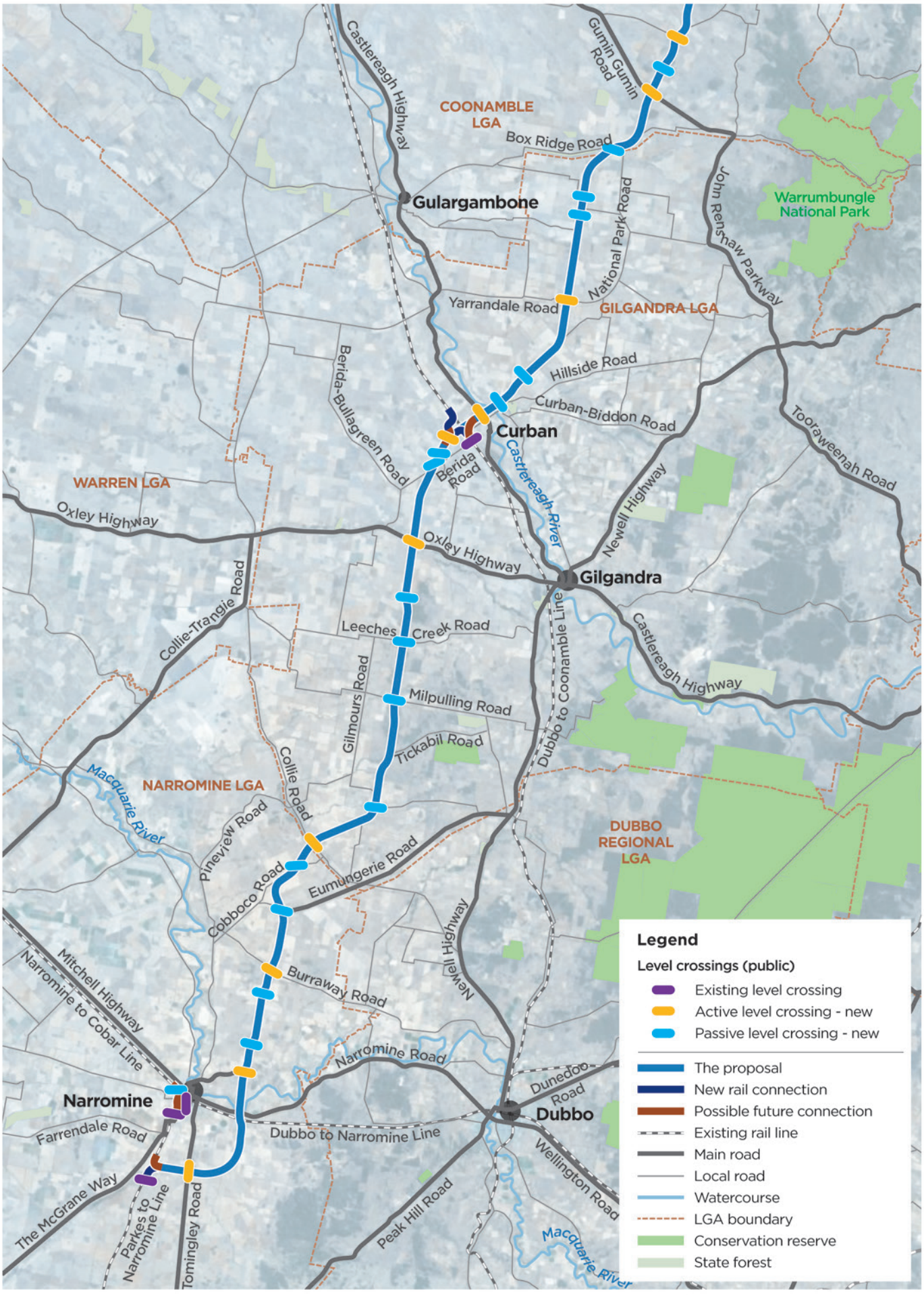

Figure A7.9 **Level crossings (map 1)**

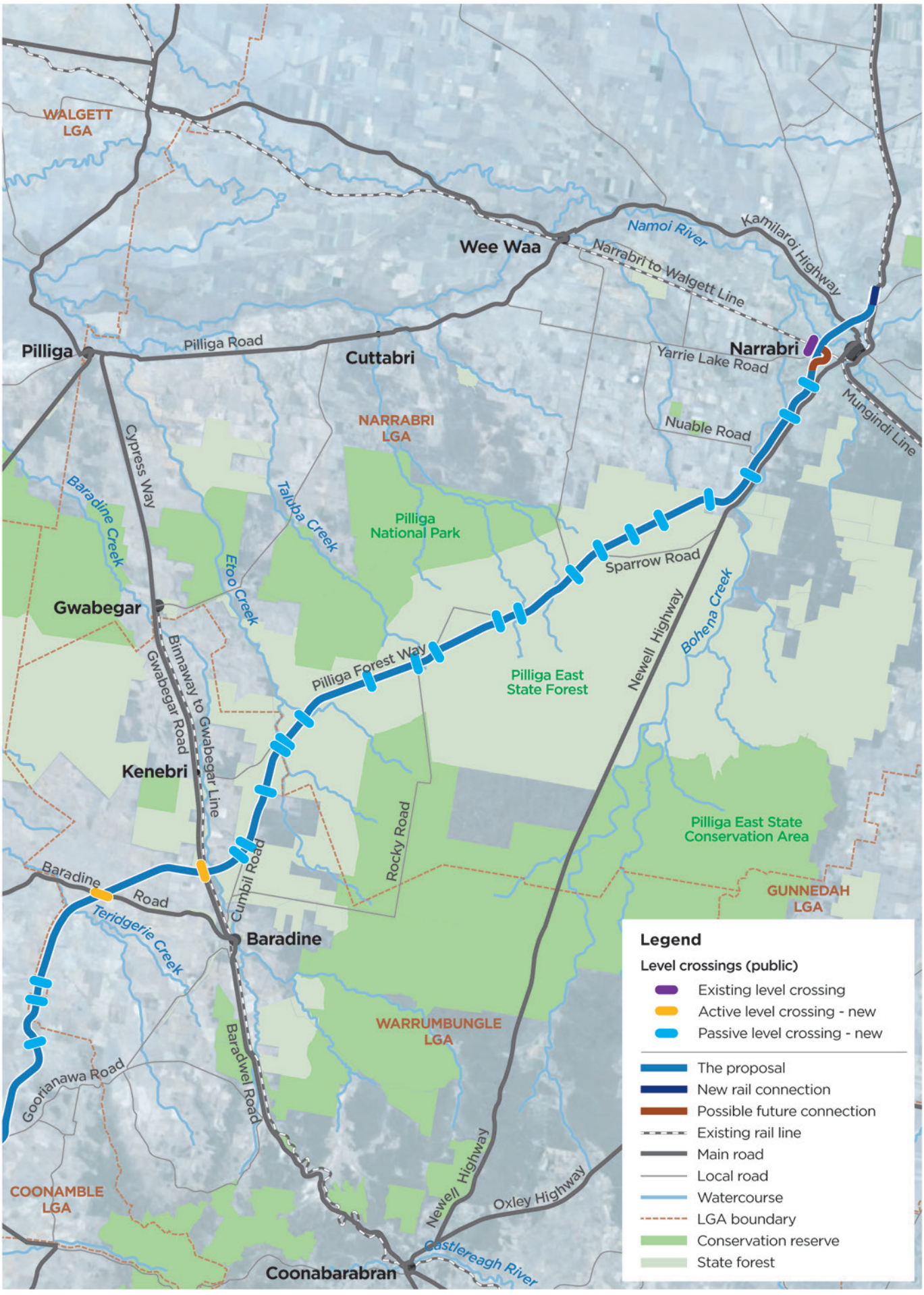

Figure A7.9 **Level crossings (map 2)**

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 A7.10.

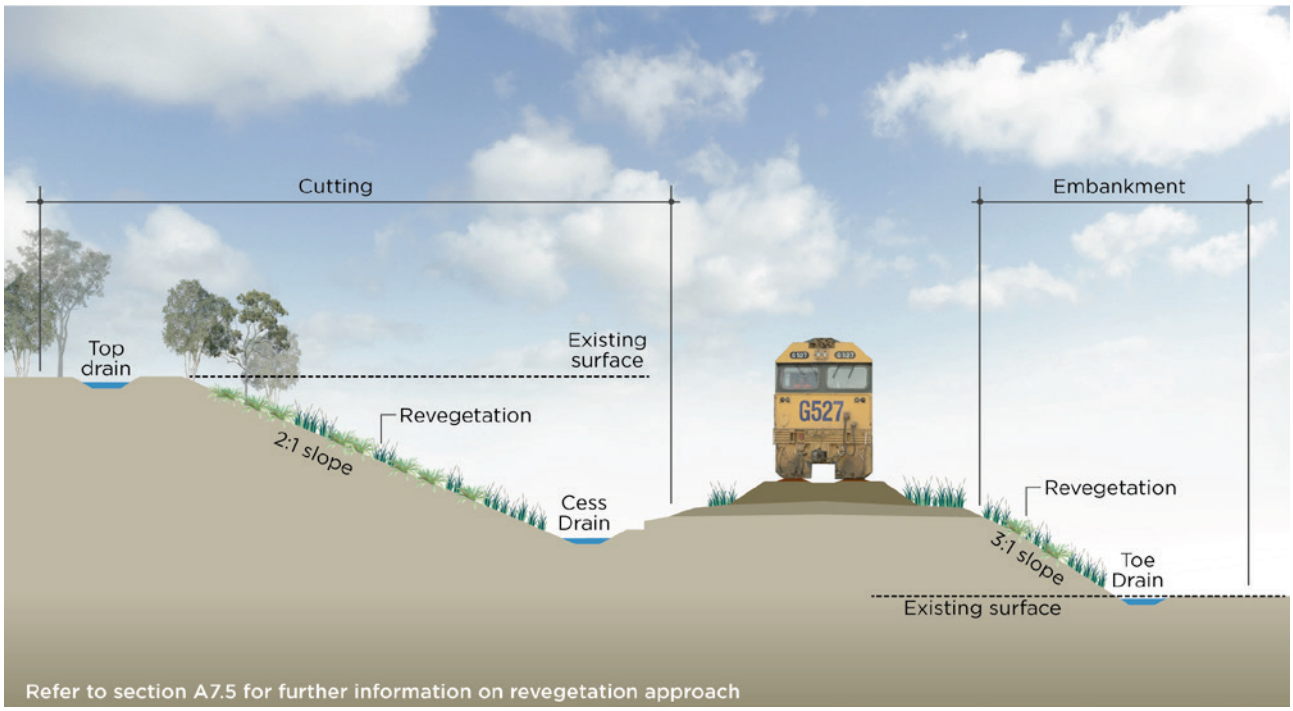

FIGURE A7.10 INDICATIVE EMBANKMENT, CUTTING AND TRACK DRAINAGE

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 A7.3.5)
- Each end of connections with other rail lines (see section A7.3.6)
- The beginning and end of each crossing loop (including maintenance siding) (see section A7.3.3).

Corridor fencing

Fencing would be constructed along the rail corridor, where it is located on 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 m 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 8.11.2). 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 m wide and would be constructed in about 34 locations, totaling about 104 km in length.

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 (e.g. 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 A7.3.7) or stock underpasses at bridges and culverts (where topography and sizing permits). Underpasses would be designed with consideration of *Underpasses for moving livestock under expressways: Primefact 823* (DPI, 2009). Where culverts are used, they would typically comprise reinforced concrete box culverts with dimensions of 3 m high by 3 m wide.

Stock underpasses proposed to be provided for travelling stock reserves are summarised in Table A7.2 and their locations are shown in the maps in Part E.

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 A7.2 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
652.4	Travelling stock reserve R48903 and R23332)	Access beneath the proposal is provided by the Castlereagh River bridge
828.5–836	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 culverts (typically comprising 3 metre by 2.4 metre by 2.4 metre reinforced concrete box culverts)

A7.4 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 (see section A6.3.3) if the design, or other relevant factors (such as traffic volumes and composition) change.

A7.4.1 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 A7.3. Of the roads listed in this table, only Dappo Road would be completely closed.

TABLE A7.3 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 1 km to the north
Brooks Road	This road would be closed and diverted to a crossing via National Park Road, located about 900 m south of the road's current intersection with National Park Road
Nalders Access Road	This road would be closed and diverted to a crossing via National Park Road, located about 2.6 km south of the road's current intersection with National Park Road
Munns Road	This road would be closed and diverted 650 m to the north of its existing location

Access tracks/road reserves

The proposal would also result in the closure and realignment of:

- Bardens 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 proposal site interacts with, one would be provided with an underpass and three would be provided with passive level crossings.

Maps showing the location and arrangements of public road closures are provided in Part E.

Approval for closures, where required, would be progressed in consultation with the relevant road manager and in accordance with the relevant legislative requirements.

A7.4.2 Public road realignments

For the majority of the proposed level crossings (see section A7.3.7), 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 (i.e. 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 53 public roads, including:

- Realignment of Pilliga Forest Way in the Pilliga East State Forest for a distance of about 6.7 km, to avoid the new rail corridor
- Realignment of 52 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 Part E.

A7.5 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 Part E. The anticipated land requirements within this footprint are listed in Appendix F.

It is estimated that about 1,723 hectares (ha) of land would be permanently required. These requirements are anticipated to include approximately:

- 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).

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* (NSW). 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 1991* (NSW) 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).

Further information about the proposal's land requirements, and the potential impacts of these requirements, is provided in chapter B12.

The proposal would also require temporary leasing of land for construction. Temporary land requirements are described in section A8.10.5.

A7.6 Urban design and landscaping

A7.6.1 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 detailed design. This would assist in minimising the potential for adverse impacts on communities and the broader landscape.

A7.6.2 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:

- ARTC's *Inland Rail Landscape and Rehabilitation Strategy* and *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 Services, 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* (Standards Australia, 1997)
- *Noise wall design guideline. Design guideline to approve the appearance of noise walls in NSW* (Roads and Maritime Services, 2016)
- *Landscape Guideline: Design guideline to improve the quality, safety and cost effectiveness of green infrastructure in road corridors* (Roads and Maritime Services, 2018a)
- *Water sensitive urban design guideline* (Roads and Maritime Services, 2017).

A7.7 Operation

A7.7.1 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. 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. 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-m long trains. Train speeds would vary according to axle loads and range from 80 to 115 km per hour.

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. This rail traffic would be in addition to the existing rail traffic using other lines that the proposal interacts with, as described in sections A2.3.2, A7.3.5 and A7.3.6.

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 2025, increasing to about 17.5 million tonnes in 2040.

Train timetabling would be the responsibility of operators.

A7.7.2 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.

A7.7.3 Employment

The proposal would require an operational workforce of about 10 people, who would be responsible for maintenance.

A7.7.4 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.