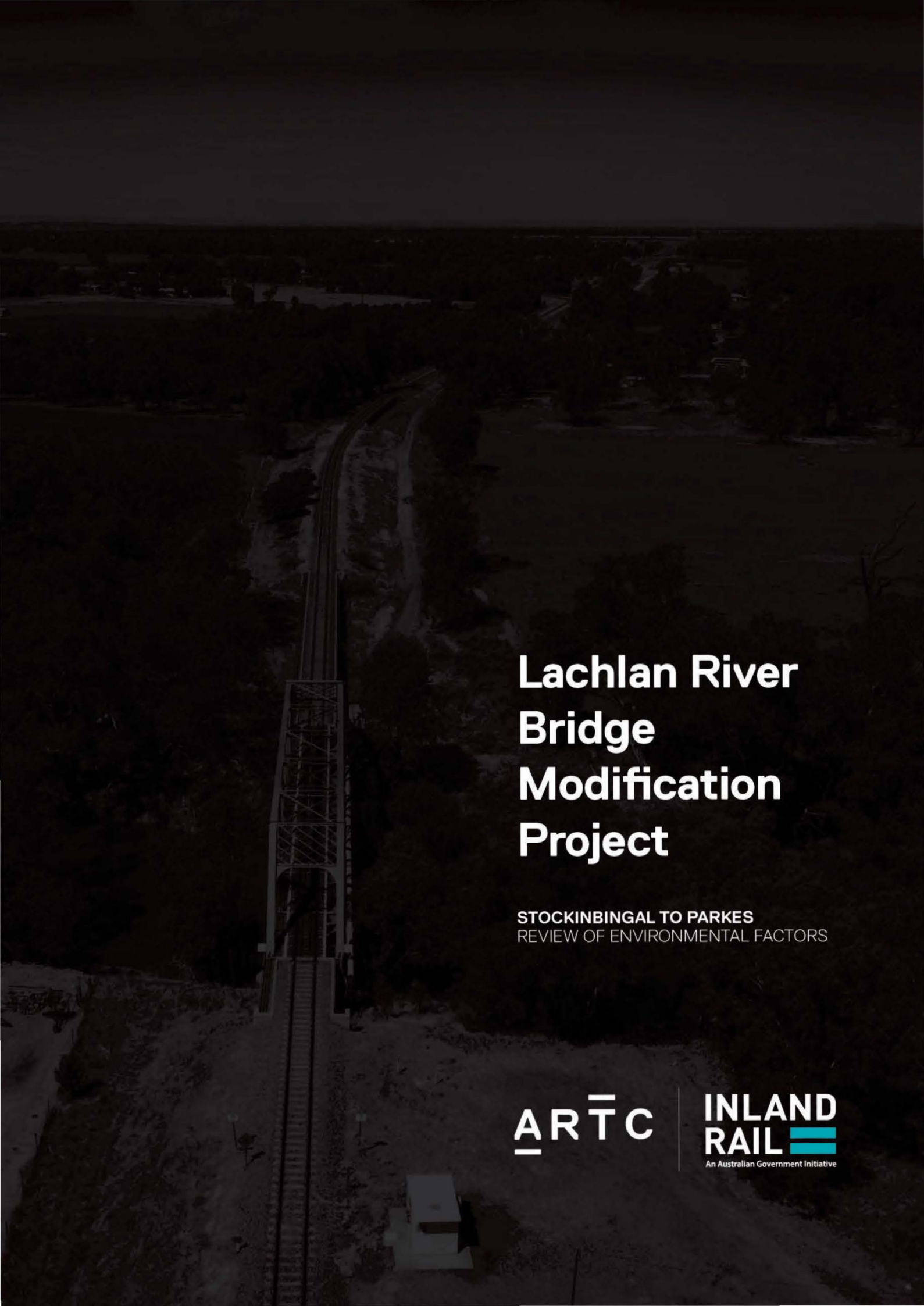

Lachlan River Bridge Modification Project

STOCKINBINGAL TO PARKES
REVIEW OF ENVIRONMENTAL FACTORS

ARTC | INLAND RAIL
An Australian Government Initiative

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Appendices

Abbreviations

AEP	Annual exceedance probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ARTC	Australian Rail Track Corporation
ASS	Acid sulfate soils
AVaTG	Assessing Vibration: A Technical Guideline
BAM	Biodiversity Assessment Method
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act 2016* (NSW)
CEMP	Construction Environmental Management Plan
CIV	Capital investment value, as defined in the EP&A Regulation
CLM Act	*Contaminated Land Management Act 1997* (NSW)
CNVG	Construction Noise and Vibration Guideline
COAG	Council of Australian Governments
DAWE	Commonwealth Department of Agriculture, Water and Environment
DITRDC	Department of Infrastructure, Transport, Regional Development and Communications
DPIE	NSW Department of Planning, Industry and Environment
DPI	NSW Department of Primary Industries
EEC	Endangered ecological community
EIP	Engagement Implementation Plan
EPA	NSW Environment Protection Authority
EP&A Act	*Environment Planning and Assessment Act 1979 (NSW)*
EP&A Regulation	Environment Planning and Assessment Regulation 2000 (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPL	Environment Protection Licence
ESD	Ecologically sustainable development
GDE	Groundwater dependent ecosystems
IAP2	International Association for Public Participation
ICOMOS	Australia International Council on Monuments and Sites
ICNG	Interim Construction Noise Guideline
ILUA	Aboriginal Land Use Agreements
ISEPP	NSW State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
MCA	Multi-criteria analysis
NCA	Noise Catchment Area
NEPM	National Environment Protection Measure
NHVR	National Heavy Vehicle Regulator
NML	Noise Management Level
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
PCT	Plant Community Type
PFAS	Per- and poly-fluoroalkyl substances
PMST	Protected Matters Search Tool

POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
RAMR	Rail access maintenance road
RBL	Background noise levels
REF	Review of Environmental Factors (this report)
RING	Rail Infrastructure Noise Guideline
S2P	Stockinbingal to Parkes (section of Inland Rail)
SEPP	State Environmental Planning Policy
SES	State Emergency Services
SIS	Species Impact Statement
SoHI	Statement of Heritage Impact
SSI	State significant infrastructure
SWMP	Soil and Water Management Plan
TEC	Threatened ecological community
WaQI	Water quality index
WM Act	*Water Management Act 2000* (NSW)
WoNS	Weeds of National Significance
UXO	Unexploded ordnance

Certification

Certification by preparing officer

This Review of Environmental Factors (REF) provides a true and fair review of the activity in relation to its likely effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed activity and provides sufficient information to determine that the activity as described in this REF will not significantly affect the environment. Accordingly, no Environmental Impact Statement (EIS) and/or Species Impact Statement (SIS) are required.

Name	Emma Dean, Principal Environmental Scientist		
Company	WSP Australia Pty Ltd		
Signature		**Date**	25 November 2021

Certification by ARTC Delivery Director

The project is titled: Stockinbingal to Parkes (S2P)—Lachlan River Bridge Modification Review of Environmental Factors

Subject to approval, proposal commencement is anticipated to be: Early 2024

I confirm that I have reviewed and accept the REF, including the scope of works as detailed, and will:

- construct and operate the project as described in the REF
- ensure all legislative requirements related to approvals, consultation and notification are fulfilled
- implement all listed environmental management measures
- seek advice from ARTC environment staff, as required, and report all non-conformances and incidents
- undertake audits and/or environmental site inspections
- appropriately communicate REF requirements to project personnel.

Name & Position	Melvyn Maylin, Delivery Director—T2N		
Signature		**Date**	May 5, 2022

Certification by ARTC Reviewing Environmental Advisor

I confirm that I have:

- reviewed the REF in accordance with legislative requirements and it meets the requirements of the REF Guidance Note (ENV-FM-021) and the Inland Rail Program Environmental Assessment Procedure (2-900-PEN-00-PR-1001)
- the management measures listed in the REF are suitable to mitigate the impact of works
- the activity, as described, is unlikely to significantly affect the environment.

Name & Position	Daniel Lumby, Senior Environmental Advisor		
Signature	Daniel Lumby Daniel Lumby (May 5, 2022 09:27 GMT+10)	**Date**	May 5, 2022

Executive summary

The Australian Government has committed to delivering a significant piece of national transport infrastructure that will provide a safe, sustainable solution to the freight challenge that exists on Australia's east coast. The Inland Rail Program (Inland Rail) is a 1,700-kilometre (km) interstate freight rail corridor that will connect Melbourne and Brisbane, via central-west New South Wales (NSW) and Toowoomba in Queensland.

The Stockinbingal to Parkes (S2P) section is an enhancement project for Inland Rail. It is a 170.3-km section of existing rail corridor located in regional NSW between the towns of Stockinbingal and Parkes. The proponent, ARTC, is proposing four separate packages of works to increase clearances within the S2P rail corridor to accommodate double-stacked freight trains up to 1,800 metres (m) long and 6.5 m high.

One of those packages involves works at Lachlan River Bridge to increase the clearances on that bridge (the proposal). The proposal is subject to assessment in accordance with Division 5.1 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).

The purpose of this Review of Environmental Factors (REF) is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail the safeguards and management measures that would be implemented during detailed design, construction and operation. The proposal involves modifications to the truss structure of Lachlan River Bridge to provide the nominated vertical clearance for double-stacked trains.

Consultation for the proposal has been completed, including statutory consultation required in accordance with the State Environmental Panning Policy (Infrastructure) 2007 (ISEPP). The outcomes of consultation undertaken are discussed further in Chapter 5 of this document.

The assessment in this REF has been carried out in accordance with ARTC's *Code of Practice for Environmental Impact Assessment of Development Proposals in NSW* (ARTC, 2016). The environmental assessment of the proposal has identified the following:

- Noise and vibration (construction): Construction noise levels are primarily predicted to exceed construction noise management levels (NML) during the daytime. During bridge works, minor (up to 5 dBA) exceedances of daytime NMLs has been predicted at 92 properties, with more noticeable exceedances at an additional 41 properties at 5-10 dBA, seven at 10-20dBA and one at 20-30dBA. Due to access constraints and the requirement for safe working sites, some works would be undertaken outside standard working hours, during scheduled track possessions. During out-of-hours night work, the number of minor noise exceedances would decrease to 33, with more noticeable exceedances at six residences. Sleep disturbance is anticipated at seven nearby properties. The decrease in impacted properties during evening and night-time works is because the noisiest works would apply only to standard hours. Implementation of noise management and project-specific mitigation measures during construction would result in substantial reductions in the predicted noise levels. Human comfort impacts from construction vibration would potentially occur at one property during site establishment.
- Noise and vibration (operation): Noise levels would increase due to the increased frequency and length of freight trains through the proposal site. Noise level criteria are not expected to be exceeded at any sensitive receiver locations during operation of the proposal. Although no exceedance is predicted, an operational noise and vibration compliance monitoring would be undertaken to confirm if mitigation is required.
- Non-Aboriginal heritage: The proposal involves works on the truss structure of the locally listed Railway Bridge over the Lachlan River. While the modification of the bridge would impact heritage value, it would be mitigated by the overall minimal modification to bridge components and by the ability to conserve the majority of the bridge's heritage values through the continued use of the bridge as an item of rail infrastructure. The continued use of the bridge would ensure its continued maintenance. The detailed design would further aim to minimise the potential for impacts and would have regard to, and be sympathetic with, its heritage significance. Archival photographic recording of Lachlan River Bridge would be carried out prior to construction.

- Biodiversity: The proposal would impact up to 0.1 hectares (ha) of native vegetation, primarily comprising grassland. This vegetation is not a threatened ecological community (TEC) or is not likely to support threatened flora or fauna species. Based on the assessment, no ecological communities, populations or threatened species were considered likely to be significantly impacted by the proposal. Direct impact to aquatic ecology would not occur as no works are proposed within Lachlan River. Other indirect risks to biodiversity through water quality, noise or biosecurity impacts would be appropriately managed through the mitigation and management measures identified in this REF. A Biodiversity Management Plan would be prepared prior to construction and implemented to manage biodiversity and minimise the potential for impacts during construction. The proposal site would be rehabilitated on completion of construction.
- Landscape character and visual amenity: The proposal is located in an area of low visual sensitivity due to the existing rail line and limited viewpoints to the proposal site. Impact to visual amenity would occur due to the presence of construction compounds and plant, modification to the bridge truss structure and an increase in size and frequency of freight trains through the proposal site. The proposed modifications to the truss structure would somewhat alter the heritage character and aesthetic value of the bridge. The overall scale of the bridge would be largely maintained and the materials would be consistent with the existing bridge. While the frequency and size of trains would increase and become a more dominant feature, the changes would be generally in character with the existing rail corridor and would not alter the use or amenity of the landscape. The viewpoint from the neighbouring property to the north east on Bathurst Street would undergo the greatest change. This impact has been assessed as a moderate–low visual amenity impact. 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.
- Surface water (hydrology and flooding): There would be no permanent change to existing catchments or drainage infrastructure as part of the proposal. The proposal includes modifications to the truss structure and would not change the height of the bridge above the Lachlan River; therefore, no impacts to flood behaviour are anticipated. Minor grading of the proposal site and the presence of construction compounds, stockpiles and the crane pad during construction may temporarily interrupt local overland flows. Detailed construction planning would consider flood risk at the proposal site.
- Waste: A small volume of waste would be generated by the proposal, which would generally comprise metal sections removed from along the top of the bridge truss structure, small volumes of spoil and general waste from construction material and workers. Small amounts of hazardous waste material would be generated, including lead-based paint flakes from works on the bridge. Waste would be reused and recycled where practicable. All waste generated would be classified and disposed of in accordance with the relevant requirements.
- Traffic and access: Construction of the proposal would result in approximately 16 additional vehicle movements a day; however, due to the low volume of traffic on existing roads, there is sufficient capacity in the network to allow for these movements. Construction of the proposal would not result in any road closures or detours on surrounding roads and no works are proposed to the level crossing on Bathurst Street. Traffic management would likely be required during deliveries using heavy vehicles. During peak construction periods, some roadside parking may be required for construction workers on Bathurst Street and Lower Bathurst Street. A Traffic, Transport and Access Management Plan would be prepared and implemented during construction to minimise the potential for impacts on the community and the operation of the surrounding road and transport environment. Public access to the Lachlan River, under and in close proximity to the bridge, may be restricted during construction in accordance with Transport for NSW (TfNSW) requirements, including public notification and temporary navigation markers. Implementation of these restrictions would mitigate the safety risk to river users during construction.
- Soil and contamination: Removal of native vegetation and grading of the proposal site would temporarily expose the natural ground surface to runoff and wind, which would increase soil erosion potential. No significant sources of existing contamination have been identified at the proposal site. There is potential for lead-based paint disturbed during construction to contaminate the soil. Erosion and sediment control would be in accordance with best practice (DECC, 2008) and a Contamination and Hazardous Materials Plan would be implemented during construction to mitigate soil impacts. Impacts to soil and contamination from construction and operation of the proposal are not considered to be significant and would be managed through the mitigation and management measures detailed in this REF.

- Socio-economic: The proposal would result in potential economic benefits during both construction and operation though the use of local labour and local businesses where available. The proposal would require a variety of roles and skills, which may result in the temporary relocation of some workers during construction. As part of Inland Rail, the proposal would facilitate an expansion of capacity on a key freight line linking Melbourne and Brisbane, while improving local road safety outcomes. Inland Rail would boost the Australian economy by creating jobs and providing better access to and from regional markets. Negative impacts would also be generated, including amenity impacts from impacts from traffic, and noise and vibration. These impacts would be managed through the mitigation and management measures identified in relevant sections of this REF.
- Aboriginal heritage: No Aboriginal heritage sites were identified in the proposal site, which was disturbed to establish the current rail corridor; therefore, Aboriginal heritage objects or intact archaeological deposit are unlikely to be harmed due to the proposal.
- Water quality: Construction activities adjacent to the Lachlan River present a risk to water quality, due to increased erosion from vegetation clearing and ground disturbance. Disturbance of lead-based paint on the bridge during construction also presents the risk of small amounts of lead entering the river and causing subsequent ecological impacts. Construction would be performed in accordance with *AS/NZS 4361.1:2017 Guide to hazardous paint management* (Standards Australia, 2017). Implementation of project-specific mitigation measures identified in this REF would avoid and minimise potential impacts to water quality from the proposal.
- Air quality and greenhouse gas (GHG): The impact of the proposal on air quality and GHG is not likely to be significant, and can be managed appropriately by the implementation of the mitigation and management measures described in this REF.
- Land use and property: Temporary use of a small area of council land in the Bathurst Street road reserve would be required during construction of the proposal. Permanent property acquisition for operation of the proposal is not required, as the proposal would be located within the existing rail corridor.
- Hazard and risk: While the proposal would result in impacts from increased hazard and risk, including disturbance of lead-based paint on the bridge, these impacts are considered consistent with similar construction projects, including those within existing rail corridors. These impacts would be managed through implementation of mitigation and management measures detailed in this REF. Significant impacts from hazard and risk are not anticipated for the proposal.
- No significant cumulative impacts from construction or operation of the proposal alongside other projects in the region were identified.

The proposal is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the proposed activity. This includes consideration of impacts on threatened species, populations and ecological communities and their habitats, and other protected fauna and native plants. The REF has also considered potential impacts to matters of national environmental significance (MNES) listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

Potential environmental impacts from the proposal have been avoided or reduced during the reference design development and options assessment. The safeguard management measures detailed in this REF would manage the impacts anticipated. The proposal is not likely to significantly affect the environment. In addition, the proposal is not likely to significantly affect any Commonwealth or NSW listed threatened species, populations or ecological communities, or their habitats. On balance, the proposal is considered justified.

1. Introduction

1.1 About Inland Rail

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.

The objectives of the Inland Rail Program are to:

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

Further information on Australian Rail Track Corporation (ARTC) and Inland Rail can be found at artc.com.au and inlandrail.com.au.

1.2 The Proponent

ARTC is the proponent for the proposal and has a program to deliver Inland Rail. ARTC is an Australian Government owned statutory corporation that manages more than 8,500 km of rail track in NSW, Queensland, South Australia, Victoria and Western Australia. ARTC is responsible for:

- Selling access to the rail network to train operators
- Capital investment in the network
- Managing train operational across the network
- Maintaining the network
- Developing new business.

1.3 The proposal

The Stockinbingal to Parkes (S2P) section forms a key component of the Inland Rail Program. It is a 170.3 km section of existing rail corridor located in regional NSW between the towns of Stockinbingal and Parkes (refer Figure 1.1).

A number of enhancement works, which do not constitute a complete upgrade of the track alignment, are required to be undertaken in this section, to accommodate double-stacked freight trains up to 1,800 metres (m) long and 6.5 m high. These works include alterations to, and construction or removal of, various structural and track assets along the alignment to provide the increased vertical and horizontal clearances required for double-stacked freight trains. The enhancement works required along the S2P section have been split into four Review of Environmental Factors (REF) packages:

- Horizontal clearances (Milvale (clearance works); Bribbaree (track realignment); Quandialla (clearance works); Caragabal (track realignment); Wirrinya (track realignment) and Forbes Station (clearance works and track realignment))
- Railway Bridge over Lachlan River (Lachlan River Bridge) (clearance works)
- Wyndham Avenue bridge (track lowering)
- Daroobalgie crossing loop (new crossing loop).

This REF has been prepared for the Lachlan River Bridge clearance works (the proposal).

1.3.1 Proposal objectives

The objectives of the proposal are to:

- Enhance existing rail infrastructure to achieve the clearances required for Inland Rail, to enable trains using the corridor to travel between Stockinbingal and Parkes, connecting with other sections of Inland Rail to the north and south
- Minimise the potential for environmental and community impacts, by maximising use of the existing rail corridor.

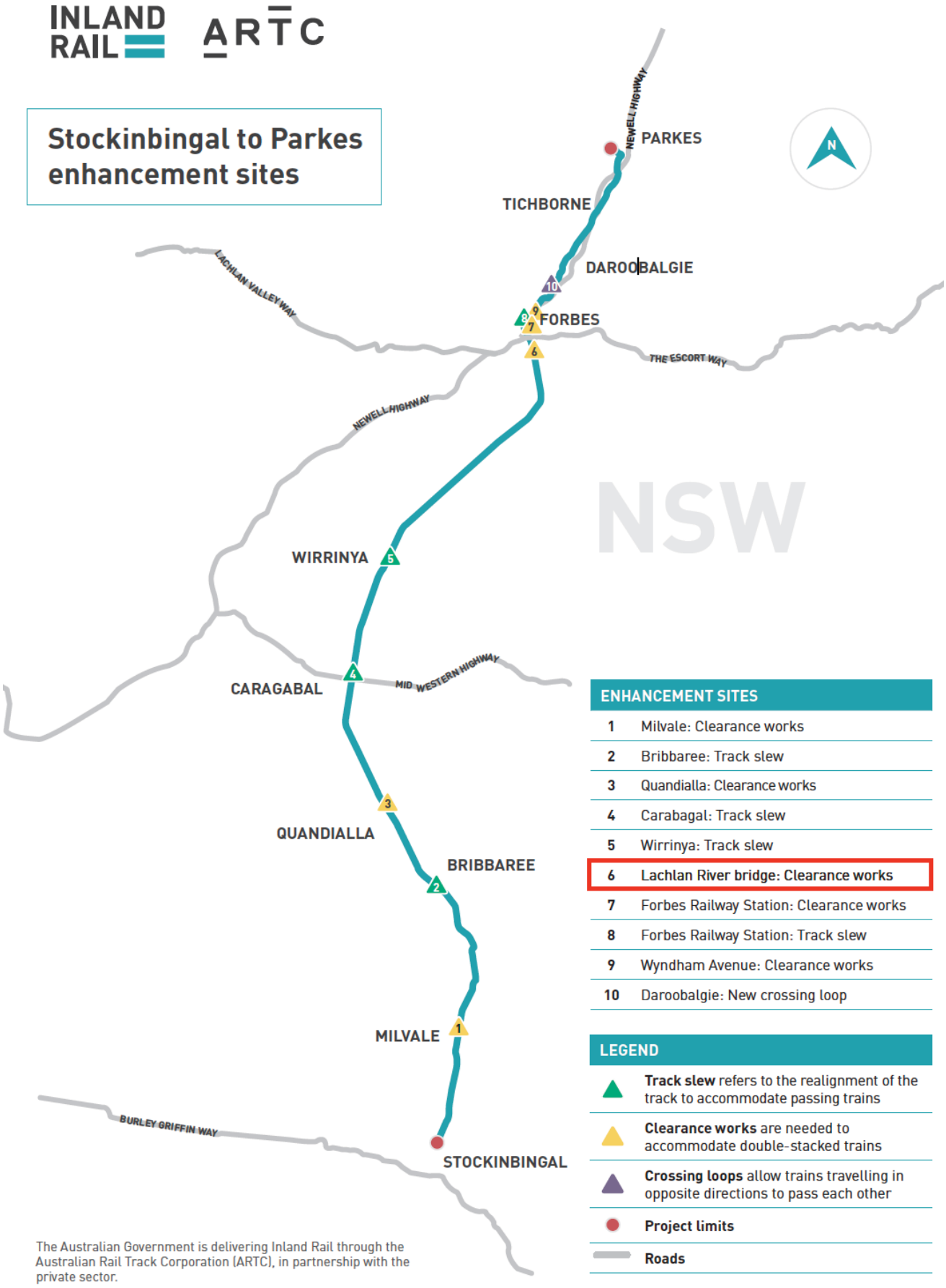

FIGURE 1.1 OVERVIEW OF THE STOCKINBINGAL TO PARKES ENHANCEMENT PROJECT

1.4 Purpose of the Review of Environmental Factors

The purpose of this REF is to:

- Describe the proposal
- Summarise the consultation work undertaken to date, and proposed future consultation with key stakeholders and the community
- Assess the likely impacts of the proposal on the environment, having regard to the provisions of Division 5.1 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act)
- Identify control measures to reduce the likely impacts of the proposal.

This REF has been prepared by WSP, on behalf of ARTC, in accordance with:

- Clause 228 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation)
- '*Is an EIS Required? Best Practice Guidelines' for Part 5 of the Environmental Planning and Assessment Act 1979*, *NSW* (NSW Department of Urban Affairs and Planning (DUAP), 1995)
- ARTC's Code of Practice for Environmental Impact Assessment of Development Projects in NSW, September 2005

For the purposes of this proposal, ARTC is the proponent and the determining authority under Part 5, Division 5.1 of the EP&A Act. The REF helps to fulfil the requirements of section 5.5 of the EP&A Act—that ARTC examines and considers, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The REF considers if an Environmental Impact Statement (EIS) or Species Impact Statement (SIS) is required for the proposal. The REF also considers the potential of the proposal to significantly impact a matter of national environmental significance (MNES) or the environment on Commonwealth land, in regard to the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) and considers the need to make referral to the Australian Government Department of Agriculture, Water and Environment (DAWE) for approval under the EPBC Act.

2. Proposal description

2.1 Overview and location

The proponent is seeking to modify the Lachlan River Bridge in Forbes, NSW, to provide the clearance required for double-stacked freight trains. The proposal site, shown in Figure 2.1, is located to the south of the Forbes township, approximately 2 km to the south-east of the Forbes Railway Station.

The existing bridge at the proposal site has a truss structure that spans the Lachlan River, as shown in Figure 2.2. The bridge was originally constructed in 1918, with the approach spans replaced in 1996. The height of the truss structure does not provide sufficient vertical clearance and sections of handrail on the bridge do not to provide sufficient horizontal clearance for double-stacked freight trains.

The proposal involves modifying the truss structure of the Lachlan River Bridge by removing metal sections from along the top of the structure and installing new angled frames to maintain structural integrity.

Ancillary works include adjustment of utilities on the bridge and establishing construction compounds, laydown areas, a crane pad and environmental controls. Patch painting would also be required where lead-based paint has been disturbed by the works.

Stockinbingal to Parkes Lachlan River Bridge Figure 2.1 Proposal Site

0 10 20 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 29/07/2021 Paper: A3
Author: WSP Scale: 1:500
Data Sources: ARTC, NSWSS

Existing railway
Local road
Track
Watercourse
Cadastre
Proposal site

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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FIGURE 2.2 EXISTING LACHLAN RIVER BRIDGE TRUSS STRUCTURE FROM THE SOUTH

2.2 Key components

The key components of the proposal are outlined in the following sections. The description of the proposal is based on the reference design and would be subject to detailed design.

2.2.1 Bridgeworks

The modification works to the bridge structure, as indicated in Figure 2.3 and Figure 2.4, include:

- Removing diagonal and horizontal sections from along the top of the truss structure including the diagonal bracing at each end
- Installing replacement sections along the top of the truss structure
- Installing six angled frames along the truss structure
- Strengthening of the underside of the bridge
- Making adjustments to short sections of existing handrail adjacent to the truss structure.

Installation of frames and strengthening the bridge is required to ensure the structural integrity of the bridge is not compromised due to removal of existing sections of the truss structure. All cutting and welds to the metalwork would be treated to protect them from corrosion. Patch painting would be completed on the bridge structure where lead-based paint is disturbed by the proposed work. No work is proposed to the track or existing bridge piers.

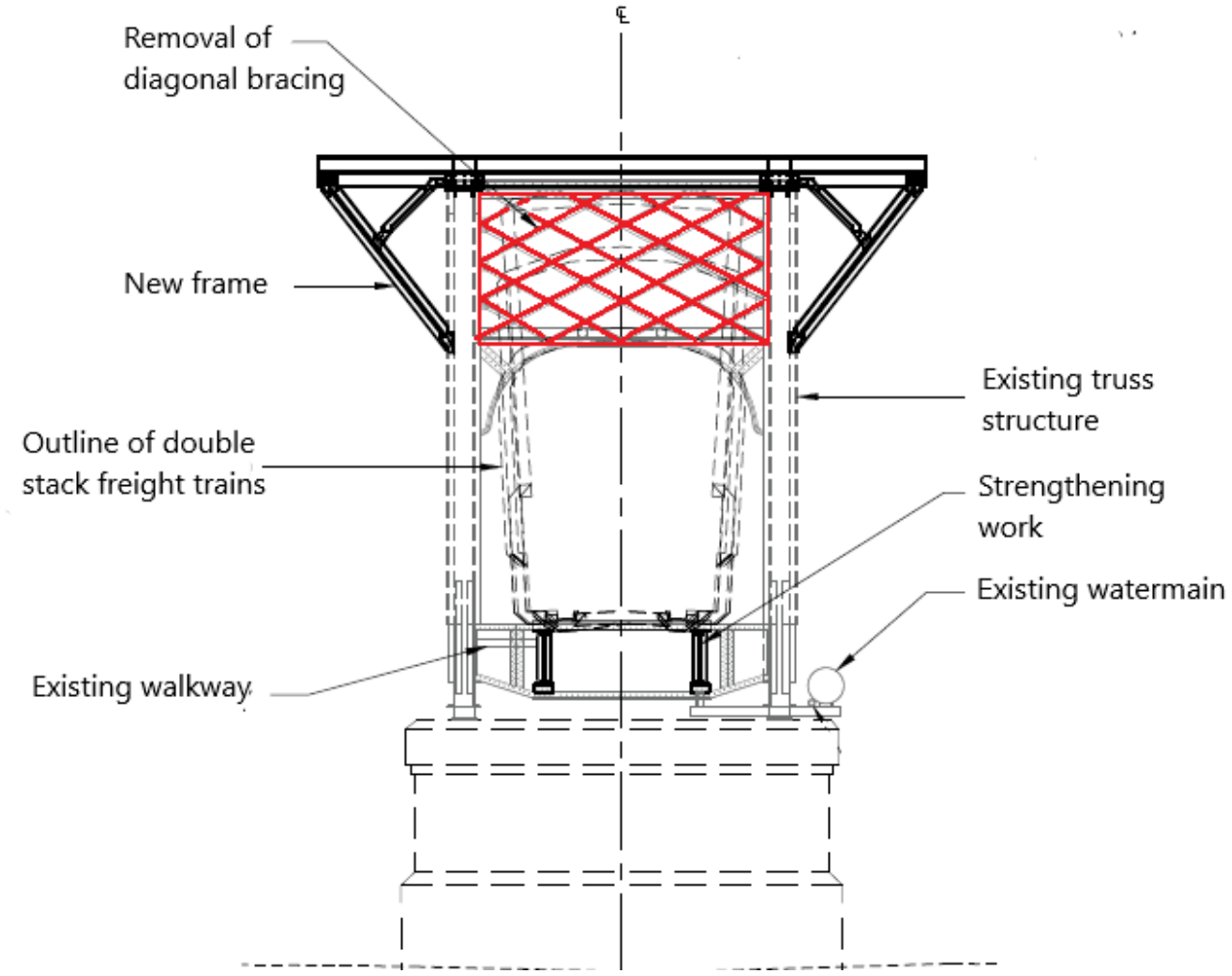

FIGURE 2.3 CROSS-SECTION OF THE PROPOSED WORKS ON THE BRIDGE STRUCTURE FOR THE BRIDGE (RED—REMOVED SECTIONS, BLACK—NEW SECTIONS AND GREY—RETAINED SECTION)

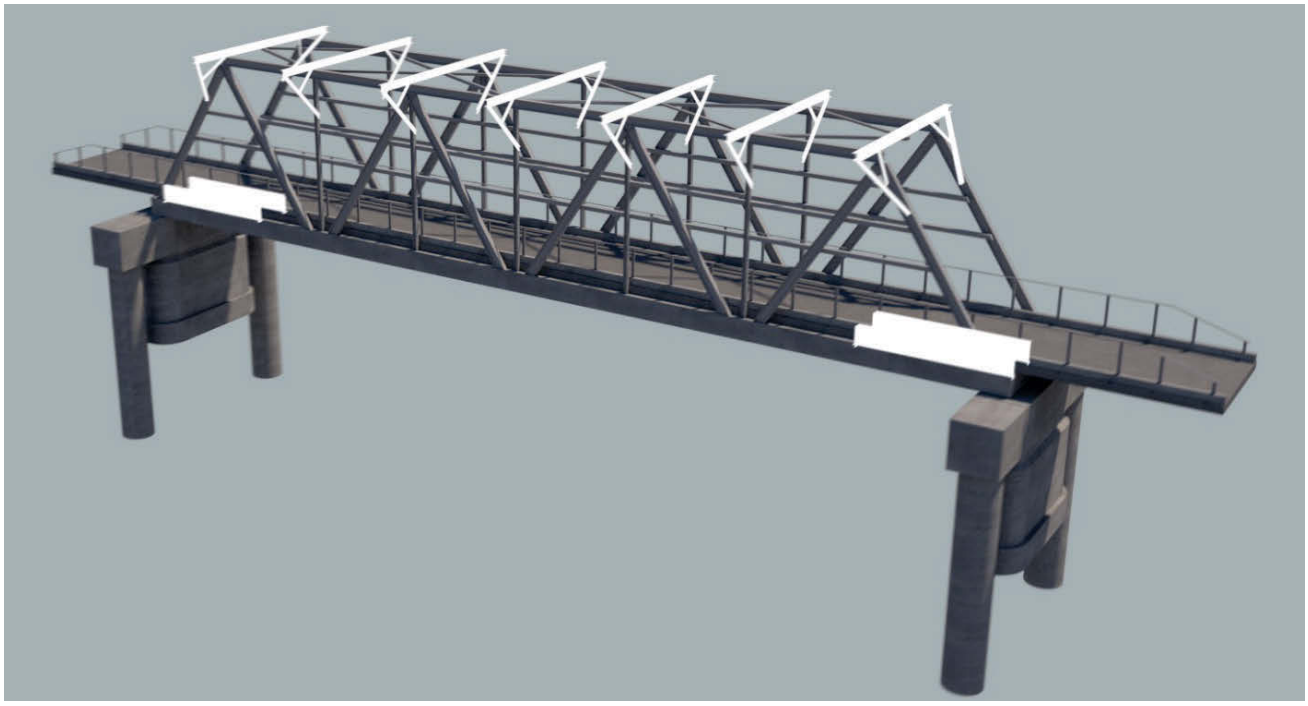

FIGURE 2.4 PROPOSED NEW ANGLED FRAMES AND HANDRAIL ADJUSTMENTS SHOWN IN WHITE ON A THREE-DIMENSIONAL IMAGE OF THE LACHLAN RIVER BRIDGE

2.2.2 Utilities

A water main and telecommunications cable are attached to the bridge. The supports on the existing water main attached to the bridge would be modified if required. Any works proposed to the water main would be undertaken in consultation with the utility owner, Forbes Shire Council. No permanent changes to the telecommunications cable are proposed.

2.3 Construction methodology

The indicative construction methodology for the proposal is outlined below. The proposed timing, methodology, resources and access arrangements would be refined prior to construction. A final construction methodology and program would be developed by the construction contractor based on the mitigation and management measures in this document, and the detailed design. Should the construction methodology change, ARTC would be consulted and would determine if additional assessment and approvals are required.

The activities required for construction of the proposal are identified below and discussed in the following sections:

- Site establishment and access
- Bridge works
- Demobilisation and rehabilitation.

No works are proposed within the Lachlan River, as works would be completed by setting up scaffolding on the bridge to facilitate access for workers.

2.3.1 Site establishment and access

Site establishment would involve:

- Implementing all ARTC rail site protection requirements (including the provision of site protection officers) prior to accessing the rail corridor
- Installing site fencing
- Establish the exclusion zone for the Lachlan River in accordance with Transport for NSW (TfNSW) requirements including set up of all navigation marks, buoyage and signage
- Hazardous material sampling
- Establishing environmental controls
- Protection of utilities
- Undertaking vegetation clearing or grubbing for site establishment
- Establishing site access locations and compound sites, including a laydown area (refer Figure 2.5)
- Establishing crane pad on north end of bridge (refer Figure 2.5).

2.3.2 Bridge works

The bridge works would involve:

- Installing scaffolding on the bridge and temporary bracing structure on the bridge to facilitate access
- Setting up of environmental and safety controls for removal of lead-based paint
- Drilling holes for new sections and attachments
- Applying coating to holes, welds and cuttings to protect from corrosion.
- Removing metal sections along the top of the truss structure
- Installing new sections and frames
- Install strengthening plates along underside of bridge
- Modifying handrail
- Removing temporary bracing
- Patch painting areas of lead-based paint disturbed during construction
- Removal of scaffolding.

2.3.3 Demobilisation and rehabilitation

Demobilisation works would involve:

- Removing the crane pad
- Decommissioning site compounds and laydown areas
- Removing all materials and waste from the proposal site
- Rehabilitating disturbed areas.

2.4 Plant and equipment

An indicative list of construction plant and equipment is provided. It is assumed that, in addition to the list, light vehicles and general equipment such as survey equipment, and hand tools would be used throughout the period of construction.

- Hi-rail elevated work platform
- Hi-rail crane truck
- Mobile crane (50–200 tonnes (t))
- Grinder
- Vacuum sheathed drills
- Self-contained abrasive blasting unit
- Temporary access scaffolding
- Rattle guns
- Grader
- Roller
- Welding equipment
- Small excavator
- Drilling equipment
- Painting equipment.

2.5 Site access and compounds

A crane pad and temporary compounds would be established to the north of the bridge. Access would be from Bathurst Street and Lower Bathurst Street, with some light vehicle access from Wandary Lane to the south. The locations of site access and compounds are shown in Figure 2.5.

The site compounds would be used for storage of material and equipment including safe storage of small amounts of:

- Fuel and mechanical fluids for plant and equipment (oils, degreaser, lubricants, coolants, etc.)
- Oxygen gas, acetylene (for welding activities) and liquid propane gas
- Safe-working rail detonators (for worksite protection).

2.6 Duration of works

Construction of the proposal is expected to last for around 12 weeks, with commencement in early 2024 (subject to ARTC determination of this REF).

2.7 Construction workforce

It is anticipated that construction of the proposal would require a peak workforce of approximately 15 personnel.

2.8 Working hours

Works would be undertaken during standard working hours, where practicable:

- 7.00 am to 6.00 pm Monday to Friday
- 8.00 am to 1.00 pm Saturday
- no work on Sundays or public holidays.

Due to access constraints and the requirement for a safe working site, some works may be undertaken outside standard working hours and during scheduled rail possessions. Any works required to be completed outside standard working hours would be identified by the contractor and need ARTC approval, and would be in accordance with ARTC's Environmental Protection License (EPL) 3142 (conditions O9.1 to O9.6). The affected community would be advised in accordance with the communication management plan.

2.8.1 Works during possessions

Bridge works (as described in Section 2.3.2) would be completed during 9- to 16-hour track possessions, which would occur up to five times a week. Timing of possessions is subject to the train timetables at the commencement of the work. Track possessions would include some out-of-hours work depending on scheduling.

2.9 Land requirements

The proposal site would predominantly occupy NSW Government-owned land, which is leased to ARTC. A small portion of the proposal site is on vacant land owned by Forbes Shire Council. This portion would temporarily be occupied during construction to facilitate safe access to the site.

No land would be permanently acquired for the proposal.

Stockinbingal to Parkes Lachlan River Bridge Figure 2.5 Proposed Location of Access, Site Compounds and Crane Pads

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 4/08/2021 Paper: A3
Author: WSP Scale: 1:2,000
Data Sources: ARTC, NSWSS

- KM post
- Existing railway
- Main road
- Local road
- Track
- Watercourse
- Cadastre
- Proposal site
- Temporary construction areas

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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2.10 Operation of the proposal

2.10.1 Train 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. Inland Rail, as a whole, would be operational once all 13 sections are complete, which is estimated to be in 2027.

Inland Rail would operate 24-hours per day and would initially accommodate double-stacked freight trains of up to 1,800 m in length and up to 6.5 m high. Train speeds would vary according to axle loads and range from 80 km to 115 km per hour.

It is estimated that S2P would be trafficked by an average of around 12 trains per day in 2027, increasing to 18 trains per day in 2039. This rail traffic would be in addition to the existing rail traffic using other lines that the proposal interacts with, as described in Section 3.3.

The Inland Rail trains would be a mix of bulk freight such as grain; non-bulk freight such as containers; and other general transport trains. Total annual freight tonnages would be about 15 million t in 2027, increasing to about 20 million t in 2039 (ARTC, 2020).

Train timetabling would be the responsibility of operators.

2.10.2 Maintenance activities

Standard ARTC maintenance activities would continue to be undertaken during operations. Typically, these activities would involve minor maintenance works, such as bridge inspections, through to major maintenance, such as reconditioning of track and topping up of ballast as required.

Works within the rail corridor would be undertaken in accordance with ARTC's standard operating procedures and EPL for operation of the rail corridor (EPL 3142), thereby reducing the potential for impacts on the health and safety of workers, visitors and users.

Business-as-usual rail maintenance activities by ARTC, such as raising and/or replacement of existing signal gantries, are excluded from this proposal.

2.11 Justification and options

2.11.1 Background

In 2006, the North South Rail Corridor Study undertaken by the Australian Government identified the 'far western corridor' through Parkes as the optimum corridor for a future Melbourne–Brisbane inland railway. In 2010, the Inland Rail Alignment Study looked at the far western corridor in detail and considered an exhaustive range of alternatives to develop the best route for Inland Rail. The study concluded that the existing Stockinbingal to Parkes alignment was suitable for Inland Rail due to its grade and generally good alignment.

In 2014, ARTC undertook consultation with freight forwarders, rail operators and customers to ascertain the key parameters necessary to achieve a shift from road to rail. As a result, ARTC developed the Inland Rail Service Offering, which provides for a transit time between Melbourne and Brisbane of less than 24 hours (around 10 hours less than the existing coastal route via Sydney), while achieving reliability, freight availability and cost that is competitive with road. The industry consultation process identified the S2P route as an important component of the Inland Rail service offering.

The Inland Rail Business Case (ARTC, 2015) defined the scope of the S2P route as an 'enhancement project' utilising approximately 170 km of existing track. As an enhancement project, S2P optimised the use of existing rail infrastructure and required only minor clearance works to enable double-stacked freight trains and some capacity enhancement with new crossing loops.

2.11.2 Strategic need for Inland Rail

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

As noted in the *Australian Infrastructure Audit*, '*Rail offers an alternative to road transport and societal benefits in terms of lower emissions, reduced road congestion and increased safety per tonne kilometre, particularly over*

longer distances or when carrying heavy goods' (Infrastructure Australia, 2015). Infrastructure Australia evaluated Inland Rail and identified it as having long-term benefits to potential users and the broader economy.

In summary, Inland Rail is needed to:

- Respond to the growth in demand for freight transport
- Address existing freight capacity and infrastructure issues
- Meet the demand for transport of non-bulk manufactured product.

2.11.2.1 Growth in freight demands

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

The *Australian Infrastructure Audit* notes that:

- The national land freight task is expected to grow by 80 per cent between 2011 and 2031
- Demand for freight rail infrastructure is projected to grow; in particular, for resource bulk commodity haulage in WA, Queensland and NSW
- Freight rail would need to play a growing role in the movement of goods between ports and inland freight terminals, and in the movement of containerised and general freight over longer distances.

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

Australia's east coast comprises 79 per cent of the country's population, 78 per cent of Australia's national employment and generates 75 per cent of the nation's gross domestic product (GDP). With the population estimated to grow by 60 per cent over the next 40 years, increasing pressure would be placed on freight infrastructure and services (ARTC, 2015).

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

2.11.2.2 Existing capacity and infrastructure issues

The current rail connection between Melbourne and Brisbane, via Sydney, cannot offer the transit times and reliability required by industry. This is largely a function of poor rail alignments and capacity constraints, particularly on the section between Sydney and Brisbane, and delays on freight transiting the Sydney metropolitan area (Infrastructure Australia, 2016). Travel-time reliability is poor as a result of the priority given to passenger services, freight transit curfews in the Sydney metropolitan area, and substandard rail alignments elsewhere. Limited capacity during morning and afternoon passenger peaks restricts freight movements at these times (TfNSW, 2013).

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

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

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

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

- The existing Sydney–Brisbane coastal route is anticipated to reach capacity by 2052
- Rail efficiency and service quality are inadequate and passing on higher costs to consumers

- Inadequate rail services are also encouraging a shift to road freight causing increased congestion, maintenance, safety and environmental issues for roads and highway
- Priority is given to passenger modes over freight modes in urban transport.

2.11.2.3 Key benefits of inland rail

Inland Rail would provide the following key benefits:

- Boost the Australian economy—Inland Rail is expected to boost Australia's GDP by $16 billion over the next 50 years
- Create jobs—it is expected to create up to 16,000 new jobs at the peak of construction, and an average of 700 additional jobs per year over the entire period
- Provide better access to and from our regional markets—it would make it easier to connect our farms, mines, cities and ports to domestic and international markets. Two million t of agricultural freight would switch from road to rail, with a total of 8.9 million t of agricultural freight more efficiently diverted to Inland Rail
- Reduce costs—rail costs for inter-capital freight travelling between Melbourne and Brisbane would be reduced by $10 per tonne
- Offer better transit time and reliability—Inland Rail offers less than 24-hour transit time between Melbourne and Brisbane terminals and 98 per cent reliability matching current road levels
- Improve road safety—up to 15 serious crashes involving fatalities and serious injuries would be avoided every year
- Improve sustainability and amenity for the community—carbon emissions would be reduced by 750,000 t per year and truck volumes would be reduced in more than 20 of our regional towns (based on a 2050 estimate)
- Provide an alternative north–south freight link—Inland Rail would provide a second link between Queensland and the southern states, making Australia's national freight rail network less vulnerable to disruptions.

2.11.2.4 Consistency with Commonwealth, state and regional strategies and plans

The strategic context of Inland Rail has been influenced by the outcomes of a number of strategic plans for transport, development and freight that have been prepared at national, state and regional levels. The Inland Rail program is consistent with elements of the following key strategies (note this list is not exhaustive), as described in Table 2.1.

TABLE 2.1 CONSISTENCY WITH NATIONAL, STATE AND REGIONAL PLANNING POLICIES AND STRATEGIES

Policy	Relevance to the proposal
National	
Australian Infrastructure Plan (Infrastructure Australia, 2021)	This plan sets out a number of projects and initiatives identified as priority infrastructure investments that Australia needs over the next 15 years. The 2019 Priority List identifies Inland Rail as a 'Priority Project.' Priority Projects are potential infrastructure solutions that address a nationally significant problem or opportunity and have been positively assessed by the Infrastructure Australia Board. The plan identifies the connectivity benefits of Inland Rail for certain commodities and the need to take advantage of these benefits to support business and economic growth.
State of Australia's Cities 2014–2015 (Department of Infrastructure and Regional Development, 2015)	The State of Australian Cities reports bring together current research and data to present a comprehensive picture of how Australia's cities are evolving, to strengthen the knowledge base used to develop policy. The 2014–2015 report observed that there is more demand for transport in Australia, including freight, than ever before. Inland Rail provides a response to some of the issues raised in this report, as it aims to: ▸ Provide a step-change improvement in rail service quality in the Melbourne to Brisbane corridor to deliver a freight rail service on the east coast that is competitive with road ▸ Improve road safety and ease congestion by moving the increased freight demand to the Inland Rail network. ▸ Move freight to the Inland Rail network to bypass bottlenecks on the congested metropolitan rail networks on the east coast, and free up train paths for other services on the coastal route.
Urban Transport Strategy (Infrastructure Australia, 2013)	The *Urban Transport Strategy*, *National Land Freight Strategy* and the *National Ports Strategy* form the key components of strategic planning for transport in Australia. The strategy acknowledges that road congestion has an impact on national productivity and economic activity, and that public transport systems influence the performance of urban roads and the

Policy	Relevance to the proposal
National Land Freight Strategy (Standing Council on Transport and Infrastructure, 2012) *National Ports Strategy* (Infrastructure Australia, 2011)	national freight systems. An aim of the strategy is to promote the best use of capacity on high-use roads. Inland Rail is consistent with this strategy, as it aims to: ▸ Improve road safety, ease congestion and reduce environmental impacts by moving freight from road to rail ▸ Bypass bottlenecks on congested metropolitan rail networks on the east coast, and free up train paths for other services on the coastal route.
National Freight and Supply Chain Strategy and National Freight and Supply Chain Action Plan (Transport and Infrastructure Council, 2019)	This strategy is a partnership between the Australian Government, state and territory governments, local governments and industry to drive efficient and sustainable freight logistics, balancing the needs of a growing Australian economy, with the quality of life aspirations of Australian people. Inland Rail is included on the map of key freight routes developed by the strategy, based on the route in the *National Land Freight Strategy Update Paper* (Infrastructure Australia, 2012). The map shows a single new national network to reflect the emphasis on potential future freight flows, freight (vehicle) connectivity, ports and settlements. Inland Rail supports the strategy by providing regional and remote parts of Australia with infrastructure capable of connecting regions and communities to major gateway.
National Ports Strategy (Infrastructure Australia, 2011)	The Council of Australian Governments (COAG) endorsed the *National Ports Strategy* in July 2012 as part of a collaborative approach to the future development and planning of Australia's port and freight infrastructure. The strategy identifies future infrastructure requirements of Australia's ports, including road and rail links to meet future demand, of which Inland Rail would form a part, by connecting key production areas in Queensland, NSW and Victoria with export ports in Brisbane and Melbourne.
Newell Highway Corridor Strategy (Department of Infrastructure Transport, Cities and Regional Development, 2019)	This strategy provides a 10-year roadmap of investment opportunities to ensure the Newell Highway corridor continues to serve the needs of its users in the longer term. Of particular importance, is the interdependency of the corridor with the Inland Rail Program, and how road and rail will work together to meet the growing freight demand and reduce costs for regional supply chains. The strategy identifies a holistic, multimodal view of freight transport that leverages the strengths of each mode (road and rail) as a key consideration for enhancing the overall efficiency of Australia's transport networks.
Regions 2030: Unlocking Opportunity (Australian Government, 2017)	This report sets out the Australian Government's vision and future directions for regional Australia towards 2030, with activity to be focused across five key areas including infrastructure. The report identifies high-quality, safe and efficient transportation as a key to regional Australia's connectivity and productivity, and identifies Inland Rail as a key investment initiative to connect the region to major global and domestic markets.
State	
State Priorities: NSW Making it Happen (NSW Government, 2015)	The NSW *State Priorities* were announced to guide the ongoing actions of the NSW Government across the state, and guide resource allocation and investment in conjunction with the NSW budget. Inland Rail particularly supports the priority of building a strong economy by creating jobs and increase connectivity of regional markets.
NSW Road Safety Strategy 2012–2021 (Transport for NSW, 2012)	This strategy set the direction for road safety in NSW and notes that heavy vehicles are often involved in serious road accidents. While they represent only 2.2% of registered motor vehicles and 7% of all motor vehicle travel, heavy trucks were involved in 17% of fatalities on NSW roads. Nearly 30% of fatal heavy vehicle crashes involved heavy vehicles from interstate. The proposal contributes to the strategy as it aims to improve road safety by moving freight from road to rail.
State Infrastructure Strategy 2018–2038 (NSW Government, 2018a)	This is a 20-year strategy, which identifies and prioritises the delivery of critical public infrastructure to drive productivity and economic growth. The 2018 strategy switches the focus from preceding years of developing an infrastructure project pipeline to achieving sustainable growth in NSW. The strategy acknowledges that Inland Rail would benefit the state's primary industries by optimising the movement of freight in regional NSW to ports and gateways in NSW, Queensland and Victoria. Inland Rail would also reallocate road space in key corridors to more sustainable transport modes.
NSW Freight and Ports Plan 2018–2023 (NSW Government, 2018b)	This plan is a call to action for government and industry to work together to make our freight system more efficient, more accessible, safer and more sustainable for the benefit of producers, operators, customers and communities across NSW. One of the goals of the plan is to improve rail freight access and flows, with a key action to support the delivery of Inland Rail to ensure the project optimises the movement of freight in regional NSW, and to ports and gateways.
NSW Future Transport Strategy 2056 (Transport for NSW, 2018a)	This strategy is an update to the 2012 *NSW Long-Term Transport Master Plan*, which guides NSW service and infrastructure investments. Inland Rail is identified in the *Future Transport Strategy* as a committed initiative for the next 10 years. The strategy identifies Inland Rail as

Policy	Relevance to the proposal
	an opportunity to provide for improved movements of freight to ports and provide relief for the coastal road and rail networks.
Regional	
Central West and Orana Regional Plan (DPIE, 2017)	The plan establishes a 20-year blueprint to grow the region's diverse and competitive economy and guide land use planning priorities and decisions. The Inland Rail program contributes to achieving one of the goals of the plan which is quality freight transport and infrastructure networks Inland Rail would achieve this by improving freight connections to markets and global gateways of Melbourne and Brisbane, and though enhancing freight rail links.
Mid-Lachlan Regional Economic Development Strategy 2018–2022 (NSW Government, 2018d)	This strategy identifies economic development opportunities that capitalise on the existing competitive advantages of the region in agriculture, mining and tourism. The Inland Rail Program supports the improvement in access to markets for agriculture, mining and manufacturing by investing in intermodal network resilience and reliability. In addition, the Inland Rail program provides support to tourism opportunities by encouraging a shift from road to rail freight improving congestion, safety and local amenity.
Forbes Community Strategic Plan 2018–2028 (Forbes Shire Council, 2018).	The Community Strategy Plan provides council, the community and other stakeholders with priority issues to address and goals for achievement in the longer term in the Forbes Local Government Area (LGA). One of the strategies to improve the economy is to leverage the Parkes intermodal hub and Inland Rail projects to foster economic growth within the shire.

2.11.3 Need for the proposal

The proposal forms an integral part of the wider Inland Rail Program, alongside other enhancement works at discrete sites along the rail corridor between Stockinbingal to Parkes. The proposal improves vertical clearance between the track and the Lachlan River Bridge to enable trains with double-stacked containers to pass safely along the existing track.

2.11.4 Options considered

2.11.4.1 Alternative Inland Rail options

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

The options assessed included:

- Reforms to delay or remove the need for infrastructure investment (relating to demand management, productivity enhancement or deregulation)
- Progressive road upgrades (continued investment in the national highway network in the north–south corridor to increase lane capacity)
- Upgrading the existing east coast railway, including investing in track duplication and passing loops to expand capacity
- Construction of an inland railway between Melbourne and Brisbane, bypassing Sydney.

Not developing Inland Rail would result in continued growth in the use of road for freight transport between Melbourne and Brisbane, particularly along the Newell Highway. In addition, road transport will be unlikely to meet the longer-term needs of Australia's freight task alone unless substantial additional investment is made (ARTC, 2015).

2.11.4.2 Proposal options considered

An options assessment report was completed in February 2021 for the Stockinbingal to Forbes project. The report identified two options to address the insufficient vertical clearance of the Lachlan River Bridge and meet the objectives of the proposal outlined in Section 1.3.1. A 'do-nothing option' was considered but as the proposal is needed to support the development of Inland Rail, this option was not progressed. The design options considered were:

- Modifications to the existing bridge
- Replacement of the bridge truss span with new concrete or steel spans.

Both options were assessed using Inland Rails' program-wide multi-criteria analysis (MCA). The MCA process is a robust methodology recognised as an industry standard. It has been widely used in Australia and internationally,

including being consistently applied across multiple Inland Rail projects. The purpose of the MCA is to assess each option against a set of criteria including: technical viability; safety; constructability and scheduling; environmental impacts; community and property impacts; operational approach; and stakeholder engagement.

The MCA process involves ARTC review and stakeholder engagement, including an options assessment workshop. The assessment and identification of the preferred option are presented in an options assessment report for the proposal (WSP, 2021a).

The assessment identified that the two options would perform similarly during operation, in regard to safety and ease of operation, as no changes to the track arrangement are proposed. The preferred option was the modification to the Lachlan River Bridge, as it provided the following superior outcomes:

- Reduced construction duration and complexity of construction activities
- Lower risk to worker safety during construction due to smaller scale of works and no in-river works
- Minimised environmental impacts including:
  - Smaller construction footprint reducing impacts to vegetation and the river banks
  - Avoidance of works within Lachlan River that may impact fish passage and aquatic habitat.
  - Avoidance of potential changes to flooding from greater changes to the bridge structure
  - Less resources, such as concrete and steel, required for construction
  - Less waste produced as demolition of bridge is not required
  - Reduced noise and visual impacts to receivers during construction
- Conservation of the locally heritage-listed Lachlan River Bridge
- Minimised impact to private property during construction due to a smaller construction footprint.

3. Statutory requirements

3.1 Commonwealth legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary Commonwealth environmental legislation and is administered by DAWE. It provides the legal framework to protect and manage nationally and internationally important values, including flora, fauna, ecological communities and heritage places defined under the Act as MNES.

The EPBC Act requires that proposed 'actions' that the proponent believes will, or may be likely to, significantly impact MNES, the environment of Commonwealth land, or the environment generally if they are being carried out by an Australian Government agency, must be referred to the Australian Minister for the Environment for assessment. If the Minister determines that a referred project is likely to have such an impact, then the project is a 'controlled action' under the EPBC Act, and the approval of the Minister would be required.

A search using the Protected Matters Search Tool (PMST) was undertaken on 6 May 2021 to determine the protected matters recorded under the EPBC Act within a 10-km radius of the site. This information, together with site inspections and surveys, was used to assess whether the proposal will have, or is likely to have, a significant impact on MNES, as outlined in Section 6.3, or if there is likely to be a significant impact to the environment generally or the environment on Commonwealth land. Based on this assessment, referral under the EPBC Act is not considered to be required; however, the proposal will be referred to the Australian Minister for the Environment for assessment to confirm the proposal is not a 'controlled action'.

3.1.2 Native Title Act 1993

The *Native Title Act 1993* (Cth) (Native Title Act) recognises that Aboriginal people have rights and interests to land and water, which derive from their traditional laws and customs. Native title may be recognised in places where Aboriginal people continue to follow their traditional laws and customs, and have maintained a link with their traditional country.

Native title is managed though native title claims, Indigenous Land Use Agreements (ILUA) or future act agreements. An ILUA (once registered on the Register of Indigenous Land Use Agreements) is a formal, binding agreement, negotiated between native title groups and other parties who use or manage the land and waters resources.

The National Native Title Tribunal Register of Native Title Claims, Unregistered Claimant Applications register, and Register of Indigenous Land Use Agreements were searched on 14 April 2021 for the proposal. No native titles, native title claims or ILUAs were identified for the LGA.

3.2 New South Wales Legislation

3.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act provides a framework for the assessment of environmental impacts and a means to consent and approve development and infrastructure in NSW. Division 5.1 of the EP&A Act applies to activities that do not require development consent.

Clause 79 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) (discussed further below) states that development for the purpose of a 'railway or rail infrastructure facilities', which would include the proposal can be undertaken without development consent where carried out by or on behalf of a 'public authority'.

ARTC is identified as a 'public authority' under Clause 5 of the ISEPP. In addition, clause 277 of the EP&A Regulation prescribes ARTC as a 'public authority' so as to make it a 'determining authority' for specified development for rail infrastructure that is permissible without development consent.

Notwithstanding, Section 5.5 of the EP&A Act requires ARTC, as a determining authority, to examine and take into account, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

If an activity is '*likely to significantly affect the environment (including critical habitat) or threatened species, populations or ecological communities, or their habitats*', as defined in Section 5.7 of the EP&A Act, further assessment such as a SIS or EIS would be needed to assess the significance of such impacts . If an EIS were to be required, then the proposal would become State significant infrastructure (SSI) and the approval of the NSW Minister for Planning and Public Spaces would be required under Division 5.2 of the EP&A Act.

An assessment of the proposal having, regard to Clause 228 factors under the EP&A Regulation 2000, is included in Chapter 6. The assessment concludes that the proposal is not likely to have a significant impact on the environment, threatened species, populations or ecological communities, or their habitats and therefore should be assessed under Division 5.1 of the EP&A Act.

ARTC is required, under Part 14 Division 8 of the EP&A Regulation, to assess development that is subject to Division 5.1 of the EP&A Act in accordance with the code of practice approved by the Planning Minister under that Division. ARTC's *Code of Practice for Environmental Impact Assessment of Development Proposals* in NSW was approved by the Minister in 2005. The proposal has been assessed in this REF in accordance with that code.

3.2.2 Protection of the Environment Operations Act 1997

The underlying objective of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) is to reduce pollution and manage the storage, treatment and disposal of waste in NSW. The POEO Act establishes the procedures for issuing licences for environmental protection on aspects such as waste, air, water and noise pollution control, and outlines the required notification.

Section 48 of the POEO Act requires that the occupier of premises at which a 'scheduled activity' (i.e. an activity specified in Schedule 1 of the POEO Act) is being carried out must hold an environment protection licence (EPL) for that activity. Schedule 1 of the POEO Act specifies three rail-related scheduled activities:

- Railway infrastructure construction
- Railway infrastructure operations
- Rollingstock operations.

The existing rail corridor on which the proposal is to be carried out is owned by the NSW government and leased to ARTC. ARTC currently holds EPL3142 for 'railway infrastructure operations' for that rail corridor and other corridors in the ARTC NSW rail network. The proposal does not trigger the need for a separate EPL for 'railway infrastructure construction' as the proposal does not meet the definition under Clause 33 of Schedule 1 to the POEO Act. The proposal would be carried out as a railway maintenance activity, in accordance with EPL3142, where applicable.

3.2.3 Other key legislation

Table 3.1 is a summary of other key NSW legislation that may be applicable to the proposal.

TABLE 3.1 OTHER KEY STATE LEGISLATION

Legislation	Objective of Legislation	Relevance to the proposal
Aboriginal Land Rights Act 1983 (NSW)	The purposes of this Act are to provide land rights for Aboriginal persons and representative Aboriginal Land Councils in NSW. Clause 36 of the Act identifies claimable Crown land on which a claim for land on its own behalf, or on behalf of one or more LALC, can be made.	The proposal does not include permanent acquisition of any land (Section 5.10.5). The Act does not apply to the proposal.
Biodiversity Conservation Act 2016 (NSW) (BC Act)	The BC Act provides for a strategic approach to conservation in NSW, while supporting improved farm productivity and sustainable development. It includes provisions for a risk-based assessment of native plant and animal impacts, and a Biodiversity Assessment Method (BAM) 2020 to assess the impact of actions on threatened species, threatened ecological communities and their habitats, and the impact on biodiversity values. The BC Act sets out the assessment framework for threatened species and ecological communities for activities subject to assessment under the EP&A Act and, as part of this, provides a scheme for offsetting impacts of development, including via the acquisition of offset credits.	The provisions of the BC Act have been considered as part of the Biodiversity Assessment Report (BAR) (Appendix D) for the proposal, which is summarised in Section 5.3. The assessment concludes that the proposal would not have a significant impact on biodiversity.

Legislation	Objective of Legislation	Relevance to the proposal
Biosecurity Act 2015 (NSW) (Biosecurity Act)	The Biosecurity Act aims to manage diseases and pests that may cause harm to human, animal or plant health, or the environment. The Act provides the regulatory controls and powers to manage pests and noxious weeds in NSW and introduces the legally enforceable concept of a General Biosecurity Duty.	Biosecurity risks from the proposal are summarised in Section 5.3. The provisions of the Biosecurity Act have been considered as part of the BAR (Appendix D) for the proposal.
Contaminated Land Management Act 1997 (NSW) (CLM Act)	The CLM Act establishes the process for investigating and, where required, the remediation of contaminated lands that pose a risk to human health and the environment.	Considerations of the provisions and requirements of the CLM Act are in Section 5.8. No remediation is proposed.
Crown Land Management Act 2016 (NSW)	The *Crown Land Management Act 2016* provides for the control and management of Crown land within NSW. The Act provides a decision-making framework for the management and use of Crown land.	The proposal is partially located over the Lachlan River, which is Crown land. The Crown lands division in the DPIE would be notified of the proposed works. Land use, including a discussion on Crown land, is summarised in Section 5.10.5.
Dangerous Goods (Road and Rail Transport) Act 2008 (NSW)	The Act regulates the transport of substances that can harm people, property and the environment. It provides the EPA with assessment control mechanisms for chemicals and chemical waste.	Dangerous goods would be transported along the operational rail line (Section 5.10.6). Inland Rail would be operated in accordance with this Act.
Fisheries Management Act 1994 (NSW) (FM Act)	The FM Act aims to conserve, develop and share the fishery resources of the state for the benefit of present and future generations. Section 201 of the FM Act requires that approval is required from the Minister of Agriculture prior to carrying out dredging or reclamation of water land. A permit may be required under Section 219 of the FM Act for any works that could result in the temporary or permanent blockage of fish passage. A licence must also be sought under Section 220ZW of the FM Act for a proposed action if it is likely to have a significant effect on threatened species, populations or ecological communities or their habitat, or if the action is on land that is critical habitat.	The Lachlan River is mapped as Key Fish Habitat and one endangered ecological community (EEC) listed under the FM Act occurs in the study area, the lower Lachlan River aquatic ecological community, as described in Section 5.3; however, the proposal does not involve instream works and would not result in any direct impact on this community. Potential indirect impacts can be mitigated and are unlikely to be significant. No dredging or reclamation work is proposed in water land. No approvals are required of the proposal under the FM Act.
Heritage Act 1977 (NSW)	The purpose of this Act is to conserve environmental heritage, which includes places, buildings, work, relics, movable objects, and precincts of State or local heritage significance. Natural, cultural and built heritage is protected under this Act and it is an offence to harm a protected item. Among other things, the Act provides the listing of state heritage places and items; requirements for approval to harm any listed places or items; requirements for a permit to harm any relics; and obligations for various government instrumentalities (including ARTC) to maintain their own heritage registers and manage items on those registers.	The proposal includes works to the Lachlan River Bridge, which is listed as a local heritage item in Schedule 5 of the *Forbes Local Environmental Plan 2013* (refer to Section 5.2 and the Statement of Heritage Impact in Appendix F). Lachlan River Bridge is not listed on the NSW State Heritage Register. Accordingly, it is not necessary to consider whether an approval is required under the *Heritage Act 1977* for the proposal. Lachlan River Bridge is also not included in ARTC's, RailCorp's or TfNSW's heritage register under Section 170 of the *Heritage Act 1977*.
Marine Safety Act 1998 (NSW)	The *Marine Safety Act 1998* provides for the safe operation of vessels in ports and other waterways, and promotes the responsible operation of vessels. Section 11 of the Act provides that the Minister for Transport and Roads may prohibit or regulate the operation of vessels in navigable waters by a notice published in the Gazette or displayed in or in the vicinity of those waters.	The proposal involve works over the Lachlan River, which is a navigable waterway; therefore, TfNSW approval is required in accordance with the Act. During construction, waterway access beneath the Lachlan River Bridge would be restricted in accordance with TfNSW requirements, as described in Section 5.7.

Legislation	Objective of Legislation	Relevance to the proposal
National Parks and Wildlife Act 1974 (NSW) (NPW Act)	The NPW Act provides for the control and management of all national parks, historic sites, nature reserves, wetlands and other state reserves. It also provides for the protection of 'Aboriginal objects' and 'Aboriginal places'. Section 86 of the Act lists offences relating to the harming or desecrating of Aboriginal objects. If any identified Aboriginal object or Aboriginal place may be harmed in the course of the proposal, an approval under Sections 87(1) and 90(2) of the NPW Act will be required.	No national parks, historic sites, nature reserves, wetlands and other state reserves are within, or in proximity to, the proposal site. Considerations of the provisions and requirements of the NPW Act is in: ▸ The Aboriginal Due Diligence Report (Appendix G) and in the assessment of Aboriginal heritage in Section 5.3 ▸ The assessment of land use and property in Section 5.10.5.
Native Title (NSW) Act 1994	The *Native Title Act 1994* (NSW) sets the obligations from the Commonwealth *Native Title Act 1993* (Cth) into state law. Part 3 of the Act confirms state ownership of all natural resources; rights to use, control and regulation of the flow of water; existing fishing access rights under state law; as well as existing public access to and enjoyment of waterways, coastal waters, beaches and areas that are public places.	A search of the National Native Title Tribunal found there are currently no registered native titles, claims, applications or ILUAs applicable to the proposal site; there is also no current or proposed agreements. Assessment of land use and property is in Section 5.10.5.
Roads Act 1993 (Roads Act) (NSW)	Section 138 of the Roads Act requires consent to be obtained prior to disturbing or undertaking work in, on, or over a public road or connecting another road to a public road. Clause 5(1) of Schedule 2 of the Roads Act exempts public authorities for this requirement, except in relation to work on or over classified and Crown road but that exception does not apply to ARTC.	The proposal does not involve direct works to any roads; however, the proposal site comprises a small section of the Bathurst Street road reserve, which would be occupied during construction; therefore, approval under Section 138 of the Act would be required from Forbes Shire Council. Traffic impacts are described in Section 5.7.
Water Management Act 2000 (WM Act) and *Water Act 1912* (Water Act)	The WM Act and Water Act control the extraction and use of water, the construction of works such as dams and weirs, and the carrying out of activities in or near waterways in NSW. The provisions of the WM Act are being progressively implemented to replace the Water Act. Approvals under the Water Act are required where water sharing plans (WSPs) do not apply. Sections 89 and 91, respectively, of the WM Act require persons to obtain water use approvals for extraction of water from specified sources and to carry out specified controlled activity at a specified location in or under waterfront land. Waterfront land is defined as within 40 m of both sides of a river, lake or estuary. Works requiring approval under the Act include construction, vegetation removal, deposition of material or any other works that may affect the flow of the water within the watercourse.	Extraction from bores and surface water is not anticipated to be required for the proposal. Relevant licences and approvals would be sought if required. The proposal involves works over a Lachlan River and within waterfront land; however, under schedule 4 of the Water Management (General) Regulation 2018, ARTC is exempt from requiring a controlled activity approval. Further assessment of water use and works on waterfront land are described in Section 5.5.
Waste Avoidance and Recovery Act 2001 (NSW) (WARR Act)	The WARR Act is aimed at minimising the consumption of waste resources and to control the management and disposal of any waste materials onsite. It promotes the waste hierarchy to avoid resource consumption and implement resource recovery in the form of material reuse and recycling in preference to waste disposal. The WARR Act acknowledges that certain material present either human or environmental risk, requiring classification, treatment and disposal of in accordance with specific waste management provisions.	The proposal would generate waste during the construction phase. The principles of the waste management hierarchy and other relevant waste management requirements would be implemented onsite. Further assessment of waste generation is in Section 5.6.

3.3 Environmental planning instruments

3.3.1 State Environmental Planning Policy (Infrastructure) 2007

The ISEPP guides the delivery of key infrastructure development across the state, including rail infrastructure facilities.

Clause 79(1) permits development for the purpose of a 'railway or rail infrastructure facilities' to be carried out on any land by or on behalf of a public authority without development consent.

Clause 78(1)(a) defines 'rail infrastructure facilities' to include 'railway tracks, associated track structures, cuttings, drainage systems, fences, tunnels, ventilation shafts, emergency access ways, bridges, embankments, level crossings and roads, pedestrian and cycleway facilities'.

ARTC is a public authority for these provisions and as the proposal falls under the definition of 'rail infrastructure facilities', development consent is not required.

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other NSW Government agencies prior to the commencement of certain types of development. Chapter 4 of the REF discusses the consultation undertaken with Forbes Shire Council and other relevant public authorities.

3.3.2 State Environmental Planning Policy (State and Regional development) 2011

The State Environmental Planning Policy (State and Regional Development) 2011 provides details of projects what will be considered State significant infrastructure (SSI) and critical SSI. Schedule 3 of the SEPP outlines that for development for the purpose of rail infrastructure to be considered SSI, it must have a capital investment value (CIV) of more than $50 million.

ARTC projects that are above $50 million in value and are 'development without consent' for the purpose of Division 5.1 of the EP&A Act, would conform to the definition of an SSI.

As the proposal has a CIV below $50 million and is unlikely to significantly affect the environment, it is not considered SSI; therefore, the proposal has been assessed under Division 5.1 of the EP&A Act.

3.3.3 Other applicable SEPPs

Table 3.2 is a summary of other relevant SEPPs considered for the proposal.

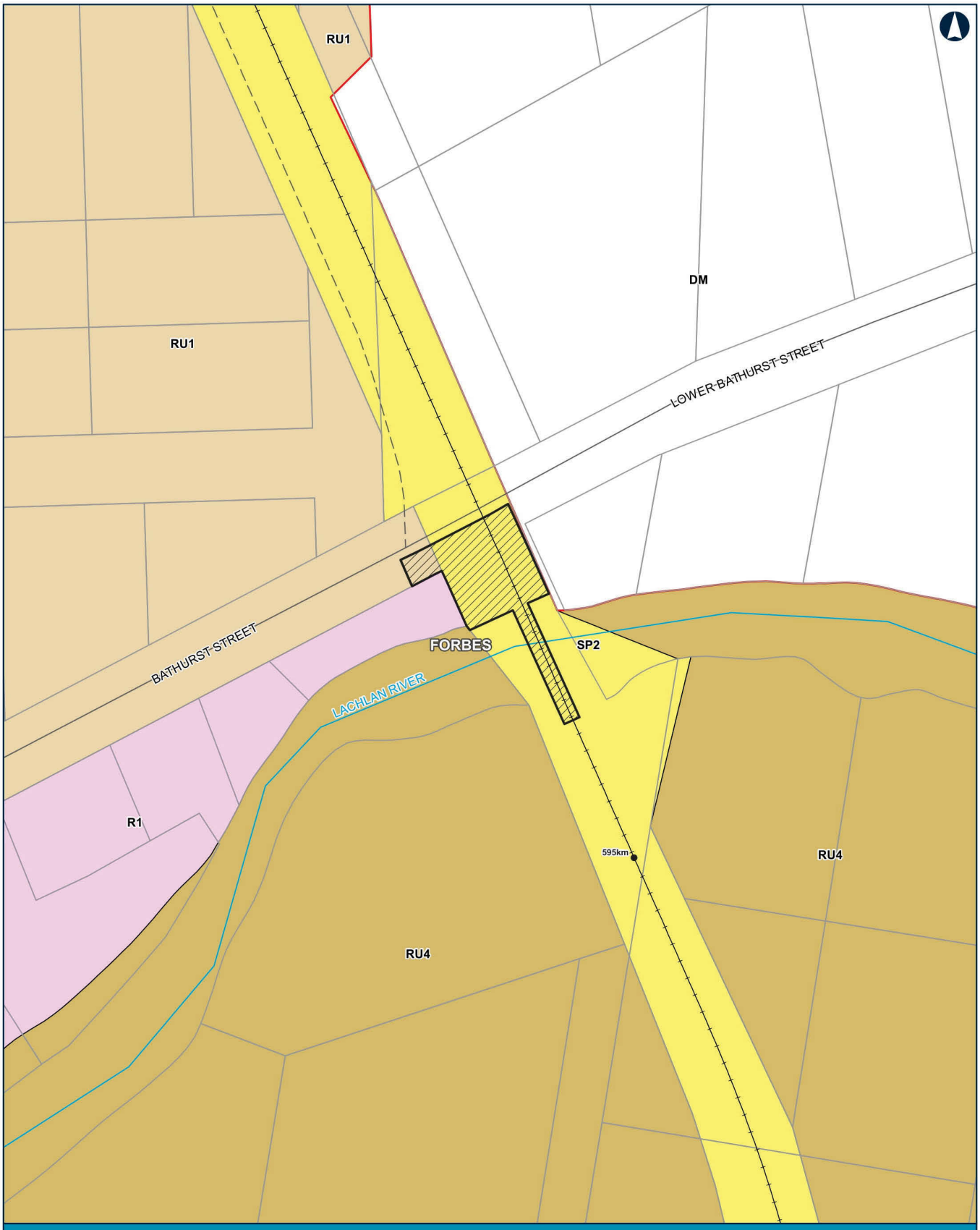
TABLE 3.2 CONSIDERATION OF OTHER SEPPS

SEPP	Objective/aims	Relevance to the proposal
SEPP (Koala Habitat Protection) 2020 and 2021	The SEPP aims to encourage the conservation of areas of natural vegetation that provide habitat for koalas to support permanent free-living population over their present range and reverse the current trend of koala population decline. The principles of the Koala SEPP are to: ▸ Help reverse the decline of koala populations by ensuring koala habitat is properly considered during the development assessment process ▸ Provide a process for councils to strategically manage koala habitat through the development of koala management plans.	The Koala Habitat Protection SEPP 2021 reinstates the policy framework of SEPP Koala Habitat Protection 2019 to specific local government areas (LGAs). For the Forbes LGA, the Koala SEPP 2021 does not apply to land zoned RU1, RU2 or RU3; therefore, Koala Habitat Protection SEPP 2020 continues to apply in these areas. A small portion of the proposal site outside the rail corridor is zoned RU1. In accordance with ISEPP, the proposal is permissible without consent and can be assessed under Division 5.1 of the EP&A Act. Subsequently the Koala Habitat Protection SEPP 2020 and 2021 are not applicable to the proposal as they are relevant to development applications. Notwithstanding, an assessment of potential impacts to biodiversity from the proposal has been considered.
SEPP 55—Remediation of land	The object of this policy is to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.	Clause 7 requires authorities to consider whether land proposed for development is contaminated, and whether it is suitable (or can be made suitable) for development. Consideration of contamination in the proposal site is in Section 5.8.

3.3.4 Local Environmental Plans

The proposal is in the Forbes LGA, predominantly on land zoned SP Infrastructure—Railway, activities under the Forbes Local Environmental Plan 2013 (Forbes LEP). A small portion of the proposal site to be occupied during construction is zoned RU1—Primary Production (see Figure 3.1); however, it is part of the road reserve.

In accordance with ISEPP, local planning provisions do not apply where they impose controls that are inconsistent with ISEPP; however, the LEP is still relevant in identifying land use objectives, potential land use impacts and planning policy conflicts. The proposed works comply with objectives of the infrastructure zoning of the Forbes LEP as it is for railway infrastructure.



Stockinbingal to Parkes Lachlan River Bridge Figure 3.1 Land Zoning of the Proposal Site and Surrounds

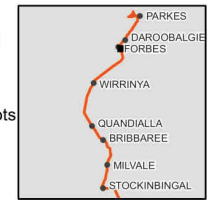
0 20 40 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 4/08/2021 Paper: A3
Author: WSP Scale: 1:1,500
Data Sources: ARTC, NSWSS

KM post
Existing railway
Local road
Track
Watercourse
Cadastre
Proposal site

Land zoning
Forbes Local Environmental Plan 2013
R1, General Residential
RU1 Primary Production
RU4, Primary Production Small Lots
SP2 Infrastructure
DM, Deferred Matter



INLAND RAIL ARTC

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

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3.4 Licences and permits

The proposal would require the following licences and permits:

- EPL 3142
- Rail possession authority issued by ARTC
- Section 138 approval under the Roads Act for works within the Bathurst Street road reserve
- Approval from TfNSW under the *Marine Safety Act 1998* (NSW) for construction work on navigable waters.

3.5 Confirmation of statutory position

Subject to the provisions of ISEPP, the proposal does not require development consent and is assessable under Division 5.1 of the EP&A Act. ARTC is the proponent and the determining authority for the proposal.

The proposal is not considered likely to significantly affect the environment; therefore, an EIS or SIS is not required.

This REF fulfils ARTC's obligation under Division 5.1 of the EP&A Act to examine and take into account, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The proposal is not likely to have a significant impact on MNES or Commonwealth land, nor is it likely to significantly affect any Commonwealth-listed threatened species, populations or ecological communities, or their habitats; however, the proposal will be referred to the Australian Minister for the Environment for assessment, to confirm the proposal is not a 'controlled action'.

4. Community and stakeholder consultation

4.1 Introduction

This chapter is a summary of the community and stakeholder consultation undertaken for the proposal. It includes details of the approach and objectives, consultation processes and activities, as well as community and stakeholder consultation undertaken to date. It also outlines future consultation activities and details of complaints management procedures.

4.2 Overall objectives

ARTC is committed to engaging with local communities in an open and collaborative manner, guided by the International Association for Public Participation (IAP2) core principals.

ARTC's objectives for consultation aim to:

- Inform community members and key stakeholders of the proposal
- Provide a process for feedback to be considered within the proposal design
- Ensure a stringent record-keeping process for stakeholder and community interactions
- Strengthen proposal trust by being transparent around issues that may have the greatest impact
- Consider potential risks and issues, to ensure we work with the local community to achieve the best possible outcomes.

4.3 Stakeholder identification

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

- Elected members of the parliaments of NSW and Australia
- Local councils
- Local business and industry
- Government agencies
- Landholders, residents and communities with the potential to be directly or indirectly impacted by the proposal
- Community and environment groups
- Traditional Owners
- Utility providers
- Representatives of neighbouring and related projects
- Local heritage committees and historical societies.

4.4 Consultation process and activities

Stakeholder consultation and community engagement has been an important part of the planning process to date. Initial stakeholder and community engagement for the proposal commenced in 2016.

4.4.1 Engagement approach

An Engagement Implementation Plan (EIP) has been developed for the S2P section, which includes the proposal. The aim of the EIP is to identify key stakeholders and inform the engagement with these stakeholders, including local councils, state government agencies, Aboriginal communities, and local communities. The EIP guides the timing of consultation and helps establish opportunities for stakeholders to provide feedback at timely junctures during planning and construction phases. Consultation will continue on a regular basis, as guided by this plan, and a summary of consultation activities to date is detailed in Section 4.4 and Section 4.5.

4.4.2 Infrastructure SEPP consultation

The ISEPP contains provisions for public authorities, such as ARTC, to consult with local councils and other government agencies prior to the commencement of development that would cause a disruption to relevant infrastructure. ARTC must take into consideration any responses received within 21 days of notification. Table 4.1 contains a checklist that details triggers for consultation in accordance with clauses 13–16 of ISEPP. Responses from consultation under the ISEPP are provided in Section 4.6.1.

TABLE 4.1 SUMMARY OF ISEPP CONSULTATION

ISEPP Clauses 13–16	Accountable agency or council	Impacts of the proposal on Infrastructure SEPP clause
Are the works likely to have a substantial impact on the stormwater management services that are provided by Council?	Forbes Shire Council	No
Are the works likely to generate traffic to an extent that will strain the existing road system in an LGA?	Forbes Shire Council	No
Will the works involve connection to a Council-owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system?	Forbes Shire Council	No
Will the works involve connection to a Council-owned water supply system? If so, will this require the use of a substantial volume of water?	Forbes Shire Council	No
Will the works involve the installation of a temporary structure on, or the enclosing of, a public place that is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?	Forbes Shire Council	Yes, a small portion of roadside Council land would be occupied during construction within the Bathurst Street road reserve for access. This is not likely to cause more than a minor or inconsequential disruption to pedestrian or vehicular flow, as described in Section 5.7. Forbes Shire Council was consulted on 14 May 2021.
Will the works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Forbes Shire Council	No
Are the works located on flood-liable land? If so, will the works change flooding patterns to a more than minor extent?	Forbes Shire Council State Emergency Services (SES)	Yes, the proposal site is located on flood-prone land; however, no changes to flooding patterns are anticipated, as described in Section 5.5, which is the notification trigger for Forbes Shire Council. Therefore, only the SES was consulted on 14 May 2021.
Is there a local heritage item (that is not also a state heritage item) or a heritage conservation item in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the item/area are more than minor or inconsequential? If works are likely to affect the heritage significance of a local heritage item that is not a state heritage item, in a way that is more than minor or inconsequential, the public authority must prepare a heritage impact statement and provide it to Council for its consideration.	Forbes Shire Council	Yes, the proposal involves works to the locally heritage listed Railway Bridge over Lachlan River (Lachlan River Bridge) under the Forbes LEP (I123). The proposal is likely to affect the heritage significance of a local heritage item that is not a state heritage item, in a way that is more than minor or inconsequential. A Statement of Heritage Impact (Appendix F) was submitted to Forbes Council on 12 August 2021. It assessed options and identified the preferred option to preserve heritage values and to mitigate heritage-related impacts. The heritage assessment is summarised in Section 5.2.
Are the works adjacent to a national park, nature reserve or other area reserved under the *National Parks and Wildlife Act 1974* (NSW)?	Department of Environment, Energy and Science	No
Are the works adjacent to a declared aquatic reserve under the *Fisheries Management Act 1994* (NSW)?	NSW Department of Primary Industries (DPI)	No

ISEPP Clauses 13–16	Accountable agency or council	Impacts of the proposal on Infrastructure SEPP clause
Are the works adjacent to a declared marine park under the *Marine Parks Act 1997*?	DPI	No
Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998* (NSW)?	Sydney Harbour Foreshore Authority	No
Do the works involve the development of a fixed or floating structure in or over navigable waters?	TfNSW	Yes, Lachlan River Bridge is considered navigable waters; therefore, TfNSW was consulted on 14 May 2021.
Are the works for the purpose of residential development, as educational establishment, a health services facility, a correctional facility or group home in bushfire-prone land?	NSW Rural Fire Service	No

4.5 Consultation during the development of the Review of Environmental Factors

4.5.1 General activities

During development of the proposal, ARTC has been engaging stakeholders, landholders, businesses and the community. To ensure stakeholders in the proposal area were kept informed, several communications tools were used, as outlined in Table 4.2.

TABLE 4.2 CONSULTATION AND COMMUNICATION TOOLS

CONSULTATION AND COMMUNICATION TOOLS	Respond to enquiries	Raise awareness	Notify and inform	Seek feedback
Toll-free community information line	✓			
Program email	✓		✓	✓
Inland Rail website	✓	✓	✓	✓
Printed information distributed to people on a mailing list and at community info sessions: ▸ Fact sheets ▸ Program information packs ▸ Mail outs ▸ Program maps.		✓	✓	
Stakeholder electronic newsletter		✓	✓	
Workshops	✓	✓	✓	✓
Community information sessions and staffed displays	✓	✓	✓	✓
Online community information sessions	✓	✓	✓	✓
Landholder face-to-face meetings	✓	✓	✓	✓
Stakeholder meetings and briefings	✓	✓	✓	✓
Submissions	✓			✓
Briefing papers to state and federal agencies	✓	✓	✓	
Local media: ▸ Advertisements ▸ Media releases.		✓	✓	
Program database (Consultation Manager)	✓		✓	
ARTC community/local investment		✓		
Electronic email blast	✓	✓	✓	✓

4.5.2 Consultation to date

The following is a summary of consultation activities undertaken for the wider S2P section of Inland Rail. The specifics of this proposal were discussed during each activity to support the development of the REF.

4.5.2.1 Community information sessions

- There have been 22 community information sessions and a regional supplier briefing held in and around Forbes since 2016. Overall feedback from the community is that they are supportive of the proposal.
- ARTC hosted a stall at the Forbes Show in September 2018 and 2019, the Parkes Elvis Festival in 2019 and the Forbes Council Contractor Information Night in 2021 to raise awareness and provide information on Inland Rail. Inland Rail staff met with over 800 people at these community events, and provided details on the proposal, and answered general enquiries. Attendees expressed interest in job opportunities, the scope of the work to be completed and timing of the works.
- In November 2019, February 2020 and December 2020, face-to-face community information sessions were held in Forbes to seek feedback on the early reference design of the proposal. During 2020, as a result of COVID-19 travel restrictions, online information sessions were also offered. Community information sessions were promoted via letterbox drop to adjacent landholders within 200 m of the proposal, local newspapers (Forbes Advocate, Grenfell Phoenix and Hilltops Chronicle) and via the Inland Rail website and social media channels. Forbes Shire Council also promoted the sessions in their weekly e-newsletter and social media channels. Key feedback from these sessions related to construction timing, traffic impacts, job opportunities and understanding the overall benefits of Inland Rail.
- Between March and June 2021, nine face-to-face and one online community information session was held with a total of 262 attendees. These information sessions were focused on providing updates on design progress, capturing community feedback, and informing the community of the next stages of the proposal. The information sessions were promoted via letterbox drop to all adjacent landholders within a 500-m radius of the proposal, as well as emailed to registered stakeholders the week prior to the event. Advertising included print and social media. Attendees at the sessions were generally in favour of the proposal, with key feedback relating to preference for the modification to the bridge and maintaining the heritage aspects, as well as minimising the construction footprint.
- In July 2021, due to COVID-19 restrictions, an online community presentation was held, and a recording of the presentation uploaded to the ARTC website. This was supported by advertising in the Forbes Advocate, Grenfell Phoenix and Hilltops Chronicle, and a letter of invitation with a project overview was sent to all residents within 500 m of the proposal. 16 people attended the online session, with key concerns raised in relation to construction impacts and timing, Aboriginal employment opportunities, and finding out more detail on the approvals and public exhibition process

4.5.2.2 Stakeholder consultation meetings and briefings

- Twenty-five face-to-face and online meetings have been held with Forbes Shire Council since July 2015. In October 2020, a monthly working group was formed with the council to collaborate on the proposal, including design, timing of construction works and employment benefits. Key concerns raised by Council include minimising the impacts to neighbouring landholders during construction and the future infrastructure requirements of the bridge, including the water main attached to the bridge.
- Twenty-five meetings have been held with representatives from TfNSW since 2016, including quarterly and monthly meetings, and design workshops to capture any feedback and concerns.
- Regular briefings have been given to local Members of Parliament and the Commonwealth Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) since May 2018, providing information on the scope of works and inviting further feedback on proposed activities, including this proposal. No major concerns were raised regarding this proposal by local members or DITRDC.
- The ARTC cultural heritage team provided updates on the proposal at the Wiradjuri Elders committee meeting and, separately, with Peak Hill members of the Wiradjuri Elders in November 2018.
- Briefings were held with the Forbes Business Chamber and the Forbes Men's Probus Club in November 2018, November 2019 and March 2021 to provide an overview of the project. The key issues discussed included timeframes around construction works and the potential opportunities for local businesses.
- Three meetings were held with the Peak Hill Local Aboriginal Land Council (PHLALC) between 2019 and 2021 to introduce the proposal, advise the upcoming activities and seek feedback on the proposal. Key feedback

provided by the PHLALC was ensuring that they are kept informed of construction activities and any potential employment training or opportunities.

- Briefings on the proposal were provided to councillors and the Mayor of Forbes Shire Council at their monthly Council meeting in November 2020 and in May 2021. The main area of concern for Council was traffic impacts during construction and operation of the Inland Rail. Council were pleased with the option to retain the bridge, rather than replace it completely.
- The local Emergency Services Management Committee were briefed in December 2020, March 2021 and April 2021 on the latest designs for the proposal. Ambulance NSW requested advance notice of any changes to traffic routes during and after construction, and preference not to close the level crossings north and south of the proposal site.
- In December 2020 and April 2021, Michael McCormack, Deputy Prime Minister (DPMO), was briefed on the progress of the proposal. No concerns or comments were raised by the DPMO.
- Consultation with members of the Forbes Heritage Society was undertaken in December 2020 regarding heritage impacts and mitigations to the bridge structure.

4.6 Results of consultation

All issues and comments are captured in a comments register and in Consultation Manager. Comments are then considered in the design development and the approvals. Any ARTC program-wide issues outside of the scope of the proposal are passed onto ARTC for management consideration.

Table 4.3 identifies topics raised by stakeholders.

TABLE 4.3 OVERVIEW OF KEY MATTERS OF CONCERN RAISED BY STAKEHOLDERS

Key topics raised	Government officials/ agencies	Impacted landholders	Aboriginal stakeholders	Wider community
Proposal scope	✓	✓		✓
Proposal design and features	✓	✓		✓
Operation of the proposal	✓	✓		✓
Land use and property	✓	✓	✓	✓
Flooding	✓	✓	✓	✓
Traffic and transport	✓	✓		
Noise and vibration		✓		✓
Air quality		✓		✓
Hazards and risks	✓	✓		
Visual amenity	✓	✓		
Biodiversity				✓
Heritage	✓	✓	✓	✓
Soils	✓		✓	
Waste management	✓			
Social and economic	✓	✓	✓	✓
Consultation	✓	✓	✓	✓

Stakeholders and community members spoke about a number of these topics in detail during the preparation of the REF. Table 4.4 outlines the topics and issues raised and where they are addressed in the REF.

TABLE 4.4 SUMMARY OF TOPICS RAISED RELATING TO THE REVIEW OF ENVIRONMENTAL FACTORS

Topic Category	Issues raised in relation to potential impacts to consider	Where addressed in the REF
Proposal scope	Understanding what the proposal involves.	Chapter 2
Proposal design and features	Understanding the key features of the design of the proposal, such as changes to the approach and structure of the bridge.	Chapter 2
Operation of the proposal	Concern about the increased number of trains and impact to bridge.	Section 2.2.1
	How many additional trains per day?	Section 2.10.1
Land use and property	Queries regarding temporary land use during construction and permanent land use during operation for immediate site neighbours.	Section 5.10.5
	Importance of not impacting the Forbes Shire Council water main attached to the bridge.	Section 2.2.2 and 5.10.6
	Request from Forbes Shire Council to future-proof the bridge in allowing for second water main in design of bridge modification.	Section 5.10.6
Hydrology	Queries about changes to local hydrology and flooding during construction, particularly to adjacent landholders.	Section 5.5
	Queries about riverbank recession as a result of construction works.	Section 5.5
Traffic and transport	Concern about provision for plant/vehicle parking during bridge construction.	Section 5.7
	Queries about travel routes during construction for school buses, local residents and emergency services, from local residents.	Section 5.7
	Queries about access under the Lachlan River Bridge during construction	Section 5.7
Noise and vibration	Construction noise and vibration.	Section 5.1.5.1 and 5.1.5.2
	Queries regarding extent of out-of-hours works.	Section 2.8 and 5.1.5.1
	Operation noise and vibration.	Section 5.1.5.3 and 5.1.5.4
Air quality	Construction air quality impacts.	Section 5.10.4
Hazards and risk	Concerns about road safety at road–rail interfaces due to increased number of trains during operation.	Section 5.7 and 5.10.6
	Preference for construction to be outside of bushfire season (summer).	Section 5.10.6
	Concern about operation of heavy machinery and safety of nearby residents.	Section 5.10.6
	Queries about management of lead paint on Lachlan River Bridge.	Section 5.10.6
Visual amenity	Loss of visual amenity during construction.	Section 5.4
	Loss of visual amenity due to bridge modification design.	Section 5.4
Biodiversity	Impacts on flora and fauna including the Lachlan River habitat.	Section 5.3
	Queries into extent of impact to local willow trees.	Section 5.3
Heritage	Queries about extent of impact to heritage value of bridge as a result of proposed modifications.	Section 5.2
Waste management	Appropriate management of waste.	Section 5.6
Socio-economic	Loss of amenity to residential receivers near the proposal during construction.	Section 5.5, 0, 5.7, 5.9, 5.10.5 and 5.10
	Request for employment opportunities to be advertised to local businesses and contractors for construction.	Section 5.9
	Impact to residents if utilities disrupted during construction—power, water, telecommunications.	Section 2.2.2 and 5.10.5
	Timing of works with other construction activities within the Forbes LGA exacerbating labour and accommodation shortages.	Section 5.9
	Impact to property value of nearby and adjacent residences.	Section 5.10.5
Consultation	Request for ongoing and timely consultation ahead of construction to local community, businesses and residents.	Section 4.5.2 and 4.8

4.6.1 ISEPP consultation results

As identified in Section 4.4.2, Forbes Shire Council, TfNSW and SES were consulted as required under the ISEPP. TfNSW provided a response on 30 August 2021 and Forbes Shire Council provided a response on 15 July 2021. The comments are summarised in Table 4.5. No response has been received from SES.

TABLE 4.5 SUMMARY OF TOPICS RAISED BY FORBES SHIRE COUNCIL AND TRANSPORT FOR NSW

ACCOUNTABLE AGENCY OR COUNCIL	ISSUES RAISED IN RELATION TO POTENTIAL IMPACTS TO CONSIDER	Where addressed in the ref
Forbes Shire Council	Assessment of the heritage impact to the Lachlan River Bridge is required. At this early stage, Council does not see any immediate issues regarding this structure.	Section 5.2
	Flood modelling, or alternative justification, should be included in the REF to ensure the additional structures will not impact a 1 in 100-year flood study.	Section 5.5
	Potential that a Controlled Activity Approval is required for the proposed works under the WM Act.	Section 3.2.3
Transport for NSW	Approval is required under the *Marine Safety Act 1998* (NSW) in relation to construction work, traffic-control facilities and other works on navigable waters.	Section 3.2.3 and 5.7
	The proposal requires formulation of a Marine Transport Management Plan, including provisions for an Exclusion Zone' prohibiting all vessels and persons from entering the zone and/or appropriate conditions of use, activity and/or operation within this zone.	Section 5.7

4.7 Aboriginal community consultation

Aboriginal consultation has been guided by the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 and the need to consult with Aboriginal people about the cultural significance of objects and/or places within the proposal footprint. Despite there being no objects, places or archaeological potential as described in Section 5.10.5. ARTC contacted the Peak Hill Local Aboriginal Lands Council (LALC) via formal letter correspondence on 18 June 2021 to invite feedback. This letter was followed up by phone and email on 27 July 2021. No formal response from the PHLALC was provided.

4.8 Ongoing consultation

Consultation with the community and key stakeholders would be ongoing in the lead up to, and during, construction of the proposal.

The objectives of the forward consultation program are the following:

- Ensure the community, stakeholders and all users of the navigable waterway have a high-level awareness of all processes and activities associated with the proposal
- Accurate and accessible information is made available
- Timely responses are provided for issues and concerns raised by the community
- Feedback from the community is encouraged and captured
- Opportunities for input are provided.

The 1800 phone number and proposal email address would 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 would continue. The Inland Rail website and social media platforms would also include updates on the progress of the proposal.

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

- Development of a Communication Management Plan detailing the complaints handling process
- Proposal email address
- 1800 phone number

- Updates to the Inland Rail website
- Targeted consultation and notifications such as letters, notifications, and face and to face communication
- Construction signage
- Complaints management system.

4.9 Complaints management

The construction contractor engaged to construct the proposal would be required to implement a complaints management procedure for the construction of the proposal. This must follow the requirements of ARTC's EPL 3142. This procedure would be defined within the Construction Environmental Management Plan, which the contractor would be required to prepare and have approved by ARTC prior to construction commencing. The process must also interface with ARTC Enviroline for reporting and EPL 3142 compliance purposes.

The complaints management procedure would include the following at a minimum:

- Contact details for a 24-hour program response line and email address for ongoing stakeholder contact throughout the proposal
- Provision of accurate public information signs while work is in progress
- Review construction staging and activities to identify opportunities, to minimise disruptions and impacts to community activities and functions
- Management of complaints in accordance with ARTC's emergency management procedure, specifically:
  - Details of all complaints received will be recorded
  - Verbal and written responses describing what action will be taken will be provided to the complainant within time limits (or as otherwise agreed by the complainant).

The current ARTC enquiry management and response times are detailed in Table 4.6. These will also apply in construction.

TABLE 4.6 ENQUIRY MANAGEMENT

Nature of enquiry	Response time
All enquiries	Initial acknowledgement within 24 hours
General or information enquiries	48 hours
Technical enquiries	Up to five working days
24-hour project response line	Immediate acknowledgement and response including for emergencies

5. Environmental assessment

This chapter outlines the environmental assessment methods, existing environment, potential impacts, and mitigation and management measures of each technical specialty. Key impacts of the proposal are assessed in Sections 5.1 to 5.9 and other potential impacts are described in Section 5.10. Cumulative impacts are considered in Section 5.11.

An environmental risk assessment was completed for the construction and operation phase of the proposal and is included in Appendix A. The risk assessment was used to inform the assessment in this chapter. A Construction Environmental Management Plan (CEMP) is proposed to be prepared and implemented to manage and mitigate environmental impacts during construction, based on the safeguards identified in this REF. A high-level outline of the CEMP is in Appendix B.

5.1 Noise and vibration

5.1.1 Introduction

This section is a summary of the *Stockinbingal to Parkes Rail Upgrade, Lachlan River Bridge, Noise and Vibration Impact Assessment* prepared by WSP (2021b) (NVIA Report) for the proposal. A copy of the NVIA Report is in Appendix E.

The NVIA Report was prepared with reference to the previous noise and vibration assessment for the *Inland Rail—Stockinbingal to Parkes, Lachlan River Bridge, Review of Environmental Factors, Report no. 2-0002-230-EAP-02-RP-2000, Version C, Lycopodium* (December 2018).

5.1.2 Legislation, policy, standards and guidelines

The NVIA has been undertaken in accordance with the following NSW Government guidelines:

- *Rail Infrastructure Noise Guideline* (RING) (EPA, 2013)
- *Interim Construction Noise Guideline* (ICNG) (DECCW, 2009)
- *Construction Noise and Vibration Guideline* (RMS, 2016)
- *Noise Policy for Industry* (EPA, 2017a)
- *Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation (DEC), 2006)
- *German Standard DIN 4150-3:1999-02, Structural vibration Part 3: Effects of vibration on structures* (German Institute for Standardisation,1999)
- *Inland Rail—Noise and Vibration Management Strategy* (01-9000-PE-P11-ST-003_5)
- *Inland Rail—Technical Specifications for Noise and Vibration Assessments* (0-9000-ENV-000-SP-0001).

5.1.3 Assessment methodology

5.1.3.1 Study area

The study area consists of noise catchment areas (NCA), which have been defined to classify groups of sensitive receivers that are likely to have a similar existing noise environment and experience similar impacts from the proposal (refer to Figure 5.1).

5.1.3.2 Assessment tasks

The noise and vibration assessment involved:

- Reviewing the existing operational noise and vibration assessment previously completed for the proposal, and documented in the 2018 NVIA
- Identifying noise and vibration sensitive receivers
- Identifying existing (background) noise levels near the proposal, including the use of unattended and operator-attended noise monitoring, which was completed at two locations considered to be representative of the existing background and ambient noise environment in the proposal study area (see Figure 5.1). Background noise levels measured in 2018 (Lycopodium, 2018) were adopted for semi-rural receivers in the vicinity of the bridge.

- Establishing noise and vibration criteria and management levels to provide a basis for assessing the potential for impacts during construction and operation of the proposal
- Identifying the main potential noise and vibration sources during construction and operation
- Developing a noise and vibration model, based on four representative construction scenarios, to predict airborne noise generated during construction
- Assessing the potential for noise and vibration to exceed the applicable criteria and impact on the amenity of sensitive receivers
- Considering cumulative impacts with other proposed projects in the vicinity
- Identifying management and mitigation measures to minimise construction and operation impacts of the proposal.

A detailed description of the assessment methodology is in the NVIA Report.

5.1.4 Existing environment

5.1.4.1 Noise environment

The existing noise environment in the study area is generally influenced by road traffic noise from Lachlan Valley Way and Bathurst Street, in addition to rural sources and trains. Natural noise sources, such as insects, birds and dogs, are commonly audible.

Unattended noise monitoring of rating background noise levels (RBL) was completed between 3 and 17 March 2021. The results are summarised in Table 5.1. Where required, RBLs have been adjusted for evening and night periods in accordance with methodologies outlined in the *Noise Policy for Industry* (NPFI) (EPA, 2017a).

TABLE 5.1 SUMMARY OF UNATTENDED NOISE MONITORING RESULTS

Monitor ID	Location	Rating Background Level (RBL) dBA			Ambient noise level dBA L_{eq} (15 min)		
		Day(1)	Evening(1)	Night(1)	Day(1)	Evening(1)	Night(1)
9-5	1 Union Street, Forbes	39	39	36	55	54	42
2018 NVIA	289 Bathurst Street, Forbes	31	31	31	61	–	60

Time periods defined as: Day: 7 am–6 pm Monday to Saturday, 8 am–6 pm Sunday; Evening: 6 pm–10 pm; Night: 10 pm–7 am Monday to Saturday, 10 pm–8 am Sunday

5.1.4.2 Noise-sensitive receivers

The nearest noise-sensitive receivers to the proposal are outlined in Table 5.2 and shown in Figure 5.1.

TABLE 5.2 IDENTIFIED NOISE-SENSITIVE RECEIVERS

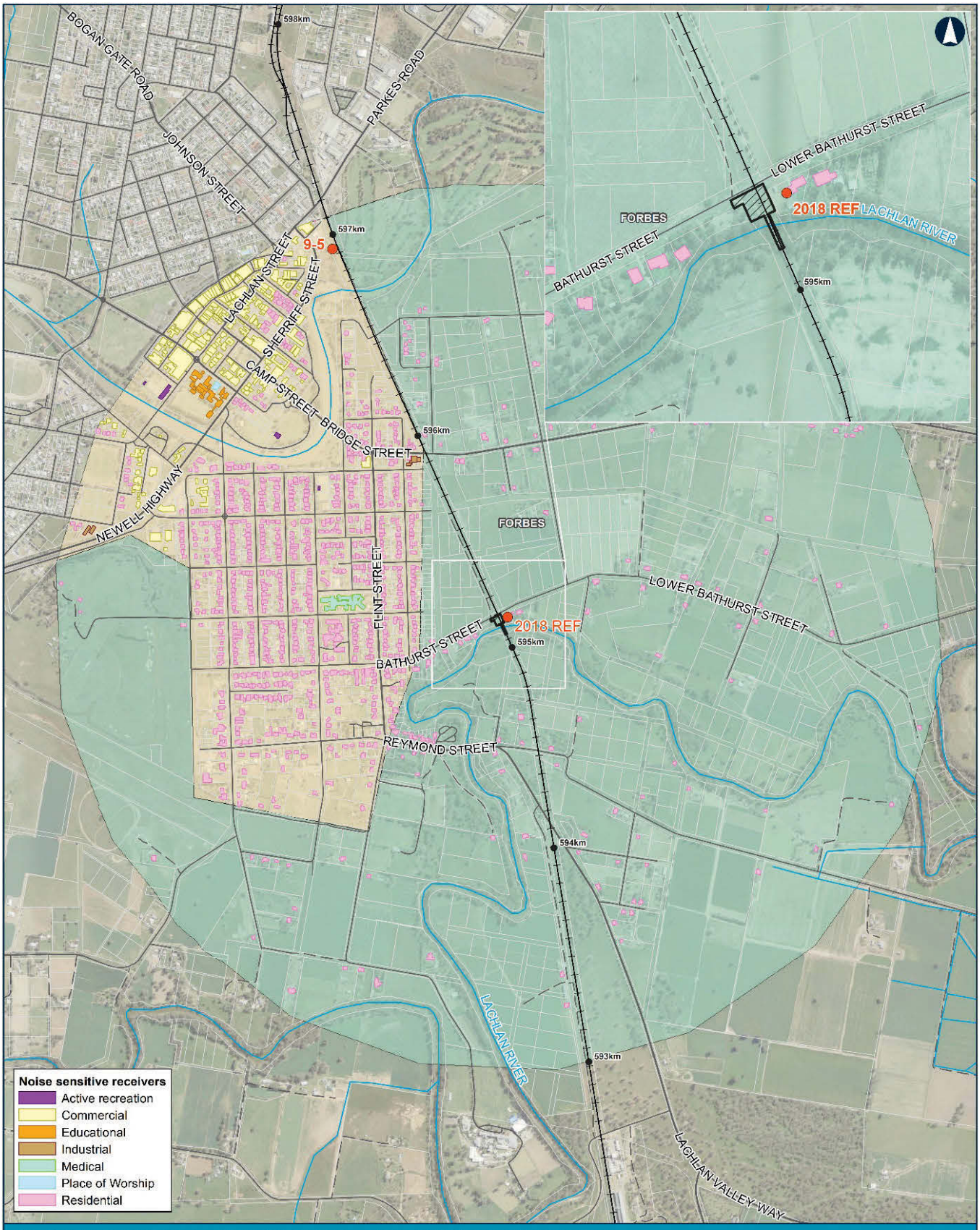
Address	Receiver type[1]	Direction from proposal Site	Distance from proposal (m)
289 Bathurst St, Forbes	Residential	East	30[2]
113 Bathurst St, Forbes	Residential	West	130
26–28 Bathurst St, Forbes	Residential	West	300
106 Ferry St, Forbes	Residential	West	365
84 Ferry St, Forbes	Residential	West	470
Breakway, 31 Riflerange Rd, Forbes	Residential	North	490
12 Reisling St, Forbes	Residential	South	350
Apex Caravan Park, 88 Reymond St, Forbes	Hotel	South	490

1. Receiver type defined in *Interim Construction Noise Guideline (DECCW, 2009)*
2. 30 m indicates the separation distance to the garage/shed of this property. Living spaces for this residence are located at a distance of approximately 45 m.

NCAs have been defined to classify groups of sensitive receivers that are likely to have a similar existing noise environment and experience similar impacts from the proposal. The noise environments at the proposal site can be generally broken into two areas: suburban areas of south-east Forbes and semi-rural areas in the remainder of the proposal study area (refer to Figure 5.1). Table 5.3 summarises the general noise environment of each NCA.

TABLE 5.3 NCAS IN THE STUDY AREA

NCA ID	Representation background monitoring location	Approximate number of receivers in NCA	Description
NCA01	9-5	816	Generally standalone, medium-density residential properties to the north-east of the proposal. Ambient noise conditions are dominated by insects, local wildlife and faint distant road and rail traffic noise from the existing Newell Highway and S2P rail corridor. Includes the Lachlan River Health Services Facility.
NCA02	2018 REF	161	Semi-rural residential properties with some farming activity. The ambient noise is dominated by vehicle movements, including trucks, motorcycles, light vehicles and S2P rail corridor.



Stockinbingal to Parkes Lachlan River Bridge Figure 5.1 Noise Sensitive Receivers

0 250 500 m

Coordinate System: GDA 1994 MGA Zone 55

ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 27/09/2021 Paper: A3
Author: WSP Scale: 1:16,000
Data Sources: ARTC, NSWSS

KM post
Existing railway
Main road
Local road
Track
Watercourse
Cadastre
Proposal site
Noise monitoring location

Noise catchment area
NCA01
NCA02

PARKES
DARCOBALGIE
FORBES
WIRRINYA
QUANDIALLA
BRIBBAREE
MILVALE
STOCKINBINGAL

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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5.1.4.3 Noise and vibration criteria

A summary of the applied noise and vibration assessment criteria (including construction and operation) is included in Chapter 3 of the NVIA in Appendix E.

Environment Protection licence (EPL3142)

ARTC operates its rail network in accordance with EPL3142, which is administered by the NSW Environment Protection Authority (EPA) under the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act). As described in Section 3.2.2, the proposal would be carried out as a maintenance activity under this EPL.

Sections O9.1 to O9.6 of EPL3142 outline conditions relating to noise and vibration management of a maintenance activity. These conditions inform the standard work hours for the proposal as a railway maintenance activity, and exceptions to these hours. They also provide guidance for the management of noise impacts for the proposal. Any works required to be completed outside standard working hours would need ARTC approval and would be in accordance with ARTC's EPL3142.

EPL3142 does not specify noise limits for operation of the rail corridor outside construction and maintenance activities. The EPL includes objectives for ARTC to progressively reduce noise impacts from railway systems through a series of measures designed to control noise emissions from freight trains.

Construction noise

In accordance with the Interim Construction Noise Guideline (ICNG), sensitive receivers are considered likely to be affected by construction noise where relevant Noise Management Levels (NMLs) are predicted to be exceeded.

For residential land uses, the NMLs are based on RBLs, which are identified for each NCA in Table 5.1. The NMLs for standard hours are the RBL +10 dBA for noise-affected receivers and 75 dBA for highly noise affected receivers. Where work is proposed outside of recommended standard hours, the NML is RBL +5 dBA and justification is required.

Construction noise during the night (10 pm to 7 am Monday to Saturday, 10 pm to 8 am Sunday) has the potential to awaken residential receivers from sleep. Sleep disturbance and awakening external noise level screening levels of RBL+15 dB and 65 dBA L_{max}, whichever is most conservative (lowest), have been adopted for residential receivers within each NCA.

NMLS for other sensitive receivers are defined by the ICNG, as shown in Table 5.4. The NMLS apply to these other sensitive receivers when the properties are in use.

TABLE 5.4 NML FOR RECEIVERS OTHER THAN RESIDENTIAL RECEIVERS (ICNG)

Receiver	NML
Classrooms at schools and other education institutions	Internal noise level of 45 dB(A)
Hospital wards and operating theatres	Internal noise level of 45 dB(A)
Places of worship	Internal noise level of 45 dB(A)
Active recreation areas (e.g. parks and sports grounds)	External noise level of 65 dB(A)
Passive recreation areas (e.g. outdoor grounds used for teaching)	External noise level of 60 dB(A)
Commercial	External noise level of 70 dB(A)
Industrial	External noise level of 75 dB(A)

Operational rail noise

Trigger levels are presented in Table 5.5 for re-developments of existing rail lines in accordance with *NSW Rail infrastructure Noise Guidelines* (RING) (EPA, 2013). The redevelopment of existing rail lines generally applies to developments that are intended to increase rail traffic or alter the track alignment through design or engineering changes.

TABLE 5.5 AIRBORNE RESIDENTIAL NOISE TRIGGER LEVELS FOR REDEVELOPMENT OF EXISTING RAIL LINE (EPA, 2013)

	Noise trigger levels (external) dBA	
Type of development	Day (7 am to 10 pm)	Night (10 pm to 7 am)
Redevelopment of existing train line	Development increases existing $L_{eq(period)}$ rail noise levels by 2 dB or more, or existing L_{max} rail noise levels by 3 dB or more and predicted rail noise levels exceed:	
	65 $L_{eq\ 15hr}$	60 $L_{eq\ 9\ hr}$
	85 L_{max}	85 L_{max}

Construction vibration

Table 5.6 presents the indicative minimum working distances for the nominated construction plant to minimise the risk of cosmetic damage to residential buildings, vibration to sensitive heritage structures, and human comfort for sensitive receivers. Vibration levels and minimum safe working distances have been sourced from the *Construction Noise and Vibration Guideline* (CNVG) (RMS, 2016).

TABLE 5.6 RECOMMENDED MINIMUM WORKING DISTANCES FOR VIBRATION INTENSIVE PLANT (RMS CNVG)

	Minimum working distance		
Plant item	Cosmetic damage	Human response	Vibration sensitive (heritage)
Vibratory roller (7–13 t)	15 m	100 m	15 m
Large hydraulic hammer (18–34 t excavator)	22 m	73 m	20 m

Operational rail vibration

Ground vibration criteria have been determined in accordance with *Assessing Vibration: A Technical Guideline* (AVaTG) (DEC, 2006), as summarised in Table 5.7. Rail traffic is generally classified as an intermittent vibration source.

TABLE 5.7 GROUND-BORNE VIBRATION ASSESSMENT VALUES FOR RESIDENTIAL RECEIVERS (DEC, 2006)

	Intermittent vibration dose level (VDV $MS^{1.75}$)	
Time period	Preferred values	Maximum values
Day (7 am to 10 pm)	0.20	0.40
Night (10 pm to 7 am)	0.13	0.26

Ground-borne noise

Ground-borne noise is generated by vibration transmitted through the ground into a building, which can be reradiated as an audible low-frequency rumble. Ground-borne noise criteria are provided by the ICNG for construction and by the RING for redevelopment of an existing rail line. The ground-borne noise criteria are generally implemented only where the ground-borne noise is a higher level than the airborne noise level and can be perceptible in habitable rooms.

Traffic noise

NSW *Road Noise Policy* (DECCW, 2011) outlines that an increase in road traffic noise during construction of less than 2 dB would generally be considered acceptable. This corresponds to an approximate increase in traffic of 60 per cent. Where increases are 2 dBA or less, then no further assessment is required. Where road traffic noise levels are anticipated to increase by more than 2 dB, the noise assessment criteria outlined in Table 5.8 are applied.

TABLE 5.8 ROAD NOISE POLICY ASSESSMENT CRITERIA

		Traffic noise assessment criteria (external)	
Road category	**Type of project/land use**	Day (7 am to 10 pm)	Night (10 pm to 7 am)
Collector/sub-arterial/arterial/ freeway	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	60 dBA L_{eq},15hr	55 dBA L_{eq},9hr
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	55 dBA L_{eq},1hr	50 dBA L_{eq},1hr

5.1.5 Potential impacts

5.1.5.1 Construction noise

A construction noise model was developed using SoundPLAN 8.2 noise modelling software in accordance with ARTC's Inland Rail NSW Construction Noise and Vibration Management Framework (CNMVF). Table 5.9 presents a summary of the predicted noise levels compared against the relevant NMLs for representative receivers for each assessed scenario. Results have been presented in terms of number of properties exceeding the construction NMLs for each work stage.

Construction noise levels are primarily predicted to exceed NMLs at residential receivers during the daytime. Compound operation and bridgeworks (refer to Section 2.3) are also predicted to result in exceedances in the evening and night-time. During bridge works, minor (up to 5 dBA) exceedances of daytime NMLs has been predicted at 92 properties, with more noticeable exceedances at an additional 41 properties at 5-10 dBA, seven at 10-20dBA and one at 20-30dBA. During out-of-hours night work, the number of minor noise exceedances would decrease to 33 receivers for all activities, with more noticeable exceedances at six receivers. The decrease in impacted receivers during evening and night-time works is because the noisiest works, such as use of a steel saw and delivery trucks, are assumed to apply only to standard hours. Sleep-disturbance impacts during construction are discussed in the following section. The predicted impacts during these stages are considered to be minor and can be managed with appropriate measures.

All works (as far as practicable) would be undertaken during standard ICNG working hours:

- 7 am–6 pm Monday to Friday
- 8 am–1 pm Saturday
- No work on Sundays or public holidays.

Due to access constraints and the requirement for safe working sites, some works may be undertaken outside standard working hours and during scheduled track possessions. Track possessions of 9 to 16 hours would occur up to five times per week over the 12-week construction program. Track possessions would be partially to fully out of hours depending on scheduling. Any out-of-hours work would be identified by the contractor and approved by ARTC, and the affected community would be advised in accordance with the community consultation plan and EPL 3142 (refer to Chapter 4).

TABLE 5.9 PREDICTED CONSTRUCTION NOISE EXCEEDANCES AT RESIDENTIAL RECEIVERS (PER NOISE CATCHMENT AREA)

		Number of receivers exceeding NML, grouped by magnitude of exceedance					Highly noise-affected
WORK STAGE	NML L_{Aeq} (15 min)	0 5 dBA	5 10 dBA	10 20 dBA	20 30 dBA	>30 dBA	>75 dBA
NCA01 (total number of receivers 816)							
Standard hours[1]							
Site establishment	49	166	23	0	0	0	0
Bridge works	49	50	0	0	0	0	0
Demobilisation and rehabilitation	49	97	9	0	0	0	0
Compound operation	49	0	0	0	0	0	0
Outside standard hours—daytime/evening[1]							
Bridge works	44	0	0	0	0	0	0
Compound operation	44	0	0	0	0	0	0
Outside standard hours—night time[1]							
Bridge works	41	0	0	0	0	0	0
Compound operation	41	10	0	0	0	0	0
NCA02 (Total number of receivers 161)							
Standard hours							
Site establishment	41	49	43	37	2	1	0
Bridge works	41	42	41	7	1	0	0
Demobilisation and rehabilitation	41	51	48	15	3	0	0
Compound operation	41	15	0	3	0	0	0

WORK STAGE	NML L_{Aeq} (15 min)	Number of receivers exceeding NML, grouped by magnitude of exceedance					Highly noise-affected
		0 5 dBA	5 10 dBA	10 20 dBA	20 30 dBA	>30 dBA	>75 dBA
Outside standard hours–daytime/evening							
Bridge works	36	15	0	3	0	0	0
Compound operation	36	33	3	2	1	0	0
Outside standard hours—night time							
Bridge works	36	15	0	3	0	0	0
Compound operation	36	33	3	2	1	0	0

1. Standard hours: Monday to Friday 7am–6 pm; Saturday 8 am–1 pm; excludes Sundays or public holidays
   Out of hours: Daytime: Monday to Friday 6 am–7 am; Saturday 6 am–8 am and 1 pm–6 pm; Sunday 6 am–6 pm
   Out of hours: Evening: all days 7 am–6 pm
   Out of hours: Night time 10 pm–6 am all days

Sleep disturbance

Table 5.10 presents a summary of the maximum noise-level assessment noise levels compared against the sleep-disturbance levels for residential receivers for each assessed scenario. Results are presented in terms of number of properties exceeding the sleep disturbance levels for each work stage. No sleep disturbance is predicted in NCA01.

Sleep disturbance may occur at residential receivers within NCA02, with the most impacts expected during compound operation. Noise management and mitigation measures would be implemented during construction, to manage sleep disturbance impacts, including provision of respite periods and/or alternative accommodation, in accordance with the out-of-hours work protocol for the proposal (refer to Section 5.1.6).

TABLE 5.10 MAXIMUM PREDICTED NOISE LEVELS (SLEEP DISTURBANCE)

Work Stage	Maximum noise level		Number of receivers exceeding sleep-disturbance levels[1]
	RBL + 15 (dBA)	L^{max} (dBA)	
NCA02 (total number of receivers: 161)			
Bridge works	50	65	5
Compound operation			7

1. Sleep disturbance applicable at residential receivers only, during period of 10 pm to 7 am.

Construction traffic

During the construction, heavy vehicles would be required for materials and equipment delivery. while light vehicles would transport workers to and from the site. Noise from construction activities would be the dominant noise source at the proposal site; however additional road traffic noise may impact receivers along the proposed transport routes.

The primary access route for this traffic is expected to be via the Newell Highway, Camp/Bridge Street, Flint Street and Bathurst Street. The proposal is anticipated to generate on average approximately 16 vehicle movements a day consisting of five light vehicles and three heavy vehicles visiting and departing the proposal site.

Minor road traffic noise impacts may occur along Bathurst Street during night and peak periods. The anticipated traffic generation from the proposal is considered a minor increase on existing traffic volumes and would not result in a noise increase of 2 dBA during standard construction hours.

Cumulative impacts

There will be instances where various noise generating activities take place onsite at the same time, such as equipment use and road traffic movements. There are also two other proposed projects as part of the S2P section of Inland Rail could contribute to cumulative noise impact during construction. When track works on southern areas of Forbes Station and Yard coincide with works at Lachlan River Bridge, some cumulative impacts may occur at receivers in the close vicinity of Forbes Station. When works at Lachlan River Bridge coincide with the track lowering works at Wyndham Avenue, some cumulative impacts may occur for receivers in the north of Forbes. The location and nature of these works is further described in the cumulative impact assessment in Section 5.11.

In most cases, the cumulative noise impact experienced at these receivers would be equivalent to the highest construction noise level, or, in worst-case scenarios, up to 3 dBA higher than the highest noise level. These cumulative impacts would be experienced for limited periods of time, in the event the highest noise generating construction activities in each area are occurring simultaneously. Potential cumulative noise impacts would be managed using the mitigation measures in Section 5.1.6.

5.1.5.2 Construction vibration

Vibration from construction plant has the potential to affect nearby sensitive receivers. The vibration-generating plant that may be required during construction are vibratory rollers. Potential impacts to human comfort may occur at the nearest property at 289 Bathurst Street, Forbes during the short-term site establishment works. No vibration impacts are predicted to occur during bridge works.

Construction vibration impact on the locally heritage-listed Lachlan River Bridge has been considered; however, given existing train movements, the bridge is considered to be structurally sound and resilient to the predicted levels of ground vibration during grading at the site compound. Management measures to ensure the structural integrity of the heritage bridge during construction would be developed through the detailed design phase.

No cosmetic damage is predicted to occur at any receivers. With the exception of the bridge itself, no other vibration-sensitive heritage items or infrastructure has been identified within the minimum working distances.

5.1.5.3 Operational noise

The proposed upgrade to the Lachlan River Bridge would, in isolation, have a minor influence on railway noise levels; however, the proposed future railway operations of Inland Rail would impact the existing noise environment.

Inland Rail would operate 24-hours per day and would initially accommodate double-stacked freight trains up to 1,800 m in length and up to 6.5 m high. Train speeds would vary according to freight loads and range from 80 km to 115 km per hour.

It is estimated that S2P would be trafficked by an average of around 12 trains per day in 2027, increasing to 18 trains per day in 2039. This rail traffic would be in addition to the existing rail traffic using other lines that the proposal interacts with.

Table 5.11 presents a summary of the operational noise assessment for future capacity operations at the Lachlan River Bridge, in 2027 and 2039, against the NSW RING. Noise levels were modelled for an area 500 m either side of the track. Noise trigger levels are not expected to be exceeded at any sensitive receivers in either scenario. The need for operational noise management and mitigation measures would be confirmed during detailed design.

TABLE 5.11 ASSESSMENT OF RAILWAY NOISE LEVELS: 2027 AND 2039

	2027		2039	
Period	Predicted noise level	Change from existing	Predicted noise level	Change from existing
Daytime	57 dBA $L_{Aeq15hr}$	6 dBA $L_{Aeq15hr}$	59 dBA $L_{Aeq15hr}$	8 dBA $L_{Aeq15hr}$
Night-time	58 dBA L_{Aeq9hr}	6 dBA L_{Aeq9hr}	60 dBA L_{Aeq9hr}	7 dBA L_{Aeq9hr}
Maximum	72 dBA L_{Amax}	2 dBA L_{Amax}	72 dBA L_{Amax}	2 dBA L_{Amax}

5.1.5.4 Operational vibration

The proposed works to the Lachlan River Bridge would not, in isolation, materially change the potential ground-borne vibration experienced at sensitive receivers.

Table 5.12 presents the offset distances between sensitive receivers and the nearest rail required to minimise the risk of operational vibration impacts in accordance with AVaTG (DEC, 2006). All sensitive receivers are at least 35 m from the rail line. As such, there would be a relatively low risk of impact from operational vibration.

TABLE 5.12 GROUND-BORNE VIBRATION ASSESSMENT VALUES (AVATG)

	Ground-borne vibration offset distance (AVaTG)	
Railway operations	**Daytime**	**Night time**
Proposal opening (2027)	7 m	9 m
Future capacity (2039)	7 m	9 m

5.1.6 Mitigation and management measures

A construction noise and vibration management plan would be prepared and implemented as part of the CEMP to manage the construction impacts identified in Sections 5.1.5.1 and 5.1.5.2. The following site-specific measures would be considered during preparation of the plan:

- Limitation of noisy works to ICNG standard hours (7 am to 6 pm weekdays, 8 am to 1 pm Saturday) as far as practicable
- Installation of screens along bridge scaffolding to minimise noise emissions

- Screening or enclosure of noisy stationary equipment
- Maximising the distance between noisy plant items and sensitive receivers
- Use of equipment noise controls, such as residential class mufflers.

Table 5.13 is a summary of the project-specific mitigation and management measures that will be implemented during the construction and operation of the proposal to minimise noise and vibration impacts that are over and above contemporary standard practice for environmental management.

TABLE 5.13 NOISE AND VIBRATION SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
CNV1	Prior to the commencement of construction, noise and vibration impacts would be confirmed based on the final project design.	Detailed design/ pre-construction
CNV2	If vibration levels are predicted to exceed the screening criteria for a particular structure as a result of detailed design, 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.	Detailed design/ pre-construction
CNV3	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 and ARTC EPL3142. The plan would have measures, processes and responsibilities to manage and monitor noise and vibration, and minimise the potential for impacts during construction. This plan will include: - Construction noise and vibration criteria for the proposal - Location of sensitive receivers in proximity to the construction area - Specific management measures for activities that could exceed the construction noise and vibration criteria - Notification of impacts would be undertaken in accordance with the Communication Management Plan for the proposal.	Pre-construction/ construction
CNV4	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. Where noise impacts are identified, these would be reduced through pro-active communication and engagement with potentially affected receivers, selection of quieter equipment, 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 ARTC EPL3142 and 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 and the community, and incorporated into the construction noise and vibration management plan.	Pre-construction/ construction
ONV1	Operational noise and vibration compliance monitoring would be undertaken once Inland Rail has commenced operation, at representative locations, to compare actual noise performance in line with the RING.	Operation
ONV2	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 Inland Rail Noise and Vibration Strategy. Where at-property noise treatment is identified as the preferred mitigation option, these would be developed in consultation with individual property owners.	Operation

5.2 Non-Aboriginal heritage

5.2.1 Introduction

This section outlines the assessment undertaken to identify any potential impacts to non-Aboriginal heritage from the proposal. It includes a summary of the *Statement of Heritage Impact for Lachlan River Bridge* (OzArk Environment & Heritage, 2021a), which is in Appendix F.

5.2.2 Legislation, policy, standards and guidelines

The assessment was undertaken in accordance with the relevant NSW legislation and guidelines including:

- EPBC Act
- Heritage Act
- Forbes LEP
- *Assessing Heritage Significance* (NSW Heritage Office, 2001)
- *Statements of Heritage Impact* (NSW Heritage Office, 2002)
- *Historical Archaeology Code of Practice* (Heritage Council of NSW, 2006)
- *Australia ICOMOS Charter for Places of Cultural Significance, The Burra Charter* (Australia International Council on Monuments and Sites (ICOMOS), 2013)
- *How to prepare archival records of heritage items* (NSW Heritage Office, 1998).

5.2.3 Assessment methodology

5.2.3.1 Assessment

The assessment of the existing environment includes:

- Reviewing the following heritage databases to identify whether any listed heritage items are located in or within the vicinity of the proposal site:
  - Section 170 heritage registers (ARTC, RailCorp, and TfNSW)
  - Forbes LEP
  - State Heritage Register NSW
  - National and World Heritage lists
- Reviewing of available literature and previous assessments to determine the historical context
- Completing a site walkover in February 2021 to validate the results of the desktop assessment and identify previously unidentified or buried heritage items (noting no intrusive investigations would be completed)
- Identifying and assessing any direct and/or indirect impacts (including cumulative impacts) to the heritage significance of:
  - Environmental heritage, as defined under the Heritage Act, as may be recorded during field assessments
  - Section 170 heritage-listed items
  - Local heritage items identified in the relevant Forbes LEP
  - Items listed on the National and World Heritage lists
- Preparing a Statement of Heritage Impact to ensure ARTC's obligations under the ISEPP are met in considering the effect of a local heritage item
- Identifying management and mitigation measures to minimise construction and operation impacts of the proposal.

5.2.4 Existing environment

The proposal involves works to Railway Bridge over Lachlan River (Lachlan River Bridge), which is a locally listed heritage item under the Forbes LEP (Item I123). The next nearest heritage-listed item to the proposal site is the locally listed Iron Bridge over the Lachlan River, which is located approximately 160 m west. No world, national, state or section 170 listed heritage items were identified within 200 m of the proposal site.

The Lachlan River Bridge was likely constructed by 1918 with plans of the bridge dated to 1912. The bridge was constructed as a single track, metal truss, box-girder bridge, which was an American innovation of the late 1800s. The bridge has been previously assessed as being locally significant due to its role in opening access to the agricultural areas to the south of Forbes, thereby contributing to the development of economic opportunities in the district.

The design of the bridge is characteristic of a class of steel truss bridge constructed throughout NSW from the 1920s onwards. The metal truss design was replicated at a number of road and rail river bridges throughout the early 20th century. The item, as a whole conforms, with early 20th century technical achievements and has a high degree of aesthetic significance associated with the engineering technique as the metal truss is still in its original form.

Two makers' marks were identified on the steel frame of the truss: one accrediting Dorman and Long (a British steelmaker) and the other accrediting Head Wrightson and Company (a British girder manufacturer). The approach spans to the bridge on both sides are manufactured of modern reinforced concrete, which support concrete sleepers. The installation of these concrete approaches has removed the original fabric of the bridge in these specific areas.

5.2.4.1 Archaeological potential

The presence of the timber piers in the river at the proposal site (see Figure 5.2) indicate that there was a waterway crossing of some kind here prior to the construction of the Lachlan River Bridge. As the current rail bridge is on almost the same alignment as the piers indicate, it is considered very unlikely that any physical remains of this earlier bridge would remain on the river banks due to the significant construction footprint for the current bridge abutments and piers.

There is no historic evidence to suggest any other specific heritage items or relics are likely to be present in the study area.

FIGURE 5.2 VIEW FROM THE NORTHERN BANK OF THE TIMBER PIERS IN THE RIVER IN RELATION TO THE BRIDGE

5.2.5 Potential impacts

5.2.5.1 Construction

During construction there is potential for minor inadvertent impacts to Lachlan River Bridge structure from set up of the scaffolding to facilitate works and use of a crane in close proximity to the bridge. Painting would be completed on areas where the paint work has been disturbed by the works.

Grading would be required to set up of the compounds and crane pad. Due to the low archaeological potential of the proposal site, extent of ground disturbance associated with the grading, it is unlikely heritage items or relics would be encountered.

Potential impacts from vibration during construction are considered in Section 5.1.5.2. No cosmetic damage to the bridge structure is predicted to occur at the proposal site due to vibration.

5.2.5.2 Operation

The two design options considered for the proposal were presented for examination within the *Statement of Heritage Impact* (Appendix F), including replacement of the bridge or modification of the bridge to achieve the required clearance for double-stacked freight trains. It is concluded that modification of the existing truss structure to achieve the appropriate vertical clearance would have the least impact to the heritage significance of the Lachlan River Bridge. This option keeps central the basic conservation principles of the Burra Charter, including articles relating to change. Modification is considered the most reasonable option for preserving the heritage values of the bridge, while allowing it to continue its function as a vital rail link across the Lachlan River.

While the modification of the bridge would impact an item of local heritage value, the loss of the values is mitigated by the overall minimal modification to truss components and by the ability to conserve the majority of the bridge's heritage values through the continued use of the bridge as an item of rail infrastructure, which would ensure its continued maintenance.

The proposal involves works on the truss structure, which would impact the original fabric of the bridge. The works involve removal of sections of the truss structure and installation of additional angled frames. The makers' marks connecting the bridge to specific companies and persons would be preserved.

The visual appearance of the bridge from side on remains relatively unchanged aesthetically from installation of the angled frames. The profile of the bridge from each end along the rail corridor would be altered, with the new angled frames creating a new profile. While this does substantially alter the end on appearance of the bridge, it remains an iron truss railway bridge, retaining much of its original visual aesthetics. The supporting beams have been designed to imitate the iron aesthetic of the existing trusses to reduce the overall negative impact of the required additional frames. The modification would generally maintain the aesthetic value of the bridge, as the original fabric and the main structure would be largely conserved. The modification would be noticeable primarily only from a view along the rail corridor (south and north of Bathurst Street), whereas the bridge from the other viewpoints (from the river or adjacent homes) would not appear significantly altered.

5.2.6 Mitigation and management measures

Table 5.14 is a summary of the project-specific mitigation and management measures that will be implemented during the construction and operation of the proposal to protect and minimise impacts to non-Aboriginal heritage values, which are over and above contemporary standard practice for environmental management.

TABLE 5.14 NON-ABORIGINAL HERITAGE SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
H1	The detailed design would minimise the potential for impacts on the Lachlan River Bridge, and would have regard to, and be sympathetic with, its heritage significance.	Detailed design/ pre-construction
H2	Modification of the truss structure and strengthening of the vertical and deficient members would be undertaken in a sympathetic style to reduce the impact to the aesthetic values of the bridge. The 'like for like' principle would be applied where feasible.	Detailed design/ construction
H3	Archival photographic recording of Lachlan River Bridge would be carried out prior to works in accordance with *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Council of NSW, 2006b) and *How to prepare archival records of heritage items* (NSW Heritage Office, 1998).	Pre-construction
H4	An Interpretation Plan would be prepared for the Lachlan River Bridge to ensure information regarding the bridge is preserved.	Detailed design/ pre-construction
H5	Patch painting and other ancillary works should similarly be conducted in a stylistically sympathetic way so as to also not affect the aesthetic heritage values of the bridge.	Detailed design/ construction

ID	Control measures	Stage
H6	A Heritage Management Plan would be developed as part of the CEMP, and comply with relevant regulatory requirements and state or Commonwealth guidelines. This plan should include appropriate criteria, directives and processes on: ▸ Requirements and protocols for heritage clearances ▸ Unexpected finds procedure ▸ Requirements for inspections and corrective actions during construction and other activities in the vicinity of heritage items ▸ Heritage management actions to be undertaken by suitably qualified persons ▸ Requirements for training, inspections, corrective actions, notification and classification of incidents, record keeping, monitoring and performance objectives for handover on completion of construction ▸ Any necessary regulatory requirements.	Pre-construction/ construction

5.3 Biodiversity

5.3.1 Introduction

This section is an assessment of potential impacts to aquatic and terrestrial biodiversity from the proposal. It includes a summary of the Lachlan River Bridge, Biodiversity Assessment Report (BAR) prepared by WSP (2021) for the proposal. A copy of the BAR is included in Appendix D

5.3.2 Legislation, policy, standards and guidelines

An indication of relevant legislation, policy and guidelines relating to biodiversity includes:

- BC Act
- EPBC Act
- Biosecurity Act
- FM Act
- WM Act
- *Biodiversity Assessment Method 2020* (BAM) (DPIE, 2020a)
- *Threatened Species Test of Significance Guidelines* (Office of Environment and Heritage (OEH), 2018)
- *Significant Impact Guidelines 1.1—Matters of National Environmental Significance for EPBC Act listed biodiversity* (Department of the Environment, 2013)
- *Referral guidelines for species listed under the EPBC Act* (Department of the Environment and Energy (DoEE), 2017)
- *Policy and Guidelines for Fish Habitat Conservation and Management—Update 2013* (DPI, 2013a).

5.3.3 Assessment methodology

The biodiversity assessment was undertaken in accordance, and where applicable, with the BAM 2020. The BAM provides a consistent method to assess impacts on biodiversity values from a proposed development, activity, clearing or biodiversity certification, as well as improvements in biodiversity values from management actions undertaken at a stewardship site.

5.3.3.1 Study area

The study area comprises the proposal site and adjacent areas of vegetation, watercourses and associated habitat surveyed as part of this investigation that may be subject to direct or indirect impacts as a result of a proposal. The study area includes areas of the rail corridor that would be used for access from the nearest public road.

Desktop searches were undertaken for a buffer surrounding the proposal site (refer to Appendix D).

5.3.3.2 Assessment

The BAR (Appendix D) addresses the requirements for assessment of significance under the NSW BC Act, FM Act and the Commonwealth EPBC Act.

The biodiversity assessment involves:

- Describing the characteristics and ecological condition of the vegetation communities and habitats within the study area
- Determining the occurrence, or likelihood of occurrence, of threatened species, populations and communities listed under the BC Act, FM Act and EPBC Act within the study area
- Describing the potential impacts on biodiversity in the study area because of the proposal
- Undertaking a test of significance for threatened species and communities, and their habitats, that are confirmed or considered likely to occur within the study area, in accordance with Section 7.3 of the BC Act, to determine whether the proposal is likely to significantly affect threatened species or communities, or their habitats
- Undertaking a test of significance for threatened species and communities that are confirmed or considered likely to occur within the study area in accordance with Division 12 of the FM Act
- Undertaking assessments in accordance with the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1. Environment Protection* and *Biodiversity Conservation Act 1999* (Cth) (Department of Environment, 2013) to consider impacts to nationally listed threatened species, ecological communities and migratory species
- Identifying management and mitigation measures to minimise construction and operation impacts of the proposal.

The BAR is used to determine if a SIS or Biodiversity Development Assessment Report (refer Section 7.8 (3) of the BC Act) or SIS (Section 220ZZA of the FM Act) is required as part of this REF and whether the proposal is likely to result in a significant impact on a MNES that requires referral under the EPBC Act.

Desktop assessment

A desktop assessment of the state and Commonwealth published data that is listed in section 3.3 of Appendix D. A previous ecological investigation was completed for the proposal site and surrounding area: *Stockinbingal to Parkes Rail Upgrade – REF: Flora and Fauna Assessment Lachlan River Bridge at Forbes* (Niche Environment and Heritage, 2018). This report was reviewed as part of the desktop assessment to gain an understanding of biodiversity in and around the proposal site.

A desktop habitat assessment was also completed prior to the field survey to assess the likelihood of occurrence of each threatened species, population and community identified with the potential to occur in or near the proposal site. The likelihood of occurrence assesses the likelihood of threatened species being found in a specific area as 'known, high, moderate, low or none'. Further details on the criteria is included in the BAR in Appendix D.

Field survey

A field survey was completed to validate the results of the desktop assessment. The survey completed for terrestrial biodiversity and aquatic ecology is discussed further in the following sections. Further details on the field survey methodologies are included in section 3.4 of the BAR in Appendix D.

Field survey—terrestrial biodiversity

The study area was inspected during daylight and nocturnal hours by qualified WSP ecologists on 29 and 30 January 2021. The field survey sought primarily to identify key ecological constraints by assessing the type, extent and condition of vegetation and fauna habitat, especially as they pertained to threatened species and ecological communities.

Flora surveys were completed using the random meander survey, rapid point assessment techniques and vegetation integrity plots.

The fauna surveys involved habitat assessment, spotlighting and surveys for birds and microbats, including use of passive ultrasonic anabat bat detection to record and identify the echolocation calls of microbats.

Field survey—aquatic ecology

The site habitat assessment was undertaken on 4 February 2021 to validate any pre-existing assessments, online data or other information; and visually assess the quality and quantity of aquatic habitat in and near the rail line crossings against key habitat requirements of the species communities identified during the desktop review. Opportunistic observations of aquatic fauna species were recorded during the field survey.

5.3.4 Existing environment

5.3.4.1 Vegetation

The study area is a heavily disturbed rail corridor with the majority of the original vegetation cleared. It contains a mix of the following vegetation types (refer to Figure 5.3 and Figure 5.4):

- Plant Community Type (PCT) 11: river red gum—lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- Miscellaneous ecosystems consisting of planted trees and highly disturbed areas with no or limited native vegetation.

The study area predominantly consists of vegetation that has been assigned to a derived native grassland condition class of PCT 11. These are disturbed grassland areas dominated by a mix of native and exotic species (see Figure 5.3). The PCT 11 present in the study area also includes poor condition remnant woodland (see Figure 5.4), isolated trees and regrowth.

FIGURE 5.3 DERIVED NATIVE GRASSLAND IN THE STUDY AREA SHOWING DOMINANCE OF THE NATIVE GRASS *PANICUM EFFUSUM* (BROWN GRASS IN PHOTO)

FIGURE 5.4 PCT 11 ON THE LACHLAN RIVER IN THE STUDY AREA SHOWING CANOPY OF *EUCALYPTUS CAMALDULENSIS* AND WEED DOMINATED GROUND LAYER

The BioNet search identified one threatened flora species listed under the BC Act that has been recorded within the locality of the study area, which is *Diuris tricolor*. Supplementary database searches, including PlantNet, show threatened flora species listed under the BC Act, including *Swainsona murrayana* and *Austrostipa wakoolica,* have also been recorded in the locality. Six other threatened plant species or their habitats are predicted to occur in the locality based on the results of the PMST search.

Likelihood of occurrence assessments were completed for all the threatened flora species identified in the database searches and are included in the BAR (Appendix D). No BC Act or EPBC Act listed threatened plant (flora) species are considered to have a moderate or higher likelihood of occurrence in the study area, as the derived native grassland present is heavily disturbed, so is unlikely to provide habitat for the threatened flora species. Furthermore, PCT 11 is not known to provide habitat for any of the threatened flora species identified from the database searches.

A summary of the vegetation types in the study area are summarised in Table 5.15 and shown in Figure 5.5. No Threatened Ecological Communities (TEC) listed under the BC Act or EPBC Act were recorded within the study area.

TABLE 5.15 VEGETATION TYPES RECORDED IN THE STUDY CONSIDERED AGAINST RELEVANT LEGISLATION

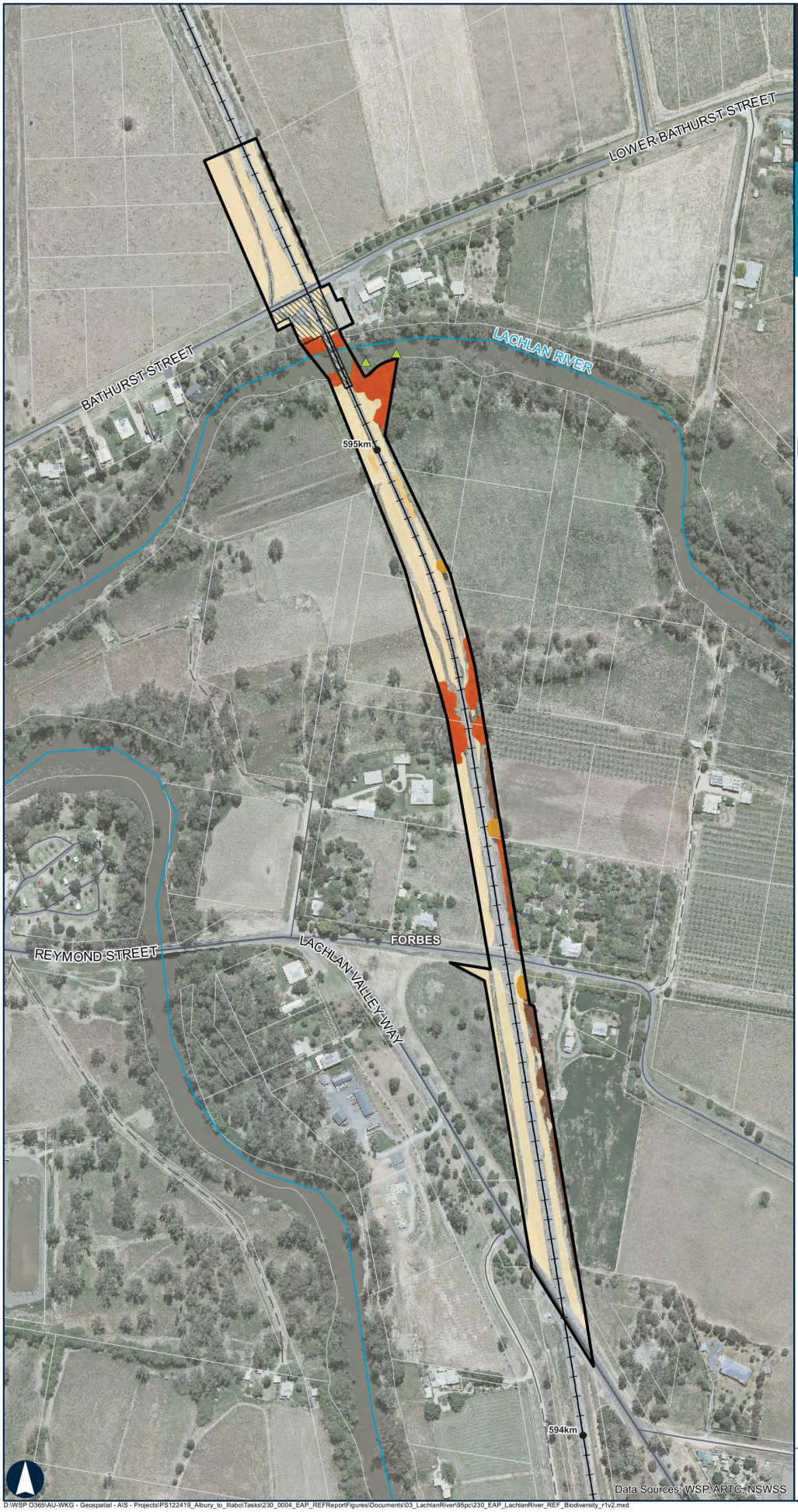
Vegetation type	Condition	Vegetation formation	Vegetation class	NSW TEC listing	EPBC TEC listing	Area within study area (ha)
Native plant community types						
PCT 11: River red gum— lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Poor condition	Forested Wetlands	Inland Riverine Forests	Not listed	Not listed	0.4
	Isolated trees					>0.1
	Regrowth					>0.1
	Derived native grassland					2.0
Miscellaneous ecosystems						
Planted trees	n/a	n/a	n/a	Not listed	Not listed	0.2
Highly disturbed areas with no or limited native vegetation	n/a	n/a	n/a	Not listed	Not listed	0.1
Total						**>2.9**

5.3.4.2 Priority and high-threat weeds and pest species

The study area is considerably disturbed and, consequently, weed species are common, particularly at roadside edges, along the edge of the rail line and along access tracks. The study area contains a number of weed species that are identified as a high-threat weed, as referenced in the BAM calculator, including *Acer negundo*, *Salix babylonica*, *Heliotropium amplexicaule*, *Alternanthera pungens*, *Phyla nodiflora*, *Megathyrsus maximus* and *Paspalum dilatatum*. These species can be extremely difficult to effectively manage.

Heliotropium amplexicaule is also listed as a priority weed under the Biosecurity Act for the Central West region. Willows (*Salix* species, including *Salix babylonica*) are listed as Weeds of National Significance (WoNS) under the National Weeds Strategy (Invasive Plants and Animals Committee, 2016).

No pests (fauna) were observed during the field survey; however, common pest species, such as rabbits, foxes, and rats, are considered to commonly occur in rural areas and may be present within the study area.



INLAND RAIL ARTC

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

Stockinbingal to Parkes Lachlan River Bridge

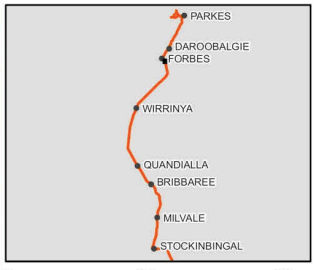
Figure 5.5
Vegetation Types in the Study Area

LEGEND

- KM post
- Existing railway
- Main road
- Local road
- Track
- Watercourse
- Study area
- Proposal site
- Cadastre
- Hollow-bearing tree

Plant Community Type (PCT)

- PCT 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Poor)
- PCT 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Isolated trees)
- PCT 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Regrowth)
- PCT 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Derived Native Grassland)
- Miscellaneous ecosystems - Planted trees



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Date: 5/08/2021 Paper: A3
Author: WSP Scale: 1:3,500

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5.3.4.3 Terrestrial Fauna

A total of 33 fauna species were recorded during field surveys, including two amphibians, two mammals and 29 birds. Of the recorded fauna species, one is listed as Vulnerable under the BC Act: the grey-crowned babbler (*Pomatostomus temporalis temporalis*).

The desktop database searches and assessments identified threatened species listed under the BC Act and the EPBC Act. The 18 species identified as having a least a moderate likelihood of occurring in the study area are summarised in Table 5.16.

Based on EPBC Act PMST search and other desktop database searches, 14 migratory species have been recorded or have potential habitat within the wider locality of the study area. Two of these species—fork-tailed swift (*Apus pacificus*) and white-throated needletail (*Hirundapus caudacutus*)—are considered to have a moderate or higher likelihood of occurrence based on the habitat available within the study area. While terrestrial and marine migratory species of bird may potentially use the study area, the site is not likely to be classed as 'important habitat' as defined by the *Significant Impact Guidelines 1.1—Matters of National Environmental Significance* (Department of the Environment, 2013).

TABLE 5.16 THREATENED FAUNA SPECIES WITH A MODERATE OR HIGHER POTENTIAL TO OCCUR IN THE STUDY AREA

Fauna type	Listed under BC Act	Listed under EPBC Act
Woodland Birds	▸ Dusky woodswallow (*Artamus cyanopterus cyanopterus*) ▸ Speckled warbler (*Chthonicola sagittata*) ▸ Brown treecreeper (*Climacteris picumnus victoriae*) ▸ Varied sittella (*Daphoenositta chrysoptera*) ▸ Grey-crowned babbler (*Pomatostomus temporalis temporalis*)[1] ▸ Diamond firetail (*Stagonopleura guttata)*	Nil
Birds of prey	▸ Spotted harrier (*Circus assimilis*) ▸ Black falcon (*Falco subniger*) ▸ Little eagle (*Hieraaetus morphnoides*) ▸ White-bellied sea-eagle (*Haliaeetus leucogaster*)	Nil
Birds other	▸ Regent honeyeater (*Anthochaera phrygia*) ▸ Swift parrot (*Lathamus discolor*) ▸ Superb parrot (*Polytelis swainsonii*)	▸ White-throated needletail *(Hirundapus caudacutus)* ▸ Regent honeyeater (*Anthochaera phrygia*) ▸ Swift parrot (*Lathamus discolor*) ▸ Superb parrot (*Polytelis swainsonii*)
Mammals	▸ Koala (*Phascolarctos cinereus*) ▸ Southern myotis (*Myotis macropus*) ▸ Squirrel glider (*Petaurus norfolcensis*) ▸ Grey-headed flying-fox (*Pteropus poliocephalus*)	▸ Koala (*Phascolarctos cinereus*) ▸ Grey-headed flying-fox (*Pteropus poliocephalus*)

1. Recorded during field survey

Due to historical vegetation disturbance, including agricultural practices (i.e. cropping and livestock grazing) and the establishment of rail infrastructure, limited shrubby understorey components remained in the study area, and the ground cover was dominated by native grasses with competing occurrences of introduced grasses and herbaceous weeds. Four fauna habitat types were recorded in the study area and are outlined in Table 5.17.

The region is heavily cleared and, as a result, is highly fragmented from intact habitat patches. The current rail line and roads divide habitats in the study area; however, functional habitat connectivity for more mobile species (e.g. birds, flying foxes, insectivorous bats, insects, plants) is still present. The current rail corridor and roads do not totally prevent fauna movement between habitat fragments (fauna can and likely do cross the rail line) but the rail corridor does present a hazard to movement.

TABLE 5.17 FAUNA HABITAT TYPES IN THE STUDY AREA

Fauna habitat	Corresponding Vegetation Type	Description
Riverine woodland	PCT 11	Riverine woodland and its position along the Lachlan River provide foraging habitat for intermittent occurrences of predatory birds such as little eagles and barn owls. In areas where remnant large river red gum trees persist, hollows exist for larger hollow-dwelling fauna (i.e. arboreal mammals and birds) and roosting microbats. The riverine woodland habitat persists in a low-to-moderate condition due to the historic disturbance and removal of important microhabitats, which has resulted in a reduction in structural complexity and microhabitat diversity, which typically corresponds to a greater diversity of fauna. Riverine woodland patches in the study area have limited linkages with other remnant habitats in the landscape; however, due to its occurrence along the Lachlan River it did provide connectivity in the broader locality.
Highly disturbed and exotic vegetation	Miscellaneous ecosystem—highly disturbed areas	Largely limited to patchy infestations of exotic grasses, herbaceous weeds and planted trees/shrubs. These habitat patches were used predominately by open country bird species for foraging purposes. These patches were heavily dominated with exotic species and as a result were in a low condition class as they lacked important microhabitat features such as native tussocks, open rocky patches, fallen timber and old growth trees with hollows.
Microhabitats (man-made structures)	N/A	The concrete structures leading up to the Lachlan River Bridge and the bridge itself provide potential habitat for roosting microbats. All potential microbat artificial habitat observed within the rail corridor did not record any significant signs of microbat habitation (i.e. bat guano, or stains of guano due to presence of microbats). An exit survey and anabat audio recording were undertaken to identify if microbats were using the structures. No microbats were recorded leaving any of the structures during the field investigation. Microbats were seen flying and foraging along the Lachlan River at dusk; however, none were witnessed to directly leave any of the structures. It is unlikely that these artificial structures in the study area act as significant roosting habitat for microbats.

5.3.4.4 Aquatic ecology

Aquatic habitat associated with the study area is represented in the form of Lachlan River shown in Figure 5.6.

The Lachlan River is an 8th order stream under the Strahler stream order mapping and is mapped by DPI as key fish habitat. As it is a permanently flowing waterway, it is defined as Class 1 major key fish habitat (Fairfull and Witheridge, 2003) and Type 1—'highly sensitive habitat' (DPI, 2013a), through the presence of snags, aquatic plants and expected threatened species habitat; however, DPI (2016) have mapped the Lachlan River in the vicinity of the proposal as having very poor fish community status.

The aquatic species recorded opportunistically during the survey were the eastern sign-bearing froglet (*Crinia parinsignifera*) and spotted grass frog (*Limnodynastes tasmaniensis*). These species are common within the region and use disturbed habitats. No threatened aquatic species were recorded during the field survey; however, five threatened aquatic species listed under the FM Act and EPBC Act were assessed as having a moderate or greater likelihood of occurrence in the study area, based on available habitat and historical occurrences in associated habitats in the wider locality. These species included:

- Western Population of olive perchlet (*Ambassis agassizii*): FM Act listed as an Endangered Population
- Eel tail catfish (*Tandanus tandanus*): FM Act listed as an Endangered Population
- Purple spotted gudgeon (*Mogurnda adspersa*): FM Act listed as Endangered
- Flathead galaxias (*Galaxias rostratus*): FM Act listed as a Critically Endangered Species, EPBC Act listed as Critically Endangered
- Silver perch (*Bidyanus bidyanus*): FM Act listed as a Vulnerable Species, EPBC Act listed as Critically Endangered.

One EEC listed under the FM Act occurs in the study area: lower Lachlan River aquatic ecological community. This community includes all fish and aquatic invertebrates within the natural drainage system of the lowland catchment of the Lachlan River.

The Lachlan River provides habitat for aquatic species and avifauna (i.e. egrets and ducks) and acts as an important habitat corridor/link in the region. The Lachlan River and the surrounding riparian area and riverbanks in the study area have been disturbed due to the rail corridor. Habitat and potential refuges in the study area include instream structures, such as logs and willow trees, bank overhangs, and some backflow areas.

FIGURE 5.6 LACHLAN RIVER BRIDGE AND LACHLAN RIVER

5.3.4.5 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are communities of plants, animals and other organisms that depend on groundwater for survival (Department of Land and Water Conservation, 1997). A GDE may be either entirely dependent on groundwater for survival, or may use groundwater opportunistically, or for a supplementary source of water (Hatton and Evans, 1998).

The GDE Atlas (Bureau of Meteorology (BoM), 2017) categorises GDEs into three classes:

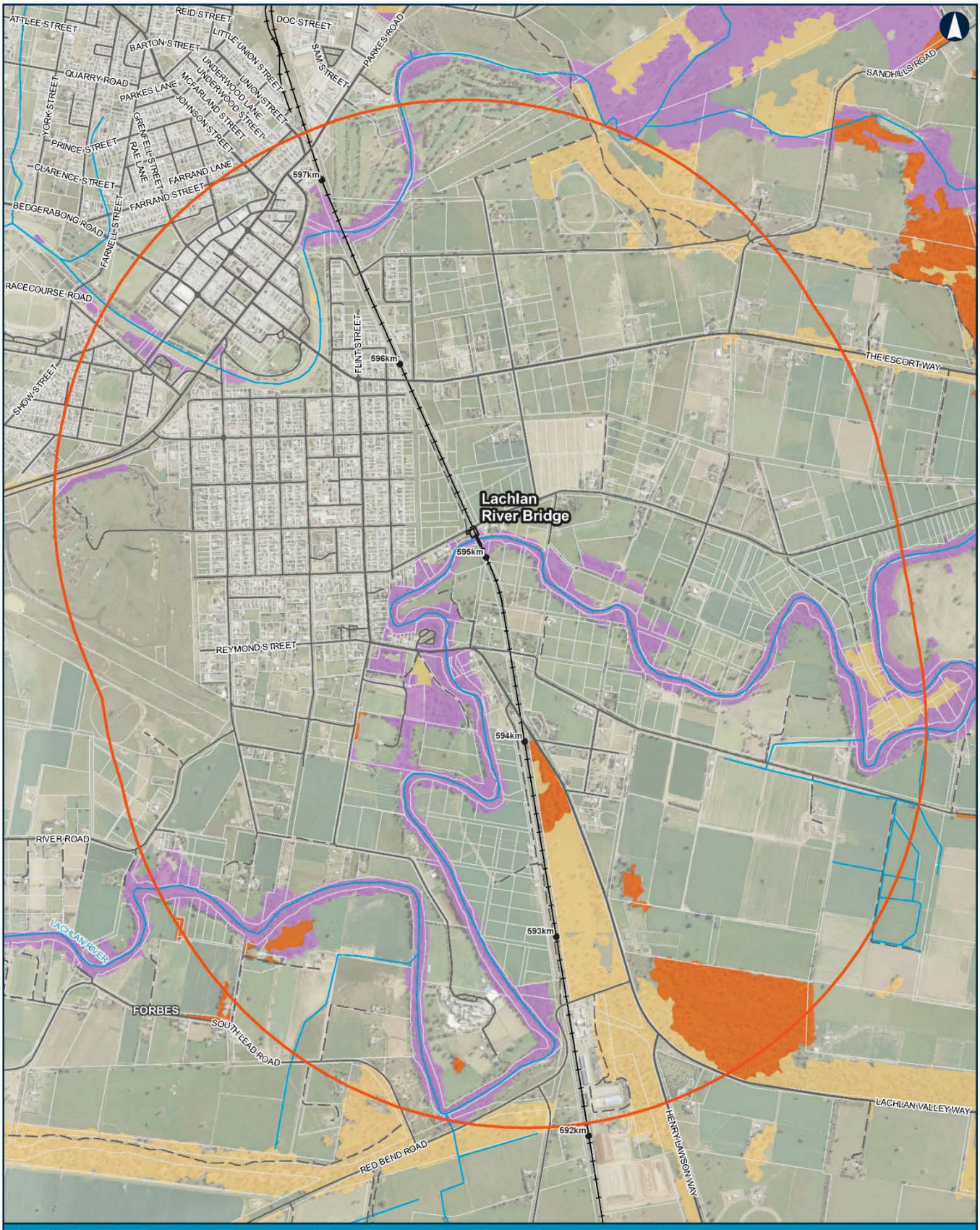
- *Ecosystems that rely on the surface expression of groundwater*—this includes all the surface water ecosystems that may have a groundwater component, such as rivers, wetlands and springs
- *Ecosystems that rely on the subsurface presence of groundwater*—this includes all vegetation ecosystems
- *Subterranean ecosystems*—this includes cave and aquifer ecosystems.

Groundwater discharge can be important in maintaining baseflow in rivers and streams, and ecosystems associated with these discharge areas may have a high dependency on groundwater for their water requirements.

Five ecosystems have been identified within the groundwater study area that are classified as terrestrial GDEs. The location of these GDEs relative to the proposal are presented in Figure 5.7 and shown in Table 5.18. Of the GDEs listed, the river red gum—lignum (high GDE potential) occurs on the riverbanks surrounding the Lachlan River Bridge and adjacent to the proposal site.

TABLE 5.18 TERRESTRIAL GDES WITHIN STUDY AREA

GDE description	GDE potential
River red gum—lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	High
Fuzzy box woodland on alluvial brown loam soils	Moderate
River red gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW	Moderate
Western grey box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Low
Plains grass grassland on alluvial, mainly clay, soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Low



Stockinbingal to Parkes Lachlan River Bridge Figure 5.7 Groundwater dependent ecosystems in the proposal site

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Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/12/2021 Paper: A3
Author: WSP Scale: 1:17,500
Data Sources: ARTC, NSWSS

- KM post
- Existing railway
- Main road
- Local road
- Track
- Watercourse
- Cadastre
- Proposal site
- Groundwater study area

Groundwater dependent ecosystems

- High potential terrestrial GDE
- Moderate potential terrestrial GDE
- Low potential terrestrial GDE

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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5.3.5 Potential impacts

5.3.5.1 Construction

The proposal has considered all impacts relating to biodiversity conservation, including both threatened and non-threatened species, communities and their habitat.

The proposal has the potential for direct impacts on biodiversity, including:

- Removal of native vegetation
- Removal of threatened fauna habitat
- Injury and mortality
- Removal of hollow bearing trees.

Potential indirect impact from construction of the proposal include:

- Wildlife connectivity and habitat fragmentation
- Sedimentation and erosion entering Lachlan River, including mobilisation of contaminants, and impacts to water quality
- Weed dispersal
- Noise and vibration
- Dust and light
- Invasion and spread of pests and pathogens and disease.

These impacts are considered in the following sections.

Removal of native vegetation

The construction of the proposal would require the removal of approximately 0.1 hectares (ha) of PCT 11, consisting of 0.08 ha of derived grassland and 0.02 ha of poor-condition vegetation. In addition, some river red gums located to the south of the crane pad may require trimming to enable full movement of the crane arm. No hollow bearing trees were identified in the proposal site. The trimming of mature river red gums has the potential to remove hollow bearing trees limbs that were not identified during the field survey, which would be confirmed during pre-clearing surveys.

Assessments of significance were completed on the threatened flora species identified as having a moderate or higher likelihood of occurring in the study area (Appendix D). The proposal includes impact to 0.1 ha of native vegetation, which is not assessed as a TEC or likely to support threatened flora species. Based on the assessment, no ecological communities, populations or threatened species were considered likely to be significantly impacted by the proposal. Consequently, the proposal is not considered likely to have a significant impact on threatened biodiversity from removal of vegetation.

Removal of *t*hreatened fauna habitat

Potential impacts to threatened fauna species from the proposal is estimated to include the removal of approximately 0.1 ha of native vegetation. The proportional impact to threatened species habitat is very small when the extent of similar habitats in the locality are considered. Accordingly, the proposal is not considered likely to have a significant impact on threatened fauna through habitat removal.

Fauna Injury and mortality

Fauna injury or death has the greatest potential to occur during construction when vegetation clearing would occur. The extent of this impact would be proportionate to the extent of vegetation that is cleared. Less mobile species (e.g. ground dwelling reptiles and frogs), or those that are nocturnal and nest or roost in trees during the day, may find it difficult to rapidly move away from the clearing when disturbed.

Wildlife may also become trapped, or may choose to shelter in, machinery that is stored in the study area overnight, and trenches or bore holes. If these animals were to remain inside the machinery, or under the wheels or tracks, they may be injured or may die once the machinery is in use.

Removal of hollow-bearing trees

No hollow- bearing trees were identified during the site survey; however, the proposal may include the loss of potentially hollow-bearing limbs during the trimming of mature river red gums. This has the potential to affect native animals that may occur in the locality and use this habitat such as:

- Hollow-nesting and canopy-nesting birds
- Hollow-dependent bats
- Arboreal mammals
- Reptiles.

Wildlife connectivity and habitat fragmentation

Habitat fragmentation results from the dividing up of continuous habitats into separate smaller fragments. Habitats recorded in the study area are those that remain or have formed since the initial broad-scale habitat clearing that occurred in the locality. Within the study area, this is largely associated with riverine woodland occurring along the banks of the Lachlan River.

The proposal is located in an existing rail corridor and includes modification to an existing rail bridge. The proposal is unlikely to break apart continuous habitats into separate smaller fragments and it is unlikely to result in an increase to the isolation of habitats beyond that currently experienced in the study area. Functional connectivity for many species would remain in the study area. This impact would be of low magnitude and mitigation measures are not deemed necessary.

Edge effects on adjacent native vegetation and habitat

The development of linear infrastructure is known to cause disturbance in terms of reducing habitat quality in adjacent areas. This is due to the greater potential for edge effects, habitat fragmentation and barrier effects due to the high perimeter to area ratio of linear developments. The proposal is in an area that is currently subject to a high level of edge effects from the existing rail line, adjacent roads and agricultural land tenures. Vegetation patches were suffering from weed invasion and the habitats that would be impacted by the proposal are edge habitats without any undisturbed core. As such, it is unlikely that there would be any further impacts from edge effects resulting from the proposal. This impact would be of low magnitude and mitigation measures are not deemed necessary.

Weed and pest dispersal

The proposal has the potential to further disperse weeds into nearby areas of native vegetation. The greatest potential for weed dispersal and establishment associated with the proposal would include movement of soil and attachment of seed to vehicles and machinery where these are used within or adjacent to retained vegetation. The clearing of native vegetation for the proposal, including grading of the site for the crane pad, would increase the potential for weed invasion into adjacent patches of native vegetation.

The proposal would generate a small amount of food waste from construction personnel, which is not considered likely to attract pest species during construction. Waste impacts and mitigation measures have been addressed in Section 5.6.

Invasion and spread of pathogens and disease

Plant and animal pathogens can affect threatened biodiversity through direct mortality and modification to vegetation structure and composition. The following pathogens are considered to have the potential to affect the biodiversity within the proposal site and are the subject of Key Threatening Process listings:

- Amphibian chytrid fungus (*Batrachochytrium dendrobatidis*)
- Exotic rust fungi (order Pucciniales, e.g. Myrtle rust fungus *Uredo rangelii*)
- Phytophthora root rot fungus (*Phytophthora cinnamomi*).

These three pathogens have all been recorded in the bioregion and have potential to occur within the proposal site at the present or in the future. The main way in which exotic rust fungi and Phytophthora root rot fungus may be spread is through the movement of infected plant material and/or soil. The construction and operation of the proposal may increase the risk of disturbing and spreading these pathogens. Amphibian Chytrid Fungus can be spread through the movement of infected animals or water (including mud or moist soil) from infected areas. With the implementation of hygiene procedures for the use of vehicles and the importation of materials to the proposal site, the risk of introducing this pathogen to uninfected areas is low.

Pest species that may be present are generally highly mobile and distributed extensively through regional areas. As such, while management may be required where these species are encountered, the proposal is not considered likely to result in any significant impacts from pest species.

Noise and vibration

Considering the existing levels of noise and vibration from the rail line, it is unlikely there would be a significant increase in noise and vibration (refer to Section 5.1) that would result in any increased impacts to biodiversity within the study area. There is, however, potential for impacts to locally common fauna from noise and vibration during construction, which may result in fauna temporarily avoiding habitats adjacent to the construction. The magnitude of this impact would be low and mitigation measures are not deemed necessary.

Dust and light pollution

The proposal site generates minimal dust and air pollutants from the passing of freight trains. There would be dust generated from construction activities (refer to Section 5.10.4); however, deposition of dust on foliage is likely to be highly localised, intermittent and temporary (particularly during the wetter seasons) and is therefore not considered likely to be a major impact.

While the construction works would occur generally during day-time hours, some lighting may be required outside of standard working hours, including temporary spotlights in support of short-duration night works (when required) and headlights from staff and construction vehicles accessing the site. This would occur for a short duration each day and for a short time within the proposal construction program. Minor security lighting may also be required at the compound sites, at site access, storage and laydown ancillary areas. The potential impacts from lighting would be short term. The lighting may result in impacts to nocturnal fauna. Common nocturnal species, such as possums and microbats, may avoid the habitat in the proposal impact area during construction as temporary 'daylight' conditions would be created by the temporary spotlights. This impact is considered temporary and would not have long-lasting effects on biodiversity.

Aquatic ecology

No instream construction works are proposed so there would be no direct impacts to aquatic habitat, fish passage or to threatened aquatic species or populations identified as likely to occur within the study area; however, the proposal could potentially cause indirect impacts to receiving waterways from the construction areas in close proximity to the Lachlan River. These impacts include:

- Unmanaged construction activities (such as grading and removal of vegetation) could result in soil erosion, siltation and offsite movement of eroded sediments by surface water runoff, that may contribute to increased levels of turbidity, contaminants (e.g. nutrients) and sediment deposition, decreased dissolved oxygen, and changes to pH levels in surrounding waterways
- Accidental fuel and chemical spills, and contaminated runoff from construction vehicles, plant, equipment or chemical storage areas, have the potential to runoff into the Lachlan River
- Accidental spills and subsequent water pollution from removal of lead-based paint and repainting. Lead from lead-based paint is known to accumulate in aquatic fauna through either direct absorption and or ingestion with food. It can affect growth, reproduction, immune response and survival in a range of aquatic species, in addition to bioaccumulating in higher order species.

Erosion and sediment controls and protocols to prevent lead-based paint from entering the river would be implement during construction. Further consideration of water quality and controls to prevent impacts are in Section 5.8 and 5.10.3. The proposal would not result in any direct impact on the EEC lower Lachlan River aquatic ecological community, and potential indirect impacts can be mitigated and are unlikely to be significant.

5.3.5.2 Operation

The proposal would not result in further disturbance to native vegetation or fauna habitat, as such additional impacts associated with vegetation clearing are not anticipated for operation of the proposal.

No changes are proposed to the bridge structure within the river or on the riverbank. As such, direct impacts to aquatic habitat or to threatened aquatic species or the lowland Lachlan River aquatic ecological community are not expected.

5.3.6 Assessment of significance

Although efforts have been made to avoid, minimise and mitigate potential ecological impacts from the proposal, some residual impacts would occur. The result of the assessment carried out in the BAR is that the proposal is not considered likely to have a significant impact on threatened biodiversity or their habitats. The proportional impact to threatened species habitat is very small when the extent of similar habitats in the locality are considered. An SIS, or referral for impacts to MNES relevant to biodiversity under the EPBC Act is not considered to be required for the proposal; however, the proposal will be referred to the Australian Minister for the Environment for assessment to confirm that approval under the EPBC Act is not required.

5.3.7 Mitigation and management measures

Table 5.19 is a summary of the project-specific mitigation and management measures that would be implemented to protected biodiversity values during the construction and operation of the proposal, which are over and above contemporary standard practice for environmental management. Measures to address potential water quality impacts and subsequent impacts on aquatic ecology are provided in sections 5.8.6 and 5.10.3.

TABLE 5.19 BIODIVERSITY SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
B1	Construction planning would avoid or minimise the need to remove and/or disturb native vegetation and fauna habitat.	Detailed design/ pre-construction
B2	Vegetation clearing would be limited to the minimum necessary to construct the proposal and allow for its effective operation.	Detailed design/ pre-construction/ construction
B3	A Biodiversity Management Plan would be prepared prior to construction and implemented as part of the CEMP. The plan would include measures to 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, including breeding habitats (including burrows and hollow-bearing trees/logs, Lachlan River Bridge) ▸ Clearing extents/site boundary/limit of works is clearly defined with flagging or marking tape, signage or other suitable means to delineate no-go areas ▸ Establishing protocols for the staged clearing of vegetation and safe tree felling and log removal to reduce the risk of fauna mortality ▸ Establishing daily checks in machinery and excavations for presence of fauna to reduce the risk of fauna mortality ▸ Animal-handling protocols, including relocation and emergency care ▸ Measures to avoid and minimise the clearing of hollow-bearing trees ▸ Unexpected finds protocol ▸ Measures to manage biosecurity risks in accordance with the *Biosecurity Act 2015* (NSW) and ARTC's Biosecurity Management Strategy ▸ Erosion and sediment control measures.	Pre-construction/ construction
B4	The trimming of canopy trees along the Lachlan River would be completed in consultation with a qualified arborist and minimised where possible.	Construction
B5	Exclusion areas would be established and maintained around native vegetation to be retained; particularly, areas of biodiversity value adjoining the proposal site that are located in close proximity to work areas.	Construction
B6	Stockpile sites would be located outside of riparian habitat.	Construction
B7	A rehabilitation strategy would be based on the Inland Rail Landscape and Rehabilitation Strategy, the Inland Rail Landscape and Rehabilitation Framework and property-specific reinstatement commitments. This would guide the approach to rehabilitation of disturbed areas following the completion of construction. The strategy would include: ▸ Clear objectives and timeframes for rehabilitation works (including the biodiversity outcomes to be achieved) ▸ Details of the actions and responsibilities to progressively rehabilitate, regenerate, and/or revegetate areas, consistent with the agreed objectives ▸ Identification of flora species and sources ▸ Procedures for monitoring the success of rehabilitation ▸ Corrective actions should the outcomes of rehabilitation not conform to the objectives adopted.	Pre-construction/ construction

5.4 Landscape character and visual amenity

5.4.1 Introduction

This section outlines the impacts of the proposal on landscape character and visual amenity. This section is a summary of the *Lachlan River Bridge—Visual and landscape impact assessment* by IRIS Visual Planning + Design (2021) for the proposal and describes the landscape and visual impacts of the proposal. A copy of the assessment is included in Appendix H.

5.4.2 Legislation, policy, standards and guidelines

The relevant legislation, policy standards and guidelines include:

- *Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW* (TfNSW, 2019)
- *Guideline for Landscape Character and Visual Impact Assessment EIA-N04* (TfNSW, 2020)
- *Guidance Note for Landscape and Visual Assessment* (Australian Institute of Landscape Architects Queensland, 2018)
- *Central West and Orana Regional Plan 2036* (DPIE, 2017a)
- *Destination Country and Outback NSW: Destination Management Plan 2018–2020* (NSW Government, 2018c)
- *Forbes Local Strategic Planning Statement 2040* (Forbes Shire Council, 2020a)
- *Forbes LEP*
- *Forbes Development Control Plan 2013*
- *Australian Standard 4282-2019 Control of the obtrusive effects of outdoor lighting* (Standards Australia, 2019).

5.4.3 Assessment methodology

5.4.3.1 Study area

The landscape and visual study area extend to include the potential visual catchment of the proposal. Photographs were taken from publicly accessible locations from a range of locations around the site. A number of viewpoints were then selected to represent the range of views to the site and areas of potential visual impact. Publicly accessible locations were used to represent views from groups of private properties where relevant.

5.4.3.2 Assessment process

The assessment involved:

- Reviewing relevant local and regional planning and policy documents, and clauses, to provide context for the landscape and visual assessment
- Identifying existing conditions, including topography, land use, land cover, settlement pattern, key sites and buildings (including heritage items)
- Assessing potential impacts on landscape character, including identification and description of landscape character zones and their sensitivity, the magnitude of change expected, and assigning a potential landscape impact level
- Assessing potential impacts on views, including identification of the potential visual catchment of the proposal, selection of representative viewpoints and identification of their sensitivity, the magnitude of change expected, and assigning a visual impact level
- Assessing impact on night-time visual conditions, with reference to the environmental zones in AS4282-2019, by identifying the relevant environmental zone and sensitivity, describing the magnitude of change expected, and assigning a potential night-time visual impact level
- Identifying management and mitigation measures to minimise construction and operation impacts of the proposal.

Sensitivity, magnitude of change and overall impact levels used for the assessment of landscape and visual impacts are described in Table 5.20, Table 5.21 and Table 5.22, respectively.

TABLE 5.20 SENSITIVITY LEVELS FOR LANDSCAPE AND VIEWPOINTS

Sensitivity	Landscape description	Visual description	Night-time description[1]
High	▸ Landscape feature or place that is heavily used and/or is iconic to the state or nationally ▸ These landscapes are generally unique to, or uncommon within, the state and/or nationally.	▸ Heavily experienced view to a feature or landscape that is iconic nationally or within the state ▸ Views from World Heritage listed places ▸ Views to areas with a scenic value recognised by the state or nationally ▸ These views are generally unique or uncommon nationally or state-wide.	▸ Environmental Zones A0: Intrinsically dark or A1: Dark ▸ UNESCO Starlight Reserve, IDA Dark Sky Parks ▸ Major optical observatories, no road lighting—unless specifically required by the road-controlling authority ▸ Relatively uninhabited rural areas ▸ No road lighting unless specifically required by the road controlling authority.
Moderate	▸ Landscape feature or place that is heavily used and valued by residents of a major portion of a city or a non-metropolitan region ▸ Places with regionally important scenic value or to landscape features ▸ These places are generally unique or uncommon within the region.	▸ Heavily experienced view to a feature or landscape that is iconic to a major portion of a city or a non-metropolitan region, an important view from an area of regional open space ▸ Views to areas of regionally important scenic value or to landscape features of the region ▸ These views are generally unique or uncommon within the region.	▸ Environmental Zone A2: Low district brightness (low light levels in the area) ▸ Sparsely inhabited rural and semi-rural areas.
Low	▸ Landscape feature valued and experienced by groups of residents and/or local recreational users ▸ Places of local scenic value or local landscape features ▸ These places are likely to be somewhat common within the landscape.	▸ High-quality view experienced by concentrations of residents and/or local recreational users, and/or large numbers of road or rail users ▸ Views to areas of local scenic value or to local landscape features, e.g. views from local conservation areas, railway stations and local parks ▸ These views are somewhat common within the landscape.	▸ Environmental Zone A3: Medium district brightness ▸ Suburban areas in towns and cities.
Negligible	▸ Places where without any particular scenic values or local landscape features ▸ These places are likely to be common within the landscape.	▸ Views where visual amenity is not particularly important to the wider community, such as lower quality views briefly glimpsed from roads ▸ These views are likely to be common within the landscape.	▸ Environmental Zone A4: High district brightness areas ▸ Town and city centres, and other commercial areas ▸ Residential areas abutting commercial areas.

(1) In accordance with *AS4282 Control of the obtrusive effects of outdoor lighting* (Standards Australia, 2019)

TABLE 5.21 MAGNITUDE OF CHANGE LEVELS FOR LANDSCAPE AND VIEWPOINTS

Magnitude of change	Landscape description	Daytime visual description	Night-time description
High	▸ The landscape is altered such that the proposal dominates and/or transforms its character, amenity and/or function.	▸ The view is altered such that the proposal visually dominates and transforms the character of the view ▸ It would result in a substantial change in the amenity of the view.	▸ Substantial change to the level of skyglow, glare or light spill expected ▸ The lighting of the proposal would transform the character of the surrounding setting at night ▸ The effect of lighting would be experienced over a large area.
Moderate	▸ The proposal substantially changes and/or is not compatible with the character, amenity and function of the landscape ▸ This would result in an extensive and/or severe change in landscape values.	▸ The proposal is visually prominent, and/or contrasts with the character of the view ▸ It would result in a considerable change in the amenity of the view.	▸ Considerable change to the level of skyglow, glare or light spill ▸ The lighting of the proposal would noticeably contrast with the surrounding landscape at night ▸ The effect of lighting would be experienced across a medium portion of the landscape.
Low	▸ The proposal somewhat changes and/or is not compatible with the character, amenity and function of the landscape ▸ This would result in a considerable and/or unsympathetic change in landscape values.	▸ The proposal is somewhat prominent and/or is not compatible with the character of the view ▸ It would result in a noticeable change in the amenity of the view.	▸ Alteration to the level of skyglow, glare or light spill would be expected ▸ The lighting of the proposal would not contrast substantially with the surrounding landscape at night ▸ The effect of lighting would be experienced across a small portion of the landscape.
Negligible	▸ The proposal would not change the character, amenity and/or function of the landscape ▸ If there is a change, it would not be perceived as altering the landscape values.	▸ The proposal is not visible, is not visually prominent in the view and/or is compatible with the character of the view ▸ It would result in no perceived change in the amenity of the view.	▸ Either the level of skyglow, glare and light spill is unchanged or, if it is altered, the change is generally unlikely to be perceived by viewers ▸ Compatible with the existing or intended future use of the area.

TABLE 5.22 IMPACT LEVELS

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-low	Negligible
Low	Moderate	Moderate-low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

5.4.4 Existing environment

5.4.4.1 Landscape character

The landscape of the study area is characterised by the Lachlan River floodplain. It is relatively flat, with the river meandering in sweeping curves and bends through the landscape. The landscape has been extensively cleared and modified for agricultural purposes such as cereal cropping and grazing. Near the Lachlan River, properties and lot sizes become smaller in size, with some small acreage properties and rural lifestyle blocks overlooking the river.

The rail corridor traverses the landscape in a north–south direction, with freight trains moving through this landscape intermittently. Regional roads are also located in the vicinity of the rail corridor, including The Escort Way and Lachlan Valley Way.

This landscape includes the riverfront areas of the Lachlan River, which are identified as having recreational values relating to the 'natural environment' in the Forbes LEP; however, there are no formalised areas for public access to the river in the vicinity of the site. While this landscape is appreciated by a moderate number of locals and tourists travelling along The Escort Way and Lachlan Valley Way, the quality of the landscape character of the site is influenced by the existing rail infrastructure. Overall, the Lachlan River floodplains rural landscape character area is of local value and is of low landscape sensitivity.

5.4.4.2 Daytime views

The visual catchment of the proposal is limited due to the flat terrain and existing trees alongside the Lachlan River, which screen views to the proposal site.

To the north of the river, there are views to the proposal site from Bathurst and Lower Bathurst Street within 100 m of the level crossing. Further from the level crossing the existing vegetation and dwellings intervene to enclose the view. There are unscreened views of the proposal site from the residence directly to the east of the existing bridge (289 Lower Bathurst Street); however, views of the proposal site from rural properties to the north east are screened by vegetation along Lower Bathurst Street.

The visual catchment also extends north west to the south-eastern outskirts of Forbes. This includes views from the eastern end of the local roads and properties orientated towards the existing rail corridor. There are also more distant views from the elevated areas to the east of Forbes near the Forbes Hospital.

There are views along the rail corridor from the level crossing on The Escort Way to north of the proposal site. There are limited views from the south due to the distance between the proposal site and surrounding dwellings; however, there are glimpsed views from the footpath on the Reymond Street Bridge and adjacent residences.

Three viewing locations were selected as representative of the range of views to the proposal during the daytime, as shown in Figure 5.8.

FIGURE 5.8 LOCATION OF VIEWPOINTS (IRIS VISUAL PLANNING + DESIGN, 2021)

Viewpoint 1: View south from The Escort Way

This view from The Escort Way is of an at-grade railway corridor and includes existing rail infrastructure in the foreground (see Figure 5.9). The rail corridor consists of a single track, slightly elevated on embankment and culvert structures, passing through a flat, open rural landscape. The vegetation along the Lachlan River and within the fields adjacent to Bathurst Street create a backdrop to this view. The existing Lachlan River railway bridge structure can be seen, silhouetted against the vegetation of the river.

The Escort Way is a busy regional road connecting Forbes with areas to the east, and the westbound views contribute to the sense of arrival to the town centre of Forbes. This is a glimpsed view, seen briefly from moving vehicles. Overall, this is a locally important view and is of low visual sensitivity.

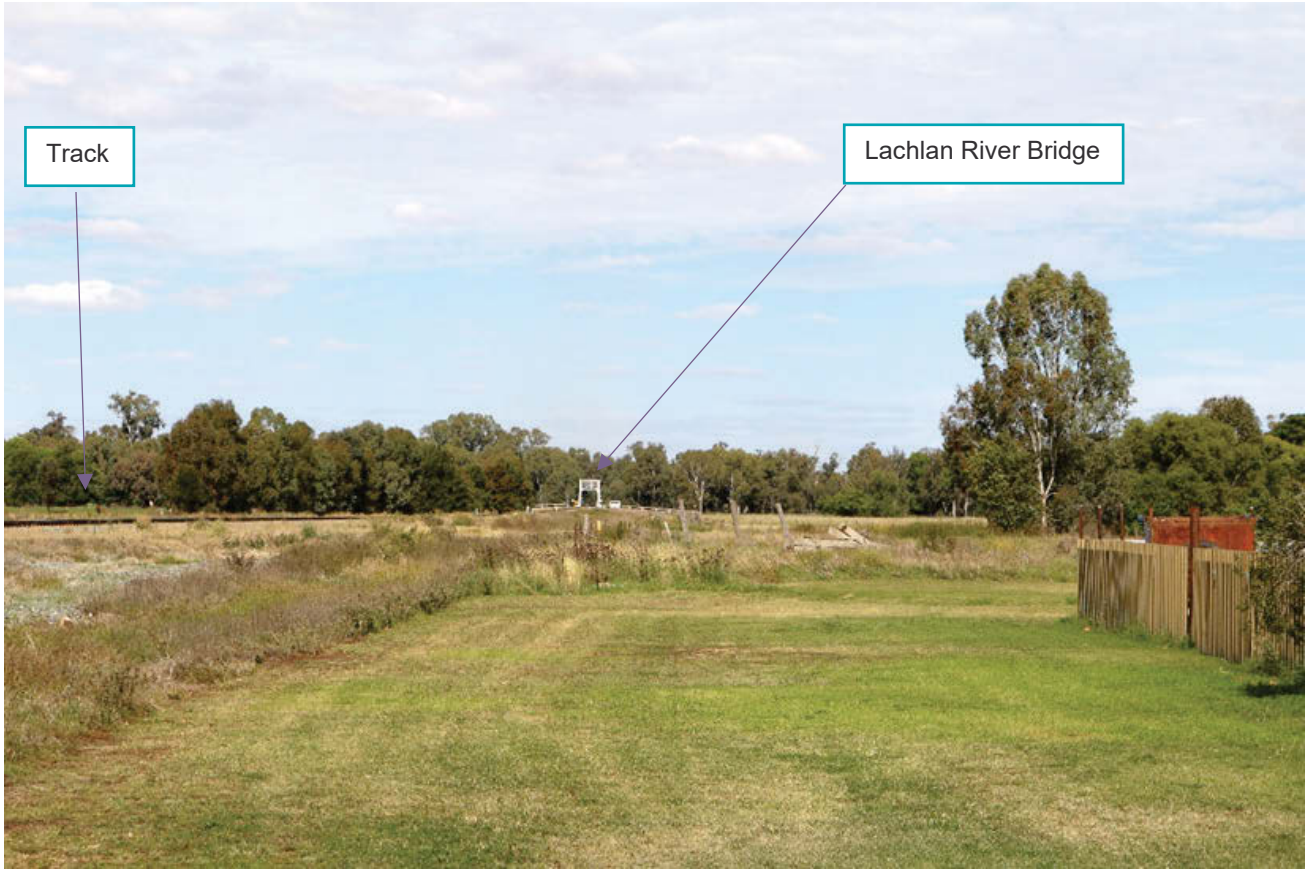


FIGURE 5.9 VIEWPOINT 1: VIEW SOUTH FROM THE ESCORT WAY

Viewpoint 2: View south-west from Bathurst Street

This view from Bathurst Street includes the existing Lachlan River Bridge in the middle ground, seen among existing mature trees (see Figure 5.10). The structure of the bridge is visible, including the northern end of the bridge with its distinctive lattice bracing.

In this view, the southern end of the bridge is screened by the buildings on the adjacent residential property. This property includes an existing dwelling, which is orientated east–west with views north towards the road and south towards the river.

Bathurst Street is a two-lane road providing access to Forbes. It is used primarily by local residents and visitors accessing local properties, and is of low visual sensitivity.

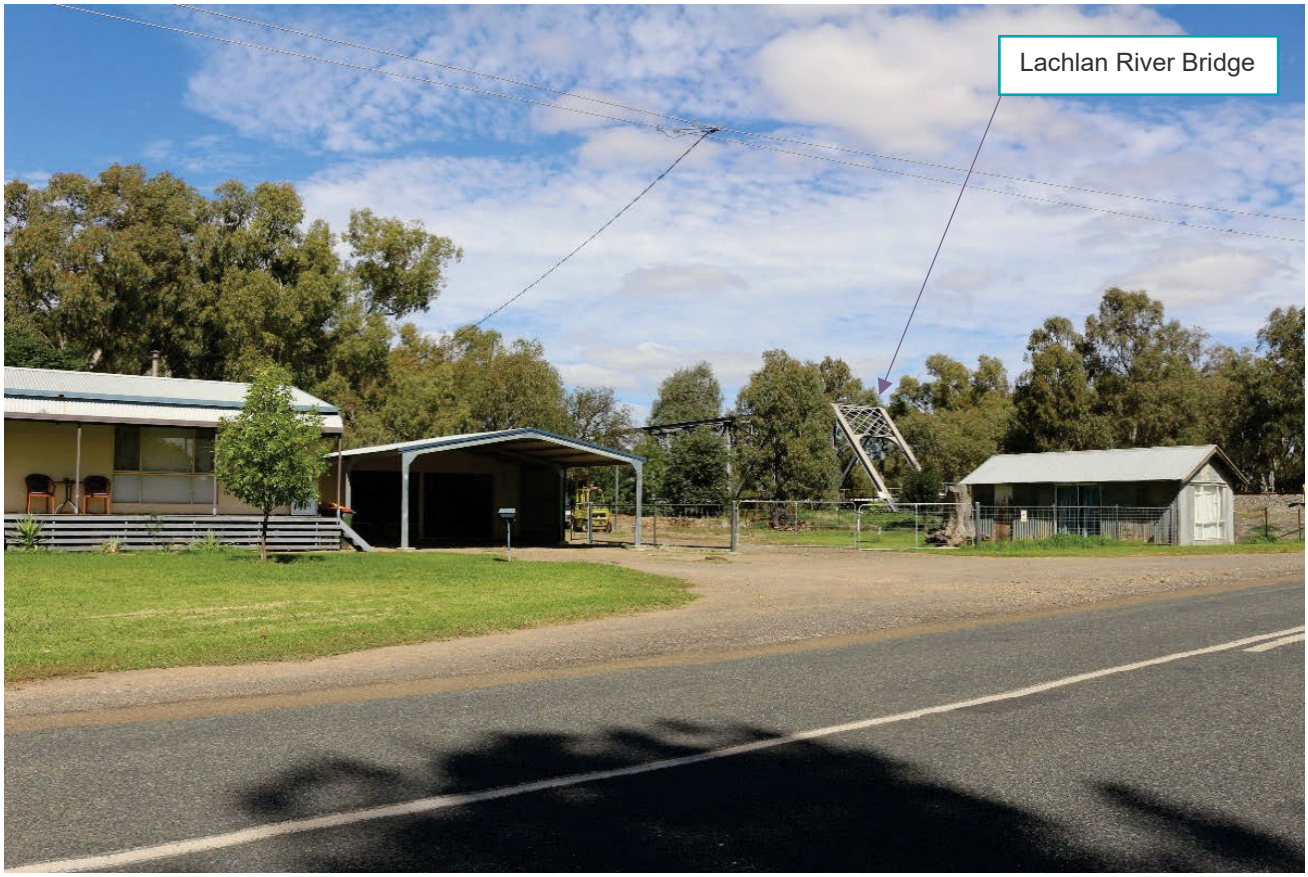


FIGURE 5.10 VIEWPOINT 2: VIEW SOUTH WEST FROM BATHURST STREET

Viewpoint 3: View north from Reymond Street

This view along the southern bank of the Lachlan River shows the riparian vegetation, and glimpses to the existing rail corridor and bridge in the background, across the rural landscape (see Figure 5.11).

Reymond Street is a local road providing access between the Forbes Apex Riverside Tourist Park and areas to the south of the river, as well as properties on Lachlan Valley Road, south east of Forbes. This view would be available to pedestrians on the path and vehicles on the bridge. Overall, this view is of low visual sensitivity.

FIGURE 5.11 VIEWPOINT 3: VIEW NORTH FROM REYMOND STREET BRIDGE

5.4.4.3 Night-time

At night, this landscape would have low light levels from rural residences scattered across the landscape. There would be additional lights on in Forbes where there is denser residential development, 24-hour facilities such as the Forbes Hospital, and where there are streetlights and vehicles travelling along local roads and the Newell Highway. There would also be a headlight on the existing trains using the rail corridor. This lighting would contribute to the light levels and a sky glow above the landscape where the proposal site is located. Overall, this is an area of low district brightness and has a moderate visual sensitivity at night.

5.4.5 Potential impacts

5.4.5.1 Construction

The proposal site would be established beside the railway line, including a crane and two compounds beside the northern end of the bridge, adjacent to Bathurst Street. Construction vehicles would be seen travelling along Bathurst Street, accessing the site and compounds, with some light vehicle access via Wandary Lane, to the south of the bridge.

Vegetation within the area used for construction would be impacted, with some river red gums located to the south of the crane pad that may require trimming to enable full movement of the crane arm. The areas impacted by construction would be revegetated and rehabilitated as appropriate.

Landscape character impacts

The character of the construction activity would somewhat contrast with the existing character of the rail corridor. This change, combined with the trimming of mature trees, would result in a low magnitude of change to the Lachlan River floodplains rural landscape character. Overall, there would be a low landscape impact during construction. The visual impacts of the tree trimming would be a temporary impact as tree limb regrowth would be expected over time.

Daytime visual impacts

A summary of the anticipated visual impacts from each identified viewpoint is in Table 5.23.

TABLE 5.23 SUMMARY OF DAYTIME VISUAL IMPACTS FROM THE CONSTRUCTION PHASE

Viewpoint	Sensitivity	Visual impact during construction	Magnitude of change	Potential impact
Viewpoint 1: View south from The Escort Way	Low	The work would be visible in the background of this view and partially screened by the adjacent riverside vegetation. Construction works would include the use of large machinery and cranes. Where the works are visible, they would contrast with the surrounding landscape. Due to the distance from this view, this would result in a low magnitude of change.	Low	Low
Viewpoint 2: View south-west from Bathurst Street	Low	The construction activity at Lachlan River Bridge would be seen in the middle ground of this view and in close proximity to the adjacent dwelling. The works would be prominent in this view and contrast with the surrounding rural landscape. Due to the close proximity of the construction activity to this viewing location, and the scale of the works, there would be a moderate magnitude of change.	Moderate	Moderate–low
Viewpoint 3: View north from Reymond Street	Low	There would be glimpses to the scaffolding, machinery and movement of vehicles at the bridge structure site; however, the compound and set-down areas would be out of view. Where the works are visible, they would contrast with the surrounding rural and natural landscape. Due to the distance and low visibility of the works in this view, there would be a low magnitude of change.	Low	Low

Night-time visual impact

The majority of the proposal site would be located at the northern end of the Lachlan River Bridge, with two small compound sites at either side of the track, beside the northern bridge landing. While the construction works would occur generally during day-time hours, some lighting may be required outside of standard working hours, including temporary spotlights in support of short-duration night works (when required) and headlights from staff and construction vehicles accessing the site. This would occur for a short duration each day and for a short time within the proposal construction program. Minor security lighting may also be required at the compound sites—at site access, storage and laydown ancillary areas.

Overall, there would be a negligible magnitude of change to this landscape, which is of moderate sensitivity, and a potential negligible visual impact at night. This night-time visual impact would be localised and temporary.

5.4.5.2 Operation

The key visible changes from operation of the proposal are:

- The modification to the truss structure of the bridge, including removal of diagonal bracing at each end of the truss structure and addition of a new angled frames
- The increase in frequency and size of freight trains along the track.

Inland Rail would operate 24-hours per day and would initially accommodate double-stacked freight trains of up to 1,800 m in length and up to 6.5 m high. It is estimated the S2P rail corridor would be trafficked by an average of around 12 trains per day in 2027, increasing to 18 trains per day in 2039, with train speeds varying from 80 to 115 km per hour.

Landscape character impacts

The proposed modifications to the truss structure would somewhat alter the heritage character and aesthetic value of the bridge. The overall scale of the bridge would be largely maintained and the materials would be consistent with the locally heritage-listed bridge.

During operations, there would also be freight trains more regularly seen travelling across this landscape character area. These trains would taller and longer than the existing freight trains seen along the Main West Line.

Overall, during operation, there would be a moderate magnitude of change to the Lachlan River rural plains landscape character area, which is of low sensitivity, resulting in a moderate–low landscape impact.

Daytime visual impacts

During operation of Inland Rail, the key visual change would be the increase in train operations, as the adjustments to the bridge would be generally in character with the heritage aesthetic of the existing bridge. While the frequency and size of trains would increase along the rail corridor, the changes would be generally in character with the existing rail corridor and would not alter the amenity of the landscape.

There would be low visual impacts from areas to the south of the Lachlan River and moderate–low visual impacts from areas to the north of the river, as described in Table 5.24.

TABLE 5.24 SUMMARY OF DAYTIME VISUAL IMPACTS FROM THE OPERATION PHASE

Viewpoint	Sensitivity	Visual impact during construction	Magnitude of change	Potential impact
Viewpoint 1: View south from The Escort Way	Low	At this distance the Lachlan River Bridge would be slightly altered in appearance, with the removal of the end frame and new angled frames on the truss structure. The main change in this view, however, would be the increase in the number, height and length of the freight trains travelling along the railway corridor, in the middle and foreground of this view. The change would intermittently alter the prevailing character of this view.	Moderate	Moderate–low
Viewpoint 2: View south–west from Bathurst Street	Low	The altered bridge structure would be more visible due to the trimming of some mature trees adjacent to the west of the bridge during construction. This change would be seen in the middle ground of this view, set back from Bathurst Street, and would continue to be viewed against a backdrop of vegetation along the river. The operation of more and longer freight trains along the bridge and north over the Bathurst Street level crossing would be visually dominant in this view due to the proximity and scale of these trains. This change would alter the character of this view intermittently.	Moderate	Moderate–low
Viewpoint 3: View north from Reymond Street	Low	Lachlan River Bridge, although slightly altered in appearance, would be located in the background of this view, and would be viewed against a backdrop of vegetation along the river. The increased height, length and frequency of freight trains would be noticeable; however, due to the intervening vegetation, it is not likely to change the prevailing character of this view.	Low	Low

Night-time visual impacts

Each freight train would have a headlight that would be seen intermittently, directed along the rail corridor. There would be an increase in frequency of headlights seen in the vicinity of the rail corridor given the increase in freight train movements. As the track and level of the rail corridor in this location would not change, new areas would not be impacted by light spill or visual intrusion from headlights; however, there would be an incremental increase in frequency for areas already impacted by freight train headlights.

Overall, this increase would result in a low magnitude of change to this landscape at night. As this area is of moderate visual sensitivity at night this results in a potential moderate–low visual impact at night.

5.4.6 Mitigation and management measures

Table 5.25 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal to minimise impacts to landscape character and visual amenity, which are over and above contemporary standard practice for environmental management.

TABLE 5.25 LANDSCAPE CHARACTER AND VISUAL AMENITY SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
LVA 1	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.	Detailed design/ pre-construction
LVA 2	In consultation with the owner of the adjoining residential property to the east of the Lachlan River Bridge, vegetation screening would be included where practicable, to mitigate the visual impact of the rail line without affecting operational rail safety.	Detailed design/ pre-construction
LVA 3	Detailed design of the bridge would consider *Bridge aesthetics: design guidelines to improve the appearance of bridges in NSW* (TfNSW, 2019).	Detailed design/ pre-construction
LVA 4	Any rehabilitation works would be completed in accordance with the *ARTC Landscape Rehabilitation Strategy*.	Detailed design/ pre-construction
LVA 5	Temporary lighting would be designed and sited to minimise light spill in accordance with *AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting* (Standards Australia, 2019).	Pre-construction/ construction

5.5 Surface water (hydrology and flooding)

5.5.1 Introduction

This section is a summary of the *Lachlan River Bridge, Surface water impact assessment* by WSP (2021d) (surface water assessment). This report describes the hydrology of the proposal, along with the potential impacts to and from surface water and flooding. A copy of the surface water assessment is included Appendix I.

5.5.2 Legislation, policy, standards and guidelines

The surface water assessment would be undertaken in accordance with the following guidelines:

- WM Act
- Water Act
- *Australian Governments Climate Change Impacts and Risk Management—A Guide for Business and Government* (Department of Environment and Heritage, Australian Greenhouse Office, 2006)
- *Australian Rainfall and Runoff Guidelines* (ARR2019) (Ball et al., 2019)
- *Forbes Development Control Plan 2013*
- *Guidelines for controlled activities on waterfront land* (DPI, 2012)
- *Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia* (Australian Institute for Disaster Resilience, 2017)
- *Murray–Darling Basin Plan 2012* (Murray–Darling Basin Authority, 2012)
- *NSW Floodplain Development Manual and Flood Prone Land Policy* (Department of Infrastructure, Planning and Natural Resources (DIPNR), 2005).

5.5.3 Assessment methodology

5.5.3.1 Study area

The study area for the hydrology, flooding and water quality impact assessment is considered to be the area that may be directly or indirectly affected by the proposal including receivers downstream of the proposal site.

The proposal site is within the Lachlan River catchment. Based on review of aerial photographs and other relevant data sources, the study area was considered to be the proposal site, with an initial buffer area of 200 m.

5.5.3.2 Flooding and drainage assessment

The drainage and flood impact assessment involved:

- Reviewing flooding information available to identify the extent of the flood plain at the proposal site (i.e. *Forbes Flood Study* (Lyall & Associates, 2018) and *Flood investigations for Lachlan River at Forbes* (Lyall & Associates 2020))

- Reviewing any historic information and other studies to inform flood behaviour and also inform existing waterway health and flood risks/mechanisms across the study area
- Reviewing the proposed works to identify changes that might affect the existing waterways, drainage and flood conditions that may cause impacts (during construction and operation)
- Identifying management and mitigation measures to minimise construction and operation impacts of the proposal.

5.5.4 Existing environment

The proposal is located in the Lachlan River catchment of the Murray–Darling Basin. The major watercourse of this catchment is the Lachlan River, which runs for 1,339 km in a general westerly direction from the Breadbane Plain between Goulburn and Yass, to the Murrumbidgee River near Oxley (Murray Darling Basin Authority, 2021).

5.5.4.1 Watercourses and bodies

The proposal site is adjacent to and over the Lachlan River. Lachlan River is the major watercourse in the catchment. Water from the Lachlan River is used to support agriculture and the Forbes town water supply (Forbes Shire Council, 2021b).

5.5.4.2 Drainage

No formal stormwater infrastructure is present within or adjacent to the proposal site. The part of the proposal site on the bank of the river is at an elevation of about 239 m Australian Height Datum (AHD) with the track formation further elevated at 240 mAHD. Overland flow paths would generally drain away from the track formation to the east and west, and towards the Lachlan River, which is at an elevation of about 233 mAHD.

5.5.4.3 Flooding

The proposal site is located in a flood-prone area, as identified in the Forbes LEP. Review of historical flooding records show that Forbes and the surrounding areas experienced, on average, a major flood every seven years from 1887 to 2007 (Forbes Shire Council, 2020b). The proposal crosses the Lachlan River, which represents the main source of flood risk. The flood conditions at the proposal site and surrounding areas were defined using the hydraulic model developed in 2020 by Lyall & Associates as part of the *Flood investigations for Lachlan River at Forbes*. Flooding is considered in terms of the annual exceedance probability event (AEP), which is the probability that a given rainfall volume accumulated over a given duration will be exceeded in any one year.

The proposal site would start to flood at 10% AEP, as shown in Figure 5.12, with inundation depths of up to 1 m in small portions of the site. During a 1% AEP, flooding depths of up to 1 m are expected to be experienced on the northern bank of the Lachlan River within the proposal site. The bridge is not affected by flooding up to and including the 0.2% AEP flood event. The track formation within the proposal site remains above flood levels up to 0.5% AEP flood event due to its elevation. Flood water flows from west to east towards the proposal site where it is blocked by the track formation and diverted to the surrounding areas.

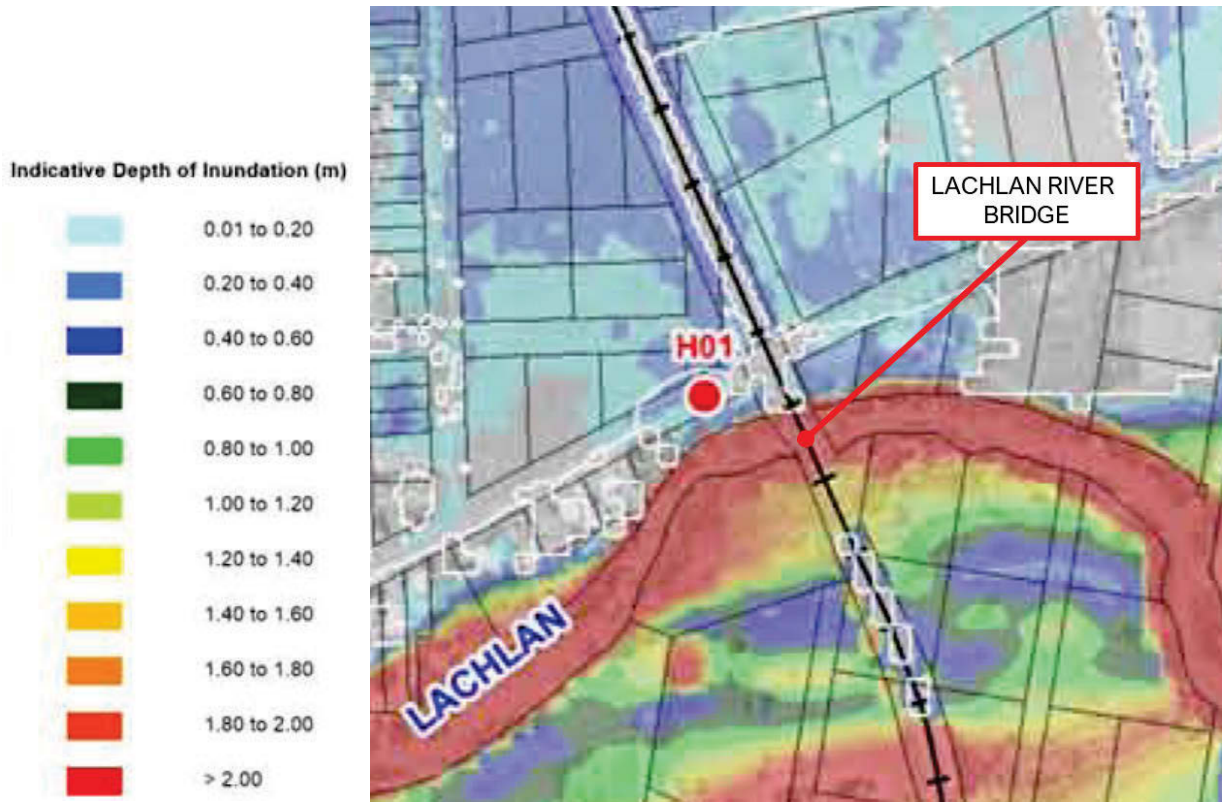


FIGURE 5.12 10% AEP FLOODING EXTENT AROUND THE PROPOSAL SITE (LYALL AND ASSOCIATES, 2020)

5.5.4.4 Sensitive receivers

The Lachlan River catchment features several significant wetlands that are considered of national significance, particularly for waterbird habitat; however, the closest of these wetlands is Lake Cowal, which is located about 55 km west of the proposal site. No Ramsar wetlands are located in close proximity to the proposal site.

GDEs and aquatic ecological communities are also present within the proposal site and adjacent areas as described in Section 5.3.4.

5.5.5 Potential impacts

5.5.5.1 Construction

No instream works are required for construction of the proposal; therefore, no direct impacts to the Lachlan River are anticipated.

Flooding

The proposal site is subject to impacts from flooding during a 10% AEP rainfall event and greater with inundation depth of up to 1 m on the northern bank. A flood event during construction would present a risk to construction site staff and may cause damage and wash out of construction materials and equipment.

The presence of compounds and a crane pad would cause a loss in flood storage but would not change flood behaviour, which is controlled by the elevated track formation. The loss in flood storage is negligible in comparison to the surrounding flooded area. During construction, the impacts to flood behaviour are likely to be temporary (around 12 weeks), localised and minor.

Drainage

Minor grading of the proposal site and the presence of construction compounds, stockpiles and the crane pad during construction may temporarily interrupt overland flow paths in the proposal site.

Water use

Small volumes of water would be required during construction for dust suppression, potable water for workers and other construction tasks such as cleaning. Extraction from bores and surface water is not anticipated to be required for the proposal.

5.5.5.2 Operation

The proposal would not result in changes to the existing catchment, drainage infrastructure or the Lachlan River as part of the proposal. As the proposed works involve modifications to the truss structure and would not change the height of the bridge or bulk of the bridge in the river, no impacts to flood behaviour are anticipated.

There would be no change to operational water use as a result of the proposal.

5.5.6 Mitigation and management measures

Table 5.26 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal to protect and minimise the impacts to surface water (hydrology and flooding), which are over and above contemporary standard practice for environmental management. Preparation of a Flood and Emergency Response Plan to be implemented as part of the CEMP has been identified as a mitigation measure, as described in Section 5.10.6.

TABLE 5.26 SURFACE WATER (HYDROLOGY AND FLOODING) SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
SW1	Detailed construction planning would consider flood risk at construction areas. This would include identification of measures to not worsen flood impacts downstream and on other property and infrastructure during construction up to and including the 1% AEP flood event, and review of site layout (e.g. waste) and staging of construction works to avoid or minimise obstruction of overland flow paths, and to limit the extent of flow diversion required.	Detailed design/ pre-construction

5.6 Waste

5.6.1 Introduction

This section describes the waste streams associated with the proposal and provides mitigation measures for the minimisation and management of waste in accordance with relevant guidelines.

5.6.2 Legislation, policy, standards and guidelines

The relevant legislation, policy standards and guidelines include:

- POEO Act
- Protection of the Environment Operations (Waste) Regulation 2005
- *NSW Waste and Sustainable Materials Strategy 2041* (DPIE, 2021)
- *Waste Avoidance and Resource Recovery Act 2001* (NSW)
- *NSW Waste Classification Guidelines—Part 1: Classification of Waste* (EPA, 2014)
- ARTC's *Earthworks Materials Management Guideline*.

5.6.3 Assessment methodology

The assessment of waste generation from the proposal involved:

- Reviewing of regulatory frameworks for waste management requirements
- Reviewing of relevant land and structure conditions
- Identifying of potential waste-generating activities and types of wastes
- Classifying of potential waste types identified, including consideration of assessment of land resources
- Estimating the quantities of each classification of waste
- Identifying of risks associated with waste arising from the proposal
- Identifying waste-handling procedures, and waste minimisation and reuse strategies.

5.6.4 Existing environment

The existing land use at the proposal site, as a railway corridor, generates negligible waste quantities. Small amounts of waste may be generated during maintenance works on the railway corridor. When waste cannot be avoided, re-used or recycled from maintenance works, the following waste management facilities (Forbes Shire Council, 2021c) in the region are available for waste disposal:

- Daroobalgie Waste Management Facility (Calarie–Daroobalgie Rd, Calarie NSW)
- Bedgerabong Landfill (Darcys Lane, Bedgerabong NSW)
- Garema Landfill (Pinnacle Road, Garema NSW).

5.6.5 Potential impacts

5.6.5.1 Construction

Most of the waste generated by the proposal would be during construction. The classifications that apply to waste in NSW and the descriptions of each are provided by the POEO Act, the Waste Regulation and supporting guidelines, including the NSW *Waste Classification Guidelines* (EPA, 2014).

Construction waste would generally be managed according to the waste hierarchy*:*

1. Avoid and reduce waste
2. Re-use waste
3. Recycle waste
4. Dispose of waste.

If reuse or recycling are not viable options, waste would be disposed of at an appropriately licensed landfill in accordance with *NSW Waste Classification Guidelines* (NSW EPA, 2014).

The key waste-generating activities during construction, along with key potential waste streams and likely classifications, are described in Table 5.27. Waste and construction materials would be separated and classified to facilitate re-use and recycling where feasible. If the spoil is deemed suitable, subject to testing, it would be reused onsite. Hazardous materials, including lead-based paint waste, would be managed in accordance with the POEO Act and would be disposed of at an appropriately licensed waste facility as required.

TABLE 5.27 POTENTIAL WASTE GENERATION DURING CONSTRUCTION

Activity	Potential waste stream	Likely classification of waste streams
Clearing during site establishment (grassland and tree trimming)	Small quantities of vegetation/green waste.	General solid waste (putrescible)
Grading of the construction site to establish the crane pad and site compounds	Small quantities of excavated soil, sediment and rock (spoil).	General solid waste (non-putrescible)
	Some of the soil/sediments may be contaminated, e.g. from lead-based paint, subject to sampling and testing.	Hazardous waste
Removal of sections from along the top of the truss structure	Multiple steel sections.	General solid waste (non-putrescible)
Removal of patches of disturbed paint along the truss structure	Small quantities of lead-based paint flakes.	Hazardous waste
General construction wastes	Metals, timbers, plastics and packaging associated with deliveries. Waste oil, grease, lubricants, oily rags and filters from use of plant and equipment.	General solid waste (non-putrescible)
Construction workers	Food, glass, plastic and paper in small volumes throughout construction related to number of workers onsite at any time.	General solid waste (non-putrescible) General solid waste (putrescible)
Site amenities and washdown facilities	Wastewater from onsite workers would be collected and disposed of offsite by a licensed contractor.	Liquid waste

5.6.5.2 Operation

The proposal would not change operational waste-generating practices and maintenance activities would continue to be managed in accordance with ARTC procedures.

5.6.6 Mitigation and management measures

Table 5.28 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal to minimise the impacts of waste that are over and above contemporary standard practice for environmental management.

Measures for the management and disposal of lead-based paint are outlined in Section 5.10.3 and Section 5.10.6. Mitigation for storage of hazardous material to address the potential to impact the water quality of the Lachlan River are in Section 5.10.3.

TABLE 5.28 WASTE MANAGEMENT SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
W1	Where possible offsite fabrication of new bridge sections is to occur to minimise generation of waste onsite.	Detailed design/ pre-construction
W2	Investigate opportunities to re-use or recycle metal sections removed from the Lachlan River Bridge.	Detailed design/ pre-construction
W3	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*, and detail processes, responsibilities and measures to manage waste and minimise the potential for impacts during construction. This plan would include: ▸ General protocols and performance objectives for keeping the worksite clean and tidy ▸ Processes for monitoring, documenting and reporting waste types, volumes and how these arisings compare to waste targets (e.g. describe waste streams and estimated	Pre-construction/ construction

ID	Control measures	Stage
	volumes, temporary waste storage areas and disposal locations on and offsite) as well as waste disposal and national environmental protection measures (NEPM) criteria for disposal sites ▸ Requirements for waste segregation ▸ Requirements for secure temporary storage, collection frequency and disposal/ recycling requirements ▸ Effluent management for construction staff amenities ▸ Procedures and reporting/documentation requirements for ensuring waste transporters and receivers are appropriately licensed according to the type of waste ▸ Requirements for training, inspections, audits, corrective actions, notification and classification of environmental incidents, record keeping, monitoring and performance objectives for handover on completion of construction ▸ Any other regulatory requirements.	
W4	All waste generated would be classified in accordance with the *NSW Waste Classification Guidelines* (EPA, 2014) and disposed of in accordance with the relevant requirements of the Protection of the Environment Operations (Waste) Regulation 2014.	Construction

5.7 Traffic and access

5.7.1 Introduction

This section describes the potential traffic and access impacts of the proposal.

5.7.2 Legislation, policy, standards and guidelines

The relevant legislation, policy standards and guidelines include:

- *Guide to Traffic Management—Part 3 Transport Studies and Analysis* (Austroads, 2020)
- *Guide to Traffic Generating Developments Version 2.2* (Roads and Traffic Authority, 2002)
- *NSW Sustainable Design Guidelines Version 4* (TfNSW, 2017).

5.7.3 Assessment methodology

5.7.3.1 Study Area

The study area for the assessment comprises the proposal site and roads, pedestrian, public transport and rail infrastructure that have the potential to be impacted by the proposal.

5.7.3.2 Assessment

The assessment methodology for the traffic and access assessment included:

- Desktop review of surrounding road network and intersections, public transport services, pedestrian and cyclist access, property access and parking conditions, and other relevant features
- Sourcing and reviewing information relevant to background traffic volumes
- Assessing construction impacts, including qualitative assessment of:
  - Number, frequency and size of construction-related vehicles (passenger, commercial and heavy vehicles, including spoil management movements) and potential unloading areas
  - Construction worker parking
  - Access constraints and impacts on public transport, pedestrians and cyclists
  - Need to close, divert or otherwise reconfigure elements of the road and cycle network associated with construction of the proposal
- Assessing operational impacts, including qualitative (or semi-quantitative where traffic counts are supplied) assessment of changes to access arrangements and delays
- Identifying management and mitigation measures to minimise the impacts of the proposal.

5.7.4 Existing environment

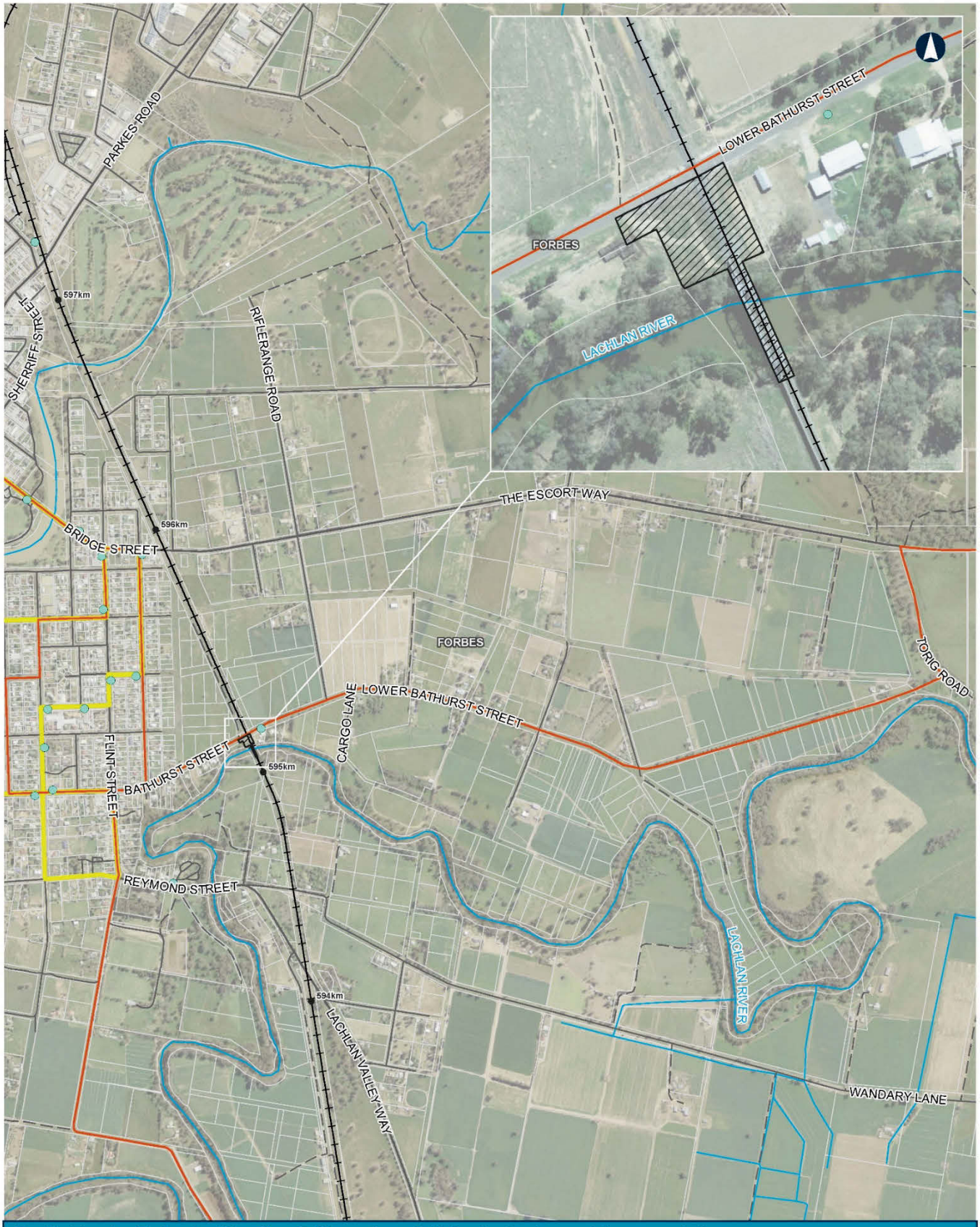
5.7.4.1 Rail corridor

The proposal site is within an existing operational freight rail corridor. The rail corridor consists of a standard-gauge single-track railway. The corridor includes a multi-span bridge that comprises a single-span truss crossing the Lachlan River and an approach structure of nine spans to the southern side.

The S2P rail corridor forms part of the rail network managed and maintained by ARTC. As of 2021, an average of five freight trains travel along the rail corridor per day between Stockinbingal and Parkes. No passenger stations or services operate along the S2P section of the rail corridor.

5.7.4.2 Road network

The proposal site would be accessed from the east via Lower Bathurst Street, The Escort Way, Torig Road and Riflerange Road; and from the west via Bathurst Street, Flint Street, Reymond Street and Wandary Lane. The road network in the vicinity of the proposal site is shown in Figure 5.13.



Stockinbingal to Parkes Lachlan River Bridge Figure 5.13 Road network around the proposal site

0 250 500 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 9/12/2021 Paper: A3
Author: WSP Scale: 1:14,000
Data Sources: ARTC, NSWSS

- KM post
- Existing railway
- Main road
- Local road
- Track
- Watercourse
- Cadastre
- Proposal site
- Bus route 558
- School bus routes (S446 and S459)
- Bus stop

INLAND RAIL ARTC

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

D:\WSP O365\AU-WKG - Geospatial - AIS - Projects\PS122419_Albury_to_Illabo\Tasks\230_0604_EAP_REFReportFigures\Documents\03_LachlanRiver\100pc\230_EAP_LachlanRiver_REF_Traffic_r1v3.mxd

Bathurst Street and Lower Bathurst Street

The road directly north of the proposal site is Bathurst Street to the west of the rail corridor and Lower Bathurst Street to the east of the rail corridor. Bathurst Street is a local road that forms a connection to the south of the Forbes township and agricultural land to the east. This street connects to Flint Street, 570 m to the west of the proposal site, which is a main road within Forbes township. To the east, Lower Bathurst Street connects to Riflerange Road, 350 m from the proposal site, and Torig Road, 3 km to the east of the proposal site. These roads lead to The Escort Way, a main road connecting Forbes to the small town of Eugowra.

Bathurst Street/Lower Bathurst Street is a sealed two-lane road with a speed limit of 80 km/hr and no signalised intersections. The road is predominantly unlined, except for the section leading up to the level crossing. The passive level crossing is located directly north of the proposal site and has no boom gates, only signage and signaling. The edges of the road have guard rails within 30 m of the level crossing, as shown in Figure 5.14 and Figure 5.15. Informal roadside parking is available within the road reserve. Due to the low-density housing present on the southern side and farm land on the northern side of the road, the roadside would only be used for short-term visitor parking.

There were no crashes recorded on Bathurst Street between 2015 and 2019 (TfNSW, 2021a). Traffic demands on Bathurst Street have been provided by Forbes Shire Council from an eight-day count undertaken approximately 70 m to the east of the proposal site in April 2021. Based on the findings of the traffic count in Table 5.29, the road is currently operating under its design capacity.

TABLE 5.29 SUMMARY OF TRAFFIC COUNT FINDINGS ON BATHURST STREET (FORBES SHIRE COUNCIL, 2021A)

Annual average daily traffic design (approx.)	Average daily vehicles no. per lane	Percentage heavy vehicles	Average speed
200 vehicles	98 vehicles	8.4%	50–60 km/hour

FIGURE 5.14 PHOTO OF THE LEVEL CROSSING ON BATHURST STREET FROM THE EAST LOOKING TOWARDS THE PROPOSAL SITE

FIGURE 5.15 PHOTO OF THE LEVEL CROSSING ON BATHURST STREET FROM THE WEST

Riflerange Road

Riflerange Road is a two-way unlined road that connects Lower Bathurst Street to The Escort Way. The narrow road is sealed and has soft edges. Wide vehicles would need to pull off the road slightly to allowing the passing of the vehicles from the opposite direction.

There were no crashes recorded on Riflerange Road between 2015 and 2019 (TfNSW, 2021a).

Torig Road

Torig Road is a two-way unlined road that connects Lower Bathurst Street to Escort Way. The narrow road is sealed and has soft edges. Wide vehicles would need to pull off the road slightly to allowing passing of the vehicles from the opposite direction.

There were no crashes recorded on Torig Road between 2015 and 2019 (TfNSW,2021a).

The Escort Way

The Escort Way is a two-lane road that connects Forbes and Eugowra (refer to Figure 5.13). The road has an 80 km/hr speed limit. The Escort Way is identified by the National Heavy Vehicle Regulator (NHVR) as a 25/26 m B-double route (TfNSW, 2021b).

Three crashes were recorded on The Escort Way between 2015 and 2019 within 1 km to the east of the intersection with Torig Way: one fatal, one resulting in moderate injury and one non-casualty (towaway) (TfNSW, 2021a).

Flint Street

Flint Street is a two-lane arterial road within the Forbes township (refer to Figure 5.13). It leads from the south of the town, starting from Lachlan Valley Way, towards the town centre, connecting to Bridge Street. On-street parking is available on both sides of the road. Flint Street is identified by the NHVR as a 25/26m B-double route (TfNSW, 2021b).

One crash, which resulted in a moderate injury, was recorded on Flint Street, 270 m north of Bathurst Street between 2015 and 2019 (TfNSW, 2021a).

Lachlan Valley Way/Reymond Street

Two crashes were recorded on Lachlan Valley Way between 2015 and 2019 within 1 km to the east of the intersection with Torig Way: one resulting in moderate injury and one non-casualty (tow-away). Reymond Street and Lachlan Valley Way are identified by the NHVR as a 25/26 m B-double routes (TfNSW, 2021b). Reymond Street has a narrow bridge, known as Iron Bridge, across the Lachlan River.

Wandary Lane

Wandary Lane is a sealed local two-way road that connects to Reymond Street south-west of the proposal site and crosses the rail corridor 550 m south of the proposal site. An access track within the rail corridor can be reached from Wandary Lane at the passive level crossing.

5.7.4.3 Public transport

Two school bus routes operate along Bathurst Street and Lower Bathurst Street (TfNSW, 2021c) including:

- S446 Dragon Bus: Eugowra to Forbes schools
- S459 Dog Bus: Canowindra to Forbes schools via Eugowra.

There are several bus stops associated with these routes located on Bathurst Street and Lower Bathurst Street, including a stop opposite 289 Bathurst Street to the east of the proposal site (refer to Figure 5.13). Each of these school bus routes visit this bus stop twice daily between 8 am and 9 am and between 3 pm and 4 pm Monday to Friday.

The town bus route 558 operates three times a day: once in the morning and twice in the afternoon, on Flint Road and Bathurst Street to the west of Flint Street (Forbes Bus Lines, 2021). This bus route does not pass the proposal site.

No passenger trains operate within the rail corridor.

5.7.4.4 Pedestrians and cyclists

Formal pedestrian footpaths and bicycle paths are not present on either side of Bathurst Street or Lower Bathurst Street.

5.7.4.5 Waterway access

The rail corridor and Lachlan River Bridge cross the Lachlan River, which is a navigable water course. The Lachlan River can be used for recreational purposes in the vicinity of the proposal site, including for fishing, canoeing, kayaking and other water activities. Use of larger vessels is limited by water levels and the presence of weirs, including Cottons Weir approximately 9 km downstream of the Lachlan River Bridge. Informal public access to the Lachlan River is available at the proposal site. Informal access to Lachlan River is also available at the end of Cargo Lane, around 350 m upstream of the Lachlan River Bridge, and at Iron Bridge approximately 1 km downstream (Waterways Guide, 2017).

5.7.5 Potential impacts

5.7.5.1 Construction

Construction of the proposal is expected to last for around three months. During this period, traffic would be generated through the movement of plant and materials, and the movement of workers to and from the proposal site. The proposal is anticipated to generate, on average, approximately 16 vehicle movements a day consisting of 5 light vehicles and 3 heavy vehicles visiting and departing the proposal site. Access to the site would predominantly be via Bathurst Street to the east and Lower Bathurst Street to the west of the level crossing. Light vehicles may access the rail corridor via Wandary Lane to the south to reach the southern side of the Lachlan River Bridge (refer to Figure 2.5).

B-double-suitable routes including Flint Road, Reymond Street, Lachlan Valley Way and The Escort Way would be used to access Bathurst Street. The haulage routes would overlap with the school bus routes on Bathurst Street and Lower Bathurst Street and small sections of the local bus routes on Flint Street. No direct impacts to the bus stop opposite 289 Bathurst Street are proposed.

The proposal would not result in any road closures or detours on surrounding roads. Traffic management would likely be required during deliveries using heavy vehicles. At these times, road users may need to wait to allow trucks to enter the proposal site safely. Traffic management would maintain access for emergency vehicles. Access to the properties adjacent to the proposal site is not anticipated to be impacted.

Due to the low number of vehicle movements anticipated to be generated by the proposal and the capacity of the roads, impacts to traffic on the local road network would be minor.

The construction workforce is anticipated to peak at around 15 personnel. Staff parking would be generally within the proposal site and the rail corridor. During peak construction periods, some roadside parking may be required for construction workers on Bathurst Street and Lower Bathurst Street. Due to the existing capacity of roadside parking along Bathurst Street, the impact to parking availability would be minimal. Roadside parking would not impact traffic movement along road.

Construction on the Lachlan River bridge may present a potential safety risk to river users moving under and near the bridge. Public access to the Lachlan River, under and within close proximity to the bridge, would be determined following the development of a Marine Transport Management Plan in accordance with TfNSW requirements. This may require canoeists, kayakers and other river users to enter and exit the river upstream at Cargo Lane or downstream near the Iron Bridge to avoid the proposal site. Implementation of the Marine Transport Management Plan would mitigate the risk to river users during construction.

5.7.5.2 Operation

Once operational, the proposal would be operated by ARTC as part of the existing S2P section of Inland Rail. The proposal would facilitate an increase in the capacity of the ARTC rail corridor between Stockinbingal and Parkes to carry freight. It is estimated that the operation of the proposal would involve an annual average of around 12 trains per day in 2027, increasing to 18 trains per day in 2039.

No changes are proposed to the local road network, access or the level crossing on Bathurst Street during operation of the proposal. Maintenance of the rail corridor would continue in accordance with ARTC protocols. Vehicles associated with maintenance and operation of the rail corridor would continue to visit the proposal site.

5.7.6 Mitigation and management measures

Table 5.30 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal to minimise the impacts to and from traffic and access that are over and above contemporary standard practice for environmental management.

TABLE 5.30 TRAFFIC AND ACCESS SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
TA1	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.	Detailed design/ pre-construction
TA2	A Traffic, Transport and Access Management Plan would be prepared and implemented as part of the CEMP. It would include measures to minimise the potential for impacts on the community and the operation of the surrounding road and transport environment. It would address all the aspects of construction relating to the movement of vehicles, pedestrians and cyclists, and the operation of the surrounding road network, including: ▸ Construction site traffic control, parking and access arrangements away from property access points and driveways ▸ Construction material, equipment and spoil haulage, including arrangements for heavy vehicles ▸ Road pavement and access road condition management ▸ Management of impacts on public transport, including school buses, pedestrian and cyclist access, and safety ▸ Traffic controls to manage deliveries ▸ Ensure adequate sight lines to allow for safe entry and exit from the site ▸ Road and driver safety. The plan would be developed in consultation with Forbes Shire Council and public transport/bus operators. As appropriate, additional reasonable and feasible measures identified as an outcome of consultation would be detailed in the plan.	Pre-construction/ construction
TA3	A Marine Transport Management Plan would be prepared and implemented as part of the CEMP. The plan would be developed in accordance with TfNSW requirements. As appropriate, additional reasonable and feasible measures identified as an outcome of consultation with TfNSW would be detailed in the plan. The plan would include: ▸ Layout of the project area and exclusion zone (including navigation marks, buoyage and signage as required)	Pre-construction/ construction

ID	Control measures	Stage
	▸ Details of the appropriate conditions of use, activity and/or operation within the exclusion zone ▸ Access management measures ▸ Inspection requirements for the exclusion zone ▸ The incident notification process.	

5.8 Soil and contamination

5.8.1 Introduction

This section outlines the existing environment and potential impacts from and to soils, erosion potential and contamination due to the proposal.

5.8.2 Legislation, policy, standards and guidelines

The relevant legislation, policy standards and guidelines include:

- POEO Act
- CLM Act
- *National Environment Protection Council (New South Wales) Act 1995* (NSW)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 and Amendment Measure No.1 (NEPM, 2013)
- *Guidelines for Consultants Reporting on Contaminated Sites* (EPA, 2000)
- *Waste Classification Guidelines—Part 1: Classification of Waste* (EPA, 2014)
- *Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme* (3rd edition) (EPA, 2017b)
- *ARTC Excavated Material Order 2020* issued by the NSW EPA
- *ARTC Excavated Material Exemption 2020* issued by the NSW EPA
- *Australian Standard 4482.1-2005—Guide to the investigation and sampling of sites with potentially contaminated soil – Non-volatile and semi-volatile compounds* (AS4482.1-2005) (Standards Australia, 2005)
- *Australian Standard 4361.1:2017 Guide to hazardous paint management* (Standards Australia, 2017).

5.8.3 Assessment methodology

5.8.3.1 Study area

The study area for the soils and contamination assessment is the proposal site. Desktop searches include a 500-m buffer around the proposal site to identify any nearby sources of contamination that have the potential to migrate to the proposal site (see Figure 5.16).

5.8.3.2 Assessment

The soils and contamination assessment involved:

- Desktop assessment, including:
  - Review of desktop information on soils and geology (including review of maps of acid sulfate soils (ASS) and saline soils)
  - Review site investigations results, including geotechnical investigations for information relevant to the assessment
  - Review of permissible land use under the zoning (refer to Section 5.10.5), and current and historical aerial photographs to identify current and historical land uses that may have impacted the soil
  - Searches of relevant databases, including the ARTC Contamination Sites Register, the NSW EPA Contaminated Sites Register, a list of sites that have been notified to the EPA, and environment protection licences (EPLs) held under the POEO Act
  - Online search of the Department of Defence unexploded ordnance (UXO) database and the Per- and Poly-fluoroalkyl substances (PFAS) investigation database

- Completion of a site walkover in February 2021 to confirm the presence or absence of any potential contaminants identified during the desktop assessment
- Assessment of potential risks from contamination during construction and operation of the proposal
- Identifying management and mitigation measures to minimise construction and operation impacts of the proposal.

5.8.4 Existing environment

5.8.4.1 Landform, geology and soils

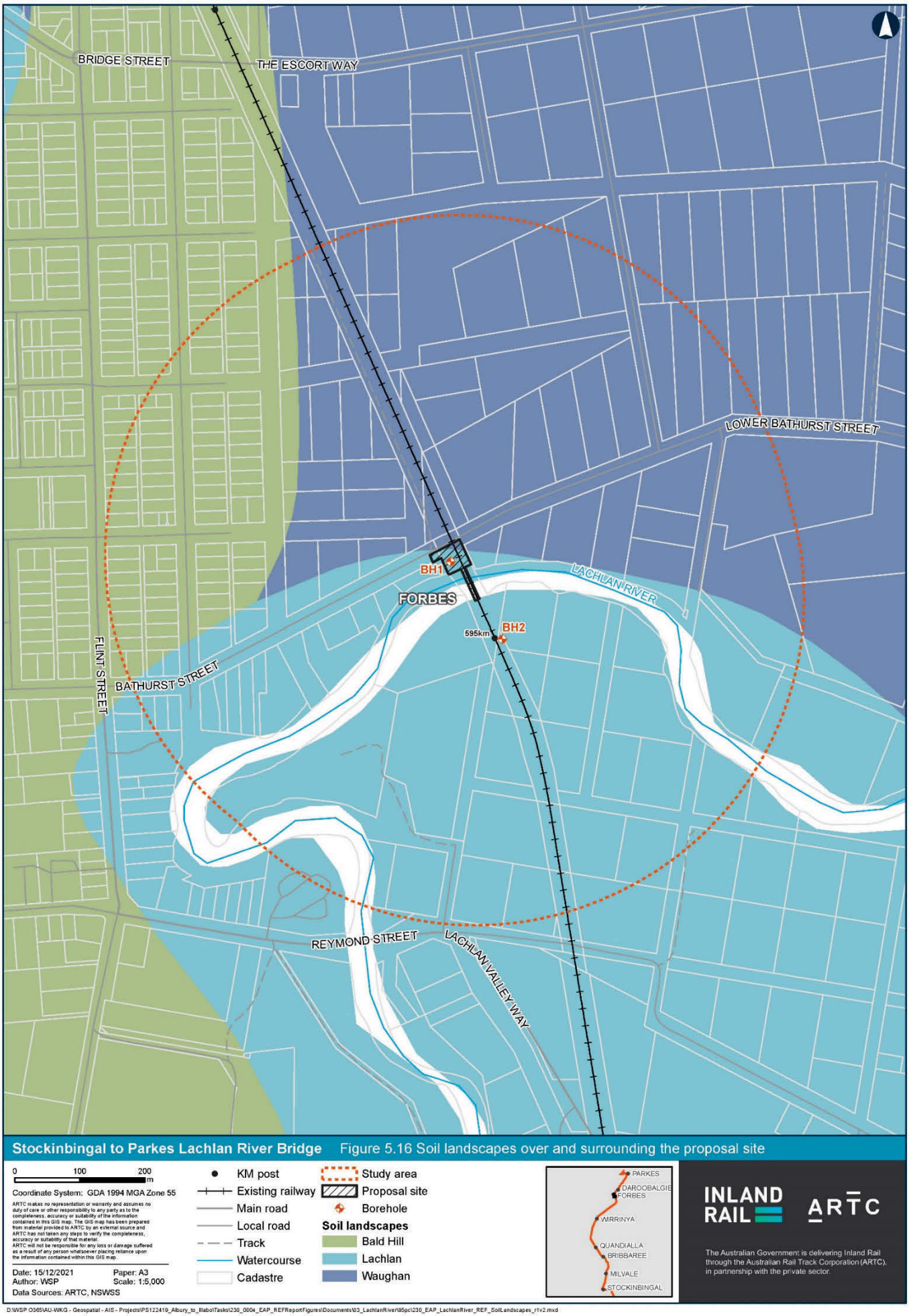
The proposal site is adjacent to, and extends over, the Lachlan River. The landform in the vicinity of the proposal site is generally flat with a gentle decline towards Lachlan River. The embankment along the southern edge of the proposal site slowly declines into the low-lying river.

The proposal site is within the Lachlan and Waughan soil landscape (Figure 5.16), which comprises the alluvial plains and terraces of the Lachlan River (DPIE, 2021a). The Forbes 1:250,000 geological series sheet SI55-7 indicates that the site is located within Quaternary Age colluvial sheet wash and scree slope deposits with minor Aeolian climbing dunes.

Geotechnical investigations completed by WSP in 2018 included two boreholes (BH01 and BH02), which were drilled either side of the Lachlan River in the study area (see Figure 5.16). The investigation identified a top layer of fill (gravelly clay with fine-to-coarse ballast fragments) up to about 0.4 m in depth followed by alluvium up to about 14 m in depth. Due to proximity of the land to the Lachlan River, there is a high-water erosion hazard.

Salinity hazard report for Catchment Action Plan upgrade—Lachlan Catchment Management Authority (NSW DPI, 2013b) identified the area around the proposal site as having a moderate salinity hazard as land salinisation is occasionally present but not extensive or common. Irrigated agriculture contributes to the potential salinity development in this area.

ASS are naturally occurring soils containing iron sulphides that, when exposed to air, react with oxygen and water to produce a variety of iron compounds and sulfuric acid. Risk of ASS occurring has not been identified in or near the proposal site based on the NSW ASS Risk Maps (DPIE, 2021a). The *Australian Soils Resource Information System* (DAFF, 2014) shows that there is low probability of presence of ASS at the proposal site.


BRIDGE STREET
THE ESCORT WAY
LOWER BATHURST STREET
BH1
FORBES
LACHLAN RIVER
595km
BH2
FLINT STREET
BATHURST STREET
REYMOND STREET
LACHLAN VALLEY WAY
Stockinbingal to Parkes Lachlan River Bridge
Figure 5.16 Soil landscapes over and surrounding the proposal site
0
100
200
m
Coordinate System: GDA 1994 MGA Zone 55
ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.
Date: 15/12/2021
Paper: A3
Author: WSP
Scale: 1:5,000
Data Sources: ARTC, NSWSS
KM post
Existing railway
Main road
Local road
Track
Watercourse
Cadastre
Study area
Proposal site
Borehole
Soil landscapes
Bald Hill
Lachlan
Waughan
PARKES
DAROOBALGIE
FORBES
WIRRINYA
QUANDIALLA
BRIBBAREE
MILVALE
STOCKINBINGAL
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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5.8.4.2 Contamination

Site history

A search of historical aerial photography (NSW Government, 2021) for the Forbes area, indicated the proposal site, has been used as a rail corridor since 1965 (based on the earliest aerial photograph for the proposal site). Figure 5.17 shows the presence of the Lachlan River Bridge structure and surrounding area, which consists of open space that is assumed to be used for agricultural purposes, and some residential development to the west and along the Lachlan River. It appears the residential property to the immediate east of the proposal site was present during this period. The Lachlan River Bridge was likely constructed by 1918 with plans of the bridge dated to 1912. Thus, the historical use of the proposal sites as a rail corridor extends earlier than 1965.

FIGURE 5.17 HISTORICAL AERIAL PHOTOGRAPH (1965)

FIGURE 5.18 HISTORICAL AERIAL PHOTOGRAPH (1977)

Between 1965 and 1977 (Figure 5.18) there appears to be no change to the proposal site and minor changes to the surrounding area, including the presence of what appears to be a trotting track to the north west (across Bathurst Street). The remaining areas appear to be used for agricultural (cropping) purposes.

By 1989 (Figure 5.19), remnants of the trotting track remain, with some infill of rural residential and residential properties to the west towards Forbes. Some disturbance is present along the rail corridor to the south of the proposal site; however, the purpose of this clearance is not clear. The proposal site remains largely unchanged.

FIGURE 5.19 HISTORICAL AERIAL PHOTOGRAPH (1989)

FIGURE 5.20 HISTORICAL AERIAL PHOTOGRAPH (1997)

Between 1989 and 1997 (Figure 5.20) there are visible changes to the proposal site. The surrounding area contains agricultural (presumably cropping) uses and residential properties present along the Lachlan River to the east towards Forbes.

Since 1997, there have been some minor changes to the proposal site, including the installation of a signal box (assumed associated with an upgrade to the level crossing), which occurred between 2006 and 2012.

Due to the historical use of the proposal site as a rail corridor, it may contain contaminated material. The *Australian Standard 4482.1-2005 – Guide to the investigation and sampling of sites with potentially contaminated soil – Non-*

volatile and semi-volatile compounds (AS4482.1-2005) (Standards Australia, 2005) lists the chemicals likely to be used by specific industries. The standard identifies the following chemicals as likely to be present in railway yards:

- Hydrocarbons
- Arsenic
- Phenolics
- Heavy metals
- Nitrates and ammonia
- Asbestos.

While the proposal site is not considered a railway yard, these chemicals are representative of the types that may be found in the rail corridor. In addition, the Lachlan River Bridge structure is known to contain lead-based paint, which requires removal as part of the proposal. The removal of this lead-based paint presents a hazard to site workers and the receiving environment (discussed further in Section 5.10.6).

Chemicals of concern are unlikely to be present in quantities that would result in contamination of the proposal site. This risk also applies to the presence of fertiliser and pesticides, which, given the long-term historical use of surrounding lands for agricultural purposes, may be present.

The historical aerial photograph review did not identify any potential storage locations for chemicals of concerns or pesticides/fertilisers in or adjacent to the proposal site that are not in their present locations.

Contaminated sites

A review of the NSW EPA Contaminated Land Public Record and the POEO Act Public Register were undertaken on 20 April 2021. The review did not identify any registered or notified contaminated sites within 500 m of the proposal site, nor has the site been subject to any regulation under the CLM Act.

A review of the ARTC Contaminated Sites Register did not identify any potential contamination sites near or within the proposal site.

The proposal site is not in or near a NSW EPA PFAS investigation site (EPA, 2021b), or in an area identified as having potential for UXOs (Australian Government Department of Defence, 2021).

5.8.5 Potential impacts

5.8.5.1 Construction

Potential impacts to soil from the construction of the proposal are described in Table 5.31.

TABLE 5.31 POTENTIAL IMPACTS—CONSTRUCTION

Construction activity	Potential impact
Site establishment and use of site compounds and site access	Removal of 0.1 ha of vegetation would temporarily expose the natural ground surface to runoff and wind, which would increase soil erosion potential. The potential for erosion impacts would be minimised by implementing standard best-practice management measures, including erosion controls based on *Managing Urban Stormwater–Soils and Construction, Volume 1* (Landcom, 2004) and Volumes 2A and 2C (DECC, 2008) also known as 'The Blue Book'. Grading of the proposal site would be required to establish the compounds and crane pad. This ground disturbance may encounter unknown sources of contaminants related to the historical use of the rail corridor (as discussed in Section 5.8.4.2); however, the potential of encountering and dispersing unknown contaminants would be minimised by implementing appropriate mitigation measures such as unexpected finds protocols.
Bridge works	The removal of lead-based paint from the bridge structure has the potential to result in local contamination of surrounding soils. Paint removal would be performed in accordance with the procedure outlined in *AS/NZS 4361.1:2017 Guide to hazardous paint management* (Standards Australia, 2017) (refer to Section 5.10.6). Contamination of soils though spills and leaks resulting from inadequate storage of waste, fuels and chemicals, and during maintenance of vehicles, plant and equipment. These potential impacts would be minimised with the implementation of standard mitigation measures.
Spoil management	If any spoil is generated during the proposal, it would require testing to ensure it is suitable for beneficial reuse, meaning it should remain onsite, where it has been assessed as suitable for use in the rail corridor with a low risk of human health impacts, or disposed of as general solid waste at an appropriately licensed waste facility.

5.8.5.2 Operation

The operation of the proposal would have no material change to geology, soils, hazardous materials or contamination.

5.8.6 Mitigation and management measures

Table 5.32 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal, to minimise impacts to and from the site from existing or potential contamination that are over and above contemporary standard practice for environmental management. Measures to manage impacts from lead-based paint and other potentially hazardous materials during construction are provided in Section 5.10.6.

TABLE 5.32 CONTAMINATION SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
C1	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 the environment, and procedures for incident management and managing unexpected contamination finds (an unexpected finds protocol). The plan would include protocols for the capture of lead paint (e.g. using a membrane fixed around the work area, vacuum-sheathed equipment and wet paint removal) along with undertaking the paint removal work in stages to reduce the scale of any potential impacts.	Pre-construction/ construction
C2	An erosion and sediment control plan and a Soil and Water Management Plan (SWMP) would be prepared as part of the CEMP. The SWMP would comply with the existing EPL3142 and be in accordance with best onsite practice, reflected in *Managing Urban Stormwater–Soils and Construction, Volume 1* (Landcom, 2004) and Volumes 2A and 2C (DECC, 2008) also known as 'The Blue Book'. The SWMP and erosion and sediment control plan would include: ▸ Surface controls to promote ground stability, limit runoff lengths and reduce runoff velocities in the construction areas ▸ Sediment and erosion controls would be built to a design standard that will ensure non-erodible velocities ▸ Inspection and maintenance of erosion and sediment controls throughout the works to ensure they are operating effectively ▸ Rainfall monitoring requirements ▸ Management protocols of problem soils (e.g. erosive, dispersive, reactive, acidic, saline, sodic, alkaline soils) ▸ Management protocols for any contaminated soils ▸ Vehicle, machinery and imported fill hygiene protocols and documentation ▸ Measures to prevent/minimise mud and dirt being tracked onto public roadways by trucks and any equipment leaving the site ▸ Spill-management procedures and provision of a spill containment kit ▸ Requirements for training, inspections, corrective actions, notification and classification of environmental incidents, record keeping, monitoring and performance objectives for handover on completion of construction.	Pre-construction/ construction

5.9 Socio-economic

5.9.1 Introduction

This section is a description of relevant socio-economic characteristics of the potentially affected community, a summary of potential impacts associated with the proposal and how they may be mitigated or managed. This section includes information outlined in the *Inland Rail: Project-level economic impact assessment* (KPMG, 2021).

5.9.2 Legislation, policy, standards and guidelines

The relevant legislation and guidelines considered by this assessment include:

- EP&A Act
- *Social Impact Assessment Guideline for State Significant Projects* (NSW DPIE, 2021g).

Although the proposal is not a state significant project, the social impact assessment for the proposal had regard to this guide.

5.9.3 Assessment methodology

5.9.3.1 Study area

To assess the potential community and socio-economic impacts associated with the proposal, two study areas have been considered. The Forbes LGA reflects the local economic catchment for workers and economic activity, as well as the potential for wider socio-economic and community impacts. The area immediately surrounding the proposal site considers the potential for direct community impacts experienced near the proposal site in Forbes.

5.9.3.2 Assessment tasks

The community and socio-economic assessment methodology included:

- Review of the *Inland Rail: Project-level economic impact assessment*, which included a review of the socio-economic characteristics of the Forbes LGA with reference to the local demographics, labour markets, and business and industry characteristics
- Desktop review of secondary-source quantitative data such as a review of the Australian Bureau of Statistics' (ABS) *Census Quick Stats* (ABS, 2016) and publicly available information on local community structure and patterns
- Search of relevant public websites and council documentation to consider the existing availability of housing supply in the LGA
- Completion of limited phone interviews with five key stakeholders to gather a snapshot in time of select community views relevant to the proposal. These key stakeholders were interviewed between 17 March and 8 April 2021 and asked a series of questions aimed at understanding the characteristics, values, opportunities and challenges of the community in relation to Inland Rail
- Review of the overarching stakeholder engagement tasks undertaken by ARTC to help identify key community concerns
- Review of the outcome of other assessments containing relevant community and socio-economic themes including, but not limited to, noise and vibration (Section 5.1), air quality (Section 5.10.4) and traffic and access (Section 5.7)
- Consideration of land use and property information, including any land requirements for the proposal
- Consideration of construction and operational impacts, including:
  - Amenity-related issues (e.g. noise, dust, visual)
  - Community values and social infrastructure
  - Employment and workforce accommodation
  - Changes in travel patterns/access/behaviours (i.e. construction traffic management requirements)
  - Impacts/benefits to industry/business in the study area
  - Cumulative impacts with other Inland Rail projects.
- Identifying management and mitigation measures to minimise the impacts of the proposal.

5.9.4 Existing environment

The proposal is in the Forbes LGA and is located in the Central West on the banks of the Lachlan River, with an estimated population of 9,920 as of 2020 (ABS, 2020). Forbes is the largest town in the LGA and hosts a number of summer and winter events, monthly farmers markets and festivals. Five schools, one preschool and three early childhood centres are located across the LGA. The Traditional Owners of the Forbes area are the Wiradjuri people.

The general population is concentrated within and around the town of Forbes. As reported by the 2016 ABS Census, the Forbes LGA had the highest proportion of population in the 1–19 age groups and the 50–69 age groups. Ages 5–9 represented the highest age group across the LGA, at 7 per cent, comparable to NSW and Australia at 6.4 per cent.

5.9.4.1 Labour market and employment

As of December 2020, the unemployment rate in NSW was 6.2 per cent. This follows peak unemployment in July 2020 of around 7.1 per cent, following market responses to the COVID-19 health crisis. COVID-19 impacted NSW labour markets abruptly; however, the labour markets have since appeared to stabilise and recover.

In the December quarter 2020, the unemployment rate in Forbes LGA was 4.3 per cent, which is substantially lower than NSW at 6.2 per cent. Labour market conditions in Forbes LGA have improved over the 24 months to December 2020, with the unemployment rate having decreased by 1.1 percentage points. The youth unemployment rate (persons aged 15 to 24 years) in Forbes (10.7 per cent) is more than double the LGA's total average rate of unemployment.

Forbes has a high Indigenous population, with 11 per cent of residents identifying as Aboriginal and/or Torres Strait Islander (compared to the NSW average of 2.9 per cent). Importantly, Aboriginal Australians are inadequately represented in the workforce and the unemployment rate for Indigenous people in Forbes is very high, at 13.9 per cent—more than double the total unemployment rate.

The top 10 industries of employment for those living within the study area is shown in Figure 5.21. The major employment industry for those living in Forbes is agriculture, forestry and fishing—employing 18.1 per cent of the total workforce.

Within the study area, there is employment in directly relevant industry sectors and occupations to support the construction of the proposal. Of the total workforce, 5.5 per cent were employed in the construction industry (210 workers), with the largest proportion employed in construction services (124 workers), followed by building construction (50 workers), and heavy and civil engineering construction (23 workers).

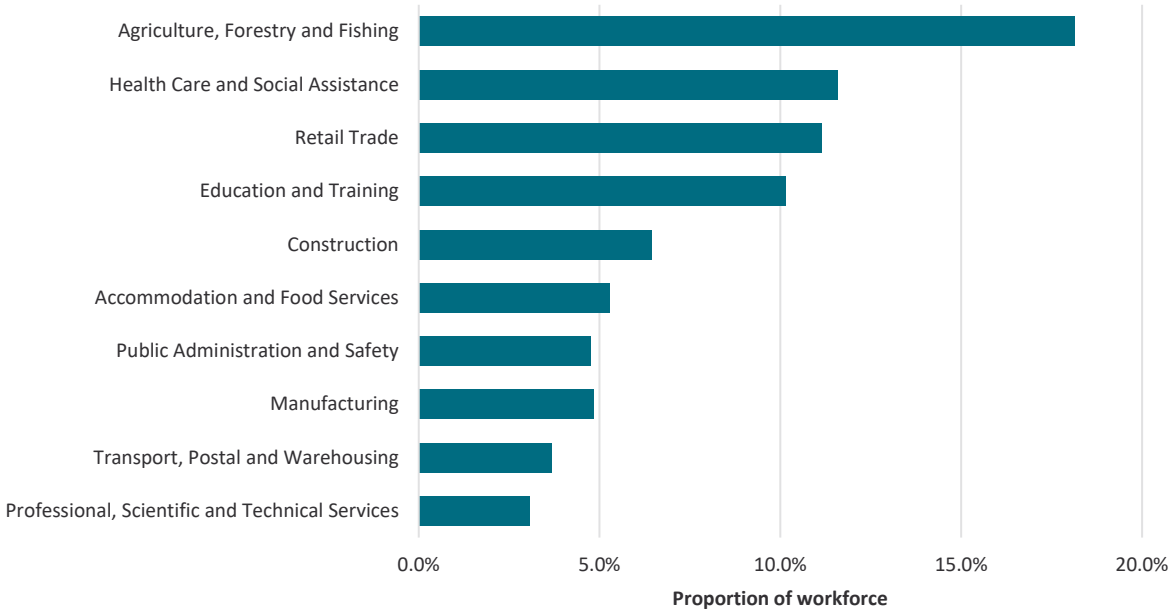


FIGURE 5.21 TOP TEN INDUSTRIES BY EMPLOYMENT IN THE FORBES LGA (ABS, 2016)

5.9.4.2 Business and industry

The proposal site is predominantly confined to the existing rail corridor. The surrounding area is generally characterised by rural land uses and primary agricultural production. There are no businesses in close proximity to the rail corridor.

This land use is reflected in the area's strength in the agriculture, forestry and fishing industry. The agriculture, forestry and fishing industry employs the largest number of local residents, as reflected in Figure 5.21. Within agriculture, forestry and fishing, the primary source of employment is in sheep, beef cattle and grain farming.

Construction labour availability

In June 2021, construction industry reports outlined that COVID-19 has disrupted labour supply chains, and is continuing to cause fluctuating labour availability and conditions, particularly due to changing government restrictions. Despite this, the reports forecast strong rail construction industry activity over the next five years, underpinned by several landmark projects, especially in capital cities. Revenue and employment are expected to peak in 2023–24 during the core stages of many of these projects, then subsequently decrease to below current

levels upon their staged completion. In line with this, the average rail construction wage is predicted to increase until 2024 then fall (Kelly, 2021).

These labour supply constraints are a contributing factor to the rising input costs for rail projects, which is exerting ongoing pressure on profit margins and increasing the total cost of project delivery. Over the past 15 years, labour has become a proportionally larger cost for rail projects compared to capital. Currently, for every dollar invested in capital, $14.82 is spent on labour, which is higher than the construction sector average of $13.69 (Kelly, 2021). Railway track construction wage costs represent 25.2 per cent of project revenue, whereas the broader industry spend only accounts for 17.8 per cent (Kelly, 2021). With workforce demand expected to peak in 2023–24, labour-sourcing difficulties are expected to remain. Shortages in labour availability are most likely for specific trades requiring specialist skills.

5.9.4.3 Housing

The Forbes LGA had the highest proportion of residents living in a standalone house at 90.5 per cent, which was significantly higher than NSW and Australia with 66.4 per cent and 72.9 per cent, respectively. The lowest percentage of residents lived in a semi-detached, row or terrace/townhouse (3.4 per cent) as well as 'other' dwellings (1.7 per cent). This is compared to NSW that represented its second highest proportion living in a flat or apartment at 19.9 per cent, and Australia at 13.1 per cent.

Across the LGA, the highest proportion of properties were owned outright at 37.9 per cent and owned with a mortgage at 30.1 per cent. Rented properties represented 27 per cent of properties. A review of real estate website Domain (**domain.com.au**) indicated 18 properties for rent in Forbes (accessed 28 April 2021). A review of vacancy rates for the Central West of NSW (*NSW Vacancy Rate Survey Results* (REINS, 2021)) indicates a residential vacancy rate of 0.6 per cent.

The housing shortage is supported by the *Forbes Local Strategic Planning Statement 2040* (Forbes Shire Council, 2020a), which has identified the development of a housing strategy to address future housing needs in the region, and specifically identify best-practice methods of housing temporary workers that are required for seasonal activities in the region. Temporary housing demand is expected to be greatest during harvest seasons, which includes: grain (October to December), hay and silage (September and October) and stone fruit (January to April) (NSW Government, 2021c).

5.9.4.4 Stakeholder engagement

This assessment has been directly informed by feedback generated through the community and stakeholder engagement. ARTC has undertaken an extensive engagement with stakeholders, including landholders, business and surrounding communities. The results of this community and stakeholder engagement is included in Chapter 4 of this REF. Section 4.6 outlines the key matters of concern of the community and key stakeholders. The range of community concerns was identified by impacted landholders, the wider community and Indigenous stakeholders, and included impacts associated with construction activities; flooding; traffic and access; noise and vibration; and impacts to social and economic factors.

In addition to the consultation outlined in Chapter 4, five key stakeholders along the S2P rail corridor were interviewed between 17 March and 8 April 2021 to understand the characteristics, values, opportunities and challenges of the community in relation to Inland Rail . Key stakeholders included: education and emergency services, the Forbes Business Chamber, Forbes Shire Council, and a local resident.

In summary:

- The Forbes community is generally described as a resilient and welcoming regional community with strong agricultural ties that support the town and local industries.
- The Forbes Lake was identified as a key focal point of recreational activities, including sporting facilities, and as being important to the history of sport in the region.
- Current community challenges were identified as: the provision of opportunities for young people; the availability of skilled workers; a lack of medical professionals; crime; climate (drought); general community health and wellbeing; and the availability of housing, including short-term accommodation, to facilitate the developments proposed in the local area.
- The general perception of Inland Rail included:
  - The benefits of Inland Rail would outweigh the construction impacts
  - It has the potential to provide increased employment opportunities and services that may encourage migration to the area

- There is a high level of interest in the business community; however, there is some apprehension as to how they would be affected in the future once Inland Rail is operational and how to maximise the benefits
- It is a good short-term economic stimulus to the local area, and would improve transport infrastructure and take demand off the roads in the long term.

- Program benefits and impacts were identified as:
  - An influx of workers, integration into the local community and local spending
  - Jobs for local workers and demand for local resources, including the supply of materials
  - Impacts to emergency services and other minor impacts during construction
  - Operational impacts such as changes to property values, noise and vibrations
  - Potential impacts to property values due to increasing demand and limited short-term accommodation opportunities.

5.9.4.5 Community facilities and public areas

There are no community facilities near the proposal site— the nearest community facility is the Lachlan Health Service in Forbes around 600 m to the west of the proposal.

The proposal site crosses the Lachlan River, which can be used for recreational purposes in the vicinity of the Lachlan River Bridge, including for fishing, canoeing, kayaking and other water activities. Informal public access to the Lachlan River is available at the proposal site (Waterways Guide, 2017).

5.9.5 Potential impacts

5.9.5.1 Construction

Workforce impacts

Construction works for the Lachlan River Bridge are expected to take up to three months in 2024, inclusive of all mobilisation and demobilisation activities. During this period, the workforce would consist of up to 15 personnel, noting that the number of construction personnel is anticipated to fluctuate, depending on work activities.

A variety of skills would be required during construction, including labourers, tradespeople, machinery operators, engineers, surveyors and site supervisors. ARTC is committed to creating opportunities for the development of skilled local workers through Inland Rail; ARTC will require its contractors to have regard to the NSW Infrastructure Skills Legacy Program.

Assuming there is no material negative change in labour market conditions between now and 2023, it seems reasonable to estimate that a small portion of the proposal's workforce requirements would be sourced locally, given the low unemployment rate in Forbes. If unemployment remains low in Forbes, it would likely be more difficult for businesses to recruit employees locally, which may result in workers moving from their current job to a higher paying job. Given the low unemployment rate in Forbes, the proposal workforce may be sourced from neighbouring areas. Where specialist or expert skills are required, some workers may be required to travel from the surrounding regions.

While the projected proposal workforce is small, there is the potential for the workforce to be employed on other similar construction projects within the S2P section of Inland Rail or on adjacent Inland Rail projects (e.g. Parkes to Narromine, and Illabo to Stockinbingal). This has the potential to increase the longevity of local employment opportunities or result in the temporary relocation of the proposal's employees to the study area. This may result in a marginal increase in local economic activity due to spending in local businesses by employees and their families.

Business and industry

The permanent land requirements for the proposal are wholly confined to the existing rail corridor. The proposal does not propose to change the land use of the rail corridor; nor would other adjoining land uses be altered during construction.

For local businesses, any temporary changes in amenity, or access disruptions due to construction traffic, would be minimised as far as practical by the implementation of appropriate consultation and mitigation measures proposed in this REF.

Accordingly, the proposal is not anticipated to result in adverse or long-term impacts on local businesses or industry due to changes in land use, the viability of rural land, access or amenity.

The proposal would require a range of construction supplies, including hard-stand materials, structural members, and paint and corrosion protection. The following local suppliers are able to provide these materials:

- Kitson Manufacturing Solutions (Parkes)
- Darren Cowan Mobile Welding (Forbes)
- LA Welding and Fabrication (Parkes)
- Forbes Engineering (Forbes).

In addition to supplying materials, there are a number of services that could potentially be sourced from within local or regional communities, including: electrical installation (excluding rail systems) and instrumentation; rehabilitation and landscaping; waste disposal services; trades services; professional services (e.g. human resources); and community adaptation to the rail corridor (e.g. community and economic development services).

ARTC has developed the *Inland Rail Sustainable Procurement Policy*, which will ensure that local, regional and Indigenous businesses have opportunities to supply to the proposal. There is a small representation of construction businesses located within the study area, with a total of 70 employing businesses and a further 68 non-employing businesses across Forbes.

Community impacts

Construction of the proposal is not expected to impact the health and wellbeing of the community or have any direct or indirect impacts on community facilities, or the demand for services at these facilities. There may be some temporary disruption and nuisance as a result of noise, dust and traffic to nearby sensitive receivers; however, impacts to these are expected to be minor and temporary, and would be mitigated to minimise their impacts.

Construction on the Lachlan River Bridge may present a potential safety risk to river users moving under and near the bridge. Public access to the Lachlan River, under and within close proximity to the bridge, would be determined following the development of a Marine Transport Management Plan in accordance with TfNSW requirements. Implementation of the Marine Transport Management Plan would mitigate the risk to river users during construction.

Construction impacts to land users in the proximity of the proposal site have been assessed and summarised in other sections of the REF:

- Noise and vibration: Section 5.1
- Air quality: Section 5.7
- Land use and property: Section 5.10.5
- Landscape character and visual amenity: Section 5.4
- Traffic and transport: Section 5.7.

5.9.5.2 Operational

When operational, the proposal is not likely to result in any material changes to the land use and landscape character that would impact the community. Due to the planned increase in rail corridor usage once operational, some residents near the rail corridor would experience an increase in operational noise. Operational noise impacts are discussed in Section 5.2.5.2.

5.9.6 Mitigation and management measures

Table 5.33 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal to minimise the impacts on the local community that are over and above contemporary standard practice for environmental management.

Where specific mitigation measures associated with other assessments are required, they have been included in the mitigation and management measures in the relevant chapter:

- Construction, Transport, and Access Management Plan as part of the CEMP (mitigation measures in Section 5.7.6) to manage the risks associated with construction transport, and risk to the public
- Construction Noise and Vibration Management Plan as part of the CEMP (mitigation measures in Section 5.1.6) to manage the construction risks associated with noise and vibration impacts to the community.

TABLE 5.33 COMMUNITY AND SOCIO-ECONOMIC SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
CS1	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: ▸ The community and key stakeholders are provided opportunities for input to the design and construction planning, where appropriate ▸ 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 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.	Pre-construction/ construction
CS2	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 Skills Academy, to leverage training programs, upskill local residents and young people, and connect businesses with Inland Rail opportunities and key regional industries.	Pre-construction/ construction
CS3	A project-specific Industry Participation Plan would be developed, which: ▸ Complies with the IR AIPP, *Australian Government Indigenous Procurement Policy* and *Inland Rail Sustainable Procurement Policy* ▸ Proposes targets for procurement with local and Indigenous businesses and social enterprises ▸ Reports to ARTC on local and Indigenous business and social enterprise participation, including achievements against targets. The local Industry Participation Plan would be provided to Forbes Shire Council.	Pre-construction/ construction
CS4	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 (including Indigenous employment opportunities) ▸ Health and wellbeing needs of the temporary construction workforce, including medical, allied health and wellbeing services. The 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. The Workforce Management Plan would be developed in consultation with local councils and service providers, including local and regional health and emergency services providers.	Pre-construction/ Construction
CS5	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.	Construction/ operation

5.10 Other issues

This section outlines other potential impacts from the proposal that are considered to have a lower risk.

5.10.1 Climate change

ARTC has developed a Climate Change Risk Assessment Framework to guide a standard approach to climate change risk assessment and mitigation across Inland Rail. The framework provides background on climate change projections and the assessment process. It includes an example climate change risk assessment template that each project is required to tailor to their own specific context.

Accordingly, climate change was considered across the S2P project through the completion of a climate change risk assessment in May 2021 (refer to Appendix C). The results of the risk assessment demonstrated that the scale and nature of the works, essentially carrying out minor modifications to an existing rail line, would result in a negligible outcome in terms of needing to include project-specific climate adaptation measures in the design; however, consistent with the Inland Rail program, climate change mitigation measures considered in the S2P project include:

- Further consideration of flooding is to be undertaken in the detailed design phase; where feasible, opportunities for improvements/adaptations would be included in the reporting
- Monitoring and responding to extreme weather events procedure.

5.10.2 Aboriginal heritage

An *Aboriginal Due Diligence Assessment* (OzArk, 2021b) was prepared for the proposal (refer to Appendix G). A desktop assessment, including a search of the Aboriginal Heritage Information System (AHIMS), was completed and a site inspection by a qualified archaeologist was conducted on 2 and 3 February 2021.

The proposal site is situated on the traditional lands of the Wiradjuri tribal and linguistic group. The Wiradjuri people referred to the Lachlan River as Galiyarr. The AHIMS searches on 25 January 2021 did not identify any Aboriginal sites within the proposal site and no Aboriginal places have been declared. No Aboriginal sites were recorded during the inspection of the proposal site. The lack of Aboriginal sites is most likely due to the highly disturbed nature of the rail corridor, which has been subject to impacts from railway construction and agriculture.

Construction would require ground disturbance for the purpose of establishing a construction site, including a crane pad and site compounds. There is a low risk of Aboriginal objects being present within the proposal site due to the history of disturbance and as no known objects were identified within the proposal site; therefore, it is considered unlikely that any Aboriginal heritage items would be harmed during construction and operation of the proposal.

Table 5.34 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal to protect and minimise impacts to Aboriginal heritage values that are over and above contemporary standard practice for environmental management.

TABLE 5.34 ABORIGINAL HERITAGE SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
AH1	Work crews would undergo cultural heritage induction to ensure they recognise Aboriginal artefacts and are aware of the legislative protection of Aboriginal objects under the NPW Act, and the contents of the unexpected finds protocol.	Construction
AH2	An unexpected finds protocol would be developed and included in the CEMP 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.	Pre-construction and construction

5.10.3 Water quality

The assessment of potential impacts to water quality from the proposal is outlined in this section. The proposal site is on and over the Lachlan River as described in Section 5.5.4.

Based on the *2018 State of the Environment report* (NSW EPA, 2018), the Lachlan River was not achieving the water quality criteria for nutrients as laid out in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), 2018) and the *Murray–Darling Basin Plan* (Murray–Darling Basin Authority, 2012). The sources of the high nutrient levels are likely to be diffuse and related to current and historical agricultural activities within the study area.

The *Lachlan River Water Quality Management Plan* (DPI, 2018) also reported a water quality index (WaQI) of 'Poor' at the monitoring site located 10 km downstream of the proposal site. This index recorded Poor scores for total nitrogen, total phosphorus and turbidity, but 'Good' scores for both pH and dissolved oxygen. Poor water quality is defined in this plan as elevated levels of nutrients, turbidity, blue-green algae, salinity, toxicants and pathogens or temperature, pH and dissolved oxygen outside specified ranges.

A sensitive receiver in close proximity to the proposal site is the lower Lachlan River aquatic ecological community, which is listed as threatened under the FM Act, as described in Section 5.3.4.4. The nearest nationally important wetland, Lake Cowal, is located over 55 km downstream of the proposal site (Australian Government, 2019). Due to the distance, impacts to water quality at Lake Cowal from the proposal would be negligible.

Impacts to water quality through release of pollutants from the proposal site are most likely to occur during construction. The close proximity to the Lachlan River increases the risk of pollutants entering the waterway. The construction activities with the potential to impact water quality are outlined in Table 5.35.

There is potential for water quality impacts as a result of spills or litter generated from continued operation and maintenance activities along the rail corridor near waterways; however, these impacts would not change substantially as a result of the proposal, as the land use and operation as a rail line does not change.

TABLE 5.35 POTENTIAL CONSTRUCTION ACTIVITIES AND ASSOCIATED WATER QUALITY RISKS

Construction activity	Potential impacts
Vegetation clearing to establish the crane pad and compounds	Clearing of approximately 0.1 ha of vegetation consisting mainly of grassland would expose and may destabilise soils, increasing potential for erosion and runoff to the Lachlan River. Increased erosion may lead to increased turbidity, lowered dissolved oxygen levels and increased nutrients in the river. It may also lead to increased deposition of materials, such as contaminants in the soil (refer to Section 5.8.4.2), in the waterway, which may reduce aquatic ecology channel habitat. If any contaminants are present in the soil, such as flakes of lead-based paint, they would also be conveyed to the river via runoff.
Construction compounds and crane pad	Installation of small areas with impervious surfaces associated with the crane pad and compounds in close proximity to the river would result in a small increase in surface runoff volumes and velocities. This may lead to changes in erosion and sediment mobilisation within the proposal site, which would then enter the Lachlan River.
Disturbance and removal of lead-based paint patches	Creates potential for release of small amounts of lead to the Lachlan River and subsequent ecological impacts.
Dust suppression	Use of water onsite for dust suppression in small sections of the proposal site may increase run off and erosion potential, and may increase the sediment load to the Lachlan River. This may result in a minimal temporary increase in turbidity.
Stockpiling of materials and storage of chemicals	Increases the risk of run off of contaminants and soils to waterways, and subsequent impacts to turbidity and waterway health.
Use of machinery and heavy vehicles	Potential for spills of fuels and chemicals to receiving waterways and subsequent ecological impacts.
Staff activity	Gross pollutants and litter entering receiving waterways.

Table 5.36 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal to protect and minimise the impacts to water quality that are over and above contemporary standard practice for environmental management. Mitigation measures for contamination, including an erosion and sediment control plan, and a SWMP as part of the CEMP are identified in Section 5.8.6.

TABLE 5.36 WATER QUALITY SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
WQ1	Dangerous goods, hazardous material and chemicals would be stored in a designated and bunded area (with 110 per cent storage capacity) away from the Lachlan River within the proposal site in accordance with relevant standards.	Construction
WQ2	Capture any potential release of lead-based paint into the Lachlan River in accordance with *AS/NZS 4361.1:2017 Guide to hazardous paint management* (Standards Australia, 2017).	Construction
WQ3	Waste materials, including any stockpiles, to be retained away from the Lachlan River.	Construction
WQ4	Refuelling of plant and equipment is to occur in impervious bunded areas located a minimum of 20 m from Lachlan River, otherwise a double bund is required.	Construction

5.10.4 Air quality

A qualitative assessment of potential impacts to air quality from the proposal is outlined in this section. At a regional level, the air quality is largely influenced by agricultural activities and natural events such as bushfires and dust storms. At a local level, the air quality of the proposal site is influenced by:

- Operation of the rail corridor, including emissions from freight train movements
- Dust from land disturbance for agricultural purposes from the properties to the north and south
- Emissions associated with the Forbes township to the north-west, including vehicles, and from general industrial and commercial land-use activities.

The nearest air quality monitoring station is located in Orange, around 98 km to the east of the proposal, which provides monitoring and data for particulate matter (PM_{10} and $PM_{2.5}$), visibility and wind. The particulate matter and visibility monitoring data indicates that bushfires have historically impacted air quality in the region. The wind data shows that wind speeds are greatest during the spring and summer months, with strong winds from the north frequent in the summer, and strong southerly winds frequent in winter months. This is more likely to cause dust and emissions spread in summer and spring months (DPIE, 2021e).

5.10.4.1 Dust emissions

During construction of the proposal, potential air quality impacts would be associated with the generation of dust and emissions from onsite machinery and associated vehicular traffic. Anticipated dust-generating activities include:

- Land disturbance to establish the construction site, including grading for the crane pad
- Loading and transfer of materials from trucks
- Light vehicles using unsealed track along rail corridor from Wandary Lane.

The residential properties along Bathurst Road and Lower Bathurst Road adjacent to these sites may be exposed to dust as a result of construction of the proposal. The likely airborne dust load generated during a typical construction day would be small and, therefore, would be unlikely to result in reduced local air quality at the nearest receivers.

5.10.4.2 Vehicle and plant exhaust emissions

The operation of plant, machinery and trucks during construction may also lead to increases in exhaust emissions in the local area. Emissions such as nitrogen oxides (NO_x) and $PM_{2.5}$ emissions from diesel combustion vehicles would be generated during construction. As only 16 vehicles are anticipated to be generated daily over a period of three months, these impacts would be minor and short term. No changes to maintenance activities during operation are proposed; therefore, exhaust emissions from plant and vehicles would not change.

5.10.4.3 Train movement emissions

The proposal would enable an increase in the number of freight trains travelling the rail corridor. It is estimated that the operation of the proposal would involve an annual average of around 12 trains per day in 2027, increasing to around 18 trains per day in 2039. The primary source of air quality emissions from the operation of the proposal is from combustion-related gaseous emissions, PM_{10} and $PM_{2.5}$ from freight train movements.

Air quality impacts from busy rail corridors are generally only an issue in densely populated areas with poor outdoor air circulation. *Development near rail corridors and busy roads—interim guideline* (Department of Planning, 2008), suggests that air quality should be a design consideration within 20 m of a freeway or main road with moderate congestion levels. There is one sensitive receiver within 50 m of proposal site, located west of the railway track on Bathurst Street. The guideline provides no specific reference to a distance from rail corridors.

The results of the *Northern Sydney Freight Corridor Strathfield Rail Underpass Air Quality Assessment* (Parsons Brinckerhoff, 2012) were reviewed with respect to the potential impacts of the operation of freight trains. The assessment included air quality modelling of 81 class diesel locomotives undertaking a minimum of 32 movements per day (16 in each direction) at 75 km per hour. The results of modelling indicated that for all assessed pollutants (NO_2, SO_2, CO, PM_{10}, $PM_{2.5}$ and benzene) the predicted levels were significantly below the impact assessment criteria at a distance of 50 m from the track.

The predicted increment of PM_{10} as a 24-hour average was 0.06 µg/m^3, and the increment of $PM_{2.5}$ was 2 µg/m^3, which complied with the assessment criteria at all sensitive receivers. The frequency of train movements in the assessment was substantially greater than those involved in the proposal and the 81 class diesel locomotives have higher emissions than those proposed here. Additionally, the annual average background concentrations of particulate matter in Orange (the nearest DPIE air monitoring station) are lower than the background levels of the highly urbanised environment referred to in the 2012 reference study; as such, the findings apply to the proposal as a conservative overestimate. As the levels of operational rail traffic along the proposal site would be much lower than for the Northern Sydney Freight Corridor, the operational emissions within 50 m, as a result of the proposal, are expected to be much lower. Overall, while the emissions associated with using existing rail line would increase as a result of the proposal, the concentrations are still expected to be low and below the relevant criteria.

Greenhouse gas emissions

An increase in greenhouse gas (GHG) emissions, primarily carbon monoxide, would be expected during construction of the proposal. Much of this would be from embedded energy in construction materials, followed by plant and equipment use. Due to the short-term and minor nature of the proposed work, generation of GHG is not anticipated to be significant.

Table 5.37 is a summary of the project-specific mitigation measure that would be implemented during the construction of the proposal to minimise impacts to air quality from the proposal that are over and above contemporary standard practice for environmental management.

TABLE 5.37 AIR QUALITY SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
AQ1	Dust management measures would be prepared and implemented as part of the CEMP, including processes and responsibilities to minimise the potential for dust impacts on the local community and environment during construction, as far as practicable.	Construction

5.10.5 Land use and property

The proposal site is to the south of the Forbes township, around 2 km from the town centre. The proposal site is predominantly located in an active rail corridor used for freight services and is zoned SP2—Infrastructure (railway) in the Forbes LEP (see Figure 3.1). A small portion of the proposal site is located within the vacant road reserve adjacent to Bathurst Street. The land immediately surrounding the proposal predominantly consists of agricultural land to the north and south, and residential properties to the east and west of the proposal site.

The rail corridor and Lachlan River Bridge cross the Lachlan River, which is bounded by waterfront land. Lachlan River is used for recreational purposes, including fishing, canoeing, kayaking and other water activities. Water from the Lachlan River is also used to support agriculture and the Forbes town water supply (Forbes Shire Council, 2021b).

The *Forbes Local Strategic Planning Statement 2040* (Forbes Shire Council, 2020a) identifies areas to the south-west of the proposal sites as investigation areas for residential development. No major residential developments are currently planned for the land surrounding the proposal site. The area to the east of the proposal site is currently not zoned under the Forbes LEP as it is mapped as a 'deferred matter' (refer to Figure 3.1 in Chapter 3). Lachlan River is Crown land (Crown waterway). No exploration licences, travelling stock routes or native title claims are present across the proposal site.

The land use of the proposal site would temporarily include construction activities. Due to the current use of the proposal site as a rail corridor and vacant road reserve, land-use impact during construction would be negligible. The proposal would not change the land use of the proposal site during operation of the proposal and no acquisition of private land is required.

Utilities within the proposal site include a water main attached to the bridge, telecommunications cables attached to the bridge, and underground and overhead powerlines. The supports on the existing water main attached to the bridge would be modified, if required, to facilitate construction on the bridge. The proposal would not prevent future utilities being attached to the bridge.

Table 5.38 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal to minimise impacts to land use and property that are over and above contemporary standard practice for environmental management. Measures to address impacts to amenity (noise, visual and air quality) and traffic are in those respective sections of this REF.

TABLE 5.38 LAND USE AND PROPERTY SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
LU1	Where construction is located 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. The measures would include, as appropriate, arrangements in terms of works timing and practices; and any required adjustments to fencing, access and farm infrastructure.	Detailed design/ pre-construction
LU2	Utility and service providers would continue to be consulted during detailed design to identify possible interactions and develop procedures to minimise the potential for service interruptions and impacts on existing land uses.	Detailed design/ pre-construction

5.10.6 Hazard and risk

The existing hazard profile of the proposal site is based on the infrastructure present, regular freight train movements and maintenance activities undertaken. Lead paint is present on the bridge structure and utilities in and adjacent to the proposal site, including overhead power lines, underground telecommunication cables and a water main attached to the bridge. The proposal site is mapped as flood-prone land, as identified in Section 5.5, and is not mapped as bushfire-prone land (NSW Rural Fire Service, 2021).

The potential hazard and risks present during construction include:

- Risk of fire due to hot works associated with construction, such as welding and grinding on the bridge
- Storage and handling of a small volume of dangerous goods and hazardous materials, such as fuels or rail weld kits
- Site could become inundated during a flooding event, which could put personnel at risk
- Exposure (via breathing or skin contact) to a small amount of lead from the removal of patches of lead-based paint from the bridge
- Potential for conflict with utilities from works on the bridge or use of crane operations close to overhead power lines services, resulting in rupture or contact with services posing a safety risk to the of workers and the public.

It is noted that the assessment does not provide a detailed account of potential health and safety risks to onsite workers for the proposal. Potential risks to onsite workers are regulated by workplace health and safety legislation (including the *Work Health and Safety Act 2011* (NSW)) and are not relevant to approval of the proposal. Site management would be the responsibility of the construction contractor, who would be required to manage the site in accordance with relevant regulatory requirements.

The frequency and size of freight trains travelling within the proposal site during operation would increase, which would result in an increase in the hazard profile. Potential operational hazards and risks associated with the rail corridor in the proposal site do not significantly increase from current operations, including train accidents (including derailment, collision or impact), spills from train and equipment (such as oil and cleaning chemicals) and accidents involving hazardous cargo. These potential impacts would be managed by undertaking the design with an appropriate emphasis on safety according to relevant design standards and requirements. The operational maintenance activities would not change as a result of the proposal and, therefore, the risks and hazards associated with those works would not change.

Table 5.39 is a summary of the project-specific mitigation and management measures that would be implemented during the construction and operation of the proposal to minimise the impacts to and from hazard and risk that are over and above contemporary standard practice for environmental management. Mitigation measures for risks associated with contamination and hazardous materials are in Section 5.8.6

TABLE 5.39 HAZARD AND RISK SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
HR1	A Flood and Emergency Response Plan would be prepared and implemented as part of the CEMP. The plan would include measures, processes 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 and bushfire risks during construction, including the evacuation protocol of personnel and monitoring of weather forecasts. The plan would be developed in consultation with emergency services and key affected landholders/managers.	Pre-construction/ construction
HR2	Construction would be undertaken in accordance with the procedure outlined in *AS/NZS 4361.1:2017 Guide to hazardous paint management* (Standards Australia, 2017).	Construction
HR3	Dangerous goods and hazardous materials will be stored in accordance with supplier's instructions and relevant legislation, Australian Standards, and applicable guidelines, and may include chemical storage cabinets/containers or impervious bunds.	Construction

5.10.7 Hydrogeology

The existing hydrogeological conditions underlying the proposal indicate that groundwater is not expected to be intersected during the construction and operation of the proposal. The geotechnical investigation completed by WSP in 2017 encountered groundwater at a depth of 9 m and 5 m at each end of the Lachlan River Bridge on the river bank. The groundwater level under and near the proposal site is likely to be heavily influenced by the water level in Lachlan River (WSP, 2017). The proposal does not require dewatering, and the grading works to establish the crane pad are shallow and unlikely to intersect groundwater; as such, the potential for the proposal to impact groundwater is considered low. Given the low chance of impacting groundwater, there are no specific mitigation measures required and can be managed through the CEMP for the project.

5.11 Cumulative impacts

5.11.1 Introduction

This section identifies and describes the potential for cumulative impacts associated with the proposal and other projects nearby.

5.11.2 Legislation, policy, standards and guidelines

In accordance with Clause 228 of the EP&A Regulation, any cumulative environmental effects of the proposal associated with other existing or likely future activities must be taken into account in determining the potential impacts of the proposal on the environment.

5.11.3 Assessment methodology

5.11.3.1 Study area

For this assessment, the cumulative impact study area is defined as the spatial area of influence, which is determined by each environmental and social issue being assessed for the proposal. The area of influence types considered by this assessment were determined by:

- Environmental values identified in impact assessments
- Recognised administrative boundaries
- Recognised physical construction and operation of the proposal.

Specific study areas for each impact theme have been included in the relevant sections of Chapter 5.

5.11.3.2 Assessment tasks

The assessment of cumulative impacts for the proposal has been based on:

- Considering 'state significant' or 'strategic projects' being planned, constructed or operated at the time of this REF, publicly listed on:
  - NSW Major Projects website (DPIE, 2021c)
  - Australian Government—DAWE, EPBC Public notices list (Australian Government, 2021)
  - Other adjacent Inland Rail projects (including the three other Inland Rail S2P enhancement proposals)

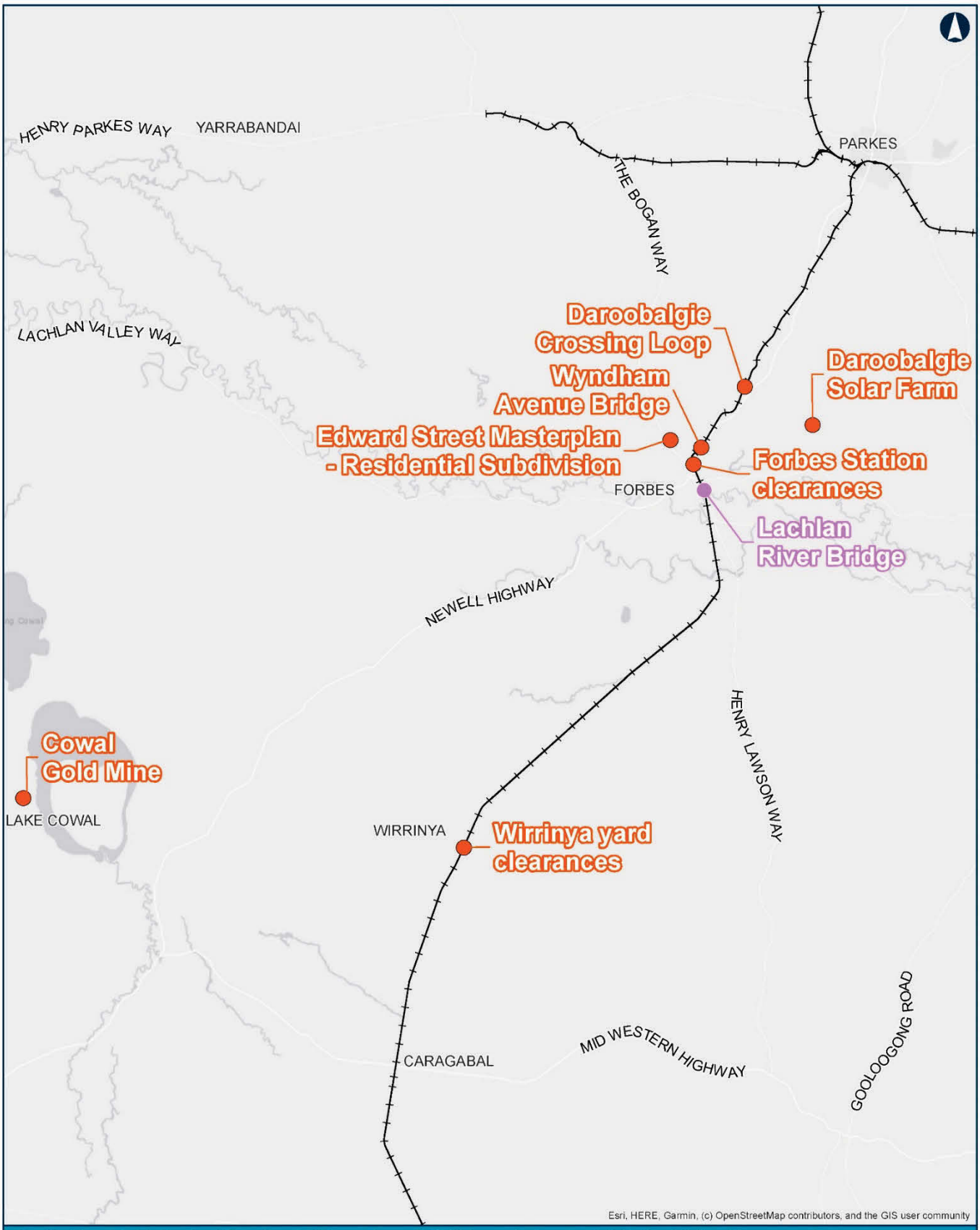
- Identifying the temporal boundaries for the projects
- Identifying the special boundaries of each issue being considered
- Considering the significance of potential cumulative impacts
- Identifying management and mitigation measures to minimise construction and operation impacts of the proposal.

Due to the nature and scale of the proposal, a qualitative assessment of cumulative impacts has been included as part of this assessment, to assess the risk of the cumulative impacts of nearby projects. The following considerations have been made:

- Type, magnitude and intensity of impacts resulting from the project
- Location of the project compared to the proposal
- Timing and duration of the project
- Sensitivity of any receiving environments.

5.11.4 Major projects in the vicinity of the proposal

Projects with the potential for cumulative impacts with the proposal are listed in Table 5.40 and the location of these projects is shown in Figure 5.22. There is potential for new developments to be approved and to commence construction during the planning and construction timeframe for the proposal.



Stockinbingal to Parkes Lachlan River Bridge Figure 5.22 Major projects potentially in the vicinity of the proposal

0 5 10 km

Coordinate System: GDA 1994 MGA Zone 55

ARTC makes no representation or warranty and assumes no duty of care or other responsibility to any party as to the completeness, accuracy or suitability of the information contained in this GIS map. The GIS map has been prepared from material provided to ARTC by an external source and ARTC has not taken any steps to verify the completeness, accuracy or suitability of that material. ARTC will not be responsible for any loss or damage suffered as a result of any person whatsoever placing reliance upon the information contained within this GIS map.

Date: 10/12/2021 Paper: A3
Author: WSP Scale: 1:300,000
Data Sources: ARTC, NSWSS

Existing railway
Proposal site
Major project

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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TABLE 5.40 PROJECTS WITH THE POTENTIAL FOR CUMULATIVE IMPACTS

Project	Description	Indicative status	Location in relation to proposal site
Inland Rail projects			
Horizontal clearances	This project consists of enhancement works at six sites along the rail corridor between Stockinbingal and Forbes. The works would ensure clearance requirements to allow for the passing of freight trains proposed to operate on the Inland Rail. All sites are within the existing rail corridor. The project would require up to approximately 80 construction staff.	Construction to start and finish 2024. Inland Rail to commence operations in 2027.	The Forbes Station site is 2 km north-west of the proposal site and next nearest enhancement site is Wirrinya Yard 36 km south-west.
Wyndham Avenue Bridge	The project involves lowering of the existing track beneath Wyndham Avenue Bridge. It would allow for the standing and passing of larger freight trains using the Inland Rail line. The project would require around 30 personnel with a peak of up to 60 during a two- to three-day period towards the completion of construction works.	Construction to start 2022 and finish 2023. Inland Rail to commence operations in 2027.	2.7 km north-east
Daroobalgie Crossing Loop	The project involves construction of a crossing loop and associated works including drainage and level crossing upgrades. It would allow for the standing and passing of larger freight trains using the Inland Rail line. The project would require between 20 and 50 personnel, with a peak period of up to 90.	Construction to start 2022 and finish 2023. Inland Rail to commence operations in 2027.	7.7 km north-east
Other projects			
Daroobalgie Solar Farm	Development of a 100-megawatt (MW) solar farm and associated infrastructure. Approximately 160 construction jobs and four to six operational jobs are estimated to be generated by the project.	Consultation with Pacific Hydro (5 May 2021) indicated a likely construction period of early 2023 for 12–18 months, with early works extending for 6 months.	9 km north-east
Edward Street Masterplan—Residential subdivision	The subdivision includes: ▸ 223 new residential lots ▸ One proposed park/public recreation area ▸ Two residual lots ▸ A number of new roads, streets and laneways ▸ Associated civil works.	Approved in December 2020. No publicly committed construction timeframe.	4.5 km north-west
Cowan Gold Operations underground development	The project is the expansion of the existing mining operation to include a new underground mine, and an extension of the mine life from 2032–2039. The proposed project is located 38 km north east of West Wyalong and 60 km to the south-west of Forbes, and 68 km to the south-west of the proposal.	Approved September 2021.	60 km south-east

5.11.5 Construction cumulative impacts

Developments proposed close to the proposal site, outlined in Table 5.40, have the potential to increase the number of construction vehicles on local roads, increase noise due to construction, have an impact on local visual amenity, and increase demand on the local workforce and accommodation. Multiple projects undertaken at a similar time and location may also lead to construction fatigue, particularly around noise, traffic and air quality impacts.

Should construction stages overlap, there is the potential for increased traffic on the surrounding roads and associated delays for road users from the use of similar roads by construction vehicles within Forbes. There is also potential for an increased demand on the local workforce and local short-term rental properties and accommodation. However, as the traffic and workforce numbers anticipated to be required by this proposal are low the cumulative impacts are expected to be minor.

Table 5.41 is a summary of the potential for cumulative operational impacts as a result of the proposal and other listed in Table 5.40. Due to the distance of the proposal from other proposed developments and the small scale of the works associated with the proposal, air quality and visual amenity impacts are considered unlikely at this stage.

TABLE 5.41 SUMMARY OF POTENTIAL CUMULATIVE CONSTRUCTION IMPACTS OF THE PROPOSAL WITH OTHER PROJECTS

Impact	Potential cumulative impacts
Noise (Section 5.1)	Where construction works at Forbes Station for the Horizontal Clearances project coincide with works at the Lachlan River Bridge, some cumulative noise impacts may occur at receivers in the south of Forbes. In most cases, the cumulative noise impact experienced at the identified sensitive receivers would be equivalent to the highest construction noise level, or, in worst-case scenarios, up to 3dBA higher than the highest noise level. These cumulative impacts would be experienced for limited periods of time if the highest noise-generating construction activities in each area are occurring simultaneously.
Biodiversity (Section 5.3)	The cumulative impacts of multiple projects occurring in the vicinity of the proposal would likely include cumulative impacts on biodiversity in the region, depending on the nature and extent of the impacts of the individual projects. The projects have the potential to contribute to the cumulative loss of habitat and would place further pressure on the local threatened flora and fauna species, and ecological communities. This proposal would result in removal of the PCT 11: river red gum—lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (0.1 ha), which is not a TEC; therefore, it would not contribute to the cumulative impacts on TECs. Further information on the assessment of cumulative impacts is in Appendix D.
Non-Aboriginal heritage (Section 5.2)	The proposal would have an impact on a locally listed heritage site: Lachlan River Bridge. The Horizontal Clearance proposal would have a minor impact on the state and locally heritage-listed Forbes Station and the locally listed Milvale Yard Railway Water Tanks. Together, the projects would result in cumulative impacts to railway heritage values. As no heritage structures would be demolished, and the railway corridor would continue to be used and maintained, these cumulative impacts to non-Aboriginal railway heritage due to the construction and operation of the proposal would be minor.
Traffic and access (Section 5.7)	The proposal would result in the generation of a small amount of additional construction traffic. Given the distance of other projects in the area, only minor cumulative impacts are anticipated on the around Forbes township. This would be subject to construction schedules overlapping.
Waste (Section 5.6)	The proposal would contribute a small volume of waste to the overall volume of construction waste generated by these projects. The significance of the potential cumulative waste impacts during construction is considered low because waste resulting from the construction activities would be managed in accordance with ARTC standard mitigation measures. Mitigation measures would be implemented during construction to encourage diversion from landfill and avoid impacts on environmental values. Avoiding, reducing, reusing or recycling waste is preferred to treating and disposing of waste.
Socio-economic (Section 5.9)	The proposal would result in cumulative community and socio-economic impacts with other projects in the area. In general, there are a number of economic benefits as a result of the projects, including employment, business for local contractors, and increases in demand for local resources and materials. The concurrent construction of interacting projects, such as Cowan Gold Operation Expansion and the Daroobalgie Solar Farm, has the potential to increase the demand for labour in the local and regional economy, particularly for workers with trade and construction skills/knowledge. If the demand for construction workers occurs within a similar timeframe, this will lead to cumulative demands on construction labour, not only within the local and regional economy but also across NSW and potentially nationally. The subsequent labour market impact of this cumulative demand to the local and regional economy will depend on the workforce profile and construction schedule of the interacting projects and the state of the labour market at any point in time. It is noted that there may also be benefits from having additional infrastructure projects in the adjacent and surrounding areas around the same time as the proposal. These benefits come in the form of lowered mobilisation costs, and transfer of labour experience and skills to projects, particularly those constructed in the period leading up to, and the period following, the proposal's construction phase. Due to the dynamic nature of local and regional labour markets, ARTC has identified that an analysis of the likely availability of construction labour from the region will be undertaken prior

Impact	Potential cumulative impacts
	to construction, to enable the refinement of local and regional recruitment and training strategies to maximise employment opportunities within local economies. The proposal would require a general workforce of about 15 personnel for a short period of time. If all projects were completed concurrently, the proposal represents a negligible amount of the total workforce demand.

5.11.6 Operational cumulative impacts

Operation of the proposal is unlikely to contribute to cumulative impacts with projects listed in Table 5.40 that are not associated with Inland Rail.

The operation of the proposal in conjunction with the operation of other Inland Rail S2P enhancement proposals would enable an increase in the capacity of the rail corridor between Stockinbingal and Parkes to transport freight. This increase in capacity would provide a number of socio-economic benefits to regional NSW (refer to Section 5.9.5).

5.11.7 Mitigation and management measures

Due to the small scale and duration of the works, and the low likelihood of cumulative impacts, mitigation and management measures summarised in Table 7.1 are considered sufficient to address the impacts.

6. Consideration of environmental factors

6.1 Ecologically sustainable development

Ecologically sustainable development (ESD) entails using, conserving and enhancing the community's environmental resources in a manner that sustains and improves ecological processes, and hence the quality of life, for present and future generations.

ARTC is committed to the principles of ESD and understands that the social, economic and environmental matters are interdependent.

Table 6.1 outlines how the principles of ESD have been applied to the proposal.

TABLE 6.1 APPLICATION OF ESD PRINCIPLES TO THE PROPOSAL

ESD principle	Definition	Application to the proposal
Precautionary principle	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. In the application of the precautionary principle, public and private decisions should be guided by: ▸ Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment ▸ An assessment of the risk-weighted consequences of various options.	The assessment of the potential impacts of the proposal has applied the precautionary principle. Specialist assessments 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 to determine potential impacts. For example, the noise assessment modelled the worst-case scenario with equipment operating simultaneously at the closest point a sensitive receiver. No potential threats of serious or irreversible environmental damage have been identified. The proposal has been designed to avoid impacts, as far as practicable, and to reflect the findings of the assessments undertaken. The proposal has taken the approach of minimising environmental impacts, through the development of a range of mitigation measures (summarised in Chapter 7). These measures would be implemented during the construction and operation of the proposal. Lack of scientific certainty has not been used as a reason to postpone mitigation measures.
Intergenerational equity	The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations	It is acknowledged that the proposal may have some minor temporary construction impacts on the current generation (such as dust and noise impacts); however, these impacts would be managed during construction and will not adversely impact future generations. Furthermore, the proposal would benefit future generations by facilitating an expansion of capacity on a key freight line linking Melbourne and Brisbane,and improving local road safety outcomes. Inland Rail would boost the Australian economy by creating jobs and providing better access to and from regional markets.
Conservation of biological diversity and ecological integrity	Conservation of biological diversity and ecological integrity should be a fundamental consideration	Potential impacts on species and vegetation communities of local, regional, state and national significance were assessed in Section 5.3 and Appendix D. The proposal has been selected and designed to minimise the construction impacts to biodiversity. As identified, the proposal is unlikely to impact any threatened communities, species or ecosystem listed under the BC Act or EPBC Act. An assessment of this impact concluded the proposal is not likely to have a significant impact on biodiversity values. Impacts to native vegetation would be minimised during construction and disturbed areas would be restored in accordance with a rehabilitation strategy, therefore preserving ecological integrity.

ESD principle	Definition	Application to the proposal
Improved valuation and pricing of environmental resources	Environmental factors should be included in the valuation of assets and services, such as: ▸ Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement ▸ The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets, and the ultimate disposal of any waste, ▸ Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.	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 and any construction and operational 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 included in the valuation of assets and services in the design and assessment of the proposal. The value of environmental resources is also inherently considered in the development of a design that avoids and minimises impacts.

6.2 Clause 228 checklist

Table 6.2 considers the factors listed under clause 228 of the EP&A Regulations.

TABLE 6.2 CLAUSE 228 CHECKLIST

Clause 228 Factor		Impact
(a)	Any environmental impact on a community?	Yes, the proposal may have some minor temporary construction impacts on the community (such as dust and noise impacts); however, these impacts would be managed during construction through the identified mitigation and management measures in place.
(b)	Any transformation of a locality?	A minor transformation to the locality is anticipated through the works on the locally heritage listed Lachlan River Bridge.
(c)	Any environmental impact on the ecosystems of the locality?	A minor impact on the ecosystem is anticipated by the removal of 0.1 ha of native vegetation, which is not a threatened ecological community (TEC).
(d)	Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	There would be a moderate reduction in aesthetic values of the local area due to the anticipated noise and air quality during construction, and due to the changes to the heritage-listed Lachlan River Bridge.
(e)	Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or other special value, for present or future generations?	The proposal is not anticipated to have a substantial effect on the aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance of the locality. There are no Aboriginal heritage sites in or near the proposal. The proposal would result in a moderate impact to the aesthetic and heritage value of the Lachlan River Bridge.
(f)	Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974* (NSW))?	The proposal would require the removal of approximately 0.1 ha of native vegetation. The proposal would actively mitigate any potential risk of fauna injury or death during the construction period. Other potential impacts include habitat fragmentation, increased edge effects, noise and vibration, and pathogens. Measures to mitigate the impacts of construction and operation of the proposal are described in Chapter 7.
(g)	Any endangering of any species of animal, plant or other form of life whether living on land, in water or in the air?	As discussed in (f) there would be a requirement for the clearing of native vegetation for the proposal. This vegetation is not consistent with threatened ecological communities and potential fauna and flora species. Mitigation measures to mitigate the impacts of construction and operation of the proposal are described in Chapter 7.
(h)	Any long-term effects on the environment?	The proposal is not likely to have any long-term risk to the environment.

Clause 228 Factor		Impact
(i)	Any degradation of the quality of the environment?	During construction, there is a risk to the environment due to accidental spills and sedimentation. Any potential risk of contamination is expected to be manageable through the implementation of the safeguards and management measures outlined in this REF, in Section 5.8.
(j)	Any risk to the safety of the environment?	During construction, there is a risk to the environment due to accidental spills and sedimentation. These risks would be managed through the implementation of proposed control measures outlined in this REF.
(k)	Any reduction in the range of beneficial uses of the environment?	The proposal site is located in an existing rail corridor and, therefore, is not likely to reduce the beneficial use of the environment.
(l)	Any pollution of the environment?	During construction, there is a risk of noise, water and air pollution. These risks would be managed through the implementation of proposed control measures outlined in this REF.
(m)	Any problems associated with the disposal of waste?	Waste generated by the proposal would be managed through the waste hierarchy established under the *Waste Avoidance and Recovery Act 2001* (NSW). All waste requiring offsite disposal would be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) prior to disposal.
(n)	Any increased demands on resources (natural or otherwise) that are or are likely to become in short supply?	Materials required for the construction of the proposal are readily available and would be sourced from local contractors where possible.
(o)	Any cumulative environmental effects with other existing or likely future activities?	The distance, timing and magnitude of other major projects in the region is such that cumulative impacts are not expected. Other Inland Rail projects currently proposed in the Forbes area may result in minor cumulative impacts when construction schedules align during periods of track possessions.
(p)	Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?	The proposal is not likely to have any impacts to coastal processes or coastal hazards.

6.3 Matters of national environmental significance

Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), the following matters of national environmental significance (MNES) and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Department of Agriculture, Water and the Environment (DAWE). Table 6.3 addresses the MNES for the proposal. The proposal would not impact MNES to the extent that a referral is required; however, it will be referred to the Australian Minister for the Environment for assessment to confirm that approval under the EPBC Act is not required.

TABLE 6.3 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

MNES	Impact
Any environmental impact on a World Heritage property?	There are no World Heritage properties located within 1 km of the proposal site. No impacts are anticipated.
Any environmental impact on national heritage places?	There are no Norld Heritage places located within 1 km of the proposal site. No impacts are anticipated.
Any environmental impact on Ramsar wetlands?	There are no Ramsar wetlands located within 1 km of the proposal site. No impacts are anticipated.
Any environmental impact on Commonwealth-listed threatened species or ecological communities?	No significant impacts to threatened species or ecological communities listed under the EPBC Act are anticipated as a result of the proposal.
Any environmental impact on Commonwealth-listed migratory species?	It is unlikely that the development of the proposal would significantly affect any listed migratory species.
Does any part of the project involve nuclear action?	The proposal does not involve a nuclear action.
Any environmental impact on a Commonwealth marine area?	There are no Commonwealth marine areas in the vicinity of the proposal.
Any impact on Commonwealth land?	There is no Commonwealth land located within 1 km of the proposal site. No impacts are anticipated.

7. Environmental management measures

7.1 Environmental Management Plan

An overarching Construction Environmental Management Plan (CEMP) would be developed for the construction of the proposal. The CEMP would include a number of associated plans, as outlined in relevant mitigation and management measures in this REF.

An outline of the CEMP has been prepared (refer Appendix B).

7.2 Summary of control measures

Table 7.1 is a summary of project-specific control measures that have either been identified throughout the assessment undertaken by this REF or are standard best-practice environmental management controls that are over and above contemporary standard practice for environmental management (refer to Chapter 5). They will be incorporated into the detailed design phase of the proposal, and during the construction and operation of the proposal, should it proceed.

TABLE 7.1 SUMMARY OF SITE-SPECIFIC CONTROL MEASURES

ID	Control measures	Stage
Noise and vibration		
CNV1	Prior to the commencement of construction, noise and vibration impacts would be confirmed based on the final project design.	Detailed design/pre-construction
CNV2	If vibration levels are predicted to exceed the screening criteria for a particular structure, as a result of detailed design, 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.	Detailed design/pre-construction
CNV3	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 and ARTC EPL3142. The plan would have measures, processes and responsibilities to manage and monitor noise and vibration, and minimise the potential for impacts during construction. This plan will include: ▸ Construction noise and vibration criteria for the proposal ▸ Location of sensitive receivers in proximity to the construction area ▸ Specific management measures for activities that could exceed the construction noise and vibration criteria. Notification of impacts would be undertaken in accordance with the Communication Management Plan for the proposal.	Pre-construction/ construction
CNV4	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. Where noise impacts are identified, these would be reduced through pro-active communication and engagement with potentially affected receivers, selection of quieter equipment, 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 ARTC EPL3142 and 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 and the community, and incorporated into the construction Noise and Vibration Management Plan.	Pre-construction/ construction
ONV1	Operational noise and vibration compliance monitoring would be undertaken, once Inland Rail has commenced operation, at representative locations, to compare actual noise performance in accordance with the *Rail Infrastructure Noise Guideline* (RING).	Operation
ONV2	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 *Inland Rail Noise and Vibration Strategy*. Where at-property noise treatment is identified as the preferred mitigation option, these would be developed in consultation with individual property owners.	Operation

ID	Control measures	Stage
Non Aboriginal heritage		
H1	The detailed design would minimise the potential for impacts on Lachlan River Bridge, and would have regard to, and be sympathetic with, its heritage significance.	Detailed design/ pre-construction
H2	Modification of the truss structure and strengthening of the vertical and deficient members would be undertaken in a sympathetic style to reduce the impact to the aesthetic values of the bridge. The 'like for like' principle would be applied where feasible.	Detailed design/ construction
H3	Archival photographic recording of Lachlan River Bridge would be carried out prior to works, in accordance with *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Council of NSW, 2006b) and *How to prepare archival records of heritage items* (NSW Heritage Office, 1998).	Pre-construction
H4	An Interpretation Plan would be prepared for Lachlan River Bridge to ensure information regarding the bridge is preserved.	Detailed design/ pre-construction
H5	Patch painting and other ancillary works should similarly be conducted in a stylistically sympathetic way so as to also not affect the aesthetic heritage values of the bridge.	Detailed design/ construction
H6	A Heritage Management Plan would be developed as part of the CEMP, and comply with relevant regulatory requirements and state or Commonwealth guidelines. This plan should include appropriate criteria, directives and processes on: ▸ Requirements and protocols for heritage clearances ▸ Unexpected finds procedure ▸ Requirements for inspections and corrective actions during construction and other activities in the vicinity of heritage items ▸ Heritage management actions to be undertaken by suitably qualified persons ▸ Requirements for training, inspections, corrective actions, notification and classification of incidents, record keeping, monitoring and performance objectives for handover on completion of construction ▸ Any necessary regulatory requirements.	Pre-construction/ construction
Biodiversity		
B2	Vegetation clearing would be limited to the minimum necessary to construct the proposal and allow for its effective operation.	Detailed design/ pre-construction/ construction
B3	A Biodiversity Management Plan would be prepared prior to construction and implemented as part of the CEMP. The plan would include measures to 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, including breeding habitats (including burrows and hollow-bearing trees/logs, Lachlan River Bridge) ▸ Clearing extents/site boundary/limit of works is clearly defined with flagging or marking tape, signage or other suitable means to delineate no-go areas ▸ Establishing protocols for the staged clearing of vegetation and safe tree felling and log removal to reduce the risk of fauna mortality ▸ Establishing daily checks to machinery and excavations for presence of fauna to reduce the risk of fauna mortality ▸ Animal handling protocols, including relocation and emergency care ▸ Measures to avoid and minimise the clearing of hollow-bearing trees ▸ Unexpected finds protocol ▸ Measures to manage biosecurity risks in accordance with the *Biosecurity Act 2015* (NSW) and ARTC's *Biosecurity Management Strategy* ▸ Erosion and sediment control measures.	Pre-construction/ construction
B4	The trimming of canopy trees along the Lachlan River would be completed in consultation with a qualified arborist and minimised where possible.	Construction
B5	Exclusion areas would be established and maintained around native vegetation to be retained; particularly, areas of biodiversity value adjoining the proposal site that are located in close proximity to work areas.	Construction
B6	Compounds and stockpile sites would be located outside of riparian habitat.	Construction

ID	Control measures	Stage
B7	A rehabilitation strategy would be based on the Inland Rail Landscape and Rehabilitation Strategy, the Inland Rail Landscape and Rehabilitation Framework and property-specific reinstatement commitments. This would guide the approach to rehabilitation of disturbed areas following the completion of construction. The strategy would include: ▸ Clear objectives and timeframes for rehabilitation works (including the biodiversity outcomes to be achieved) ▸ Details of the actions and responsibilities to progressively rehabilitate, regenerate and/or revegetate areas, consistent with the agreed objectives ▸ Identification of flora species and sources ▸ Procedures for monitoring the success of rehabilitation ▸ Corrective actions should the outcomes of rehabilitation not conform to the objectives adopted.	Pre-construction/ construction
Landscape character and visual amenity		
LVA1	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.	Detailed design/ pre-construction
LVA2	In consultation with the owner of the adjoining residential property to the east of Lachlan River Bridge, vegetation screening would be included, where practicable, to mitigate the visual impact of the rail line without affecting operational rail safety.	Detailed design/pre-construction
LVA3	Detailed design of the bridge would consider *Bridge aesthetics: design guidelines to improve the appearance of bridges in NSW* (Transport for NSW (TfNSW), 2019).	Detailed design/ pre-construction
LVA4	Any rehabilitation works would be completed in accordance with the ARTC *Landscape Rehabilitation Strategy*.	Detailed design/ pre-construction
LVA5	Temporary lighting would be designed and sited to minimise light spill in accordance with *AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting* (Standards Australia, 2019).	Pre-construction/ construction
Surface water (flooding and hydrology)		
SW1	Detailed construction planning would consider flood risk at construction areas. This would include identification of measures to not worsen flood impacts downstream, and on other property and infrastructure during construction, up to and including the 1% AEP flood event; and review of site layout (e.g. waste) and staging of construction works to avoid or minimise obstruction of overland flow paths and to limit the extent of flow diversion required.	Detailed design/ pre-construction
Waste		
W1	Where possible, offsite fabrication of new bridge sections is to occur to minimise generation of waste onsite.	Detailed design/ pre-construction
W2	Investigate opportunities to re-use or recycle metal sections removed from the Lachlan River Bridge.	Detailed design/ pre-construction
W3	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. This plan would include: ▸ General protocols and performance objectives for keeping the worksite clean and tidy ▸ Processes for monitoring, documenting and reporting waste types, volumes and how these arisings compare to waste targets (e.g. describe waste streams and estimated volumes, temporary waste storage areas and disposal locations on and offsite) as well as waste disposal and NEPM criteria for disposal sites ▸ Requirements for waste segregation ▸ Requirements for secure temporary storage, collection frequency and disposal/recycling requirements ▸ Effluent management for construction staff amenities ▸ Procedures and reporting/documentation requirements for ensuring waste transporters and receivers are appropriately licensed according to the type of waste ▸ Requirements for training, inspections, audits, corrective actions, notification and classification of environmental incidents, record keeping, monitoring and performance objectives for handover on completion of construction. ▸ Any other regulatory requirements.	Pre-construction/ construction

ID	Control measures	Stage
W4	All waste generated would be classified in accordance with the *NSW Waste Classification Guidelines* (EPA, 2014) and disposed of in accordance with the relevant requirements of the Protection of the Environment Operations (Waste) Regulation 2014.	Construction
Traffic and access		
TA1	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.	Detailed design/ pre-construction
TA2	A Traffic, Transport and Access Management Plan would be prepared and implemented as part of the CEMP. It would include measures to minimise the potential for impacts on the community and the operation of the surrounding road and transport environment. It would address all the aspects of construction relating to the movement of vehicles, pedestrians and cyclists, and the operation of the surrounding road network, including: ▸ Construction site traffic control, parking and access arrangements away from property access points and driveways ▸ Construction material, equipment and spoil haulage, including arrangements for heavy vehicles ▸ Road pavement and access road condition management ▸ Management of impacts on public transport, including school buses, pedestrian and cyclist access, and safety ▸ Traffic controls to manage deliveries ▸ Ensure adequate sight lines to allow for safe entry and exit from the site ▸ Road and driver safety. The plan would be developed in consultation with Forbes Shire Council and public transport/bus operators. As appropriate, additional reasonable and feasible measures identified as an outcome of consultation would be detailed in the plan.	Pre-construction/ construction
TA3	A Marine Transport Management Plan would be prepared and implemented as part of the CEMP. The plan would be developed in accordance with TfNSW requirements. As appropriate, additional reasonable and feasible measures identified as an outcome of consultation with TfNSW would be detailed in the plan. The plan would include: ▸ Layout of the project area and exclusion zone (including navigation marks, buoyage and signage as required) ▸ Details of the appropriate conditions of use, activity and/or operation within the exclusion zone ▸ Access management measures ▸ Inspection requirements for the exclusion zone ▸ The incident notification process.	Pre-construction/ construction
Soils and contamination		
C1	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 the environment, and procedures for incident management and managing unexpected contamination finds (an unexpected finds protocol). The plan would include protocols for the capture of lead paint (e.g. using a membrane fixed around the work area, vacuum-sheathed equipment and wet paint removal) along with undertaking the paint removal work in stages to reduce the scale of any potential impacts.	Pre-construction/ construction
C2	An erosion and sediment control plan and a Soil and Water Management Plan (SWMP) would be prepared as part of the CEMP. The SWMP would comply with the existing EPL3142 and be in accordance with best onsite practice, reflected in *Managing Urban Stormwater–Soils and Construction, Volume 1* (Landcom, 2004) and Volumes 2A and 2C (DECC, 2008) also known as 'The Blue Book'. The SWMP and erosion and sediment control plan would include: ▸ Surface controls to promote ground stability, limit runoff lengths and reduce runoff velocities in the construction areas ▸ Sediment and erosion controls would be built to a design standard that will ensure non-erodible velocities ▸ Inspection and maintenance of erosion and sediment controls throughout the works to ensure they are operating effectively ▸ Rainfall monitoring requirements ▸ Management protocols of problem soils (e.g. erosive, dispersive, reactive, acidic, saline, sodic, alkaline soils) ▸ Management protocols for any contaminated soils ▸ Vehicle, machinery and imported fill hygiene protocols and documentation	Pre-construction/ construction

ID	Control measures	Stage
	▸ Measures to prevent/minimise mud and dirt being tracked onto public roadways by trucks and any equipment leaving the site ▸ Spill management procedures and provision of a spill containment kit Requirements for training, inspections, corrective actions, notification and classification of environmental incidents, record keeping, monitoring and performance objectives for handover on completion of construction.	
Socio economic		
CS1	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: ▸ The community and key stakeholders are provided opportunities for input to the design and construction planning, where appropriate ▸ 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 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.	Pre-construction/ construction
CS2	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 Skills Academy, to leverage training programs, upskill local residents and young people, and connect businesses with Inland Rail opportunities and key regional industries.	Pre-construction/ construction
CS3	A project-specific Industry Participation Plan would be developed which: ▸ Complies with the IR AIPP, *Australian Government Indigenous Procurement Policy* and *Inland Rail Sustainable Procurement Policy* ▸ Proposes targets for procurement with local and Indigenous businesses and social enterprises ▸ Reports to ARTC on local and Indigenous business and social enterprise participation, including achievements against targets. The local Industry Participation Plan would be provided to Forbes Shire Council.	Pre-construction/ construction
CS4	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 (including Indigenous employment opportunities) ▸ Health and wellbeing needs of the temporary construction workforce, including medical, allied health and wellbeing services. The 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. The Workforce Management Plan would be developed in consultation with local councils and service providers, including local and regional health and emergency services providers.	Pre-construction/ Construction
CS5	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.	Construction/ operation
Aboriginal heritage		

ID	Control measures	Stage
AH1	Work crews would undergo cultural heritage induction to ensure they recognise Aboriginal artefacts and are aware of the legislative protection of Aboriginal objects under the NPW Act and the contents of the unexpected finds protocol.	Construction
AH2	An unexpected finds protocol would be developed and included in the CEMP 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.	Pre-construction and construction
Water quality		
WQ1	Dangerous goods, hazardous material and chemicals would be stored in a designated and bunded area (with 110 per cent storage capacity) away from the Lachlan River within the proposal site, in accordance with relevant standards.	Construction
WQ2	Capture any potential release of lead-based paint into the Lachlan River in accordance with *AS/NZS 4361.1:2017 Guide to hazardous paint management* (Standards Australia, 2017).	Construction
WQ3	Waste materials including any stockpiles to be retained away from the Lachlan River.	Construction
WQ4	Refuelling of plant and equipment is to occur in impervious bunded areas located a minimum of 20 m from Lachlan River; otherwise, a double bund is required.	Construction
Air quality		
AQ1	Dust management measures would be prepared and implemented as part of the CEMP, including processes and responsibilities to minimise the potential for dust impacts on the local community and environment during construction, as far as practicable.	Construction
Land use and property		
LU1	Where construction is located 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. The measures would include, as appropriate, arrangements in terms of works timing and practices; and any required adjustments to fencing, access, and farm infrastructure.	Detailed design/ pre-construction
LU2	Utility and service providers would continue to be consulted during detailed design to identify possible interactions and develop procedures to minimise the potential for service interruptions and impacts on existing land uses.	Detailed design/ pre-construction
Hazard and risk		
HR1	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 and bushfire risks during construction, including the evacuation protocol of personnel and monitoring of weather forecasts. The plan would be developed in consultation with emergency services and key affected landholders/managers.	Pre-construction/ construction
HR2	Construction would be undertaken in accordance with the procedure outlined in *AS/NZS 4361.1:2017 Guide to hazardous paint management* (Standards Australia, 2017)	Construction
HR3	Dangerous goods and hazardous materials will be stored in accordance with supplier's instructions and relevant legislation, Australian Standards, and applicable guidelines, and may include chemical storage cabinets/containers or impervious bunds.	Construction

8. Finalisation

8.1 Justification and conclusions

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.

Inland Rail would provide the following key benefits:

- Boost the Australian economy
- Job creation
- Provide better access to and from our regional markets
- Offer better transit time and reliability for freight transport
- Improve road safety by removing more trucks from the road network.

This REF has been prepared in accordance with the provisions of Section 5.5 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act), taking into account, to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposal.

The following key impacts have been identified should the proposal proceed:

- Loss of 0.1 ha of native vegetation
- A minor increase in local traffic movements during construction with potential for minor delays on the local road network during material delivery
- Temporary visual, noise and air quality impacts during the construction period
- Increase in trains along the rail corridor during operation, which would have minor noise, air quality and visual impacts.

Mitigation and management measures have been identified to address these and other potential impacts. This REF has assessed the potential impacts of the proposal in accordance with clause 228 of the EP&A Regulation and the requirements of the EPBC Act. Based on the assessment, it is considered that the proposal is not likely to have a significant impact on the environment nor any threatened species, populations or communities. Accordingly, an environmental impact statement (EIS) or species impact statement (SIS) is not required. This assessment concludes that it would be appropriate for the proposal to proceed.

Potential environmental impacts from the proposal have been avoided or reduced during the reference design development and options assessment. The safeguard management measures detailed in this REF would manage the impacts anticipated. On balance, the proposal is considered justified. This assessment concludes that it would be appropriate for the proposal to proceed.

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APPENDIX A

Lachlan River Bridge Modification Project

Environmental Risk Assessment

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Appendix A Environmental Risk Assessment

A.1 Purpose

The purpose of this environmental risk assessment is to:

- Describe the potential environmental risks and issues to be considered in this report with input from the Review of Environmental Factors (REF)
- Identify and rank environmental risks based on the risk or significance rating.

A.2 Methodology

The environmental risk analysis was undertaken in accordance with the principles of the Australian and New Zealand standard A*S/NZS ISO 31000:2009 Risk Management—Principles and Guidelines* (Standards Australia, 2009). This involved categorising each of the environmental values by identifying the consequence of the impact and the likelihood of the impact occurring.

For both the risk and significance assessment methods, a pre-mitigation and a post-mitigation scenario was assessed and a risk/significance ranking determined. The initial assessment of potential impact was undertaken on a pre-mitigation scenario. Following the assessment of the level of risk/significance, the application of mitigation measures is then applied to determine a new risk or significance ranking.

The risk assessment and significance assessment are discussed in the following sections.

A.3 Risk assessment

For those environmental values where an impact may occur, a qualitative risk assessment method based on *AS/NZS 31000:2009 Risk Management—Principles and Guidelines* is considered appropriate.

The definitions of the likelihood used are in Table A. 1 and the consequence criteria are in Table A. 2. The resulting risk matrix is in Table A. 3.

TABLE A. 1 DEFINITION OF LIKELIHOOD

Likelihood	Definition	Frequency of occurrence	Percentile
Almost certain	Is expected to occur in most circumstances	Once per month	>90%
Likely	Will probably occur in most circumstances	Between once a month and once a year	60–90%
Possible	Might occur at some time	Between once a year and once in five years	30–60%
Unlikely	Could occur at some time	Between once in 5 years and once in 20 years	10–30%
Rare	May occur in exceptional circumstances	Once in more than 20 years	<10%

TABLE A. 2 CONSEQUENCE CRITERIA

	Consequence				
Risk category	Not significant	Minor	Moderate	Major	Extreme
Safety—impact to people	No medical treatment required	Lost Time Injury (LTI) results OR medical treatment required	Serious injury occurs	Single fatality occurs	Multiple but localised fatalities occur
Assets—engineering impacts and satisfying objectives	Up to 6 hrs track closure	>6 hrs to 24 hrs track closure	>24 hrs to 48 hrs track closure	>48 hrs to 5 days track closure	>5 days track closure
Financial—total outturn cost impact	Up to 0.05% of program budget (i.e. to $5m in $10b)	>0.05% to 0.5% of program budget (i.e.>$5m to $50m in $10b)	>0.5% to 1.5% of program budget (i.e.>$50m to $150m in $10b)	>1.5% to 5% of program budget (i.e.>$150m to $500m in $10b)	>5% of program budget (i.e.>$500m in $10b)

Risk category	Consequence				
	Not significant	Minor	Moderate	Major	Extreme
	Up to 0.1% of project budget (e.g. to $100k in $100m)	>0.1% to 0.5% of project budget (e.g. >$100k–$500k in $100m)	>0.5% to 2.5% of project budget (e.g. >$500k–$2.5m in $100m)	>2.5% to 10% of project budget (e.g. >$2.5m–$10m in $100m)	>10% of project budget (e.g. >$10m in $100m)
Environment—environment impact, heritage, flora and fauna, archaeology and Aboriginal impacts, pollution and amenity (public)	Contained environmental damage—fully recoverable (no cost or ARTC action required)	Isolated environmental damage—minimal ARTC remediation required	Localised/clustered environmental damage—requiring remediation	Considerable environmental damage—requiring remediation	Widespread, long-term or permanent environmental damage—remediation required
Regulatory—regulatory/legislation exposure, non-compliance and our licence to operate	Minimal or no regulatory involvement	Notice to produce information	Improvement notice or threatened action	Prohibition notice or fines	Prosecution of the company and/or its office holders
Reputation—reputational exposure, customer dissatisfaction, shareholder support, service quality and reliability, public image and stakeholder attitudes.	Isolated event able to be resolved (up to 7 days)	Management intervention required (>7 days to 3 months)	Tactical (business unit/divisional) intervention required (>3 months to 18 months)	Strategic intervention required (>18 months to 3 years)	Corporate loss of shareholder and/or customer support (tangible business impact >3 years)
Schedule—time-based impacts	Influences schedule up to 1% of program-approved schedule period	Influences schedule >1% to 2.5% of program-approved schedule period	Influences schedule >2.5% to 5% of program-approved schedule period	Influences schedule>5% to 10% of program-approved schedule period	Influences schedule >10% of program-approved schedule period
	Influences schedule up to 2% of project-approved schedule period	Influences schedule >2% to 5% of project-approved schedule period	Influences schedule >5% to 10% of project-approved schedule period	Influences schedule >10% to 20% of project-approved schedule period	Influences schedule >20% of project approved-schedule period

TABLE A. 3 RISK ASSESSMENT MATRIX

Likelihood	Consequence				
	Not significant	Minor	Moderate	Major	Extreme
Almost certain	Medium	Medium	High	Very high	Very high
Likely	Low	Medium	High	Very high	Very high
Possible	Low	Low	Medium	High	High
Unlikely	Low	Low	Low	Medium	Medium
Rare	Low	Low	Low	Low	Medium

A.4 Environmental risk analysis

Using the framework described above, the risk assessment for the proposal is in Table A.4.

TABLE A.4 RISK ASSESSMENT

	Pre-mitigated risk				Residual risk		
Potential impact	**Consequence**	**Likelihood**	**Risk**	**Proposed mitigation**	**Consequence**	**Likelihood**	**Risk**
Biodiversity							
Impacts on endangered terrestrial populations, threatened species and threatened ecological communities during construction	Major	Unlikely	Medium	Refer to mitigation in Section 5.3	Moderate	Unlikely	Low
Impacts on endangered aquatic populations, threatened species and threatened ecological communities during construction	Major	Unlikely	Medium	Refer to mitigation in Section 5.3	Moderate	Unlikely	Low
Noise and vibration							
Construction noise impacts on residential receivers	Moderate	Almost certain	High	Refer to mitigation in Section 5.1	Minor	Almost certain	Medium
Potential impacts of vibration	Moderate	Unlikely	Low	Refer to mitigation in Section 5.1	Moderate	Unlikely	Low
Potential impacts from increase in train operation on the rail	Not significant	Likely	Low	Refer to mitigation in Section 5.1	Not significant	Likely	Low
Aboriginal heritage							
Direct impacts on known Aboriginal heritage items	Moderate	Unlikely	Low	Refer to mitigation in Section 5.10.2	Moderate	Rare	Low
Non Aboriginal heritage							
Impacts on known heritage items	Minor	Almost certain	Medium	Refer to mitigation in Section 5.2	Minor	Almost certain	Medium
Landscape character and visual amenity							
Visual impacts of machinery, site compounds and scaffolding during construction	Minor	Likely	Medium	Refer to mitigation in Section 5.4	Minor	Likely	Medium
Potential amenity impacts to receivers from lighting during construction	Minor	Likely	Medium	Refer to mitigation in Section 5.4	Minor	Possible	Low
Potential impacts due to the slightly altered bridge design and train operations	Minor	Likely	Medium	Refer to mitigation in Section 5.4	Minor	Possible	Low
Surface water							
Impacts to on flood-prone areas during construction	Moderate	Possible	Medium	Refer to mitigation in Section 5.5	Moderate	Rare	Low
Impacts to surface water quality during construction by sedimentation, chemicals and nutrients	Moderate	Likely	High	Refer to mitigation in Section 5.10.3	Moderate	Unlikely	Low

	Pre-mitigated risk				Residual risk		
Potential impact	**Consequence**	**Likelihood**	**Risk**	**Proposed mitigation**	**Consequence**	**Likelihood**	**Risk**
Waste							
Increased waste generation during construction	Minor	Almost certain	Medium	Refer to mitigation in Section 5.6	Not significant	Likely	Low
Impacts associated with the management of waste	Minor	Almost certain	Medium	Refer to mitigation in Section 5.6	Not significant	Likely	Low
Air quality							
Impacts to local air quality due to the during construction	Minor	Likely	Medium	Refer to mitigation in Section 5.10.4	Minor	Likely	Medium
Land use and property							
Impacts on other infrastructure during construction including utilities and existing rail lines	Minor	Likely	Medium	Refer to mitigation in Section 5.10.5	Minor	Possible	Low
Soil and contamination							
Disturbance of contaminated land	Minor	Possible	Low	Refer to mitigation in Section 5.8.6	Minor	Unlikely	Low
Contamination of land due to leaks and spills	Moderate	Possible	Medium	Refer to mitigation in Section 5.8.6	Moderate	Unlikely	Low
Traffic and access							
Construction vehicle movements with potential impacts to road safety and traffic delays	Moderate	Likely	High	Refer to mitigation in Section 5.7.6	Minor	Likely	Medium
Community and socio economic							
Amenity impacts on residential receivers during construction	Moderate	Likely	High	Refer to mitigation in Section 5.9	Minor	Likely	Medium
Amenity impacts on residential receivers during operation	Minor	Likely	Medium	Refer to mitigation in Section 5.9	Minor	Likely	Medium
Hazard and risk							
Environmental exposure of lead-based paint	Moderate	Possible	Medium	Refer to mitigation in Section 5.10.6	Moderate	Unlikely	Low
Spill or leak from transport and storage of hazardous substances and dangerous goods during construction	Moderate	Possible	Medium	Refer to mitigation in Section 5.10.6	Moderate	Unlikely	Low
Cumulative impacts							
Cumulative impacts from the construction and operation of multiple projects in the region	Minor	Possible	Low	Refer to mitigation in Section 5.11.6	Moderate	Unlikely	Low

APPENDIX B

Lachlan River Bridge Modification Project

Outline Environmental Management Plan

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS

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Appendix B Outline Environmental Management Plan

B.1 Context

Inland Rail operates within the broader ARTC Environmental Management System. ARTC manages its environmental responsibilities and environmental performance by implementing an Environmental Management System that is consistent with the principles contained within the ISO 14000 series and standards. The Inland Rail Environment and Sustainability Policy guides the planning, design and implementation of the Inland Rail Program. It outlines the organisation's commitment to effectively manage any risks that may lead to an impact on the environment during construction and operation of Inland Rail. Consistent with this policy, ARTC has developed a Construction Environmental Management Framework to provide for a high standard of environmental performance during construction of all Inland Rail projects. In accordance with the framework, contractors will be required to develop, implement and maintain a Construction Environmental Management Plan (CEMP) that meets the requirements of the respective contract, the Construction Environmental Management Framework and the REF. Construction is required to be completed in accordance with the most recent version of the CEMP approved by the relevant administrating authority (where required). The relationship between the Construction Environmental Management Framework, ARTC's and Inland Rail's corporate and program-level environmental documentation, and the CEMP is shown by Figure B.1.

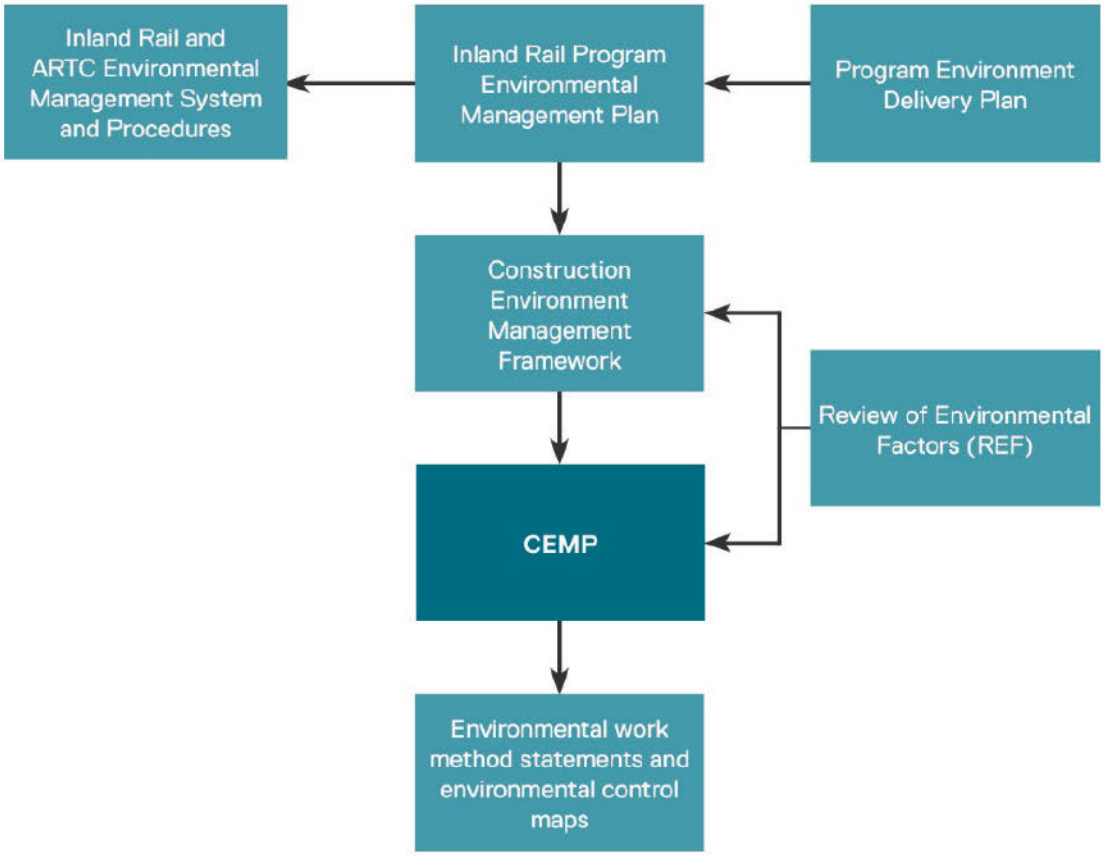

FIGURE B.1 ENVIRONMENTAL MANAGEMENT HIERARCHY

B.2 Outline of Environmental Management Plan

The management of environmental impacts during construction would be documented in the CEMP, to be prepared by the construction contractors. The CEMP would provide a centralised mechanism through which all potential construction-related environmental impacts will be managed. It would also provide the overall framework for the system and procedures to ensure that environmental impacts are minimised, and that legislative and approval requirements are fulfilled.

- Environmental obligations
- Required licences and permits

- All applicable environmental assessment mitigation measures
- Environmental aspects and impacts associated with project scopes of work
- Allocation and statement of ARTC and contractor obligations
- Environmental management roles and responsibilities
- Coverage of identified risks by environmental controls and mitigations
- Environmental training needs
- Obligations of reporting to ARTC
- Emergency response incident management and non-compliance processes
- Hold-point list, as supplied by ARTC
- Complaints and enquiries procedure
- Incident and emergencies procedure
- Document change/version control for the CEMP.

Contractors would develop and document a process of periodically reviewing the CEMP. The process would focus on identifying opportunities for continual improvement of processes and practices to ensure that the CEMP is relevant to contractors' activities. The process would address how legislative changes and environmental incident corrective actions will be addressed via an update to the CEMP. Any changes to the CEMP would be reported as part of contractors' monthly environmental reports.

B.3 Environmental performance

The management measures detailed in the CEMP would be monitored during construction to confirm their effectiveness and whether any additional measures are required. Site inspections would be regularly undertaken to check and update erosion and sediment control measures as necessary. Environmental site monitoring would also be undertaken to confirm project impacts and existing environmental values in accordance with monitoring commitments made in this document. The CEMP would provide for an internal compliance monitoring program where the construction contractors would periodically monitor and report on project performance against the mitigation measures of the REF. Independent external audits would also be carried out in accordance with *ISO 19011:2003—Guidelines for Quality and/or Environmental Management Systems Auditing* every six months.

B.4 Non-conformance and corrective action

For any environmental issues that arise, corrective and preventative actions must be implemented. Corrective and preventative actions might be developed to address issues or initiate environmental management improvement opportunities identified as a result of incidents, inspections and monitoring, and audit findings and other reviews.

The CEMP would document the corrective and preventative action procedures that will be implemented during construction of the project.

B.5 Outline of CEMP plans

The CEMP would comprise a main CEMP document, issue-specific plans, activity-specific procedures and strategies, and site-based control maps. The CEMP, issue-specific plans and strategies/plans proposed to manage the impacts identified in the REF (in accordance with the mitigation measures) are shown in Figure B.2.

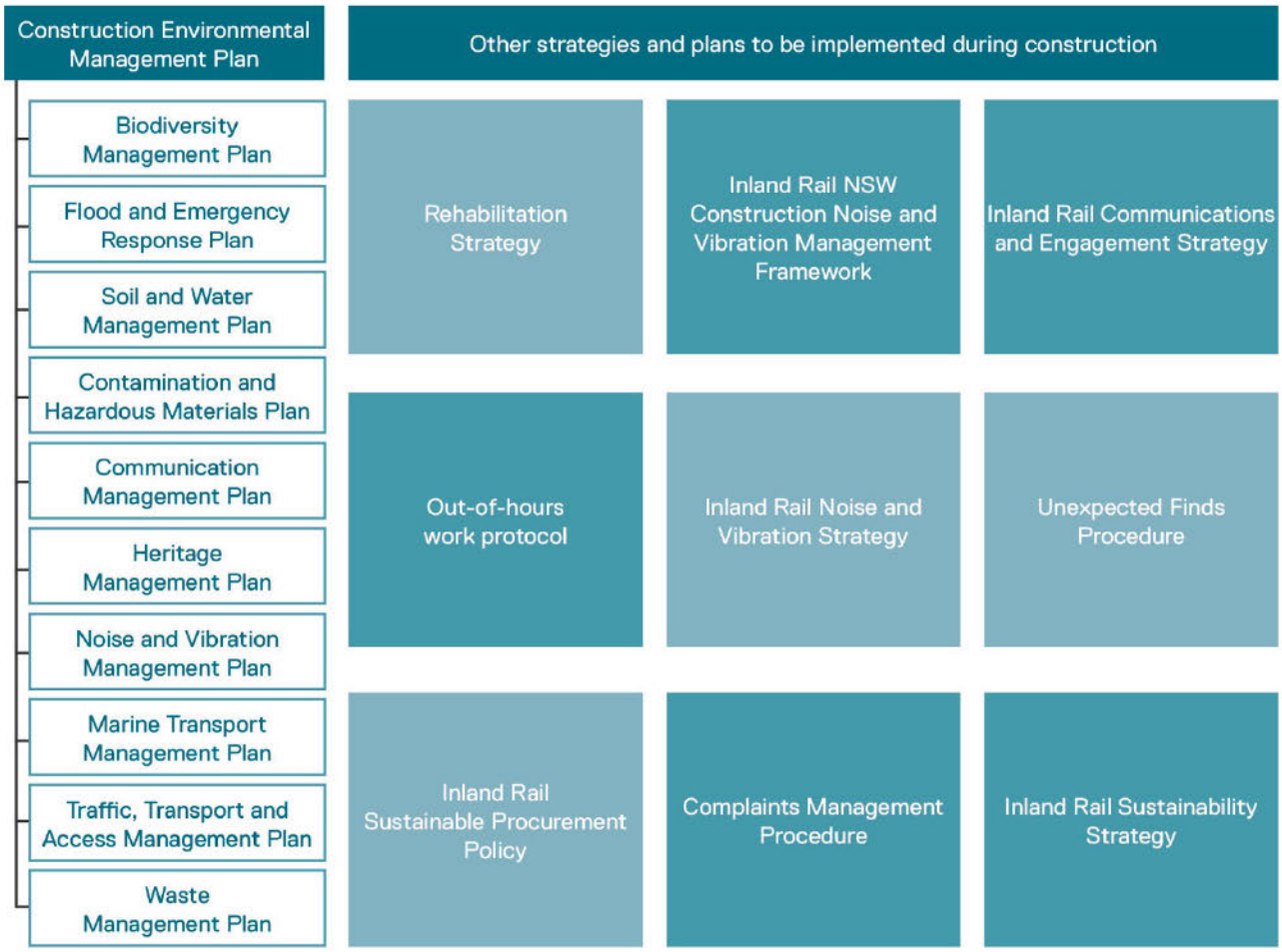

FIGURE B.2 CONSTRUCTION PLANS AND STRATEGIES

An outline of the required plans, and a guide to the general construction management measures required in each, is in Table B. 1. The requirement to prepare these plans is specified by the mitigation measures in relevant REF chapters.

TABLE B. 1 OUTLINE OF CEMP PLANS

Plan	What would the plan address?	Issue	Management measures to be included in the CEMP and implemented during construction
Biodiversity management	The Biodiversity Management Plan would detail how construction impacts on aquatic and terrestrial flora and fauna would be mitigated, managed and monitored.	Vegetation management	Employee education and training, including inductions for staff, contractors and visitors to the site would include the biodiversity issues present at the site and so they know their role and responsibilities in relation to the protection and/or minimisation of impacts to native biodiversity. The CEMP and construction plans would clearly document the location and full extent of clearing required.
		Management of trees to be retained	The management of trees in the vicinity of the construction zone would be consistent with the *AS 4970-2009 Protection of trees on development sites.*
		Pre-clearance surveys—native vegetation	Pre-clearance surveys would be implemented within areas of native vegetation that are to be cleared. Pre-clearance surveys will be undertaken by suitably qualified and experienced ecologists and involve the following: ▸ The demarcation of areas approved for clearing to reduce risk of accidental clearing/disturbance of surrounding native vegetation ▸ The likely habitat resources and habitat trees would be identified and marked— habitat trees are those containing hollows, cracks or fissures and spouts, active nests, dreys or other signs of recent fauna usage. Other habitat features to be identified include fallen timber/hollow logs and burrows ▸ The potential presence of threatened flora and fauna species, endangered populations and threatened ecological communities (TECs) would be identified ▸ The identification of species or habitat features that are suitable for translocation or salvage.
		Weed management	Weeds would be managed and disposed of in accordance with the requirements of the *Biosecurity Act 2015* (NSW). Weed control mitigation and management strategies would be documented and implemented as follows: ▸ Vehicles or equipment being brought onto the proposal site and/or travelling around the site must be inspected and cleaned prior to commencing work, to limit the spread of seeds and plant material ▸ Regular inspections to monitor the spread of weed species ▸ Training of environmental personnel on the identification of target weed species. Weed control and eradication techniques may include: ▸ Spraying with herbicides ▸ Physical removal, e.g. chipping ▸ Minimisation of area available for weed infestation, through prompt revegetation of bare areas ▸ Site hygiene and waste-management protocol to deter pest species.

Plan	What would the plan address?	Issue	Management measures to be included in the CEMP and implemented during construction
Noise and vibration	The Noise and Vibration Management Plan would detail how potential noise and vibration impacts would be mitigated and managed during construction. The plan would include the listed management measures. Where the noise and vibration levels are predicted to exceed the criteria after implementation of the general work practices, the additional mitigation measures detailed in the Construction Noise Strategy would be implemented. The requirements of relevant standards and guidelines, including *AS 2436-2010 and the Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009) would be addressed. The plan would also include reference to the working hours protocol and the complaints management procedures specified in the Communication Management Plan.	Notification and behaviour	Notification undertaken during construction would inform relevant stakeholders of the work locations and timing, and the potential for noise impacts. Construction sites and compounds located within 200 m of sensitive receivers would be managed to minimise noise-generating activities, including unnecessary shouting, loud stereos/radios, dropping of materials from height, throwing of metal items, and slamming of doors, particularly at the start and end of shifts.
		Construction hours and scheduling	The relevant noise and vibration criteria would be defined and reference to obligations to EPL3142 (see condition O9.1 to 9.6).
		Equipment and plant	Quieter and less vibration emitting construction methods would be used where reasonable and feasible The noise levels of plant and equipment would have operating sound power or sound pressure levels that comply with the required criteria Simultaneous operation of noisy plant within range of sensitive receivers would be avoided The offset distance between noisy plant and adjacent sensitive receivers would be maximised Plant used intermittently would be throttled down or shut down Noise-emitting plant would be directed away from sensitive receivers Stationary noise sources would be enclosed or shielded while ensuring that the health and safety of workers is maintained Consider site topography when situating plant and use structures (such as site shed placement, earth bunds, fencing, noise barriers) to shield receivers from noise.
		Traffic flow and deliveries	Loading and unloading of materials/deliveries would occur as far as possible from sensitive receivers, and preferably during standard construction hours. Site access points and roads would be selected to minimise impacts on sensitive receivers. Where practicable, delivery vehicles would be fitted with straps rather than chains for unloading.
		Measuring and monitoring	Vibration and noise monitoring may be required in response to complaints.
Heritage	The potential impacts on heritage would be mitigated and managed during construction. The CEMP would incorporate the results of the Due Diligence Assessment and comply with relevant regulatory requirements and state or Commonwealth guidelines.	General	This plan should include appropriate criteria, directives and processes on: ▸ Requirements and protocols for heritage clearances ▸ Unexpected finds procedure ▸ Requirements for inspections and corrective actions during construction and other activities in vicinity of heritage items ▸ Heritage management actions to be undertaken by suitably qualified persons ▸ Requirements for training, inspections, corrective actions, notification and classification of incidents, record keeping, monitoring and performance objectives for handover on completion of construction ▸ Any necessary regulatory requirements.

Plan	What would the plan address?	Issue	Management measures to be included in the CEMP and implemented during construction
		Unexpected finds	An unexpected finds procedure would be developed and included in the CEMP to provide a consistent method for managing any unexpected heritage items (both Aboriginal and non-Aboriginal heritage items) discovered during construction, including potential heritage items or objects, and human skeletal remains. Procedures and notification requirements for potential human remains in accordance with relevant guidelines.
Flood and emergency response plan	Potential impact from flooding and other emergencies, such as bushfire, would be addressed	Emergency incident	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. Evacuation protocols and monitoring for emergency events in the region would be detailed.
Soil and water	The Soil and Water Management Plan would detail how potential impacts on soils, erosion, sedimentation, watercourses and water quality (surface and groundwater) would be mitigated and managed during construction. The plan would consider site-specific conditions including dispersive soils and potential treatment options during construction. The plan would provide for incident management in relation to potential water quality contamination incidents. The plan would include procedures to manage the impact of the proposal on flooding, and would take into account the requirements of relevant guidelines, including: ▸ *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) ▸ *Managing Urban Stormwater: Soils and Construction Volume 2A: Installation of Services* (Department of Environment and Climate Change (DECC), 2008)	Erosion of exposed soils and sediment management	Sediment and erosion control devices would be installed to minimise mobilisation and transport of sediment in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004). Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and any subsequent records retained. Sediment would be cleared from behind barriers/sandbags on a regular basis as required and all controls would be managed to ensure they work effectively at all times. The area of exposed surfaces would be minimised. Disturbed areas would be stabilised progressively to ensure that no areas remain unstable for any extended length of time. Soil and sediment that accumulates in erosion and sediment control structures would be reused where practicable during site reinstatement, unless it is contaminated or otherwise inappropriate for reuse. Work would cease where practicable during heavy rainfall events when there is a risk of sediment loss off site or ground disturbance due to waterlogged conditions. Equipment, plant and materials would be placed in designated lay-down areas where they are least likely to cause erosion. Erosion control devices would be removed as part of the final site clean-up. This would include removing any sediment in drainage lines that has been trapped by erosion control devices, and restoring disturbed areas. Exposed surfaces would be stabilised, and final rehabilitation implemented, as soon as practicable. Containment of any lead paint.

Plan	What would the plan address?	Issue	Management measures to be included in the CEMP and implemented during construction
	▸ *Managing Urban Stormwater: Soils and Construction Volume 2C: Unsealed roads* (DECC, 2008) ▸ *Erosion and sediment control on unsealed roads* (Office of Environment and Heritage (OEH, 2012) ▸ *Technical Guideline: Temporary stormwater drainage for road construction* (RMS, 2011) ▸ *Waste Classification Guidelines* (EPA, 2014).	Spill/incident management	Spill kits would be maintained onsite at all times. Machinery would be checked daily to ensure that no oil, fuel or other liquids are leaking. Refuelling of plant and equipment would be undertaken within designated areas with appropriate controls. Visual monitoring of local water quality (such as turbidity, hydrocarbon spills/slicks) would be undertaken on a regular basis to identify any potential spills.
Waste	The Waste Management Plan would detail how waste would be managed during construction to minimise the potential for significant impacts. The plan would include disposal requirements, measures to reduce, re-use or recycle wastes, where possible. It would set targets for waste diversion, demonstrate how targets can be achieved, and outline how waste diversion would be tracked and reported. The plan would be prepared in accordance with the *Waste Classification Guidelines* (EPA, 2014).	Waste management	Resource management hierarchy principles would be followed: ▸ Avoid unnecessary resource consumption as a priority ▸ Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) ▸ Disposal is undertaken as a last resort. Waste material, including soil and spoil to be taken offsite, would be classified and managed in accordance with the *Waste Classification Guidelines* (EPA, 2014) and would be disposed of in accordance with the *Protection of the Environment Operations Acts 1997* (NSW) (POEO Act). All waste documentation would be collated and maintained on file in accordance with these guidelines. Waste material is not likely to be left onsite once the works have been completed. Working areas would be maintained, kept free of rubbish, and cleaned up at the end of each working day. Any waste material identified as being contaminated would be managed in accordance with the *Contaminated Land Management Act 1997* (NSW) and other relevant legislation and guidelines. The removal, handling and disposal of any asbestos-containing materials would be undertaken by an appropriately licensed contractor, and in accordance with: ▸ *Code of Practice—How to Safely Remove Asbestos 2019* ▸ *Code of Practice—How to Manage and Control Asbestos in the Workplace 2019*

Plan	What would the plan address?	Issue	Management measures to be included in the CEMP and implemented during construction
Communication Management Plan	The Communication Management Plan would provide guidance for the management of communication and consultation during the construction period, including objectives of consultation, stakeholders, contact mechanisms and protocols. The plan would be consistent with the consultation plan developed by ARTC, as described in Chapter 4. The plan would also include implementation and maintenance of a complaints register and complaints handling and escalation procedures, consistent with ARTC requirements.	Communication and complaints	Contact details for a 24-hour project response line and email address would be provided for ongoing stakeholder contact throughout the construction period. Provision of accurate public information signs while work is in progress. Staging of works would be undertaken to minimise disruption, in consultation with relevant stakeholder groups, to minimise impacts to community activities and functions. Relevant stakeholders would be notified regarding service disruptions in accordance with the communication management plan. Complaints would be managed according to the following procedure: ▸ Details of all complaints received would be recorded ▸ A detailed written response would be provided to the complainant within 14 calendar days.

APPENDIX C

Lachlan River Bridge Modification Project

Climate Change Risk Register

Inland Rail Climate Change Risk Register - Albury to Illabo and Stockinbingal to Parkes Project

Albury to Illabo and Stockinbingal to Forbes Packages

Revision Date: 12-05-21 Document: 2-0008-210-ESS-00-RG-0001

Risk Ref	Climate Hazard	Risk impact description	Direct/ Indirect Risks	Adaptation inherent in design / operations (inc. ARTC Operational Procedures)	2030 Initial Risk Assessment										2090 Initial Risk Assessment										Applicability					Additional Adaptation Actions (Inland Rail Climate Change Risk Assessment Framework)	A2I Design Adaptation Actions	2030 Reassessed Risk Assessment										2090 Reassessed Risk Assessment									
					Likelihood	Consequence								Initial Risk	Likelihood	Consequence								Initial Risk	Stockinbingal to Forbes	Albury	Lockhart / Greater Hume	Wagga Wagga	Junee			Likelihood	Consequence								Reassessed Risk	Likelihood	Consequence								Reassessed Risk
						Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence			Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence										Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence			Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence	
IR CCR 1	Temperature increase - More hot days and warm spells	Risk to health and safety of staff or visitors working along the rail corridor through heat stress or heat related illness	Direct	Pre work brief Monitoring and responding to extreme weather events Access to corridor Night working across the Nullarbor Heat stress training Hazards and new miss reporting First aid training	C	2					1		2	LOW - 2C	C	2					1		2	LOW - 2C	X	X	X	X	X	Learning from other locations to ensure a consistent approach across the Australian Network (e.g. expanding night works) Apply learnings from hazard and near miss reporting	Not applicable to design	C	2					1		2	LOW - 2C	C	2					1		2	LOW - 2C
IR CCR 2	Temperature increase - More hot days and warm spells	Risk to business continuity as a result of heat event (e.g. increased incidence of delayed services	Direct	Monitoring and responding to extreme weather events Business continuity plans for each site ETM-06-08 Managing Track Stability ETM-06-08F-01 Misalignment/Buckle Report ETI-06-07 Responding to Buckles Put speed restrictions in place (more cautious in Jan and Feb due to uncertainty of how work upgrades will perform)	B		1	2					2	MED - 2B	A		1	2					2	MED - 2A	X	X	X	X	X	In future consider impacts on contracting and reliability criteria, adjusting level of service offering	Not applicable to design	B		1	2					2	MED - 2B	A		1	2					2	MED - 2A
IR CCR 3	Temperature increase - More hot days and warm spells	Increase in hot days resulting in track twisting (buckling) which could lead to derailment of trains along the rail line	Direct	Monitoring and responding to extreme weather events ETM-06-08 Managing Track Stability ETM-06-08F-01 Misalignment/Buckle Report ETI-06-07 Responding to Buckles Put speed restrictions in place (more cautious in Jan and Feb due to uncertainty of how work upgrades will perform)	D	3	3	1					3	LOW - 3D	C	3	3	1					3	MED - 3C	X	X	X	X	X	Ensure stress free temperature is monitored and issues are identified early. Recognising trigger points for speed restrictions when temp reached in the rail Designing for future extreme temperatures (e.g. turn outs and grade separations). Instrument the track. Ensure and enforce high quality of the build/ welds and track adjustment Stress Free Temperature monitoring instrumentation to the rails	Where track slewing or track re-construction is being undertaken, - Ensure stress free temperature is monitored and issues are identified early. - Recognising trigger points for speed restrictions when temp reached in the rail - Ensure and enforce high quality of the build/ welds and track adjustment - Stress Free Temperature monitoring instrumentation to the rails - Inspection and maintenance proceedure to observe and action throughout operation.	E	3	3	1					3	LOW - 3E	D	3	3	1					3	LOW - 3D
IR CCR 4	Temperature increase - More hot days and warm spells	Decreased efficiency and more frequent outages of electrical (track switches, signalling, etc.) and communication systems	Direct	Standards and type approvals Redundancies and continuity plans Run under degraded conditions as per ARTC standards	C		1	1					1	LOW - 1C	B		1	1					1	LOW - 1B	X	X	X	X	X		N/A to Design scope. Signalling scope of works by ARTC	C		1	1					1	LOW - 1C	B		1	1					1	LOW - 1B
IR CCR 5	Temperature increase - More hot days and warm spells	Increased extreme temperature and solar exposure may lead accelerated degradation of materials and reduced life of structures (bridges, crossings, track) and specialist equipment (communications towers, signalling) resulting in increased capital cost due to the need for more frequent repairs and maintenance	Direct	Type approval process General standards	C			1					1	LOW - 1C	B			1					1	LOW - 1B	X	X	X	X	X		AS5100 Bridge Design standards incorporates maximum temperature. Recommend in Detailed Design stage that temperatures be reassessed for sensitivty to account for climate change projections. Protective coatings to account for higher UV ratings expected, and may have implications on reapplication schedule.	C			1					1	LOW - 1C	B			1					1	LOW - 1B
IR CCR 6	Temperature increase - More hot days and warm spells	Extreme heat leading to increased power demand and/or failure of power infrastructure (i.e. substations, LV/HV switchboards) resulting in interruptions to power mains supply with increased frequency and duration of power outages	Indirect	Redundancies and continuity plans Business continuity plans Remote sensing and remote monitoring Run under degraded conditions as per ARTC standards	C		2						2	LOW - 2C	B		2						2	MED - 2B	X	X	X	X	X	Review and retrofit for new technologies and improvements (ongoing), future proof to ensure alternative power sources are possible. Keep up to date. Consider asset replacement time horizons to ensure appropriateness and suitability for service. Forward maintenance strategy (trial, test and approval) and non-mandated review periods.	Not applicable to design	D		2						2	LOW - 2D	C		2						2	LOW - 2C
IR CCR 7	Temperature increase - More hot days and warm spells	Increased incidence of extreme heat limiting the ability for ARTC to attract workers due to undesirable conditions	Indirect	Staff survey and feedback process	C			2					2	LOW - 2C	B			2					2	MED - 2B	X	X	X	X	X	Attractive salary and workforce reward systems (competition with other industries i.e. mining companies in parts of the country) Common issue for many companies in response to heat so will be an industry wide response.	No design adaptation actions.	C			2					2	LOW - 2C	B			2					2	MED - 2B
IR CCR 8	Temperature increase - More hot days and warm spells	Rolling stock or hot works igniting fire due to hot, dry and windy conditions	Direct	Hot works procedure during extreme temperature (total fire ban, hot works application to go through) Welders qualified for managing heat and hot works (with rural fire brigade) Monitoring of noise and temperature of wheels and brake assembly. If temperature reaches a certain limit it will alert operating staff.	C	2	2				2		2	LOW - 2C	B	2	2				2		2	MED - 2B	X	X	X	X	X	In future stipulating requirements around rolling stock in customer contracts (however don't want to exclude those who can't afford new stock). Review wayside device placement and strategy for the future to include more at certain key points in the network.	No design adaptation actions, only operational adaptation actions.	B	2	2				2		2	MED - 2B	B	2	2				2		2	MED - 2B

Inland Rail Climate Change Risk Register - Albury to Illabo and Stockinbingal to Parkes Project

Albury to Illabo and Stockinbingal to Forbes Packages

Revision Date: 12-05-21 Document: 2-0008-210-ESS-00-RG-0001

					2030 Initial Risk Assessment											2090 Initial Risk Assessment											Applicability							2030 Reassessed Risk Assessment										2090 Reassessed Risk Assessment									
						Consequence											Consequence																		Consequence											Consequence									
Risk Ref	Climate Hazard	Risk impact description	Direct/ Indirect Risks	Adaptation inherent in design / operations (inc. ARTC Operational Procedures)	Likelihood	Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence	Initial Risk	Likelihood	Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence	Initial Risk	Stockinbingal to Forbes	Albury	Lockhart / Greater Hume	Wagga Wagga	Junee	Additional Adaptation Actions (Inland Rail Climate Change Risk Assessment Framework)	A2I Design Adaptation Actions	Likelihood	Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence	Reassessed Risk	Likelihood	Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence	Reassessed Risk
IR CCR 9	Solar radiation	Increase in solar radiation, resulting from decrease in cloud cover may result in potential increase in periods of direct sunshine - potential glare issues during rail operation, reducing safety	Direct		C	1							1	LOW - 1C	B	1							1	LOW - 1B	X	X	X	X	X		No design adaptation actions.	B	1							1	LOW - 1B	B	1							1	LOW - 1B
IR CCR 10	Increased intensity of extreme rainfall events	Risk to health and safety of staff (e.g. conductor, emergency crews) working along the rail corridor due to velocity and flow of flooding (e.g. flash flooding events)	Direct	Monitoring and responding to extreme weather events procedure (code red, amber and black procedure)	C	2							2	LOW - 2C	B	2							2	MED - 2B	X	X	X	X	X	Connect with and learn from emergency services, establish communications channels and procedures. More training on emergency event response	Not applicable to design	C	2							2	LOW - 2C	B	2							2	MED - 2B
IR CCR 11	Increased intensity of extreme rainfall events	More intense rainfall (and increased runoff volume from catchment) could lead to flooding of tracks and assets, inundation of drainage infrastructure and damage due to scour	Direct	Monitoring and responding to extreme weather events procedure Inland Rail hydrological risk assessment framework inclusive of climate change impacts AAR16 Sensitivity analysis as part of the hydrological risk assessment framework Modelling verification in areas requiring flood works permits. Greenfield projects undertaking sensitivity analysis and risk modelling so design can be adjusted for climate change (if deemed necessary)	C	2	3	1			1		3	MED - 3C	B	3	3	1			1		3	HIGH - 3B	X	X	X	X	X		Qualitative flooding assessment completed as part of the options assessment phase. Further consideration of flooding is to be undertaken in detailed design phase, including flood modelling at some sites to determine impacts of RCP8.5 scenario in accordance with ARTC Climate Change Framework. **S2F:** The exisitng flooding at the Lachlan River Bridge is unchanged as a bridge modification works only. Works do not imapact the bridge waterway area. Existing immunity is therefore maintained. The exisitng flooding at the Forbes yard clearances is unchanged as local track works are minor track slew works only. Existing immunity is therefore maintained. All other Horizontal Clearance sites are not impacted by flooding and therefore existing immunity is unchanged.	C	2	3	1			1		3	MED - 3C	B	3	3	1			1		3	HIGH - 3B
IR CCR 12	Increased intensity of extreme rainfall events	More intense rainfall could lead to flooding of tracks and assets, inundation of drainage infrastructure reducing the safety of running conditions with resulting service disruption.	Direct	Monitoring and responding to extreme weather events procedure Inland Rail hydrological risk assessment framework inclusive of climate change impacts	C	2	3						3	MED - 3C	B	3	3						3	HIGH - 3B	X	X	X	X	X	Design for retrofit upgrade (e.g. raising track, glued ballast) - in 30 years time there will be additional rainfall and runoff data to assess climate change impacts. Review risks in line with updates to the ARR guideline (about every 30 years)/or in line with an extreme flooding event (e.g. overtopping, 1% event becomes a 5% event). Then multi-criteria analysis to determine what actions to take to reduce risk.	Qualitative flooding assessment completed as part of the options assessment phase. Further consideration of flooding is to be undertaken in detailed design phase, including flood modelling at some sites to determine impacts of RCP8.5 scenario in accordance with ARTC Climate Change Framework. Where identified, opportunities for improvements/adaptations is included in the design documention.	C	2	3						3	MED - 3C	B	3	3						3	HIGH - 3B
IR CCR 13	Increased intensity of extreme rainfall events	Increase in intense rainfall could result in overtopping leading to damaged infrastructure	Direct		C		3	3					3	MED - 3C	B		4	3					4	V HIGH - 4B	X	X	X	X	X	Climate change should be looked at upfront to inform designs (RCP8.5) rather than analysis at end. Non-greenfield projects should also consider RCP8.5.	Qualitative flooding assessment completed as part of the options assessment phase. Further consideration of flooding is to be undertaken in detailed design phase, including flood modelling at some sites to determine impacts of RCP8.5 scenario in accordance with ARTC Climate Change Framework. Where identified, opportunities for improvements/adaptations is included in the design documention.	D		3	3					3	LOW - 3D	C		4	3					4	HIGH - 4C
IR CCR 14	Increased intensity of extreme rainfall events	Longitudinal scour through water running along embankment, impacting on embankment.	Direct		C	2	2	2					2	LOW - 2C	B	3	3	3					3	HIGH - 3B	X	X	X	X	X		Drainage and flooding velocities at rail embankment considered in assessment, and appropriate protection provided. RipRap or other matress type erosion controlling systems used.	C	2	2	2					2	LOW - 2C	B	3	3	3					3	HIGH - 3B
IR CCR 15	Increased intensity of extreme rainfall events	Inundation of adjacent road network and signalling equipment causing potential isolation of assets due to flooding	Direct	Run under degraded conditions as per ARTC standards	C	2	2						2	LOW - 2C	B	2	2						2	MED - 2B	X	X	X	X	X	Similar to above Plus solar back-up on most level crossings and minimisation of number of level crossings	Qualitative flooding assessment completed as part of the options assessment phase. Further consideration of flooding is to be undertaken in detailed design phase, including flood modelling at some sites to determine impacts of RCP8.5 scenario in accordance with ARTC Climate Change Framework. Where identified, opportunities for improvements/adaptations is included in the design documention.	C	2	2						2	LOW - 2C	B	2	2						2	MED - 2B
IR CCR 16	Increased intensity of extreme rainfall events	More intense rainfall could lead to flooding of tracks and assets, inundation of drainage infrastructure, increasing maintenance and insurance premiums costs.	Direct	Monitoring and responding to extreme weather events procedure Inland Rail hydrological risk assessment framework inclusive of climate change impacts	B			1					1	LOW - 1B	A			2					2	MED - 2A	X	X	X	X	X		Qualitative flooding assessment completed as part of the options assessment phase. Further consideration of flooding is to be undertaken in detailed design phase, including flood modelling at some sites to determine impacts of RCP8.5 scenario in accordance with ARTC Climate Change Framework. Where identified, opportunities for	B			1					1	LOW - 1B	A			2					2	MED - 2A
IR CCR 17	Increased intensity of extreme rainfall events	Inundation of adjacent road network impacting on ability of emergency response to reach the corridor	Direct	Out of inland rail control	C						2		2	LOW - 2C	B						2		2	MED - 2B	X	X	X	X	X		assessment phase. Further consideration of flooding is to be undertaken in detailed design phase, including flood modelling at some sites to determine impacts of RCP8.5 scenario in accordance with ARTC Climate Change Framework. Where identified, opportunities for	C						2		2	LOW - 2C	B						2		2	MED - 2B
IR CCR 18	Increased intensity of extreme rainfall events	Water damage to signalling, substations and electrical circuitry may result in disruption to electricity supply thereby impacting the functionality of level crossings, signals and utility supply	Direct/ Indirect	All signalling equipment installed above 1%AEP Monitoring and responding to extreme weather events Operational procedures when level crossings fail Redundancy through two power supplies, solar / batteries, with up to 48hrs power.	D		2	1					2	LOW - 2D	C		2	1						2	LOW - 2C	X	X	X	X	X		Not applicable to design	D		2	1					2	LOW - 2D	C		2	1					2	LOW - 2C

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					Likelihood	Consequence								Initial Risk	Likelihood	Consequence								Initial Risk	Stockinbingal to Forbes	Albury	Lockhart / Greater Hume	Wagga Wagga	Junee			Likelihood	Consequence								Reassessed Risk	Likelihood	Consequence								Reassessed Risk
						Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence			Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence										Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence			Safety	Assets	F nanc a	Env ronmenta	Regu story	Reputat ona	Schedu e	Max Consequence	
IR CCR 19	Increased intensity of extreme rainfall events	Extreme rainfall leading to flooding/standing water resulting in the increased presence/risk of disease and water-borne pathogens impacting the health and safety of employees	Direct	Pre work brief Work method statements	E	2						2	LOW - 2E	D	2						2	LOW - 2D	X	X	X	X	X		Not applicable to design	E	2						2	LOW - 2E	D	2						2	LOW - 2D
IR CCR 20	Increased intensity of extreme rainfall events	Extreme rainfall and flooding resulting in delays to construction schedule and cost impacts	Direct	Project planning for maintenance activities consider seasonal variables	C			3				4	4	HIGH - 4C	C			3			4	4	HIGH - 4C	X	X	X	X	X	Ensure planning for maintenance activities reflect seasonal variables. Ensure maintenance planning activities are reviewed and procedures modified over time to account for seasonal variables.	Not applicable to design	C			3			4	4	HIGH - 4C	C			3			4	4	HIGH - 4C
IR CCR 21	Increased intensity of extreme rainfall events	Uncertainty of extreme rainfall events/flooding behaviour impacting on design conditions/requirements. [Over or under design risks]	Indirect	Sensitivity analysis as part of the hydrological risk assessment framework	E			4				4	LOW - 4E	E			4				4	LOW - 4E	X	X	X	X	X		A blockage factor of 20% has been considered in design and no change to existing or proposed track immunity is predicted.	E			4				4	LOW - 4E	E			4			4	4	LOW - 4E
IR CCR 22	Increased intensity of extreme rainfall events	Extreme rainfall and flooding causing damage to non-rail structures potentially impacting operations	Direct	Ability to comment on land developments on adjacent properties	D		3					3	LOW - 3D	C		3					3	MED - 3C	X	X	X	X	X	Ensure that the ability to comment on land developments is maintained through the asset design life.	Not applicable to design	D		3					3	LOW - 3D	C		3					3	MED - 3C
IR CCR 23	Increased intensity of extreme rainfall events	Increase in intense rainfall could result in regional isolation and/or service interruption due to flooding along the 1,700-km route	Direct	Inland Rail hydrological risk assessment framework inclusive of climate change impacts Property strategy to deal with severance issues	C			2				2	LOW - 2C	C			2				2	LOW - 2C	X	X	X	X	X		Qualitative flooding assessment completed as part of the options assessment phase. Further consideration of flooding is to be undertaken in detailed design phase, including flood modelling at some sites to determine impacts of RCP8.5 scenario in accordance with ARTC Climate Change Framework. Where identified, opportunities for	C			2				2	LOW - 2C	C			2				2	LOW - 2C
IR CCR 24	Increased intensity of extreme rainfall events	The projected periodic extreme dry and wet periods may increase the potential for erosion of substrate and ballast materials, causing increase washout. This could cause infrastructure instability, train derailment and disruption in the event of collapse.	Direct	Track inspection procedure Review and update in accordance with any updates to standards	D		3	3			3	3	LOW - 3D	C		3	3			3	3	MED - 3C	X	X	X	X	X	Routine LIDAR runs to determine mass/soil changes/movements. Install track inspections and monitoring stations to check in on these changes especially in vulnerable areas. Proximity sensors.	Routine inspections to be undertaken throughout operation in accordance with ARTC standards.	D		3	3			3	3	LOW - 3D	C		3	3			3	3	MED - 3C
IR CCR 25	Increased intensity of extreme rainfall events	Increased intense rainfall and flooding resulting in scour damage to adjacent properties	Direct	Agronomy assessment in hydrology design Consultation as part of EIS	C			2			3	3	MED - 3C	B			2			3	3	HIGH - 3B	X	X	X	X	X	Collect baseline photographic evidence of current conditions (visual monitoring/ dilapidation survey). Especially useful for new greenfield sites. Cameras on monitoring vehicles/trains (AK cars – three monthly). Updating commissions and operational monitoring. – Go-Pro on drones and GPS spot checks.	Flood assessment completed to demonstrate afflux, velocity and hazard are compliant against the impact criteria to minimise site risks where possible.	D			2			3	3	LOW - 3D	C			2			3	3	MED - 3C
IR CCR 26	Increased intensity of extreme rainfall events	Potential blockages of drainage infrastructure caused by the movement of debris during flood.	Direct		C		2					2	LOW - 2C	B		2					2	MED - 2B	X	X	X	X	X		A blockage factor of 20% has been considered in design and no change to existing or proposed track immunity is predicted.	D		2					2	LOW - 2D	C		2					2	LOW - 2C
IR CCR 27	Increased intensity of extreme rainfall events	Increased rainfall leading to rise of groundwater, increase in salinity and reduced durability of materials.	Direct	No inherent design or operational adaptation	D			2				2	LOW - 2D	D			2				2	LOW - 2D	X	X	X	X	X		Potential for coatings systems or increased cover of reinforced in concrete structures if evidence of increased salinity is probable and assessment of strucutres durbability iis instructed. TBC at detailed design.	D			2				2	LOW - 2D	D			2				2	LOW - 2D
IR CCR 28	Increased intensity of extreme rainfall events	Increased rainfall intensities leading to greater discharges, which leads to increased hydraulic impacts (e.g. afflux) on adjacent properties	Direct		C				2	2	2	2	LOW - 2C	B					3	3	3	3	HIGH - 3B	X	X	X	X	X	Insurance only valid if not foreseeable so premiums will likely then go up, may need to renegotiate. Reassess rainfall data and re-run models to check what impacts are now likely to affect adjacent properties (number of properties in the 1% AEP floodplain may change).	Flood assessment completed to demonstrate afflux, velocity and hazard are compliant against the impact criteria to minimise site risks where possible.	D				2	2	2	2	LOW - 2D	C				3	3	3	3	MED - 3C
IR CCR 29	Decrease in average rainfall	Structural deterioration, soil subsidence, erosion, movement and cracking as a result of increased variability of periods of wetting and drying, reducing integrity of tracks, bridges, embankments and signalling infrastructure with potential structural failure	Direct	Basis of design Real time monitoring of track conditions	E		4	3				4	LOW - 4E	D		4	3				4	MED - 4D	X	X	X	X	X	Ensure real-time monitoring of track conditions is maintained and future monitoring technology is considered to mitigate this risk.	ARTC to carry out asset maintenance regime.	E		4	3				4	LOW - 4E	D		4	3				4	MED - 4D

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						Safety	Assets	Financial	Environmental	Regulatory	Reputational	Schedule	Max Consequence			Safety	Assets	Financial	Environmental	Regulatory	Reputational	Schedule	Max Consequence										Safety	Assets	Financial	Environmental	Regulatory	Reputational	Schedule	Max Consequence		Safety	Assets	Financial	Environmental	Regulatory	Reputational	Schedule	Max Consequence	
IR CCR 30	Decrease in average rainfall	Structural deterioration, soil subsidence, erosion, movement and cracking as a result of increased variability of periods of wetting and drying causing increases in monitoring and maintenance programs	Direct	Basis of design Real time monitoring of track conditions	C			2				2	LOW - 2C	B			2				2	MED - 2B	X	X	X	X	X	Ensure real-time monitoring of track conditions is maintained and future monitoring technology is considered to mitigate this risk.	Routine inspections to be undertaken throughout operation in accordance with ARTC standards.	C			2				2	LOW - 2C	B			2				2	MED - 2B
IR CCR 31	Increase in extreme weather events and storms	Damage to tracks/siding, electrical, communications infrastructure and other structures due to higher wind speeds and falling debris requiring repair and/or replacement and an increase in capital costs	Direct	Vegetation management Extreme weather redundancies	C			2				2	LOW - 2C	C			3				3	MED - 3C	X	X	X	X	X		Assets to be in protective enclosures where necessary. Wind loading (AS1170) standard incorporated in design and sesnsitivty assessment to be undertaken with provided climate change projections. Landscape/civil scope to limit extent of objects that have potential to become falling debris (detailed design to consider).	D			2				2	LOW - 2D	C			3				3	MED - 3C
IR CCR 32	Increase in extreme weather events and storms	Storm events resulting in closure of rail line (due to damage to communications equipment., for safety purposes or loss of power supply/increased frequency and duration of power outages) with subsequent delays	Direct/Indirect	Monitoring and responding to extreme weather events procedure Land form procedure Run under degraded conditions as per ARTC standards	D		3					3	LOW - 3D	C		3					3	MED - 3C	X	X	X	X	X		Not applicable to design	D		3					3	LOW - 3D	C		3					3	MED - 3C
IR CCR 33	Increase in extreme weather events and storms	Storm events and subsequent higher winds resulting in derailment (loss of freight, rolling stock, cessation of operation) including damage to infrastructure	Direct/Indirect	Monitoring and responding to extreme weather events procedure Run under degraded conditions as per ARTC standards	D		3	3			2	3	LOW - 3D	C		3	3			2	3	MED - 3C	X	X	X	X	X		Not applicable to design	D		3	3			2	3	LOW - 3D	C		3	3			2	3	MED - 3C
IR CCR 34	Increase in extreme weather events and storms	Structural integrity of construction materials may be affected by extreme wind speeds.	Direct		D		2	2				2	LOW - 2D	D		2	2				2	LOW - 2D	X	X	X	X	X		TBC with structural engineer for wind loading and inclusion of climate change conditions in standards applied at detailed design stage. Wind loading (AS1170) standard incorporated in design and sesnsitivty assessment to be undertaken with provided climate change	D		2	2				2	LOW - 2D	D		2	2				2	LOW - 2D
IR CCR 35	Harsher fire-weather conditions	Smoke from bushfires limiting visibility resulting in increased risk of freight disruptions and/or cancellations	Direct	Monitoring and responding to extreme weather events procedure Run under degraded conditions as per ARTC standards	D		2					2	LOW - 2D	C		2					2	LOW - 2C	X	X	X	X	X		Not applicable to design	D		2					2	LOW - 2D	C		2					2	LOW - 2C
IR CCR 36	Harsher fire-weather conditions	Bushfire damaging rail infrastructure including trackside infrastructure (e.g. signals, communications equipment requiring increased operational costs)	Direct	Material durability Standards and type approvals (e.g. bury pipes not above ground) Vegetation management	D			3				3	LOW - 3D	C			3				3	MED - 3C	X	X	X	X	X		Designed in protective enclosures where necessary. Landscape/civil scope to limit extent of objects that have potential to increase bushfire danger for assets (detailed design phase to confirm).	E			3				3	LOW - 3E	D			3				3	LOW - 3D
IR CCR 37	Harsher fire-weather conditions	Risk to health and safety of staff working along the rail corridor due to inhalation of bushfire smoke and proximity to flames	Direct	Pre work brief Monitoring and responding to extreme weather events procedure	D	2						2	LOW - 2D	C	2						2	LOW - 2C	X	X	X	X	X		N/A to Design scope. Operational procedure to cover	D	2						2	LOW - 2D	C	2						2	LOW - 2C
IR CCR 38	Harsher fire-weather conditions	Bushfire events leading to damage to power supply infrastructure or a need to cut supply resulting in interruptions to power supply (particularly signalling and communications equipment) with increased frequency and duration of power outages	Indirect	Redundancies built in	D		3					3	LOW - 3D	C		3					3	MED - 3C	X	X	X	X	X		N/A to Design scope, ARTC in control of signalling and comms controls. Operational procedure to cover	E		3					3	LOW - 3E	D		3					3	LOW - 3D
IR CCR 39	Harsher fire-weather conditions	Bushfire event resulting in surrounding community using the rail corridor as access/egress	Indirect	Under direction of EMS	D		2				2	2	LOW - 2D	C		2				2	2	LOW - 2C	X	X	X	X	X		Not applicable to design	D		2				2	2	LOW - 2D	C	2				2	2	LOW - 2C
IR CCR 40	Harsher fire-weather conditions	Bushfire events resulting in closure of surrounding road network, impacting emergency access, rescue, community evacuation or maintenance	Indirect	Existing risk	E	4					4	4	LOW - 4E	E	4					4	4	LOW - 4E	X	X	X	X	X		Not applicable to design	E	4					4	4	LOW - 4E	E	4					4	4	LOW - 4E

Inland Rail Climate Change Risk Register - Albury to Illabo and Stockinbingal to Parkes Project

Albury to Illabo and Stockinbingal to Forbes Packages

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Risk Ref	Climate Hazard	Risk impact description	Direct/ Indirect Risks	Adaptation inherent in design / operations (inc. ARTC Operational Procedures)	2030 Initial Risk Assessment										2090 Initial Risk Assessment										Applicability					Additional Adaptation Actions (Inland Rail Climate Change Risk Assessment Framework)	A2I Design Adaptation Actions	2030 Reassessed Risk Assessment										2090 Reassessed Risk Assessment									
					Likelihood	Consequence								Initial Risk	Likelihood	Consequence								Initial Risk	Stockinbingal to Forbes	Albury	Lockhart / Greater Hume	Wagga Wagga	Junee			Likelihood	Consequence								Reassessed Risk	Likelihood	Consequence								Reassessed Risk
						Safety	Assets	Financial	Environmental	Regulatory	Reputational	Schedule	Max Consequence			Safety	Assets	Financial	Environmental	Regulatory	Reputational	Schedule	Max Consequence										Safety	Assets	Financial	Environmental	Regulatory	Reputational	Schedule	Max Consequence		Safety	Assets	Financial	Environmental	Regulatory	Reputational	Schedule	Max Consequence	
IR CCR 41	Harsher fire-weather conditions	Bushfire event along the Inland Rail corridor resulting in stoppage of freight along the rail and subsequent severing of community evacuation and CFA access/egress points	Indirect	Existing risk Monitoring and responding to extreme weather events procedure Under direction of EMS (signalling equipment is fire resistant) Reducing severance in considered in basis of design	D		4					4	MED - 4D	C		4					4	HIGH - 4C	X	X	X	X	X	Expand early warning network for fire (currently mainly used for flood). Trains advised to not leave major centres and if no assessment is possible then the network is shut down (more difficult in fire due to uncertainty of fire behaviour, this should improve with time with real-time data collection). Grade separations in high risk areas (over bridge).	Not applicable to design	D		4					4	MED - 4D	C		4					4	HIGH - 4C
IR CCR 42	Harsher fire-weather conditions	Bushfire event along the Inland Rail corridor resulting in stoppage of freight along the rail and subsequent impacts on customers good not being delivered	Indirect	Monitoring and responding to extreme weather events procedure Under direction of EMS (signalling equipment is fire resistant)	C						2	2	LOW - 2C	B						2	2	MED - 2B	X	X	X	X	X		Not applicable to design	C						2	2	LOW - 2C	B						2	2	MED - 2B
IR CCR 43	Multi-hazard (flooding and warmer days)	Changing climatic conditions leading to the spread of weeds and water-bourne pathogens, reducing the productivity of farms and subsequently the demand for ARTCs services	Indirect	Agronomist assessment	C			1				1	LOW - 1C	B			1				1	LOW - 1B	X	X	X	X	X		Not applicable to design	C			1				1	LOW - 1C	B			1				1	LOW - 1B