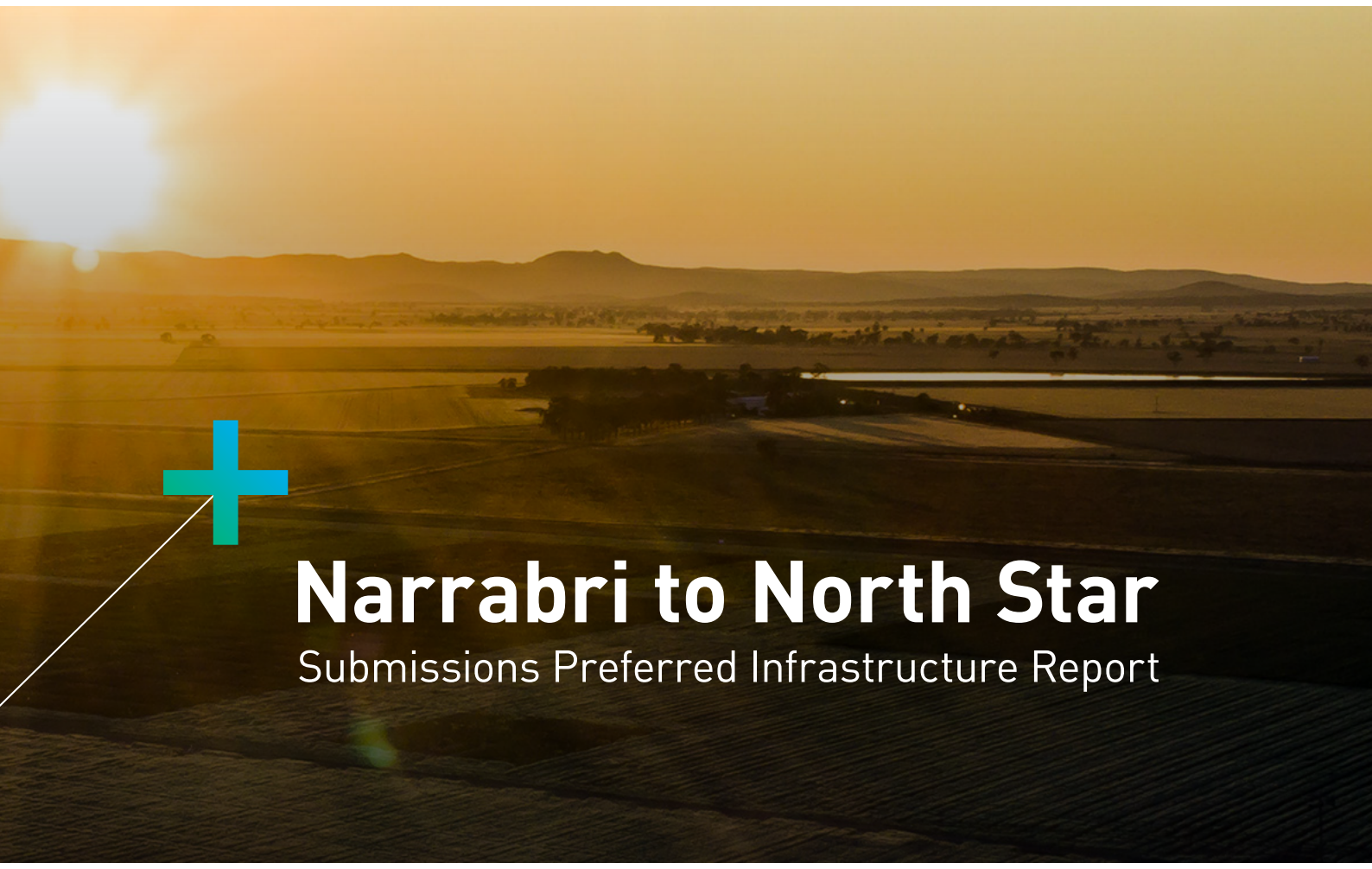
INLAND RAIL

Main Report



Narrabri to North Star

Submissions Preferred Infrastructure Report

ARTC

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

IR_1432

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Abbreviations

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

ABBREVIATION	DEFINITION
AEP	Annual exceedance probability
AHIMS	Aboriginal Heritage Inofmration Management System
ARI	Average recurrence interval
AS	Australian Standard
AVTG	*Assessing Vibration: A Technical Guideline* (Dec, 2006a)
BC Act	*Biodiversity Conservation Act 2016* (NSW)
CEMP	Construction environmental management plan
DECC	NSW Department of Environment and Climate Change (Former)
DPI&E	NSW Department of Planning, Infrastructure and Environment
EIS	Environmental impact statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPL	Environment protection licence
FM Act	*Fisheries Management Act 1994* (NSW)
ICNG	*Interim Construction Noise Guideline* (DECC, 2009)
ISCA	Infrastructure Sustainability Council Australia
ISO	International Organisation for Standardisation
km	Kilometres
m	Metres
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	NSW Office of Environment and Heritage (former)
OEMP	Operational environmental management plan
PCT	Plant community type
POEO Act	*Protection of the Environment Operations Act 1974* (NSW)
PPV	Peak particle velocity
RBL	Rating background level
RING	*Rail Infrastructure Noise Guideline* (EPA, 2013)
Roads and Maritime	NSW Roads and Maritime Services (Roads and Martime)
SEARs	Secretary's Environmental Assessment Requirements (for the EIS)
SEPP	State environmental planning policy
TSC Act	*Threatened Species Conservation Act 1995* (NSW) (former)

Definitions

TERM	DEFINITION
Aboriginal object	Defined by the *National Parks and Wildlife Act* 1974 as: 'any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation ofthe area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'.
Aboriginal place	Declared by the NSW Minister for the Environment, in accordance with section 84 of the NPW Act and by an order published in the Gazette, as a place that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture.
Active control (level crossings)	Where the movement of vehicular or pedestrian traffic across a railway crossing is controlled using devices such as flashing signals, gates or barriers (or a combination of these), with the device/s activated prior to, and during, the passage of a train through the crossing.
Annual Exceedance Probability (AEP)	The chance of a flood of a nominated size occurring in a particular year. The chance of the flood occurring is expressed as a percentage and, for large floods, is the reciprocal of the ARI. For example, the one per cent AEP flood event is equivalent to the 100 year ARI flood event.
Average Recurrence Interval (ARI)	The long-term average number of years between the occurrence of a flood of a nominated size.
Ballast	Crushed rock, stone etc used to provide a foundation for a railway track. Ballast usually provides the bed on which railway sleepers are laid, transmits the load from train movements, and restrains the track from movement.
Biodiversity credits	In accordance with the *Framework for Biodiversity Assessment* (OEH, 2014a) the biodiversity credits, which consist of ecosystem credits and species credits, represent, in a quantified way, the enhancements to biodiversity values on a biobank site or biodiversity stewardship site which may be used to offset the impacts on threatened species as a result of a development proposal. A decision support tool, produced by OEH, is used to determine the number and type of biodiversity credits required to offset the impacts of the development.
Biodiversity offsets	Biodiversity offsets are measures that benefit biodiversity by compensating for the adverse impacts elsewhere of an action, such as clearing for development. Biodiversity offsets work by protecting and managing biodiversity values in one area in exchange for impacts on biodiversity values in another.
Biophysical environment	The physical environment (water, soil etc.) as well as the biological activity within it (plants, animals etc.).
Chainage	A measure of distance in kilometres along the rail corridor from Sydney. The nominated values are not exact distances as there are some local adjustments made to reflect progressive changes to the rail as works are progressively implemented to, for example, ease bends.
Climate	The average weather experienced at a site or region over a period of many years, ranging from months to many thousands of years. The relevant measured quantities are most often surface variables such as temperature, rainfall and wind.
Construction compound	An area used as the base for construction activities, usually for the storage of plant, equipment and materials and/or construction site offices and worker facilities.
Crossing loop	A section of track off to the side of the main track/s that allows a train to move to the side so that another train can pass.
Culvert	A structure that allows water to flow under a road, railway, track, or similar obstruction.

TERM	DEFINITION
Dangerous goods	Dangerous goods are substances or articles that pose a risk to people, property or the environment, due to their chemical or physical properties. They are usually classified with reference to their immediate risk.
dB(A)	A-weighted decibels, which are an expression of the relative loudness of sounds in air as perceived by the human ear.
Detailed design	The stage of the design where the proposal elements are designed in detail, suitable for construction.
Ecologically sustainable development	Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased.
Ecosystem credit	A biodiversity credit that represents a measurement of the value of EECs, CEECs, and threatened species habitat for species that can be reliably predicted to occur with a specified plant community type. Ecosystem credits measure the gain in biodiversity values at an offset site, and this can be used to offset the impact on biodiversity values as a result of a development proposal.
Emission	A substance discharged into the air.
Exhibited proposal	The proposal to construct and operate the Narrabri to North Star section of the Inland Rail program as described by the EIS.
Existing rail corridor	The corridor within which existing rail infrastructure, subject to works as part of Inland Rail, are located. The existing rail corridor is defined by ARTC to mean everywhere within 15 metres of the outermost rails; or within the boundary fence where boundary fences are provided and are closer than 15 metres; or if the property boundary is less than 15 metres, the property boundary; or a permanent structure such as a fence, wall or level crossing separating the operating rail corridor from other land.
Flood resilience	For the N2NS proposal, flood resilience is management of surface water to limit impacts on land and structures, including the flood immunity of structures and the ability to withstand flood effects (depth/afflux, velocity and duration).
Formation	The earthworks/material on which the ballast, sleepers and tracks are laid.
Freight	Goods transported by truck, train, ship, or aircraft.
Freight task	The amount of freight transport, usually measured in tonnes or tonne kilometres.
Heritage listed	An item, building or place included on statutory heritage lists maintained by local, State and/or the Australian Government.
Infrastructure sustainability	The concept of designing, constructing or operating infrastructure with regard to the environmental, social and economic outcomes of the long term.
Inland Rail program	The Inland Rail program encompasses the design, construction and operation of a new inland rail connection between Melbourne and Brisbane, via Wagga, Parkes, Moree, and Toowoomba. The route for Inland Rail is about 1,700 kilometres in length. Inland Rail will involve a combination of upgrades of existing rail track and the provision of new track.
Intermodal	The movement of freight using multiple modes of transport (rail, ship, truck) without handling of the freight itself when changing modes. For a railway this usually refers to the transport of freight in containers which may be double stacked on the wagons carrying them.
$L_{A90(period)}$	The sound pressure level exceeded for 90 per cent of the measurement period, where the specific period in each case is specified in brackets.

TERM	DEFINITION
$L_{Aeq(1\ hour)}$	The busiest 1-hour 'equivalent continuous noise level' – it represents the typical LAeq noise level from all the proposal noise events during the busiest 1-hour of the assessment period.
$L_{Aeq(15\ hour)}$	The daytime 'equivalent continuous noise level' - it represents the cumulative effects of all the proposal noise events occurring in the daytime period from 7am to 10pm.
$L_{Aeq(24\ hour)}$	The 'equivalent continuous noise level', sometimes also described as the 'energy-averaged noise level' – it represents the cumulative effects of all the proposal noise events occurring in one day.
$L_{Aeq(9\ hour)}$	The night-time 'equivalent continuous noise level' - it represents the cumulative effects of all the proposal noise events occurring in the night-time period from 10pm to 7am.
$L_{Aeq(time)}$	Typically used to describe ambient (background) noise levels measured over a specified period of time, where the specific period in each case is specified in brackets.
L_{Amax}	The maximum sound level recorded during the measurement period.
Landscape	All aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities and infrastructure.
Landscape character	The combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place.
Level crossing	A place where rail lines and a road cross at the same elevation.
Level of service	Defined by Austroads as a measure for ranking operating road and intersection conditions, based on factors such as speed, travel time, freedom to manoeuvre, interruptions, comfort and convenience.
Local road	Road used primarily to access properties located along the road.
Peak particle velocity (PPV)	The instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position.
Possession	A period of time during which a rail line is blocked to trains to permit work to be carried out on or near the line.
Preferred infrastructure	The construction and operation of the Narrabri to North Star section of Inland Rail as described by the Preferred Infrastructure Report. The preferred infrastructure is a refinement of the exhibited proposal, comprising changes made in response to submissions and on-going design work.
Preferred infrastructure site	The area that would be directly affected by construction (also known as the construction footprint). It includes the location of the preferred infrastructure, the area that would be directly disturbed by the movement of construction plant and machinery, and the location of the storage areas/compounds sites etc, that would be used to construct that infrastructure.
Proponent	ARTC is the proponent for the preferred infrastructure.
Proposal	The construction and operation of the Narrabri to North Star section of Inland Rail as described in the EIS (also referred to as the 'exhibited proposal').
Rail alignment	The exact positioning of the track, accurately defined both horizontally and vertically, along which the rail vehicles operate.
Rail corridor	The corridor within which the rail tracks and associated infrastructure are located .
Rail level	The theoretical level of the running surface of the rails.
Rating background level (RBL)	The underlying level of noise present in an area once transient and short-term noise events are filtered out.

TERM	DEFINITION
Sensitive receivers	Land uses which are sensitive to potential noise, air and visual impacts, such as residential dwellings, schools and hospitals.
Species credit	A biodiversity credit that represents a measurement of the value of a threatened species that is predicted to occur in an area of land but cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the threatened species profile database. **Species** credits measure the gain in the specified species value at an offset site, and this can be used to offset the impact on species values as a result of a development proposal.
Spoil	Ground material removed by construction.
Study area	The study area is defined as the wider area including and surrounding the proposal site, with the potential to be directly or indirectly affected by the proposal (for example, by noise and vibration, visual or traffic impacts). The actual size and extent of the study area varies according the nature and requirements of each impact assessment technical report.
Track	The structure consisting of the rails, fasteners, sleepers and ballast, which sits on the formation.
Track formation	Refer to the definition of formation.
Travelling stock reserves	Travelling stock routes and reserves are parcels of Crown land reserved under the Crown Land Management Act 2016 (NSW) for use by travelling stock.
Vibration dose value	Combines the magnitude of vibration and the time for which it occurs. It can be a cumulative measurement of the vibration level received over a given period.
Visual amenity	The value of a particular area or view in terms of what is seen.
Visual impact	The impacts on the views from residences, workplaces and public places. This can be positive (i.e. benefit or an improvement) or negative (i.e. adverse or a detraction).
Waste	Waste is defined in the POEO Act. It includes, among other things, any matter (whether liquid, solid, gaseous or radioactive) that is discharged, emitted or deposited in the environment in such volume, constituency, or manner as to cause an alteration to the environment.

PART A

Introduction and Overview

NARRABRI TO NORTH STAR SUBMISSIONS PREFERRED INFRASTRUCTURE REPORT

1. Introduction

1.1 Background

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

The Inland Rail route, which is about 1700 kilometres long, involves:

- using the existing interstate rail line through Victoria and southern NSW
- upgrading about 400 kilometres of existing track, mainly in western NSW
- providing about 600 kilometres of new track in northern NSW and south-east Queensland.

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

Australian Rail Track Corporation Ltd (ARTC) has developed a ten-year program to deliver Inland Rail. ARTC was created after the Australian and state governments agreed in 1997 to the formation of a 'one stop shop' for all operators proposing to the national interstate rail network. Across its network, ARTC is responsible for:

- selling access to train operators
- developing new business
- capital investment in the corridors
- managing the network
- infrastructure maintenance.

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

ARTC ('the proponent') is proposal to construct and operate the Narrabri to North Star section of Inland Rail ('the proposal') which consists of upgraded rail track and associated facilities, generally within the existing rail corridor between Narrabri and the village of North Star. The proposal forms a key component of Inland Rail.

1.2 The assessment and approval process

The proposal is declared critical State significant infrastructure under section 5.12 (formerly section 115U) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). As critical State significant infrastructure the proposal is permissible without development consent and is subject to assessment and approval by the Minister for Planning and Public Places under Division 5.2 of the EP&A Act. The proposal is also a controlled action under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) (referral reference 2016/7729) and requires approval from the Australian Government Minister for the Environment and Energy.

An Environmental Impact Statement (EIS) was prepared to support ARTC's application for approval of the proposal in accordance with the requirements of Division 5.2 of the EP&A Act. The EIS addressed the environmental assessment requirements of the Secretary of the Department of Planning and Environment ('the SEARs'), dated 8 November 2016.

The EIS was placed on public exhibition by the Department of Planning, Industry and Environment (DPI&E) (formerly the Department of Planning and Environment) for a period of 31 days, commencing on 15 November 2017, and concluding on 15 December 2017.

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

During the exhibition period, interested stakeholders and members of the community were able to review the EIS online or at display locations (described in section 4.3), participate in consultation and engagement activities (also described in section 4.3 of this report), and make a written submission to the DPI&E for consideration in its assessment of the proposal.

1.3 Changes to the exhibited proposal

Subsequent to public exhibition of the EIS, ARTC has undertaken further investigations and design refinement with the aim of addressing a number of issues raised in submissions, while also minimising potential impacts – particularly in respect of flooding, traffic and access. This design refinement has generally encompassed the following proposal elements:

- horizontal and vertical rail alignment
- bridge and culvert structures
- level crossings.

As an outcome of these investigations, and to facilitate delivery of the Narrabri to North Star section of Inland Rail, ARTC has divided the Narrabri to North Star section into two phases:

- Phase 1 would consist of two sections of upgraded track and associated facilities, comprising:
  - about 93 kilometres between Narrabri and Alice Street, Moree
  - about 80 kilometres between Camurra North and North Star
- Phase 2 would consist of about 15 kilometres of upgraded track and associated facilities between Alice Street, Moree and Camurra North.

The locations of the two phases are shown on Figure 1.1.

ARTC is currently seeking approval to undertake Phase 1, which is referred to as the 'preferred infrastructure' for the purposes of this document. Phase 2 would be subject to a separate approval process. Further information about Phase 2, including an overview of the proposed approach to the approval and assessment process, is provided in section 8.1.

1.4 The preferred infrastructure

An overview of the preferred infrastructure for which approval is sought is provided in the following sections. Further information, including a comparison between the preferred infrastructure and the exhibited proposal, a description of how the design has been refined, and the reasons for these refinements, is provided in Chapters 8 and 9 of this report. A detailed description of the preferred infrastructure is provided in Appendix B.

1.4.1 Key features

The key features of the preferred infrastructure include:

- upgrading the track, track formation, culverts and underbridges within the existing rail corridor, in two sections:
  - between Narrabri and Alice Street in Moree (a distance of about 93 kilometres)
  - between Camurra North and North Star (a distance of about 80 kilometres)
- realigning the track within the existing rail corridor at Gurley and Moree stations
- providing five new crossing loops within the existing rail corridor at Bobbiwaa, Waterloo Creek, Tycannah Creek, Coolleearllee, and Murgo
- removing the existing bridge and providing a new rail bridge over Croppa Creek
- realigning about 1.5 kilometres of the Newell Highway near Bellata, and providing a new road bridge over the existing rail corridor ('the Newell Highway overbridge')
- providing a new road bridge over the existing rail corridor at Jones Avenue in Moree ('the Jones Avenue overbridge').

Ancillary work includes works to level crossings, signalling and communications, signage, fencing, noise attenuation structures, rail maintenance access roads, and services and utilities.

The preferred infrastructure consists of a two sections of single-track standard gauge railway, with crossing loops, to accommodate double-stacked freight trains up to 1800 metres long. The preferred infrastructure includes components to accommodate possible future augmentation, including a possible future requirement for 3600 metres long trains (subject to a separate approval process). It is noted that any future expansion, and the operation of 3600 metre long trains, does not form part of the preferred infrastructure for which approval is being sought.

Further information is provided in Chapter 9 and Appendix B.

1.4.2 Construction methodology

Subject to approval of the preferred infrastructure, construction is planned to start in late 2020 and is expected to take about 44 months. Construction is expected to be completed in mid-2024.

Existing train operations along the Narrabri to North Star line would continue prior to and following construction. During construction, train operations may be suspended during periods of full track possession to allow for more efficient construction work.

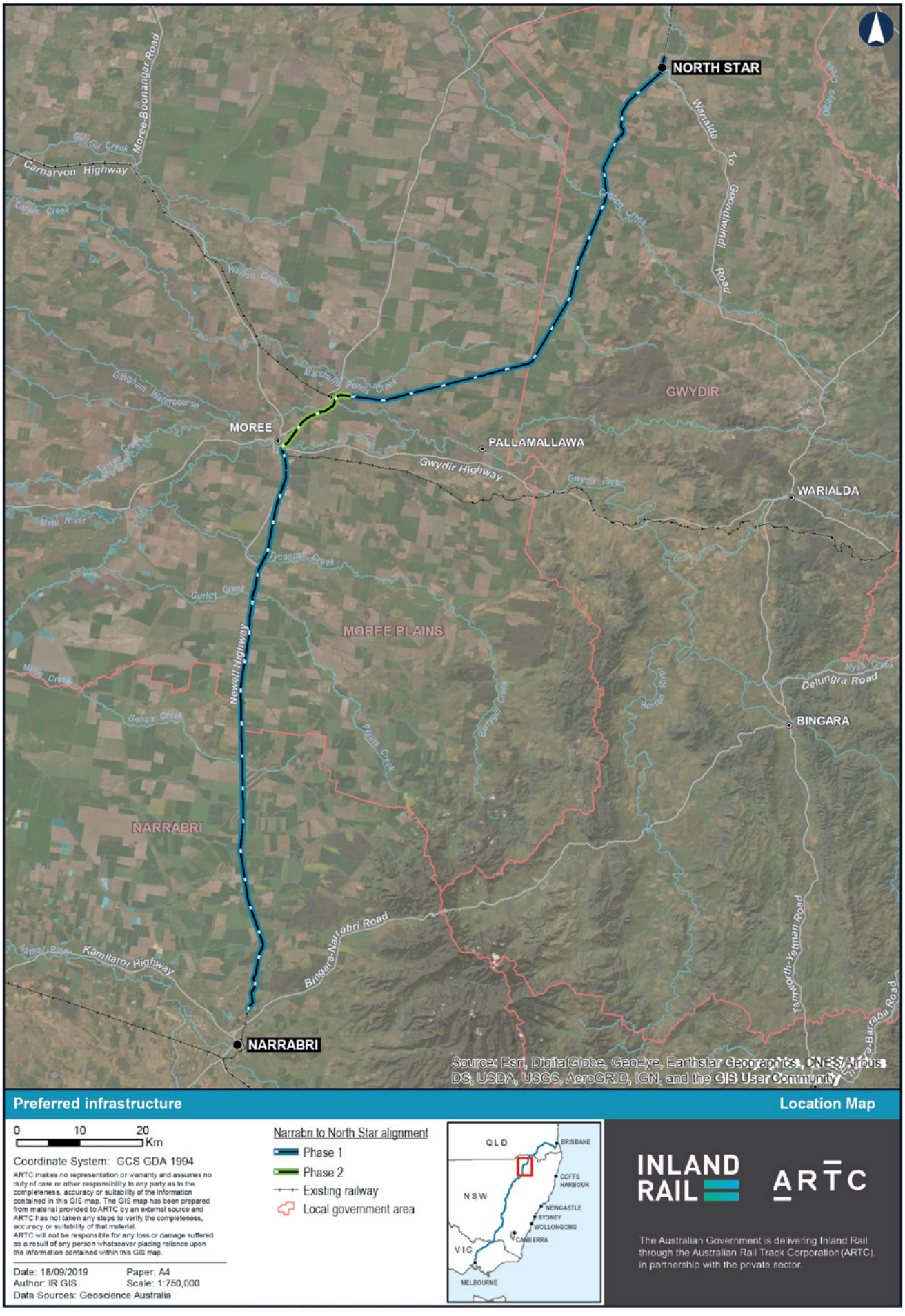

FIGURE 1.1: LOCATION OF THE PREFERRED INFRASTRUCTURE

1.5 Purpose and structure of the report

This report comprises a Submissions Report and a Preferred Infrastructure Report. It has been prepared in accordance with the requirements for State significant infrastructure under Division 5.2 and, more specifically, the requirements of section 5.17(6) formerly section 115Z(6) of the EP&A Act. section 5.17(6) of the EP&A Act specifies that:

- 'The Secretary may require the proponent to submit to the Secretary:
  a) a response to the issues raised in those submissions, and
  b) a preferred infrastructure report that outlines any proposed changes to the State significant infrastructure to minimise its environmental impact or to deal with any other issue raised during the assessment of the application concerned.'

This report is structured as summarised below.

Part A – provides an introduction and overview including:

- an introduction to the report (Chapter 1)
- an overview of the proposal as exhibited (Chapter 2)
- clarifications on the exhibited proposal, where relevant to the preferred infrastructure (Chapter 3)
- a description of the stakeholder and community consultation undertaken during and following the exhibition of the EIS (Chapter 4).

Part B – provides an analysis of, and responses to, the submissions received regarding the exhibited proposal, including:

- an analysis of the submissions received, including numbers, types of submitters and key issues raised (Chapter 5)
- responses to the issues raised in community, key stakeholder, and government agency submissions (Chapters 6 and 7).

Part C – contains the preferred infrastructure report including:

- an introduction to the preferred infrastructure including justification and context (Chapter 8)
- a description of the preferred infrastructure compared with the exhibited proposal (Chapter 9)
- an environmental risk and impact screening for the preferred infrastructure compared with the impacts identified in the EIS for the exhibited proposal (Chapter 10)
- an impact assessment for the preferred infrastructure (Chapters 11 and 12).

Part D – provides a conclusion to the report including:

- revised mitigation measures specific to the preferred infrastructure, and a summary of the process to date and the next steps (Chapter 13)
- a reference list (Chapter 14).

2. Overview of the exhibited proposal

This section provides an overview of the proposal as described in the EIS (the exhibited proposal). It includes an overview of the key features, the need for the proposal, its benefits, and the main potential impacts identified by the EIS.

2.1 Overview of the proposal as described by the EIS

2.1.1 Location

The exhibited proposal was generally located within the existing rail corridor between Narrabri and the village of North Star via Moree. Some works were also proposed outside the rail corridor, including works at Bellata, Moree, and Camurra. The location of the exhibited proposal is shown in Figure 2.1.

2.1.2 Key features of the proposal

The key features of the exhibited proposal included:

- upgrading the track, track formation, culverts and underbridges within the existing rail corridor, for a distance of 188 kilometres, between Narrabri and North Star via Moree
- realigning the track within the existing rail corridor at Bellata, Gurley, and Moree stations to conform with required platform clearances for Inland Rail trains
- providing five new crossing loops within the existing rail corridor at Bobbiwaa, Waterloo Creek, Tycannah Creek, Coolleearllee, and Murgo
- providing a new section of rail line at Camurra about 1.6 kilometres long, to bypass the existing hairpin curve ('the Camurra bypass')
- removing the existing bridges and providing new rail bridges over the Mehi and Gwydir rivers and Croppa Creek
- realigning about 1.5 kilometres of the Newell Highway near Bellata, and providing a new road bridge over the existing rail corridor ('the Newell Highway overbridge')
- providing a new road bridge over the existing rail corridor at Jones Avenue in Moree ('the Jones Avenue overbridge').

The key features of the exhibited proposal are shown in Figure 2.2.

Ancillary work included works to level crossings, signalling and communications, signage, fencing, and services and utilities within the proposal site.

The land requirement for the exhibited proposal comprised the existing corridor with a typical width of 30 metres, with some variation to accommodate particular infrastructure and to cater for local topography.

The exhibited proposal consisted of a single-track standard gauge railway, with crossing loops to accommodate double-stacked freight trains up to 1800 metres long. Components of the exhibited proposal included infrastructure to accommodate possible future augmentation and upgrades of the track. Clearing of the corridor would also have occurred where necessary for the exhibited proposal, to allow for construction and safe operation of the railway.

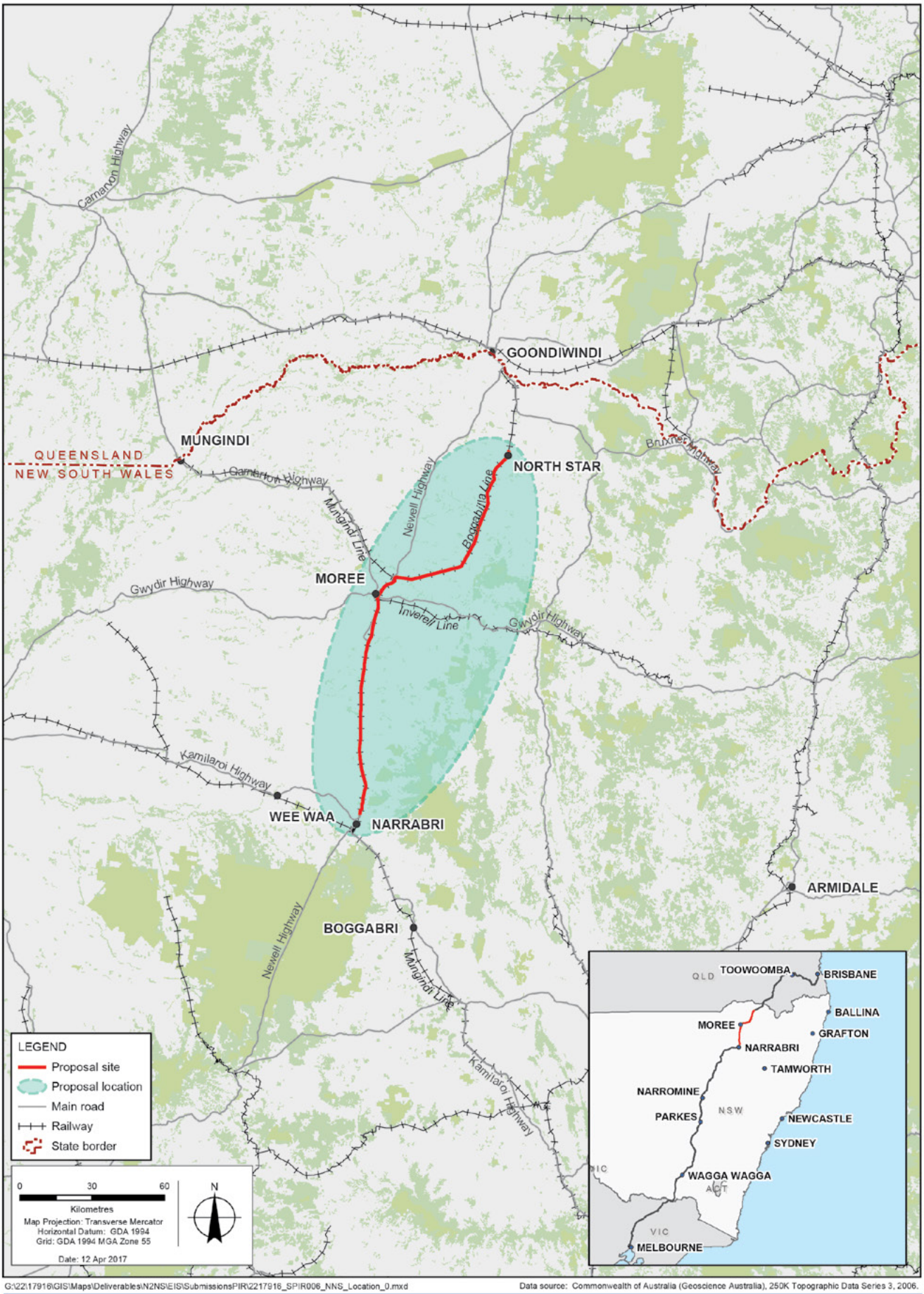

FIGURE 2.1: LOCATION OF THE EXHIBITED PROPOSAL

FIGURE 2.2: KEY FEATURES OF THE EXHIBITED PROPOSAL

2.1.3 Timing and operation

The exhibited proposal was estimated to take about 24 months to construct and would have been completed in mid-2020.

The exhibited proposal would form part of the rail network managed and maintained by ARTC. Train services would be provided by a variety of operators. Prior to the opening of Inland Rail as a whole, the rail line would be used by existing rail traffic, which includes trains carrying passengers and grain at an average rate of about four trains per day.

Existing train operations along the Narrabri to North Star line would continue prior to, during, and following construction of the exhibited proposal. Train numbers are not anticipated to increase until all 13 sections of Inland Rail are complete, which is estimated to be in 2025.

It is estimated that the operation of Inland Rail would involve an annual average of about 10 trains per day travelling north of Moree (between North Star and Moree) and 12 trains per day travelling south of Moree (between Moree and Narrabri) in 2025. This would increase to about 19 trains per day north of Moree (between North Star and Moree) and 21 trains per day south of Moree (between Moree and Narrabri) in 2040. The trains would be a mix of grain, intermodal (freight), and other general transport trains. The EIS assessed the operational impacts of the use of the exhibited proposal as part of Inland Rail.

2.1.4 Objectives of the exhibited proposal

The objectives of the exhibited proposal were to:

- provide upgraded rail infrastructure that meets the Inland Rail specifications, to enable trains using the Inland Rail corridor to travel between Narrabri and North Star, 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.

2.2 Need for Inland Rail and the exhibited proposal

2.2.1 Need for Inland Rail

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

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

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

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

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

2.2.2 Need for the exhibited proposal

Inland Rail consists of 13 geographically based projects, involving:

- building sections of new or 'greenfield' route
- upgrading sections of existing secondary lines to meet Inland Rail's performance specification
- enhancing sections of existing main lines, mainly to improve vertical and horizontal clearances between infrastructure above the rail corridor and the tracks themselves, to enable trains with double-stacked containers to pass safely beneath.

The exhibited proposal is a critical component of Inland Rail, and was designed to maximise use of the existing rail corridor, while still contributing to the overall efficiency of Inland Rail. Development of both the exhibited proposal and the Parkes to Narromine Project is required to enable the orderly and economic implementation of Inland Rail.

The exhibited proposal would also facilitate safe access for vehicles across the rail corridor in Moree by means of the proposed Jones Avenue road overbridge.

2.3 Summary of key potential impacts

The key potential impacts identified by the EIS for the exhibited proposal are summarised in Table 2.1 and Table 2.2. Further information on these impacts is provided in Chapters 9 to 25 of the EIS.

TABLE 2.1: SUMMARY OF KEY POTENTIAL CONSTRUCTION IMPACTS OF THE EXHIBITED PROPOSAL

ISSUE	KEY POTENTIAL CONSTRUCTION IMPACTS
Traffic, transport and access	▸ Temporary impacts on traffic and access, and an increase in heavy and light vehicle movements on the local road network, including in the vicinity of the proposed Newell Highway and Jones Avenue overbridges. ▸ Works on level crossings may result in local traffic disruptions and short-term access restrictions. ▸ New temporary access tracks may be required in some locations. ▸ Construction activities would result in temporary impacts on existing rail operations.
Biodiversity	▸ Permanent removal or modification (clearing) of about 411 hectares of native vegetation, and temporary disturbance of about 72 hectares of native vegetation, which includes threatened ecological communities listed under the *Threatened Species Conservation Act 1995* (TSC Act) and/or the EPBC Act. ▸ Impacts on aquatic ecological systems as a result of works to culverts, bridges and across watercourses.
Noise and vibration	▸ Potential for construction noise to exceed the relevant criteria at various receivers along the proposal site.
Air quality	▸ Generation of dust from construction works and the movement of equipment and machinery.
Soils and contamination	▸ Erosion and sedimentation during construction could result in the contamination of soils and surface waters. ▸ The main contaminants that could be exposed during excavation are hydrocarbons and asbestos. ▸ Contamination associated with any leaks and spills.
Hydrology and flooding	▸ Potential for inundation of the works area during flood events. ▸ Temporary changes in flows as a result of construction activities.
Water quality	▸ Erosion and the generation of sediment, particularly during works in watercourses associated with the construction of new culverts and bridges and track works. ▸ Impacts on downstream water quality if management measures are not implemented, monitored, and maintained.
Aboriginal heritage	▸ Potential to impact two Aboriginal heritage sites listed on the NSW OEH's Aboriginal Heritage Information Management System, which are located in the proposal site, and 12 unlisted sites. ▸ Impacts on any unexpected finds.
Non-Aboriginal heritage	▸ Removal of two items listed on ARTC's section 170 heritage register (the rail bridges over the Mehi and Gwydir rivers) and removal of an item considered to have heritage significance by the assessment undertaken for the EIS (the rail bridge over Croppa Creek). ▸ Impacts on the existing rail line, which is a potential heritage item considered to be generally of local significance. ▸ Potential for vibration impacts on Moree Station (a locally listed heritage item) and other potential heritage items, including the former Edgeroi Woolshed, and remaining structures associated with Edgeroi, Bellata, and Gurley stations. ▸ Potential to impact any remains associated with a former Aboriginal fringe camp site located near the Mehi River bridge (considered to be a site with archaeological potential). ▸ Impacts on any unexpected finds.

ISSUE	KEY POTENTIAL CONSTRUCTION IMPACTS
Visual and landscape	▸ Visual impacts during construction as a result of the presence of construction works, plant, and disturbance.
Land use and property	▸ Temporary disturbance to land use along the proposal site. ▸ Temporary impacts on agricultural/farming practices. ▸ Limited acquisition of privately-owned land, with resultant changes in land use.
Socio-economics	▸ Beneficial impacts during construction including employment (an estimated average workforce of 180 people), training opportunities, and flow on local and regional economic benefits. ▸ Impacts on the local community and/or individual landowners/occupants resulting from changes to traffic, transport and access arrangements. ▸ Impacts on the amenity of the local community, and impacts associated with the inflow of the workforce into the local area, including a requirement for temporary accommodation.
Sustainability and climate change	▸ Material consumption and associated carbon footprint. ▸ Emissions of greenhouse gases. ▸ Discharge to surrounding environment including waste production. ▸ Clearing and land excavations. ▸ Demand for fuel (diesel), water, sand, and aggregate.
Waste	▸ Spoil would be generated, some of which would be re-used in track formation/ construction. Spoil mounds (for spoil that is not re-used) would be formed adjacent to the formation and within the rail. ▸ Other waste material would include green waste, sleepers, rail tracks, formation material, fencing, and general soil waste.
Health and safety	▸ Introduction of potential ignition sources and fuel sources could increase bushfire risks. ▸ If inadequately managed, the storage and handling of dangerous goods and hazardous materials could cause leaks and spills, with resultant contamination and health impacts. ▸ Potential rupture of underground utilities during excavation or collision of plant and equipment with aboveground services. ▸ Public health and safety risks during construction.

TABLE 2.2: SUMMARY OF KEY POTENTIAL OPERATION IMPACTS OF THE EXHIBITED PROPOSAL

ISSUE	KEY POTENTIAL OPERATION IMPACTS
Traffic, transport and access	▸ Minor impacts on road travel times as a result of increased train activity at level crossings, with an estimated maximum delay at Alice Street and Bullus Drive of 143 seconds. ▸ Improved access across the rail corridor in Moree as a result of the Jones Avenue overbridge. ▸ An increase in traffic volumes on Jones Avenue and Tycannah Street in Moree.
Biodiversity	▸ Potential increase in train strikes on fauna species.
Noise and vibration	▸ Noise levels at a number of residential receivers have the potential to exceed the redeveloped rail line criteria for operational rail noise by the year 2040.
Air quality	▸ Increase in the number of diesel freight trains has the potential to increase levels of pollutants such as nitrogen oxides and particulate matter. ▸ Decreasing the number of heavy vehicles using major transport routes such as the Newell Highway would have a positive impact on air quality for receivers along these routes.

ISSUE	KEY POTENTIAL OPERATION IMPACTS
Soils and contamination	▸ If inadequately managed, maintenance could result in erosion of soils. ▸ Contamination of soils as a result of any accidental spills.
Water quality	▸ Surface runoff, which may contain sediment, traces of fuel, dissolved metals, and other contaminants deposited in the corridor from operation activities, could impact water quality. ▸ Impacts on water quality as a result of any accidental spills.

Hydrology and flooding	▸ Raising the height of the rail formation would impact surface water flows across the floodplain, changing the upstream flooding regime, and resulting in more concentrated flows through culverts that discharge to downstream waterways.
	▸ Flood modelling predicts that the proposal would:
	  ▸ reduce the length of overtopping of the existing rail corridor in the proposal site during a one per cent annual exceedance probability (AEP), from about 6203 metres to 1789 metres
	  ▸ reduce the area of upstream flooding for all flood events except the 0.2 per cent AEP event
	  ▸ reduce the extent of flooding in a one per cent AEP event by about 6 per cent.

Visual and landscape	▸ Introduction of new structures in the landscape, mainly associated with the Newell Highway and Jones Avenue overbridges, and the new rail bridges over the Mehi and Gwydir rivers and Croppa Creek.

Land use and property	▸ Use of the rail line would intensify once Inland Rail is operational in 2025.
	▸ Flood modelling predicts that the proposal would result in:
	  ▸ an increase in the number of buildings and structures subject to temporary inundation
	  ▸ an overall decrease in the area of land subject to temporary inundation, with the exception of land used for intensive animal production, mining and quarrying, and tree and shrub cover (based on land use mapping data provided by OEH).

Socioeconomics	▸ Beneficial impacts would include better access to and from regional markets, enabling regional economic development along the Inland Rail corridor, and safety and amenity benefits as a result of the reduction of freight transport on major road corridors.
Sustainability and climate change	▸ Potential risk of asset damage or failure in extreme weather events. ▸ Emissions of greenhouse gases from operational energy use and embodied energy in materials. ▸ Reduction in greenhouse gas emissions from transfer of freight from trucks to rail. ▸ Demand for fuel (diesel) and water.
Waste	▸ Minor quantities of green waste, general debris, and litter may be generated during maintenance.
Health and safety	▸ Introduction of potential ignition sources could increase bushfire risks. ▸ If inadequately managed, transport of hazardous materials and dangerous goods via rail has the potential to impact the surrounding community and the environment through leaks and spills. ▸ Public health and safety risks including risks to pedestrians and road vehicles as a result of collisions with trains at level crossings, and other safety risks, such as security risks and unauthorised access.

3. Environmental impact statement clarifications

This section provides clarifications regarding information presented in the EIS, where relevant to the preferred infrastructure. It also includes the results of additional assessment undertaken to respond to specific queries regarding the EIS.

3.1 Clarifications

Since the EIS was placed on public exhibition, it has been identified that some of the assessment results require clarification. The purpose of this section is to:

- clarify some of the information presented in the EIS, including information related to the potential impacts of the preferred infrastructure
- provide clarification of some potential inconsistencies within the EIS and the technical reports where these are relevant to the preferred infrastructure.

The following clarifications are provided in this section:

- project description clarifications (section 3.2)
- traffic data used for the traffic, transport and access assessment (Technical Report 1) (section 3.3)
- clarification of noise receiver types (section 3.4)
- downstream impacts (hydrology and flooding) (section 3.5)
- potential for impacts on Moree station (section 3.6)
- potential for impacts on Moree Airport airspace during construction (section 3.7).

3.2 Project description clarifications

A number of queries were received regarding whether the proposed possession strategy, described in section 8.3 of the EIS, considered the potential for displacement of grain freight movements, and whether this had also been considered in the construction traffic and noise assessments.

As a result of further consultation with Transport for NSW and other stakeholders, including managers of the grain holding sidings along the alignment, the possession strategy for the preferred infrastructure has been refined to minimise potential impacts on freight operators during construction. The refined possession strategy is described in section 2.3 of Appendix B.

In summary, freight and passenger movements would be displaced from rail services during construction periods where operation of the rail line is suspended (see section 2.3 of Appendix B). Based on the anticipated construction program, the potential impacts are summarised in the following sections.

3.2.1 Freight train movements

Construction of the preferred infrastructure would result in suspension of

- scheduled freight and grain season haulage between Narrabri and Moree
- occasional 'at call' grain movements between North Star and Moree.

ARTC's current freight schedule (from April 2019) indicates that there are contracted train paths for two general freight movements per week running to Narrabri through the Hunter Valley network, with two further services passing through Narrabri en-route to Wee Waa. Similar movements were contracted in January 2019. No contracted freight train paths ran between Narrabri and Moree during these periods. No contracted paths run north of Moree towards either North Star or Mungindi.

Accordingly, limited general freight is likely to be displaced by suspension of the Narrabri to Moree section of the network during construction.

Grain movements are volatile and subject to harvest yields and market conditions. Grain freight is therefore reflective of these factors and cannot be predicted in advance of the growing season. Grain is stored on farms and trucked to either rail facilities or to port/other destinations. The majority of grain movements occur between November and April. Under the proposed possession regime for the preferred infrastructure, grain movements during the grain freight season would be able to use rail services, unless otherwise agreed with grain handlers. Therefore, grain movements from November to April would be unlikely to be displaced during construction. However, it is noted that grain handlers may opt to truck grain for commercial reasons in preference to rail. During the period between May and October, all grain movements would need to use the road network.

The traffic impact assessment undertaken as part of the EIS (Technical Report 1) considered seasonal variation due to the addition of grain trucks on the road network during construction. The assessment concluded that even if the peak hourly volume of traffic on Newell Highway (the busiest road likely to be used for construction) increased by 50 per cent due to the addition of grain trucks (an additional 125 vehicles per hour), a Level of Service B would still be expected to be achieved.

The noise impact assessment undertaken as part of the EIS (Technical Report 5) noted that the increase in noise levels due to construction traffic would be estimated to be less than two dB, which would not be noticeable at receivers. Based on the assessment undertaken, vehicle volumes would need to increase by at least 58 per cent for noise to be noticeable at receivers.

Grain movement volumes would be lower during the May to October period than during the November to April period. Therefore, based on the noise and traffic impact assessments undertaken as part of the EIS, it is considered unlikely that the increase in grain truck movements due to the displacement of grain freight would be of sufficient volume to impact on road capacity or safety, or impact adjacent residential amenity due to noise.

Subject to crop yields, longer possession periods may be agreed with grain handlers to allow for extended construction periods.

3.2.2 Passenger train movements

Xplorer passenger train services between Narrabri and Moree would be suspended for the duration of construction activities between Narrabri and Moree, including during the 'grain freight season' (November to April).

Currently, one passenger train per day operates in each direction along this section, consisting of two carriages. A replacement bus service would be provided to mitigate this impact.

The replacement bus would add up to four movements per day between the towns (i.e. a passenger movement and a return empty movement). This would not contribute to a noticeable increase in traffic or noise levels.

Mitigation measure C2.4 has been updated to include a commitment to provide rail replacement buses for passenger rail services.

3.3 Traffic data

Some submissions sought clarification of the traffic data used in the EIS.

The traffic, transport and access assessment undertaken as part of the EIS (Technical Report 1) used the traffic data for parts of the Newell Highway that was available at the time of the assessment. This data was traffic volume data (annual average daily traffic (AADT)) published in 2008.

NSW Roads and Maritime Services (Roads and Maritime) subsequently provided unpublished sample count data from April 2012 for similar locations (between Bellata and Gurley, and north of Croppa Moree Road).

Transport for NSW's submission on the EIS suggested that the 2008 AADT data was unacceptably old. To respond to this issue, the two sets of data are compared in Table 3.1, and additional commentary is provided below Table 3.2.

TABLE 3.1: TRAFFIC DATA FOR 2008 AND 2012

LOCATION	STATION	DESCRIPTION	AADT DATA (2008)			SAMPLE COUNT DATA (2012)		
			Daily	Heavy vehicles (%)	Peak hour	Daily	Heavy vehicles (%)	Peak hour
North of Narrabri	91022	120 m north of Brigalow Lane	2012	52	148	2714	39	206
North of Moree	91117	10 m south of Murrays Road	2075	48	150	2329	51	178

The 2008 AADT data makes allowance for seasonal variations across the year, while the 2012 sample count data is for a specific time period only.

As shown in Table 3.1, the daily traffic volumes in 2012 were higher than in 2008. However, the data for Newell Highway was only used in a very limited way in the EIS. It was used by the traffic, transport and access assessment to provide context, and to assess the broad level of service on the highway (as described in sections 3.3.4 and 5.3.3 of Technical Report 1).

In summary, the traffic data for rural sections of Newell Highway was used as the basis for estimating peak hour level of service with and without construction traffic activity. The threshold for maximum one-way volumes for various level of service categories is shown in Table 3.2.

TABLE 3.2: INDICATIVE MAXIMUM ONE-WAY VOLUMES FOR LEVEL OF SERVICE BANDS (VEHICLES/HOUR)

LEVEL OF SERVICE BAND	ONE-WAY VOLUME
A	250
B	500
C	900
D	1500

As indicated in Table 3.2, in 2008 the maximum one-way peak hour volumes for Newell Highway did not exceed 150 vehicles per hour, which is consistent with a level of service A. To exceed a level of service A by the start of construction, peak hour traffic volumes would need to grow at over eight per cent per annum, which is considered to be at the higher end of likely growth rates. However, the traffic, transport and access assessment assumed that, for the duration of construction with the additional construction traffic required by the proposal, this would be possible, and therefore a level of service B was likely for Newell Highway when construction commenced. Any further growth beyond a level of service B was considered unrealistic, as this would require peak hour traffic volume growth of more than 20 per cent per annum, with construction traffic added separately. Therefore, the assessment concluded that, even with growth, construction traffic and potential seasonal variation in traffic patterns, a level of service B on Newell Highway would be maintained.

The data from 2012 (presented in Table 3.1) indicates that at one location (north of Narrabri) a peak period growth rate of almost 10 per cent per annum had been recorded over the period 2008-2012 (comparing the 148 peak hour volume from 2008 to the 206 peak hour volume from 2012). At another location north of Moree a lower rate of growth was recorded. Using the higher of the 2012 peak hour volumes as a starting point, peak hour traffic would need to grow at over 14% per annum (with construction traffic added separately) when construction commences for a level of service B to be exceeded along Newell Highway. Again, this rate of growth is considered to be unrealistically high, and the original conclusion from the EIS is still considered applicable, ie that Newell Highway would achieve no worse than a level of service B even with the addition of construction traffic.

Given the above, the 2012 data does not change the predicted level of service for Newell Highway during construction, with the predicted traffic volumes well within the range for a level of service B (as described by Technical Report 1). In addition, the intersection analysis undertaken as part of the assessment (described in sections 3.4 and 5.4.3 of Technical Report 1) was based on 2016 traffic surveys, with an allowance for future growth and seasonal variation in traffic activity.

As a result of the above, further assessment using the 2012 data is not considered to be required.

3.4 Confirmation of noise receiver types

The noise and vibration assessment reported in Technical Report 5 and summarised in chapters 11 and 12 of the EIS considered sensitive (residential and non-residential) receivers identified using NSW points of interest mapping (LPI mapping) and verified using aerial imagery. Following exhibition of the EIS, an audit of community infrastructure in the study area was undertaken. This involved reviewing the receivers originally identified for the noise and vibration assessment, confirming the correct classification of receivers, and undertaking additional noise modelling where required.

As an outcome of the review, a number of receivers were reclassified, and some additional receivers were identified. These changes/additions were mainly as a result of the following:

- A number of sensitive non-residential receivers are located in current or former residential premises so were inadvertently identified as residential receivers from aerial imagery.
- The preferred infrastructure site commences to the north of Narrabri; however the noise study area extends two kilometres from the preferred infrastructure site. The original assessment included residential receivers located within two kilometres south of the preferred infrastructure site, but did not include sensitive non-residential receivers, which are sourced from a different data set. Therefore, a number of sensitive non-residential receivers in Narrabri were missed.
- Some recreational receivers in Moree were originally identified as vacant blocks; however, the additional review took into consideration whether these areas were zoned recreational under the relevant Council local environmental plan.

Additional/revised receivers are listed in Table C.1 and are shown in Figure C.1 in Appendix C. The results of the additional construction noise assessment based on the reclassified receivers is provided in section 12.2. The results of the additional operational noise assessment which considered the reclassified receivers is provided in Appendix D and summarised in section 11.1.

3.5 Hydrology and flooding

A hydrology and flooding assessment was undertaken as part of the EIS to assess the potential operational hydrology and flooding impacts of the proposal. The results of this assessment are provided in Technical Report 6 and are summarised in chapter 15 of the EIS. The assessment considered and modelled flood events resulting from rainfall on individual and small groups of catchments immediately upstream of the existing rail corridor. However, some submissions queried why downstream conditions were not assessed as part of the hydrology and flooding assessment.

It is noted that local upstream catchment flooding was modelled for the assessment, as upstream flooding was considered to best represent the conditions under which the new formation and track would have the greatest influence on flood levels. Downstream conditions were not assessed in the EIS for the following reasons:

- The proposal site is already used for rail infrastructure, and culverts and bridge would be generally upgraded in their existing location. As a result, the pattern of flooding and drainage downstream of the rail corridor is expected to be largely unaffected.
- If more extensive flood modelling was undertaken, broader flood processes (eg major river flooding, tailwater affects, etc) would dominate the results, rather than the impacts of the proposal.
- Increasing the extent of inundation upstream would result in a corresponding reduction in extent downstream.
- By assuming that water would flow unimpeded through the culverts, the maximum potential flow velocities (that is, the worst-case scenario) were estimated. This assisted in the identification of scour protection requirements without requiring downstream modelling.

Therefore, while downstream conditions were not explicitly modelled, the design would include downstream erosion and scour protection measures, and culverts would be widened. These features would assist in reducing discharge velocities and encourage the spread of flows.

Section 15.3 of the EIS noted that further modelling would be undertaken during detailed design to determine what modifications (if any) would be required to achieve the aim of not materially worsening existing flooding characteristics (in terms of property and building inundation). This modelling, which included consideration of downstream changes to flood behaviour, has since been undertaken. The outcomes of this modelling contributed to development of the preferred infrastructure. The results of this modelling are provided in the flood study report undertaken for the preferred infrastructure. This report is provided in Appendix E and summarised in section 11.2.

3.6 Potential for impacts on Moree Station

Moree Station is a listed heritage item on both the Moree Plains Local Environmental Plan 2011 and the RailCorp section 170 heritage register.

Section 7.2.2 of the EIS noted the potential need for the eastern side of the platform at Moree Station to be upgraded to allow passengers to join or alight from the Xplorer passenger service. The exact nature of the platform works was not known at the time of the EIS. As a result, the heritage impact assessment undertaken for the EIS (Technical Report 9) did not assess the potential impacts of works to the platform.

The preferred infrastructure would comprise:

- southerly extension and straightening of the eastern platform to allow the platform and carriages to remain parallel
- a safety fence along the western platform edge to separate passengers from the Inland Rail operational mainline.

The design of these features is currently subject to refinement in consultation with key stakeholders (Transport for NSW and train service operators). At this stage, it is considered unlikely that the works would have a direct impact on the station building, although there is the potential for impacts on the platform and the item's setting. An assessment of the potential impacts of the preferred infrastructure on Moree Station will be undertaken, and a Statement of Heritage Impact prepared, once the needs of the key stakeholder are confirmed. The assessment will inform detailed design.

Mitigation measure D9.1 has been revised to include the requirement to prepare the Statement of Heritage Impact.

3.7 Potential for impacts on Moree Airport airspace during construction

Moree Airport is located about six kilometres south of Moree and about 200 metres west of the proposal site at the nearest point. The airport is owned, operated and managed by Moree Plains Shire Council. It is acknowledged that the operational airspace for the airport extends over the proposal site within and in the vicinity of Moree. The potential for airspace intrusion during construction of the exhibited proposal was not considered as part of the EIS and therefore consideration is given here.

The Civil Aviation Safety Authority (CASA) is responsible for airspace regulation. Airservices Australia (Airservices) manages the airspace and provides air traffic control services and equipment to ensure the safe and efficient flow of air traffic. Airspace protection is guided by the National Airports Safeguarding Framework, which is a nationally agreed set of guidelines on issues such as:

- building generated windshear and turbulence
- wildlife airport buffers and landscaping controls to reduce the incidence of bird strike
- lighting restrictions to prevent pilot distraction
- mitigation of other risks.

The framework includes managing potential airspace intrusions at airports, including non-Commonwealth airports such as Moree Airport. The guidelines note that 'In the case of non-Commonwealth airports, councils should take account of advice from Airservices, CASA and airlines in determining whether to permit an intrusion into prescribed airspace'. The Civil Aviation Safety Authority (CASA) is responsible for airspace regulation. Airservices Australia (Airservices) manages the airspace and provides air traffic control services and equipment to ensure the safe and efficient flow of air traffic.

Airspace protection is regulated under the *Airports Act 1996* (Cth) and *Airports (Protection of Airspace) Amendment Regulation 1996* (Cth). For Moree Airport, the potential for airspace intrusions are declared under the Regulation and reflected by relevant provisions of the Moree Plains Local Environmental Plan 1995. Clause 42 (Development of land in the vicinity of Moree Airport) provides that:

1. The council must not consent to the erection of a building on land which is shown on the OLS Map, unless it is satisfied that the height of the building will not exceed the limitation specified for the land on that map.
    a) Despite subclause (1), the council may consent to the erection of a building on land which is shown on the OLS Map that will exceed the limitation specified for the land on that map, but only if:
    b) the application for that consent has been referred by the council to Airservices Australia for comment, and
    c) the council has taken into account any comment furnished by Airservices Australia within 28 days after that referral.
2. The council may grant consent to the erection of a building intended for human occupation on Lot 5, DP 817286 only if it is satisfied that measures will be taken:
    a) which comply with the provisions of Australian Standard AS 2021—2000, Acoustics—Aircraft noise intrusion—Building siting and construction published by Standards Australia, and
    b) which are adequate for the insulation of the building from aircraft noise.
3. In this clause, OLS Map means the map marked 'Obstacle Limitation Surface (OLS) Map for Moree and environs' deposited in the office of the council.

Within and around Moree, the proposal site where track upgrading works would be undertaken falls within land covered by the 230 to 256.5m AHD contours on the OLS Map. The Jones Avenue overbridge site would fall within the 240m AHD contour. The main potential for OLS intrusions in these locations would relate to the use of cranes during construction. Preliminary consultation with Moree Shire Council has indicated that the cranes would need to be around 40 metres high in these areas to present a risk of intrusion. The potential for intrusion would need to be confirmed by the construction contractor once the construction methodology is finalised.

ARTC will consult with Moree Shire Council to confirm the potential notification and/or approval requirements in relation to works within the land shown on the OLS Map. This is committed to through new mitigation measure D11.8 (refer to section 13.1).

The requirements for any application for approval required are defined by Guideline F of the National Airports Safeguarding Framework (Managing the risk of intrusions into the protected operational airspace of airports).

4. Consultation undertaken during and after EIS exhibition

This section describes the community and stakeholder consultation undertaken subsequent to finalising the EIS.

4.1 Approach

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

ARTC's approach to consultation for the proposal is described in section 4.1 of the EIS. The consultation activities undertaken prior to exhibition of the EIS are described in sections 4.2 to 4.3 and Appendix D of the EIS.

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

4.2 Consultation prior to exhibition

Section 4.2 and Appendix D of the EIS describe the consultation undertaken up until 30 June 2017. Subsequent to this date and prior to public exhibition of the EIS, additional consultation was undertaken. As the EIS was being finalised at this time, these activities were not described in the EIS.

Table 4.1 lists the engagement activities undertaken in 2017, prior to exhibition of the EIS.

TABLE 4.1: CONSULTATION UNDERTAKEN IN EARLY TO MID-2017 PRIOR TO PUBLIC EXHIBITION

ACTIVITY	DETAIL
Project website (**inlandrail.com.au/N2NS**)	▸ Information about exhibition of the EIS was included on the project website.
Toll free community information line (**1800 732 761**) and Project email (**inlandrailenquires@artc.com.au**)	▸ Requests for information (the majority of which were from potential suppliers) were responded to by the stakeholder engagement team.
Face to face meetings	▸ A meeting was held with Gunnedah Shire Council on 19 July 2017 to discuss options for local development to utilise Inland Rail. ▸ Meetings were held with five private and public landowners to organise access agreements particularly with regards to borrow pits.
Ongoing email and telephone contact with stakeholders	▸ Regular communication was undertaken with Narrabri Shire Council, Moree Plains Shire Council and Gwydir Shire Council to provide updates on the proposal. ▸ The new Inland Rail Stakeholder Engagement Manager for NSW undertook introductions with key stakeholders, including elected representatives of the NSW and Australia governments. ▸ Landowner enquiries were responded to, as required.

4.3 Consultation during exhibition

The EIS was placed on public exhibition for a period of 31 days between 15 November 2017 and 15 December 2017.

During the exhibition period, government agencies, key stakeholders (including interest groups and organisations), and the community were invited to make written submissions. A summary of the engagement activities and tools used to encourage community and stakeholder participation during the exhibition is provided below.

The EIS was made available to the public at the following locations:

- Moree Plains Shire Council Administration Centre, Level 2, 3D Heber Street, Moree
- Narrabri Shire Council Administration Centre, 46-48 Maitland Street, Narrabri
- Gwydir Shire Council, 33 Maitland Street, Bingara
- Gwydir Shire Council, 58 Hope Street, Warialda
- Narrabri Library, 8 Doyle Street, Narrabri
- Wee Waa Library, 106 Rose Street, Wee Waa
- Dhiiyaan Aboriginal Centre, 38 Albert Street, Moree
- North Star Post Office, 17 Edward Street, North Star
- Croppa Creek Store, 6 Buckle Road, Croppa Creek.

The EIS was also available on the DPI&E's website at: **majorprojects.planning.nsw.gov.au**, and the project website at **inlandrail.com.au**.

Table 4.2 lists the engagement activities undertaken during the public exhibition period.

TABLE 4.2: CONSULTATION DURING THE EIS EXHIBITION PERIOD

ACTIVITY	DETAIL
Project website (**inlandrail.com.au/N2NS**)	▸ Information about public exhibition of the EIS was provided on the project website.
Podcast	▸ A podcast about the EIS process was made available on the project website, consisting of short interviews with Inland Rail representatives.
Letters to landowners	▸ Letters were sent to 110 landowners/occupants at which property access agreements were signed. ▸ Letters were sent to an additional 656 landowners/occupants located within 500 metres of the existing rail line (focussing on residents in Edgeroi, Bellata, Gurley, Moree, Croppa Creek and North Star).

Advertisements	▸ Half page colour advertisements were placed in the following local papers to provide information about exhibition of the EIS, display locations, and information sessions:
	  ▸ Narrabri Courier 16 November and 23 November 2017
	  ▸ Moree Champion 16 November and 23 November 2017
	  ▸ Warialda Standard 15 November and 22 November 2017
	  ▸ Goondiwindi Argus 15 November and 22 November 2017
	  ▸ Koori Mail 15 November
	  ▸ North West Magazine (an insert in 14 local newspapers) 20 November
	▸ Radio advertising was undertaken on 2VM and NOW FM in Moree with 216 spots over a period of 30 days. Different scripts were used pre and post the community information sessions (see below).

Community information sessions	▸ Seven community information sessions were held in local venues. The sessions provided information and displays, and were supported by members of the project team and specialists to answer questions. The sessions were held at the following locations:
	  ▸ Narrabri - Narrabri Crossing Theatre, 3pm to 6pm on Tuesday 21 November and 9am to 12pm on Wednesday 29 November 2017
	  ▸ Moree – Balo Square, 9am to 12pm on Wednesday 22 November and 3 pm to 6 pm on Tuesday 28 November 2017
	  ▸ Croppa Creek – Croppa Creek Store,1pm to 2pm on Wednesday 22 November 2017
	  ▸ North Star – North Star Sporting Club, 9am to 12pm on Wednesday 22 November and 3pm to 6pm on Tuesday 30 November 2017

ACTIVITY	DETAIL
Community information sessions (continued)	▸ A total of 147 people attended the community information sessions. ▸ Attendees included Department of Infrastructure and Regional Development representatives.
Other contacts made	▸ Agencies and key stakeholders were contacted via telephone or email to encourage attendance at the community information sessions and to promote awareness of the public exhibition and submissions period. Agencies/stakeholders contacted included emergency services representatives from Fire, Ambulance, Police and State Emergency Services, Local Land Services representatives, NSW Farmers Federation and existing rail freight users. ▸ Staff from Moree Plains, Narrabri and Gwydir councils forwarded details of the community information sessions to their contacts and ratepayers.
Fact sheets	▸ A project fact sheet, which included information on how to make a submission, was made available on the project website and at the community information sessions. ▸ A level crossing fact sheet, which included information on what level crossings are and why works are proposed, was also made available on the project website and at the community information sessions.

4.4 Consultation during preparation of this report

Based on community and stakeholder feedback received during the public exhibition of the EIS, ARTC revised the project to minimise flooding and traffic and access impacts (the preferred infrastructure).

Prior to the lodgement of this report, ARTC consulted with the following key stakeholders either regarding elements of the exhibited proposal or the proposed approach to construction and operation:

- Department of Planning, Industry and Environment
- Narrabri Shire Council
- Moree Plains Shire Council
- Gwydir Shire Council
- Office of Environment and Heritage
- Transport for NSW
- Roads and Maritime.

The preferred infrastructure is an outcome of this additional consultation.

4.5 Ongoing consultation

4.5.1 Consultation plan

As described in section 4.1.2 of the EIS, ARTC has developed a Communication and Engagement Plan – Narrabri to North Star to guide engagement with the local community. As defined by the plan, consultation will continue to be undertaken over the next three phases:

- construction
- commissioning and handover
- operation.

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

- meetings and briefings
- workshops
- community information sessions
- phone, email and written correspondence
- project website
- distribution of information, including mail outs.

Consultation will continue on a regular basis as guided by this plan. A full list of the activities proposed is provided in Table 4.3.

TABLE 4.3: PROPOSED CONSULTATION ACTIVITIES

ACTIVITY	TIMING	DESIGN	CONSTRUCTION	OPERATION
Advertisements	Relevant milestones	✓	✓	
Stakeholder engagement team – locally based	Ongoing	✓	✓	✓
Community events including sponsorship	Ongoing	✓	✓	✓
Community information sessions	Ongoing	✓	✓	
Construction complaints management system	Prior to construction	✓	✓	
Construction notifications	As required	✓	✓	
Operations complaints management system	As required			✓
Email and newsletter updates	Relevant milestones and project information/ updates	✓	✓	
Engagement with landowners	Ongoing	✓	✓	✓
Enquiries hotline and email	Ongoing	✓	✓	✓
Engagement with stakeholders including government, peak bodies, emergency services, suppliers	Ongoing	✓	✓	✓
Fact sheets	Relevant milestones	✓	✓	
Project briefings and presentations	Relevant milestones	✓	✓	
Website	Ongoing	✓	✓	✓

Consultation and community feedback

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

- accurate and accessible information is available and the community and stakeholders are made aware of the preferred infrastructure
- directly affected stakeholders, such as private level crossing owners, have the opportunity to review and endorse design outcomes
- a timely response is given to issues and concerns raised by the community
- feedback from the community is encouraged
- opportunities for input are provided.

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

Targeted consultation methods, such as letters, notifications, signage and face-to-face communications, will continue to occur. The Inland Rail website and social media platforms will also include updates on the progress of the preferred infrastructure.

The following communication tools and activities will be used during the construction phase:

- email address
- 1800 phone number
- updates to the Inland Rail website
- targeted consultation and notifications as required, including letters, notifications, and face to face communication
- construction signage.

Complaints management

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

The complaints management procedure will include, at a minimum:

- contact details for a 24-hour response line and email address, for ongoing stakeholder contact throughout construction
- provision of accurate public information signs while construction work is in progress
- staging of works, developed in consultation with relevant stakeholder groups, to minimise disruption and impacts on community activities and functions
- management of complaints in accordance with ARTC's emergency management procedure, specifically:
  - details of all complaints received will be recorded
  - verbal and written responses will be provided within defined time limits.

PART B

Submissions Report

NARRABRI TO NORTH STAR SUBMISSIONS PREFERRED INFRASTRUCTURE REPORT

5. Overview of submissions

This section provides an overview of the submissions received, including a breakdown of the types of submitters, the number of submissions received, and the key issues raised in submissions.

5.1 Overview of submissions received

During the exhibition period, submissions were invited from the community and other stakeholders. The receipt of submissions was coordinated and managed by the DPI&E. Submissions were received, registered and uploaded by DPI&E onto their website.

Submissions were accepted by electronic online submissions or post, and were forwarded to ARTC for review and consideration.

A total of 18 submissions were received and registered by the DPI&E. A breakdown of submissions by type of stakeholder is provided in Table 5.1.

TABLE 5.1: BREAKDOWN OF SUBMISSIONS RECEIVED

SUBMITTER TYPE	NUMBER OF SUBMISSIONS RECEIVED
Community submissions	
Community member/individual	7
Organisation/business	3
Government submissions	
Councils	2
State government departments/agencies	6
Total	**18**

5.2 Analysis of submissions

5.2.1 Review of community submissions

The analysis of submissions involved identifying the issues raised and coding the issues into key issues (eg construction noise) and sub-issue categories (eg noise from construction compounds). A total of eight key issue and 13 sub-issue categories were identified and coded during the submission review process. These categories form the basis for the structure of issue specific responses to the issues raised, which is provided in section 6 of this report.

An assessment of each submission was undertaken, with each submission individually reviewed to understand the issues raised. The analysis involved identifying the issues raised, and coding them into key issues and sub-issues, as described above.

The issues raised were summarised and grouped according to the key issue and sub-issue categories, and responses to the issues raised are provided in section 6 according to these categories. Where relevant, input to the responses was sought from the specialists who assisted with preparation of the EIS.

Each issue identified in section 6 is presented as a summary of the issues raised by individual submissions. This means that, while the exact wording of a particular submission may not be presented in the summary of the issue, the intent of each individual issue raised has been captured. A response has been provided to each grouped issue summary. The relationship between the issues raised and responses provided to the phase of the project, including any issues that will require further clarification during Phase 2, is noted where relevant.

Table A.1 in Appendix A identifies the key issues raised in community submissions, according to the submission number, and a reference to where a response to the key issues is provided in section 6.

A breakdown of the issues raised in community submissions is provided in Table 5.2. As most of the submissions raised more than one issue, the number of issues identified is greater than the total number of submissions received.

A visual breakdown of the key issues raised by submissions is provided in Figure 5.1.

TABLE 5.2: SUMMARY OF KEY ISSUES RAISED BY THE COMMUNITY

KEY ISSUE CATEGORY	SUB-ISSUE	NUMBER OF TIMES ISSUE WAS RAISED IN SUBMISSIONS
Proposal need and background	Proposal support	3
	Need for the proposal/Inland Rail	2
	Alternatives/options	2
Proposal features and design	Design	1
	Level crossings	1
Traffic, transport and access	Operation impacts – access	2
	Operation impacts – traffic	1
Noise and vibration (amenity impacts)	Operation impacts (noise)	4
	Operation impacts (vibration)	1
Air quality impacts	Operation impacts	1
Land use and property	Property values and compensation	1
	Property impacts	1
Out of scope / Other	n/a	3
Total		**23**

FIGURE 5.1: BREAKDOWN OF THE KEY ISSUES RAISED IN COMMUNITY SUBMISSIONS

5.2.2 Review of Government agency submissions

Comprehensive submissions were received from a number of government agencies, including local councils. These submissions raised a variety of issues and made a number of recommendations. Submissions were received from the following agencies:

- Moree Plains Shire Council
- Narrabri Shire Council
- Department of Industry (Crown Land and Water)
- Environment Protection Authority
- Office of Environment and Heritage
- Heritage Division, Office of Environment and Heritage (as Delegate of the Heritage Council of NSW)
- Transport for NSW
- Geological Survey of New South Wales.

Each Government agency submission was reviewed in detail, and the issues raised categorised according to the main issue categories identified (as described in section 5.2.1). A high level summary of the submissions received is provided in Table 5.3 while summaries of the key issues raised in each submission, and responses to the issues raised, are provided in section 7 of this report. The relationship between the issues raised and responses provided to the phase of the project, including any issues that will require further clarification during Phase 2, is noted where relevant.

TABLE 5.3: SUMMARY OF GOVERNMENT AGENCY AND KEY STAKEHOLDER SUBMISSIONS

AGENCY	ISSUE CATEGORY	KEY ISSUES RAISED
Moree Plains Shire Council	Proposal need	▸ Council supports Inland Rail and the proposal, but has a number of concerns that should be addressed.
	Proposal alternatives	▸ Although an eastern bypass is preferred by Council, Council accepts that the through-town route is preferred by the proponent, provided that all amelioration measures are implemented.
	Socio-economic impacts	▸ The impacts of the through town route on the Moree community have not been fully resolved. ▸ The proposed Jones Avenue overpass on its own is not adequate to address severance impacts. An additional grade separated pedestrian overpass is required.
	Health and safety (security)	▸ Security fencing is required along the length of the through town section. ▸ All grade separated crossings need full security. ▸ Double footpaths with shared cycle capacity should be provided on any road-based overbridges.
	Traffic, transport and access	▸ Grade separated access is required to ensure emergency service access at all times to East Moree. ▸ The Jones Avenue overpass should be designed to cater for heavy vehicles. ▸ Impacts on the local road network should be modelled and assessed. ▸ Insufficient attention has been given to the potential impacts of the Jones Avenue overpass. ▸ To facilitate high productivity vehicle access, consideration should be given to contributing to a grade separated overpass of the railway corridor south of Moree. ▸ Additional upgrades are required to facilitate traffic from the Carnarvon Highway, ▸ Roads need to be restored to the same condition post-construction. ▸ Construction needs to minimise disruption to local landholder's access.
	Noise and vibration (amenity)	▸ Consideration should be given to the development of a compensation scheme together with acoustic treatments.
	Land use and property	▸ It is unclear whether specific property resumption is required. ▸ Detailed consideration needs to be given to biosecurity.
	Proposal features and design	▸ Grade separation should be considered for the Gwydir Highway/Inland Rail crossing. ▸ Both formal and informal level crossings need to be addressed to minimise the potential for farm severance impacts.

AGENCY	ISSUE CATEGORY	KEY ISSUES RAISED
Moree Plains Shire Council (continued)	Hydrology and flooding	▸ Need to minimise the impact of additional flooding on local roads and agricultural land. ▸ Detailed attention to culvert design is necessary. ▸ A management plan for culvert and drain maintenance should be developed. ▸ The increase in the number of dwellings impacted is unacceptable. ▸ Detailed design needs to address the 2012 wash-out. ▸ Council is keen to work with ARTC through the detailed design phase to improve flooding outcomes. ▸ Council commissioned an independent review of the flooding assessment, which identified a number of issues and concerns.
	Consultation	▸ A detailed consultation strategy and plan should be prepared to include landholders as well as other stakeholders.
	Air quality	▸ Regional baseline air quality monitoring should be undertaken. ▸ Unsealed roads need to be addressed by the construction environmental management plan.
	Consultation	▸ Local contractor and Indigenous community input should occur.
Narrabri Shire Council	Traffic, transport and access	▸ The proposal should not impact on the operation of the Newell Highway and travel times during operation. ▸ The proposal should minimise delays to traffic at level crossings, and ensure adequate space to queue safely. ▸ Site specific construction traffic management plans should be prepared. ▸ During harvest time, the major storage sites and heavy vehicle transport companies should be given prior warning of works that will affect truck movements. ▸ Council should be informed of all changes to level crossings and detours during construction. ▸ Any new track required at level crossings should be constructed on the western side.
	Noise and vibration	▸ The implementation of noise and vibration mitigation measures should be required as a condition of consent.
	Hydrology and flooding	▸ Flood modelling should be undertaken to confirm the extent of impacts on properties. ▸ Flood mitigation measures should be implemented to ensure that impacts are appropriately managed. ▸ Opportunities to mitigate flooding should be investigated in consultation with Council.
	Consultation	▸ Landowners should be fully consulted in relation to any property acquisition and land access requirements.
	Land use and property	▸ The operation of rural properties should not be detrimentally affected by operation.
	Proposal construction/ socio-economic impacts	▸ Council reiterates the availability of accommodation in Narrabri and Boggabri for construction personnel, and asks that it be consulted during preparation of the workers housing and accommodation plan.

AGENCY	ISSUE CATEGORY	KEY ISSUES RAISED
Department of Industry (Crown Land and Water)	Biodiversity	▸ Reference should be made to the Vehicle Biosecurity Security Kit factsheet.
	Land use and property	▸ A consistent strategy for rehabilitation should be developed.
	Proposal construction	▸ Water supply works should be confirmed.
	Assessment and approval	▸ Should provide an assessment of the impacts and proposed mitigation of water extraction. ▸ A construction environmental management plan must be prepared in consultation with Crown Lands & Water
	Hydrology and flooding	▸ Provide an assessment of the consistency of the proposal and associated impacts with the *Floodplain Management Plan for the Gwydir Valley Floodplain 2016*. ▸ Works within waterfront land must be carried out in accordance with the *Guidelines for Controlled Activities on Waterfront Land*.
Environment Protection Authority	Air quality	▸ Should manage dust generating activities such that off-site impacts are minimised.
	Noise and vibration (amenity impacts)	▸ Requested justification for works outside recommended standard construction hours. Sleep disturbance needs to be assessed in accordance with the *Industrial Noise Policy*. ▸ The Inland Rail NSW Construction Noise and Vibration Management Framework, and all feasible and reasonable noise mitigation measures, should be implemented.
	Vibration (structural impacts)	▸ Vibration criteria from *Assessing Vibration: A Technical Guideline* should be used.
	Water quality	▸ The full range of potential pollutants and the environmental values of the receiving waters should be considered. ▸ Requested further investigations into the suitability of water if recycled water/treated water is to be used for construction.
	Waste	▸ Need to confirm with each local council that adequate space is available to receive waste generated by the proposal.

AGENCY	ISSUE CATEGORY	KEY ISSUES RAISED
Office of Environment and Heritage	Biodiversity	▸ The total biodiversity credit liability should be finalised prior to determination. ▸ Impacts to biodiversity outside the approved development footprint should be assessed and offset through a proposal modification. ▸ Spoil mounds should be placed to avoid impacts. ▸ Temporary impacts on biodiversity values need to be assessed and offset using the BioBanking credit calculator. ▸ There are a number of locations along the development footprint where there may be the potential to avoid impacts. ▸ Biodiversity offset credits for creeping tick-trefoil must be retired based on the area of habitat occupied. ▸ Further justification of the area identified as koala habitat should be provided. ▸ Handling of micro-bats should be avoided where possible. ▸ Requests provision of additional information to determine whether impacts have been assessed and offset appropriately. ▸ Phase 2 of the Biodiversity Offset Strategy should be finalised prior to determination, and Phase 3 should be finalised prior to the commencement of construction. ▸ Biodiversity offset credits should be secured in a more timely manner.
	Hydrology and flooding	▸ Additional modelling should consider both free outlet and tailwater conditions for a range of flood events. ▸ Should continue liaison with Moree Plains Shire Council.
	Heritage	▸ Community monitoring is preferred rather than excavation and artefact analysis.
Heritage Division	Non-Aboriginal heritage	▸ Rail bridges should be retained and strengthened rather than demolished. ▸ A strategy for the ongoing conservation, care and management of steel truss bridges on the ARTC network should be developed. ▸ The potential for indirect impacts on Moree Station should be managed. ▸ Concerned regarding the use of 'high significance' in the assessment of the Aboriginal fringe camp, and the need for an AHIP should be determined. ▸ Further consideration of heritage impacts during detailed design is required. ▸ An updated heritage impact assessment is required if any actual and/or potential heritage items near the proposal site would be directly impacted during construction. ▸ Provided recommended conditions of approval.
Transport for NSW	Assessment and approval	▸ The proposed grade separated crossing at Jones Avenue and the replacement crossing on the Newell Highway would be subject to approval by Roads and Maritime.
	Proposal features and design	▸ Each level crossing should be properly examined on an individual basis including the use of the Australian Level Crossing Assessment Model.
	Traffic, transport and access	▸ Issues are noted and recommendations are made in relation to the traffic, transport and access assessment.
Geological Survey of New South Wales	Consultation	▸ Application for renewal of petroleum licences within the study area has been sought, and consultation with the intersected and nearby title holders should be ongoing.

6. Response to community submissions

This section provides responses to issues raised in submissions from the community. Unless otherwise noted, all mitigation measures referenced in this section refer to the mitigation measures for the preferred infrastructure, provided in chapter 13 of this report.

6.1 Proposal need and background

This section provides responses to issues raised in relation to the need for the proposal and the background to its development, including the alternatives considered.

6.1.1 Support/objection

SUMMARY OF ISSUES RAISED

Of the 10 submissions received from the community, four submissions expressed support for the proposal and two submissions objected to the proposal. The others provided comments on the proposal.

Comments made in support of the proposal included:

- General support for Inland Rail as a result of the benefits to northern NSW.
- The Inland Rail Project is a nation-building project. The government should proceed with the Narrabri to North Star section as it will benefit the Moree region, take trucks off the roads and lower the cost to export grain.
- Inland Rail would benefit industry, reduce freight costs and increase jobs.

Comments made objecting to the proposal included:

- Concerns and reservations regarding the proposal, including noise and air pollution, traffic and property values.
- Concerned about the high level of investment in rail. A review of the real economic value of Inland Rail in comparison to coastal shipping should be undertaken.

Response

ARTC acknowledges the support expressed for Inland Rail as a whole and the exhibited proposal (ie North Star to Narrabri) in particular.

In response to submissions regarding the regional benefits of Inland Rail, including employment benefits, mitigation measure C13.2 has been revised to include a commitment to support local employment through the Inland Rail Academy.

Where submissions expressed objections to the proposal specific issues which were raised have been responded to in the sections below.

6.1.2 Need for Inland Rail and the proposal

SUMMARY OF ISSUES RAISED

One submission raised concerns about the need for the proposal and Inland Rail as a whole. Issues raised included:

- Australia is overinvesting in rail. The proposed route is a waste of taxpayers' money, as the major population centres have less than 50,000 people.
- The Project section would only experience minimal utilisation, with 12 trains per day in each direction.

Response

A summary of the key issues and demands relevant to the development of, and need for, Inland Rail (including the exhibited proposal) is provided in section 5.2 of the EIS. The need for Inland Rail as a whole, and for the proposal as part of Inland Rail, is described in section 5.3 of the EIS, and a summary of the need for Inland Rail and the exhibited proposal is provided in section 2.2 of this report. The need for the preferred infrastructure is consistent with this.

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

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

Inland Rail will connect key production areas in Queensland, NSW and Victoria with export ports in Brisbane and Melbourne, and provide linkages between Melbourne, Brisbane, Sydney, Adelaide and Perth.

It will reduce freight transit times, reduce congestion on rail and road networks, and enable the movement of larger freight volumes via rail, by making the movement of longer and double-stacked trains possible.

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

In summary, as described in chapter 5 of the EIS, Inland Rail is needed to respond to the growth in demand for freight transport, and address existing freight capacity and infrastructure issues. The analysis of demands undertaken by ARTC indicated that there would be sufficient demand for Inland Rail.

The preferred infrastructure is a critical component of Inland Rail, and has been designed to maximise use of the existing rail corridor, while still contributing to the overall efficiency of Inland Rail.

The preferred infrastructure also facilitates safe access for vehicles across the rail corridor in Moree by means of the proposed Jones Avenue road overbridge.

Further information on the need for the preferred infrastructure is provided in chapter 5 of the EIS.

6.1.3 Options considered

SUMMARY OF ISSUES RAISED

One submission noted that another option for the Jones Avenue overpass should be considered:

- The proposed overpass should be located just north of Bullus Drive, as it would benefit more people, take traffic away from the Alice Street rail and highway crossing, avoid the need for a more expensive southern bypass, and stop almost all trucks having to use level crossings in the area.

Response

As described in section 6.2 of the EIS, option development has been an integral part of the overall design process for the exhibited proposal. An iterative process of option selection, design development, and evaluation has been undertaken to define the proposal to date. As described in section 6.3.7 of the EIS, an assessment of options to minimise the potential impacts of the proposal on the Moree community was undertaken during the design process. The options considered opportunities to improve vehicular, pedestrian, cyclist, and emergency vehicle access between the areas of Moree on either side of the existing rail corridor, and included an examination of an eastern deviation around the Moree urban area.

In addition to the do nothing option, the following connectivity options were assessed:

- level crossing upgrades
- footbridge(s)
- emergency vehicle only access
- Gwydir Highway detour
- Gwydir Highway bypass
- road overbridges within Moree.

Engagement with Moree Plains Shire Council and local emergency services identified that the provision of a road bridge over the rail corridor (a road overbridge), together with level crossing upgrades, would be the preferred solution to the connectively issues. Whilst a number of options were canvassed, three road overbridge options were considered in detail:

- Option 1: Jones Avenue overbridge
- Option 2: Newell Highway (Frome Street) to Tycannah Street overbridge
- Option 3: Newell Highway (Frome Street) to Bullus Drive overbridge.

The assessment and consultation outcomes concluded that the upgrade of existing level crossings, and provision of an additional road access across the corridor via a new overbridge at Jones Avenue, was the preferred connectivity option. This has not changed for the preferred infrastructure.

Further information on the above options and the criteria used to assess the options is provided in section 6.3.7 of the EIS.

6.1.4 Alternatives to the proposal

SUMMARY OF ISSUES RAISED

One submission noted that alternatives to Inland Rail as a whole should be considered:

- road/rail intermodal terminals, a freight line bypass in Sydney, and signal upgrades on the coastal network would eliminate the need for Inland Rail, enabling money to be invested elsewhere
- coastal shipping would reduce the pressure on the rail network, and would reduce environmental impacts. A review of the real economic value of Inland Rail by comparison to coastal shipping should be undertaken.

Response

As noted in chapter 6 of the EIS, alternative freight transport solutions 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 *Programme Business Case* (ARTC, 2015), and examined in the *Inland Rail Implementation Group Report* (Inland Rail Implementation Group, 2015).

The alternatives considered as part of the development of Inland Rail are summarised in chapter 6. These included strategic alternatives to Inland Rail as a whole (including road upgrades, upgrading the east coast railway, and greater use of maritime and air freight), and alternative route locations.

The two main rail solutions considered were enhancing the existing east coast railway, and constructing a new inland railway. As noted in chapter 6, there are a number of capacity, reliability, and performance issues associated with the existing east coast railway, mainly relating to constraints associated with moving freight trains through the Sydney metropolitan rail network.

As a sub-option of enhancing the existing east coast railway, it was noted that the proposed new Outer Sydney Orbital corridor would provide opportunities for a rail route that could ease freight congestion on Sydney freight networks. However, the main role of this corridor would be to address freight capacity constraints on other routes, such as those for intrastate and export freight. In addition, this option would not provide significant transit time savings for Melbourne to Brisbane freight, as the missing link between north west NSW and southern Queensland would still be required, or the existing coastal line would need to be upgraded. As a result, the Outer Sydney Orbital corridor would complement, but not replace, Inland Rail.

In summary, for Melbourne to Brisbane freight, the existing east coast railway would not be competitive with road in terms of cost or time, even with significant further investment, and it is not a viable alternative to Inland Rail.

Maritime freight was examined as a potential alternative to Inland Rail based on two types of services:

- a dedicated service between the Melbourne and Brisbane (coastal shipping)
- using spare capacity on vessels calling at Melbourne and Brisbane as part of an international voyage.

The Inland Rail Implementation Group Report concluded that:

- Shipping is unlikely to be a strong alternative to Inland Rail, as it does not provide the level of service (transit time and service availability) required by the majority of the Melbourne to Brisbane interstate market.
- Shipping still has a role to play, especially due to its strengths in transporting high volume and long distance cargo around the coast. Shipping must be used in conjunction with other modes such as Inland Rail to meet Australia's future transport and freight needs.

Overall, in relation to the various alternatives to Inland Rail, the Inland Rail Implementation Group Report concluded that:

- while shipping and air will continue to play a role in the interstate freight market, they are not viable alternatives to rail
- without Inland Rail, road is the only mode capable of addressing the majority of the future freight task, with associated direct and indirect costs.

6.2 Proposal features and design

This section provides responses to issues raised in relation to the design of the proposal and its key features.

6.2.1 Design

SUMMARY OF ISSUES RAISED

One submission requested a turnout to a proposed private rail siding/loop, noting that:

- To operate the submitter's private rail siding/loop, turnouts would be required on the bend in the track at Milguy. The submitter would like confirmation that this is possible, and would like to work with Inland Rail in relation to this.

Response

In response, ARTC acknowledges the request for a turnout on the bend in the track at Milguy to provide access to the landowner's proposed private rail siding/loop. As establishment of new turnouts are additional to the Inland Rail program, ARTC will continue to liaise with the landowner in relation to this request.

6.2.2 Level crossings

SUMMARY OF ISSUES RAISED

One submission requested confirmation that their private crossings would be retained, noting that:

- A number of private crossings are used to access the submitter's property located on both sides of the rail corridor between Milguy and Crooble. Confirmation is sought as to whether these crossings would be maintained.

Response

ARTC acknowledges this issue and has continued to liaise with relevant stakeholders, including landowners, as part of the level crossing strategy throughout detailed design. This builds upon previous discussions that have occurred since 2017 with relevant stakeholders, including landholders.

Following the public exhibition of the EIS, ARTC has progressed with stage 2 of the level crossing strategy (described in section 6.3.4 of the EIS), which has involved:

- consulting with stakeholders regarding the preferred option
- reviewing the proposed works for each crossing in detail, taking into account input from stakeholders
- reviewing consolidation options in accordance with the requirements of the *Transport Administration Act 1988*
- preparing detailed designs for each crossing
- stakeholder consultation
- finalising the detailed designs for each crossing, taking into account the results of consultation.

Based on the outcomes of stage 2:

- all legal public level crossings would be maintained except one which will be closed
- all legal private level crossings would be maintained or slightly relocated, other than five where closures have been agreed and three that have become redundant due to changed land ownership patterns.

The four level crossings identified in this submission include:

- Public level crossing 0911 located at 706.56 kilometres chainage on the County Boundary Road. The current level crossing controls are stop signs, which would be upgraded to flashing lights and boom barriers for the preferred infrastructure. This location is identified as the 'Roburn Access Road' on the maps provided in the submission.
- Public level crossing 0912 at 710.95 kilometres chainage on Makims Road/Alma Lane (Milguy-Crooble). The level crossing controls are currently stop signs, which would be maintained for the preferred infrastructure.
- Private level crossing 3158 at 708.755 kilometres chainage. This level crossing has become redundant as the land on either side of the rail corridor is no longer in single ownership. This crossing would be closed.
- Private level crossing 3159 at 7111.71 kilometres chainage. The level crossing controls are currently stop signs, which would be maintained for the preferred infrastructure.

None of the public or private level crossings identified in the submission have been identified as potential candidates for closure.

A summary of the preferred options for level crossings is provided in section 1.4.2 of Appendix B. Further information regarding ARTC's decision-making process in relation to the selection of treatments for level crossings is provided in Appendix L.

Mitigation measure D2.1 commits that the detailed design of the preferred infrastructure would minimise the potential for impacts on the surrounding road and transport network, and property accesses. Mitigation measure D11.6 commits ARTC to consult with landowners affected by the preferred infrastructure and any potential property impacts/changes, particularly in relation to potential impacts on access, services, or farm operational arrangements. This process is on-going and includes further consultation in relation to any changes to level crossings.

As described in sections 3.4 and 6.3.4 of the EIS, any closure of level crossings needs to be undertaken in accordance with the requirements of the Transport Administration Act 1988. Private level crossings cannot be closed unless there is an alternative means of legal access to the property, and the landowner has been consulted.

6.3 Traffic, transport and access

This section provides responses to issues raised in relation to the impacts during operation on access and traffic.

6.3.1 Operational impacts on traffic and access

SUMMARY OF ISSUES RAISED

Three submissions raised concerns about access and traffic during operation. Issues raised included:

- The submitter's farm is located on both sides of the proposed Murgo crossing loop, and there is a need to cross the tracks several times a day in harvest season. Need to confirm that access to both sides of the farm would be maintained.
- An intermodal facility is proposed on the submitter's property, with traffic volumes of 5,000 trucks per year. Need to ensure that there would be no access restrictions to the property as a result of the project.
- Concerned about the potential traffic impacts on surrounding roads, intersections, and businesses as a result of the Jones Avenue overpass.

Response regarding access impacts on properties/facilitating access to intermodal facilities

In response to the submission regarding Murgo crossing loop and property access, ARTC notes that Murgo access road 2 at Croppa Creek, also known as level crossing 920 at chainage 739.315 km, was located within the proposed location of the Murgo crossing loop identified for the exhibited proposal (refer to Figure 7.13 in the EIS). It is therefore assumed that the submission relates to the potential closure or loss of this level crossing if the Murgo crossing loop is constructed at the location.

As described in section 1.3 of this report, ARTC has refined the design with the aim of addressing a number of issues raised in submissions, while also minimising potential impacts. This has included refinement of the crossing loop locations presented in the EIS. Figure 9.2 shows the location of the Murgo crossing loop for the preferred infrastructure compared with the previous location identified for the exhibited proposal. As shown in this figure the revised crossing loop location is about 1.6 kilometres south of the location previously identified for the exhibited proposal, and Murgo access road 2 at Croppa Creek is no longer within the crossing loop location.

In accordance with mitigation measure D2.1, ARTC commits to minimising the potential for impacts on property access. To further minimise the potential for impacts on property access, the mitigation measure has been amended to include a commitment to consult with landowners where there is a potential for access to be impacted.

With regards to intermodal facilities mitigation measure D12.2 has been amended to include a commitment to work with relevant stakeholders to identify opportunities to facilitate local access between Inland Rail and other intermodal facilities where feasible and reasonable.

As part of the detailed design, ARTC would develop a number of typical layouts for level crossings. The safe movement of stock and farm machinery across the rail line at private crossings would be considered when developing these typical level crossing layouts. Stakeholder engagement and discussions with private level crossing holders have included review of stock and plant movements. Further information about ARTC's decision-making process regarding the selection of treatments for level crossings is provided in Appendix L of this report.

In addition to engineering solutions, ARTC would continue to support rail safety education programs through its membership of the TrackSAFE Foundation.

As per mitigation measure O8.1, a safety awareness program would continue to be implemented to educate the community regarding safety around trains. This would include community and rural property operators who cross the rail corridor to access their properties.

Response regarding Jones Avenue overbridge traffic impacts

The potential traffic, transport and access impacts of the exhibited proposal were assessed in Technical Report 1, and the results were summarised in chapter 9 of the EIS. The potential traffic and road network impacts of the Jones Avenue overbridge were summarised in section 9.3.3 of the EIS.

The assessment concluded that the main potential traffic impacts of the overbridge would be on Jones Avenue and Tycannah Street, where increases in traffic volumes are expected as vehicles divert from Alice Street and Bullus Drive. The conclusions of the assessment in relation to the potential traffic impacts of Jones Avenue overbridge would still be relevant to the preferred infrastructure given that changes to the design of Jones Avenue overbridge are minimal. The exception to this is that the preferred infrastructure design for Jones Avenue overbridge would enable temporary use by heavy vehicles. The overbridge would be signed to restrict access to light vehicles, emergency services, and public transport only, and therefore no regular increase in heavy vehicle traffic is expected on these streets. However, the bridge has been designed to accommodate heavy vehicle traffic in order to maintain accessibility in the event of blockages on other routes. Accordingly, displacement of heavy vehicles onto the bridge and local streets would occur only in an ad-hoc fashion, and would involve traffic management by police or Moree Plains Shire Council.

The greatest increase in traffic would occur on Jones Avenue east of the old Newell Highway (Frome Street) where there are currently very low traffic volumes of around 300 vehicles per day. It is predicted that the traffic volumes would increase to around 1500 vehicles per day with the overbridge, with a peak hour traffic volume of about 120 to 150 vehicles. This volume is well within the capacity of the road, and within the environmental goal for a local or collector street according to the environmental capacity performance standards on residential streets provided by Roads and Maritime's *Guide to Traffic Generating Developments* (RTA, 2002).

Traffic volumes on Tycannah Street are expected to increase to around 2800 vehicles per day by 2029. The peak hour volume is expected to be about 225 to 280 vehicles per hour. This is within the environmental goal for a collector street.

Modifications would be required at the intersection of Joyce Avenue with Jones Avenue, requiring all traffic to use Frome Street to access Joyce Avenue. Joyce Avenue is a short (300 metres long) street, and the truncation is expected to result in only minor impacts on some trip distances and times. No significant change in performance is expected at the Frome Street intersection as a result of the modifications.

The traffic impact assessment focussed on Jones Avenue and Tycannah Street, as not enough information was available at the concept design stage to determine how other intersections would be affected. Given that the assessments undertaken for Jones Avenue and Tycannah Street determined that additional traffic associated with the overbridge would be within the capacity and environmental goals of these roads, it is considered that traffic volumes on local roads beyond these would also be within the capacity of these roads.

The proposed overbridge would benefit the community by improving connectivity across the rail line. This is particularly important for emergency vehicles, as it would remove the risk of vehicles being delayed at a level crossing, and would be critical in the event of any train breakdown within Moree.

As per mitigation measure D2.1, ARTC commits to minimising the potential for impacts on the surrounding road and transport network during detailed design.

6.4 Noise and vibration

6.4.1 Operational noise impacts

SUMMARY OF ISSUES RAISED

Some submissions raised concerns about the impacts of the proposal during operation, and how these impacts would be mitigated. Issues raised included:

- Greatly concerned about the additional noise during operation and the impacts on the submitter's house. Concerned about potential noise impacts at the Croppa Creek Bowling Club, and the impacts on the amenity and enjoyment of the club, and on communication during bowls matches.
- Concerned regarding potential horn noise impacts as trains approach crossings, with crossings located about 100 and 300 metres from house.
- The predicted noise levels at the submitter's house are five dB(A) over the recommended level. How would this be managed?

Response regarding operational noise impacts

The operational noise and vibration assessment undertaken as part of the EIS assessed the potential impacts as a result of the proposed track design, increased number of trains, and increased operational speeds for the exhibited proposal. An operational noise and vibration assessment has also been undertaken to assess the impacts associated with the preferred infrastructure and is provided in Appendix C and summarised in chapter 11 of this report.

Operational rail noise impacts were assessed in accordance with the RING. The RING specifies noise and vibration trigger levels for assessing rail infrastructure projects to protect the community's amenity and wellbeing. If the noise and vibration assessment shows that these trigger levels are likely to be exceeded during operation, 'feasible and reasonable' noise mitigation must be considered to reduce the noise impacts. The RING notes that, in general, where existing noise levels can be reduced through feasible and reasonable measures, the primary objective is to reduce the noise levels to meet the noise assessment trigger levels. Where the predicted increase in the L_{Aeq} noise level is more than two dB(A) over the existing levels, strong justification should be provided as to why it is not feasible or reasonable to reduce the increase. It is noted that the RING does not consider commercial premises as a sensitive land use.

ARTC respects the communities in which it operates. ARTC does not discount the fact that people living close to rail lines will experience noise from the operation of rolling stock and maintenance of track. Whilst some noise is unavoidable, ARTC is proposing a range of measures to mitigate noise impacts. As per mitigation measure O4.1, ARTC commits to operating the proposal with the aim of achieving the operational noise and vibration criteria identified by the noise and vibration assessment.

For the three submissions that expressed concern about potential operational noise impacts, two provided contact details. The noise and vibration assessment for the preferred infrastructure considered the potential impacts at these receivers.

One of the submissions was provided by the Croppa Creek Bowling Club. The club consists of a range of sporting/recreational facilities, including a bowling green, nine-hole golf course, and a clubhouse building. In accordance with the RING, the noise trigger level for 'open space – active use (eg a sports field, golf course)' associated with redevelopment of an existing rail line is that development increases existing $L_{Aeq(period)}$ rail noise levels by two dB(A) or more, and resulting rail noise levels exceed 65 dB(A) $L_{Aeq(15hour)}$ external.

In the vicinity of the clubhouse/bowling green, the assessment predicted a noise level of about 58 dB(A) $L_{Aeq(1\ hour)}$ in 2040, which is below the trigger level.

With regards to the golf course, this was identified as an additional recreational receiver as part of the audit of community infrastructure undertaken following exhibition of the EIS (described in section 3.4 of this report). Based on this classification potential noise (amenity) impacts on the golf course were considered by the assessment undertaken for the preferred infrastructure. In the golf course, the assessment predicted a noise level of 57 dB(A) $L_{Aeq(1hour)}$ in 2040 at one of the golf holes, which is below the RING trigger level.

The other submission for which a location was provided relates to a residence at the corner of Warialda Street and Thompsons Avenue in Moree. The noise trigger level for residential land uses associated with redevelopment of an existing rail line is that development increases existing $L_{Aeq(period)}$ rail noise levels by two dB or more, or existing L_{Amax} rail noise levels by three dB or more, and predicted rail noise levels exceed:

- 65 dB(A) $L_{Aeq(15hour)}$ (during the day)
- 60 dB(A) $L_{Aeq(9hour)}$ (during the night)
- 85 dB(A) L_{Amax}.

At this receiver, the assessment for the preferred infrastructure predicted noise levels in 2040 of 50 dB(A) $L_{Aeq(9hour)}$ and 68 dB(A) L_{Amax}, which are below the trigger levels.

As described in section 11.5.1 of the EIS, and as per mitigation measure D4.3, an operational noise and vibration review would be undertaken during detailed design. The operational noise and vibration review would define the further design work and iterative noise modelling required to identify feasible and reasonable mitigation measures for operational noise. Further information on the approach to mitigation and management is provided below.

Where exceedances of the criteria for non-residential sensitive receivers were predicted, this would be verified during detailed design, and would involve further investigation of the façade performance at these receivers.

The preferred infrastructure would be operated in accordance with the operational noise and vibration review, the conditions of approval for the preferred infrastructure, and the relevant operational environment protection licences (EPL).

To validate the predicted noise levels, in accordance with mitigation measure O4.2, monitoring would be undertaken after the commencement of operation of Inland Rail as a whole. Monitoring would confirm compliances with the predicted noise levels, as modified by the operational noise and vibration review. If the results of modelling indicate that the predicted operational noise and vibration levels are being exceeded, then additional feasible and reasonable mitigation measures would be implemented in consultation with affected landowners.

ARTC operates the existing network in accordance with EPL number 3142. Amongst other things, this requires ARTC to operate a complaints handling service (Enviroline) and encourages residents to contact them so that their concerns can be addressed.

Response regarding operational horn noise impacts

The potential impacts of train horns were assessed in Technical Report 5, and the results are summarised in section 11.4.4 of the EIS. Section 11.4.4 noted that trains are required to sound their horns as they pass through level crossings and at other times. It is acknowledged that noise emitted by train horns can be a source of annoyance for the general public, however the train horn is an essential safety warning device and is designed to be broadcast to large area.

The use of high noise level horns ('country' horns) would exceed the relevant noise criteria at distances up to 282 metres from the source. Low noise level horns ('town' horns) would exceed the criteria at distances up to 180 metres from the source. This conclusion is still relevant to the preferred infrastructure.

Section 11.4.4 of the EIS noted that, during operation, an increase in the number of horn events is expected due to the projected increase in train numbers.

Mitigation of horn noise is complex, as the horn tone is specifically set to draw attention to the on-coming train at the approach to level crossings. Individual property treatments that provide additional acoustic protection to the premises would provide some mitigation of horn noise above and beyond the sound pressure retardation that would occur through the building fabric.

Warning bells and horns at level crossings were considered by the operational noise assessment (see section 4.1.6 of Technical Report 5 (Warning bells and horns) and Table 7.1 (Potential noise control options)). As warning bell and horns were considered as part of the overall rail noise model, specific exceedances related to warning bells and horns have not been identified. Instead, exceedances are as per those identified for operational noise, which are summarised in section 11.4.4 of the EIS.

Exceedances of the RING trigger level would only occur during train pass by, which would take up to 90 seconds (dependant on the speed of the train) and would occur a maximum of 12 times per day in 2025 and 21 times per day in 2040, over a 24 hour period.

For properties where rail noise exceedances were identified, options to mitigate potential impacts would continue to be considered during detailed design. As described in section 11.5.1 of the EIS and below, and as per mitigation measure D4.3, an operational noise and vibration review would be prepared to detail how the predicted operation impacts would be mitigated. The operational noise and vibration review would define the further design work and iterative noise modelling required during detailed design to identify feasible and reasonable mitigation measures for operational noise. Properties identified in the review would be further assessed for specific noise exposure and appropriate treatment.

Approach to mitigation and management

Mitigation measures would be required for operational rail noise at affected sensitive receivers. Three main strategies are used to reduce noise and vibration impacts:

- controlling noise and vibration at the source
- controlling noise and vibration on the source to receiver transmission path
- controlling noise and vibration at the receiver.

Strategies would be assessed against a range of issues to determine whether they are feasible and reasonable, including:

- cost of construction and ongoing maintenance
- likely noise reduction
- potential environmental, visual and social impacts
- consideration of feedback from relevant stakeholders and landowners.

The RING recommends that control strategies should be considered in a hierarchical manner so that all measures that reduce noise at the source are exhausted before property-based measures are considered. Where predicted noise levels trigger the RING criteria levels, properties would be eligible for mitigation consideration.

Indicative noise mitigation measures were described in section 11.5 of the EIS and included the following:

- rail dampers
- track lubrication
- noise walls
- earth mounds
- architectural treatment.

The operational noise and vibration impact assessment undertaken for the preferred infrastructure has determined that the majority of the above mitigation approaches would not be feasible for a number of reasons (refer to section 4.7 of Appendix D). Therefore, modelling was undertaken to determine the potential noise impacts if noise walls were constructed in the following locations:

- Bellata
- Gurley
- Moree
- Croppa Creek
- North Star.

As summarised in section 11.1 the operational noise assessment found that with noise attenuation structures in place at these locations, the RING trigger values would be exceeded at eight receivers for the 2025 scenario, compared with exceedances at 36 receivers if the structures were not in place. Receivers predicted to exceed the noise criteria with the noise structures in place would require additional at-property noise treatment.

As per mitigation measure D4.3, an operational noise and vibration review would be undertaken to detail how the predicted operation impacts would be mitigated. The operational noise and vibration review would define the further design work and iterative noise modelling required during detailed design to identify feasible and reasonable mitigation measures for operational noise. This would include consideration of the mitigation options described below. The final form of the mitigation options would be determined during detailed design and will be subject to approval conditions.

As described in section 11.5.1 of the EIS, the operational noise and vibration review would:

- confirm predicted noise and vibration levels at sensitive receivers, which may include the results of façade testing for non-residential receivers
- assess feasible and reasonable noise and vibration measures in a hierarchical manner, consistent with the RING
- identify options for controlling noise and vibration at the source and/or receiver, including location, type, and timing of implementation (as described below)
- specify noise and vibration abatement measures for all relevant sensitive receivers
- include a consultation strategy to seek feedback from directly affected stakeholders on the proposed noise and vibration abatement measures
- include a timetable for delivery of abatement prior to operation
- outline post-operational monitoring to verify noise and vibration predictions.

Mitigation measures would be further refined as part of the operational noise and vibration review.

6.4.2 Vibration impacts

SUMMARY OF ISSUES RAISED

One submission expressed concern about the potential for vibration impacts on the submitter's timber house, which is located about 50 metres from the rail line.

Response

The potential structural vibration impacts during construction of the exhibited proposal were assessed in Technical Report 5 (Noise and vibration assessment report) and the results were summarised in chapter 12 of the EIS. The conclusions of the construction vibration assessment undertaken as part of the EIS for the exhibited proposal would still be relevant to the preferred infrastructure given the construction equipment used and methodology is generally the same. Less receivers would potentially be impacted by construction vibration in the northern part of Moree as the Mehi River bridge would no longer be upgraded as part of the preferred infrastructure.

The assessment concluded that, during construction, the expected magnitude of ground vibration from general construction activities would not be sufficient to cause damage if works are undertaken at distances greater than 18 metres from non-heritage listed buildings.

An assessment of potential structural vibration impacts during operation has been undertaken for the preferred infrastructure and is provided in Appendix D and summarised in section 11.1. The assessment found that operation of the preferred infrastructure would not be expected to increase operational vibration levels noticeably, and would not be expected to exceed structural damage criteria.

Potential vibration impacts during construction and operation would be minimised and managed in accordance with relevant mitigation measures provided in section 13.1 of this report, in particular, measures D4.1 to D4.3, C4.1, O4.1, and O4.2.

6.5 Land use and property

6.5.1 Property impacts

SUMMARY OF ISSUES RAISED

One submission noted that one of golf course holes at the Croppa Creek Bowling Club is bisected by the rail line, and that players need to cross the rail line to play that hole. The submission requested that options to address this issue be considered.

Response

ARTC acknowledges this issue and would continue to liaise with the Croppa Creek Bowling Club to develop a safe and workable solution. Mitigation measure D12.1 commits ARTC to consulting with key stakeholders (including surrounding landowners/occupants) regarding the preferred infrastructure in accordance with the communication management plan described in chapter 4 of the EIS. Mitigation measure D11.1 requires individual property agreements to be developed in consultation with landowners/occupants, to define the management of construction on or immediately adjacent to private properties, where appropriate.

The preferred infrastructure accounts for pedestrian movements across the rail corridor at the Buckie Road level crossing. This would facilitate pedestrian access across the rail corridor by golfers and pedestrian movements between the Croppa Creek Store (west of the railway) and the clubs and school facilities (to the east).

6.5.2 Property values compensation

SUMMARY OF ISSUES RAISED

One submission expressed concern about the impacts of the proposal on property values, and queried whether landowners would be compensated for the impacts of the proposal (such as noise and air quality impacts).

Response

Potential impacts associated with the exhibited proposal, including access, noise and vibration, air quality, visual, and safety impacts, were considered in chapters 9, 11, 12, 13, 19 and 25 of the EIS respectively. Where the impacts due to construction and operation of the preferred infrastructure differ to those identified for the exhibited proposal, these have been assessed further in chapter 11 and chapter 12 of this report.

Appropriate mitigation measures would be implemented during detailed design, construction, and operation of the preferred infrastructure to mitigate the potential impacts on adjacent sensitive receivers. The updated mitigation measures for the preferred infrastructure are provided in section 13.1 of this report.

Living next to any transport infrastructure comes with the inherent risk of potential increased or decreased rail traffic.

In relation to homes and businesses identified as 'sensitive receivers', noise mitigation is discussed further in section 6.4.1 of this report. The most appropriate noise mitigation controls are being further refined and determined as part of detailed design and will be undertaken in consultation with directly affected stakeholders.

Any compensation paid to landowners affected by the preferred infrastructure would be in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991.*

6.6 Air quality

SUMMARY OF ISSUES RAISED

One submission expressed concern about air quality impacts during operation as a result of air pollution created by the substantial increase of diesel fumes and exhaust particulates.

Response

The results of the assessment of the potential for air quality impacts as a result of the exhibited proposal is provided in chapter 13 of the EIS. These results are still relevant to the preferred infrastructure, given that the operational arrangements remain the same.

In relation to operation, section 13.4.4 of the EIS noted that diesel locomotives, like trucks and cars, emit nitrogen oxides and particulate matter to the air. In terms of potential impacts, the assessment concluded that emissions would increase as a result of the increase in the number of trains travelling along the corridor, however the emissions are expected to be below the relevant impact assessment criteria. The assessment noted that air pollution from transport corridors decreases significantly with distance. Therefore, air pollution is expected to be negligible for the preferred infrastructure.

During operation, air quality would be managed to achieve compliance with the operational environment protection licence. Mitigation measure O5.1 commits to managing the preferred infrastructure in accordance with the air quality management requirements specified in the environment protection licence.

6.7 Additional issues

SUMMARY OF ISSUES RAISED

The following additional issues, were raised:

- Moree needs another bypass to get the trucks from the Carnarvon and Gwydir Highways out of residential areas and school zones
- ARTC is not providing reliable and full information on its rate of capital utilisation or rates of return
- port corporations should be operated by a single Federal corporate entity.

One submission requested whether they could purchase steel generated by removal of the old railway lines.

Response

The above issues are not part of the scope of the preferred infrastructure for which approval is being sought. The Inland Rail program provides for rail infrastructure and does not include other infrastructure works, except where necessary or appropriate to deliver the rail infrastructure.

In relation to the additional Moree bypass, it is understood that Council are investigating the road network and overall connectivity to address existing traffic and capacity issues. Inland Rail is mitigating impacts caused by the preferred infrastructure. The Inland Rail program provides for rail infrastructure and does not include other infrastructure works, except where necessary or appropriate to deliver the rail infrastructure.

Consideration of corporate matters does not lie within the scope of environmental assessment.

ARTC acknowledges the request to purchase scrap steel, and would continue to liaise with the submitter in this regard.

7. Response to Government Agency submissions

This section provides responses to the issues raised in submissions provided by government agencies, including local councils and NSW State Government departments and agencies.

7.1 Overview

Submissions were received from the following government agencies:

- NSW Government departments/agencies (as at December 2017):
  - Department of Industry (branches of Crown Lands and Water and Department of Primary Industries)
  - NSW Environment Protection Authority
  - NSW Office of Environment and Heritage
  - Heritage Council of NSW
  - Transport for NSW
  - Geological Survey of New South Wales.
- Councils:
  - Moree Plains Shire Council
  - Narrabri Shire Council.

No submissions on the exhibited proposal were received from Roads and Maritime who had previously provided input to the SEARs (refer to Appendix A of the EIS).

The approach to processing and responding to submissions (including agency submissions) is described in chapter 5 of this report. The issues raised in the agency submissions are categorised according to the key issue categories (as described in section 5.2 of this report) and responses are provided in the following sections.

The issues listed in each section are a summary of the key issues raised in submissions. Full details of the issues raised are provided in the complete submissions, available on the DPI&E's major projects' website.

The relationship between the issues raised and responses provided to the phase of the project, including any issues that will require further clarification during Phase 2, is noted where relevant. Unless otherwise indicated, the mitigation measures referred to in this section are the revised mitigation measures for the preferred infrastructure, provided in section 13.1 of this report.

7.2 Department of Industry

7.2.1 Water supply

ISSUE

Construction water supply and extraction

Provide an assessment of the impacts and proposed mitigation of water extraction, including where there is the potential for a loss of water supply and a new surface flow path due to redirecting surface flows.

Water supply works should be confirmed to ensure an adequate water supply is available.

Response

ARTC has is undertaking a detailed program-wide study to assess potential sources of construction water for the Inland Rail program as a whole. The results of the study will be documented in a program-wide strategy document, supported by individual Construction Water Supply Plans for each section of the Inland Rail program.

The study is considering all potential water sources and on-going management requirements. It is expected that a range of sources would be required to avoid a significant adverse effect on any single source or small cluster of sources. Water supply options being considered include:

- Surface water – landowner direct offer, authority allocation, new source (creek/dam/river)
- Wastewater – treated with allocation through commercial supply
- Groundwater – landowner direct offer / authority allocation from existing bore, available aquifer with new bore developed.

To ensure the study is considering the availability, suitability, sustainability and community impacts of water sources, given the drought conditions and the potential on-going absence of reliable surface water supplies, the study will follow a water supply sources hierarchy, as follows:

1. Confirm water requirements (supply volume, location and water quality for use) and water saving measures that can be used
2. Gather available water supply information for point source, transport and storage
3. Consider water supply options for different locations of the alignment, being in surface water, then wastewater and lastly then Groundwater
4. Likelihood of significant negative community concern regarding a water supply source
5. Likelihood of significant environmental or social impacts, either direct or cumulative

6. Can regulatory approval for access to water be gained within schedule?
7. Can a water supplier agreement be negotiated with reasonable terms?
8. Does new water infrastructure meet Local Council initiatives and ARTC's infrastructure criteria?

Each construction water supply source will be assessed against evaluation criteria, and a weighted score for each source will be provided. The criteria to be used include:

- Distance from alignment
- Site access and roads
- Water volume available
- Demand vs existing extraction (groundwater)
- Cost
- Legacy and community benefits
- Landowner sensitivity
- Water sharing plans
- Water quality
- Extent of aquifer resource (ground water)
- Density of sources – distance from next water supply
- Proximity to Groundwater Dependent Ecosystems (GDEs)
- Social license – location in relation to sensitive receptors/neighbours.

To provide sufficient resilience, the outcomes of the study will take some time to prepare and analyse. The final licensing requirements (license applications, conditions etc) will be confirmed once the water sources are identified and the volumes associated with the sources finalised. ARTC will continue to engage with landholders and relevant stakeholders with regard to water planning.

It is considered that the above approach would ensure that the potential impacts of water sourcing and usage for the preferred infrastructure are appropriately managed in accordance with the requirements of relevant legislation.

New mitigation measure D6.4 commits ARTC to confirming appropriate sources for construction water prior to construction, in consultation with relevant stakeholders, and seeking appropriate approvals and agreements.

ISSUE

Approval requirements

Identify any relevant exemptions from approval requirements under the *Water Management Act 2000*.

Response

ARTC acknowledges the exemptions from approval requirements in section 5.23 (formerly section 115ZG) of the EP&A Act and under the *Water Management Act 2000*, and would assess the need for water related authorisations once more information relating to the possible water sources is obtained (as an outcome of the construction water supply study described above).

New mitigation measure D6.4 commits ARTC to seeking appropriate approvals and agreements for water supply.

7.2.2 Construction environmental management

ISSUE

Construction Environmental Management Plan

A Construction Environmental Management Plan must be prepared in consultation with Crown Lands & Water prior to commencing works.

Response

Mitigation measure D1.1 commits ARTC to prepare a CEMP to detail the approach to environmental management during construction and in accordance with the conditions of approval. In accordance with mitigation measure D7.2, a surface water monitoring framework would be developed as part of the soil and water management sub-plan in the CEMP. It would identify monitoring locations at discharge points, and selected watercourses where works are being undertaken.

The monitoring framework would include the relevant water quality objectives, parameters, and criteria from Technical Report 7, and specific monitoring locations identified based on the hydrological attributes of the receiving watercourse, in consultation with Crown Land and Water and the EPA.

7.2.3 Biodiversity

ISSUE

Biosecurity

The biodiversity management sub-plan should include reference to the Vehicle Biosecurity Security Kit fact sheet.

Response

The CEMP outline provided in Appendix K of this report has been updated to include reference to this fact sheet.

7.2.4 Hydrology and flooding

ISSUE

Consistency with the Gwydir Valley Floodplain Management Plan

Provide an assessment of the consistency of the proposal and associated impacts with the requirements of the *Floodplain Management Plan for the Gwydir Valley Floodplain 2016*.

Response

The modelling undertaken for the preferred infrastructure (described in Appendix E), included consideration of the *Floodplain Management Plan for the Gwydir Valley Floodplain 2016* as well as other relevant flood risk management plans.

As per mitigation measure D6.1, any further flood modelling undertaken during detailed design would consider floodplain risk management plans including the *Floodplain Management Plan for the Gwydir Valley Floodplain 2016*.

ISSUE

Waterfront land

Works within waterfront land must be carried out in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (Office of Water, 2012).

Response

Mitigation measure D6.1 commits ARTC to consider these guidelines when undertaking flood modelling as part of detailed design.

Additionally, works within or near watercourses would be undertaken with consideration given to the NSW Office of Water's guidelines for controlled activities. This is committed to through new mitigation measure C8.3.

7.2.5 Land use and property

ISSUE

Rehabilitation strategy

A consistent strategy for rehabilitation should be developed, including consideration of baseline condition, vegetation types, photo evidence, desired final condition, and appropriate species lists.

Response

Mitigation measure D3.5 commits to preparing a rehabilitation strategy to 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.

7.3 NSW Environment Protection Authority

7.3.1 Noise and vibration

ISSUE

Construction working hours

Clear justification (other than convenience) is required for construction outside the *Interim Construction Noise Guideline* (ICNG) recommended standard construction hours.

Response

The proposal for non-standard construction hours is justified in accordance with section 2.3 of the ICNG because:

- The proposed works relate primarily to an existing, operational rail corridor. They constitute the maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours. The application of standard working hours would:
  - prolong the closure of existing operational public infrastructure, significantly impacting existing train operators, mines, grain handling facilities, and other users of the rail network
  - create indirect community impacts by leading to an increase in road freight to meet the shortfall in rail freight services - an increase in road freight may have consequences in terms of noise, air quality, and safety for the wider community.
- Noise generated by construction would be somewhat offset by the absence of noise from operational rail freight during the construction period. As work would progressively move along the alignment, residents would experience construction noise for only a portion of the overall construction period, while operational train movement would be interrupted over a significantly larger area. This would include locations where many receivers are not subject to construction noise at any given time. The closure of the rail line and the proposed construction working hours ('the primary proposal construction hours' as defined in section 8.3.2 of the EIS, ie, 6am to 6pm) mean that night-time amenity would not be impacted by construction or operational rail noise (except when out of hours construction work is permitted).
- The majority of the preferred infrastructure site is located in a relatively unpopulated area.

ISSUE

Work outside standard hours

Outside standard hours, work generating noise exceeding background plus five dB(A) should not proceed unless an agreement has been negotiated with noise sensitive receivers.

Response

The proposed construction working hours (the primary proposal construction hours) are defined in section 8.3.2 of the EIS and in section 2.3.2 of the preferred infrastructure description (Appendix B) as follows:

- Monday to Friday: 6am to 6pm
- Saturday: 6am to 6pm
- Sundays and public holidays: 6am to 6pm.

Mitigation measure C4.1 commits to managing noise during construction in accordance with the Construction Noise and Vibration Management Framework. Section 2.2 of the framework provides the requirements for works outside the above hours.

To mitigate the potential impacts of works close to sensitive receivers, all feasible and reasonable noise and vibration management controls would be implemented as per Table 7.5 of Technical Report 5. To minimise the potential impacts of work outside recommended standard working hours, additional noise and vibration mitigation measures will be implemented by matching the predicted exceedance to the appropriate mitigation measures as detailed in the Tables 7.3 and 7.4 of Technical Report 5.

In addition, Construction Noise and Vibration Impact Statements would be prepared prior to specific construction activities and based on a more detailed understanding of the construction methods, including the size and type of construction equipment, duration and timing of works, and detailed reviews of local receivers if required. The Construction Noise Impact Statements would include:

- a more detailed understanding of surrounding receivers, including particularly sensitive receivers such as education and childcare, and vibration sensitive medical, imaging, and scientific equipment
- application of appropriate noise and vibration criteria for each receiver type
- an assessment of the potential noise and vibration impacts as a result of different construction activities
- minimum requirements in relation to standard noise and vibration mitigation measures
- noise and vibration auditing and monitoring requirements

- additional mitigation measures to be implemented when works outside the ICNG recommended standard construction hours or exceedances to the noise management levels are likely to occur - these measures are aimed at proactive engagement with potentially affected receivers, provision of respite periods, and alternative accommodation for defined exceedance levels.

A new mitigation measure D4.3 has been included which requires the preparation of Construction Noise and Vibration Impact Statements prior to specific construction activities.

ISSUE

Awakening levels and sleep disturbance

Awakening levels have been incorrectly applied as sleep disturbance criteria.

Sleep disturbance needs to be assessed in accordance with the relevant *Industrial Noise Policy* (EPA, 2000) application note.

Response

Section 1.3 of the *Industrial Noise Policy* explicitly excludes transportation corridors (roadways, railways and air corridors) from its scope. Accordingly, the *Industrial Noise Policy* was not considered applicable to the proposal when undertaking the noise and vibration assessment as part of the EIS (Technical Report 5).

The ICNG requires a quantitative sleep disturbance assessment be undertaken, but does not provide specific assessment criteria for sleep disturbance impacts. Numerous guidelines provide research and discussions around sleep disturbance impacts (including the *Road Noise Policy* and the *Industrial Noise Policy*). These guidelines all acknowledge that no absolute noise level criteria have been established that correlate to an acceptable level of sleep disturbance, however offer suggestions to assess possible sleep disturbances and awakening impacts.

The ICNG suggests that some guidance can be found in the *NSW Environmental Criteria for Road Traffic Noise* (EPA, 1999), which has been superseded by the *Road Noise Policy*. The *Road Noise Policy* discusses a sleep disturbance impact screening level. It suggests that the $L_{A1,1min}$ noise level should not exceed the background L_{A90} level by more than 15 dB(A). This advice in the *Road Noise Policy* is analogous to that provided in the *Industrial Noise Policy* Application Notes.

The Industrial Noise Policy bases its research on the Road Noise Policy and suggest that the L_{Amax} or $L_{A1,1min}$ noise level should not exceed the background L_{A90} level by more than 15 dB(A). These guidelines suggest that this value can be used as a screening test to identify potential for sleep disturbance.

Therefore, while the *Industrial Noise Policy* is not directly applicable, it does consider research and discussions around sleep disturbance, which are relevant to the construction assessment component of this proposal. As such, in the absence of specific criteria in the ICNG, an assessment of sleep disturbance has been undertaken which incorporates the screening assessment described in the *Industrial Noise Policy*. This additional assessment is provided in section 12.2 of this report.

The additional assessment identified the potential for construction to cause sleep disturbance impacts on numerous sensitive receivers. Given the potential for sleep disturbance impacts, feasible and reasonable noise and vibration mitigation measures would be implemented in accordance the Inland Rail NSW Construction Noise and Vibration Management Framework. Mitigation measure C4.1 commits ARTC to implementing the Inland Rail NSW Construction Noise and Vibration Management Framework and constructing the proposal with the aim of achieving the construction noise management levels identified by the noise and vibration assessment.

ISSUE

Construction Noise and Vibration Management Framework

Implementation of the Inland Rail NSW Construction Noise and Vibration Management Framework, and the commitment to implement all feasible and reasonable noise mitigation measures to minimise impacts, in accordance with the framework, should be included as a condition of any approval.

Response

Mitigation measure C4.1 commits to managing noise during construction in accordance with the Construction Noise and Vibration Management Framework.

ISSUE

Construction vibration impacts

Construction vibration impacts should be assessed using criteria from *Assessing Vibration: A Technical Guideline* (AVTG), rather than BS 5228.

Response

Assessment of vibration levels from intermittent construction sources is described in AVTG, which is based on BS 6472:1992. The assessment evaluates a vibration dose value, which incorporates the magnitude of vibration and the length of time the source operates. During construction of a project, the vibration impact on a receiver can be measured and compared directly to the AVTG vibration dose value criteria.

The detailed construction methodology, such as the operating duration of vibration generating equipment, would be confirmed once a construction contractor is appointed. As a result, the estimation of vibration dose values from construction sources require a broad range of assumptions to be made. Given this, consideration was given to BS 5228-2:2009, which refers to standards for assessing the 'human comfort criteria' for residential building types. BS 5228-2:2009 contains human response criteria for construction activities, and uses the most practical unit of measurement, which is peak particle velocity. As such, ARTC considers BS 5228-2:2009 to be the more relevant guideline to the construction of the proposal.

However, as requested, an assessment of construction vibration in accordance with AVTG has been undertaken, and the results are summarised in section 12.2. The assessment found that sensitive receivers would potentially be exposed to vibration that may impact on human comfort, taking into consideration safe-buffer distances from either the BS 5228-2:2009 or AVTG.

To minimise the potential for these impacts, potential vibration exceedances would be managed and mitigated by implementing the Inland Rail NSW Construction Noise and Vibration Management Framework, which includes development of construction noise and vibration impact statements prior to specific construction activities. These would be prepared based on a more detailed understanding of the construction methods, including the size and type of construction equipment, duration and timing of works, and detailed reviews of local receivers as required.

Mitigation measure C4.1 commits ARTC to implementing the Inland Rail NSW Construction Noise and Vibration Management Framework.

ISSUE

Operational compliance assessment

The proponent's proposed operational compliance assessment should be included as a condition of any approval.

Response

Mitigation measure O4.2 provides for compliance monitoring, and requires that:

- once Inland Rail has commenced operation, operational noise and vibration compliance monitoring would be undertaken at representative locations to compare actual noise performance against that predicted by the noise and vibration assessment
- compliance monitoring requirements would be defined as part of the operational noise and vibration review
- the results of monitoring would be included in an operational noise and vibration compliance report, prepared in accordance with the conditions of approval.

7.3.2 Air quality

ISSUE

Managing dust

The proponent should be required to manage dust generating activities on site to prevent dust moving offsite, so far as reasonably practicable.

Response

The CEMP outline (provided in Appendix K of this report) contains mitigation measures to minimise the generation of dust. Additionally, revised mitigation measure C5.2 commits ARTC to road watering and/or other stabilisation approaches when sensitive receivers are located within 150 metres of construction works, or where visible dust is generated from vehicles using access roads.

7.3.3 Water quality

ISSUE

Considering potential pollutants

The full range of potential pollutants associated with the activity and the environmental values of the receiving waters should be considered. The EPA requires such information when considering whether or not to grant a licence allowing any discharge to waters.

Response

Potential pollutants associated with construction of the exhibited proposal were described in section 16.3 of the EIS while the environmental values of the receiving water were described in section 16.2 of the EIS. This is still relevant for the preferred infrastructure.

Where discharge to surface watercourses is required, a monitoring program would be developed and implemented to assess water quality prior to discharge. As committed to through mitigation measure D7.2, a surface water monitoring framework would be developed as part of the soil and water management sub-plan in the CEMP. It would identify monitoring locations at discharge points, and selected watercourses where works are being undertaken.

The monitoring framework would include the relevant water quality objectives, parameters, and criteria from Technical Report 7, and specific monitoring locations identified based on the hydrological attributes of the receiving watercourse, in consultation with Crown Land and Water and the EPA.

The CEMP outline (provided in Appendix K of this report) includes reference to the *Protection of the Environment Operations Act 1974* (POEO Act) when considering management of groundwater (including potential dewatering), spills and leaks and waste management.

An EPL will be obtained for the construction of the preferred infrastructure in accordance with the POEO Act. Under section 5.24 of the EP&A Act, the EPL must be consistent with the State significant infrastructure approval.

ISSUE

Use of wastewater for construction

If wastewater (including recycled/treated water) is to be used for construction, investigations need to be undertaken to confirm the wastewater is fit-for-purpose and does not pose a risk of non-trivial harm to human health or the environment.

Response

As described in section 7.2.1, ARTC has recently commissioned a detailed program-wide study to assess potential sources of construction water for the Inland Rail program as a whole.

Further assessment is being undertaken to scientifically verify that potential water sources can meet the water demand profile in a sustainable manner. Preliminary communications have also occurred between ARTC and the stakeholders associated with potential sources, to determine if they would be willing to allow ARTC to negotiate access to the water.

A number of stakeholders have indicated that they are prepared to further discuss access to some of their water and ARTC is currently confirming its position in this regard before formally engaging with the stakeholders. These negotiations remain commercial in confidence at this time.

Once access negotiations are more advanced, Phase 1 desktop assessments of water sources are planned to be undertaken. These assessments are intended to evaluate the overall condition of the source (age, condition of equipment, storage facilities etc); determine what infrastructure may be present (pipework, pumps, rising main etc.); potential yields; quality; and current water licence conditions. Some preliminary field works may also be required to confirm the source conditions identified in the Phase 1 assessment, and to complete any additional data required.

Preliminary field work may also be required to confirm the conditions identified by the Phase 1 assessment, involving testing of water levels, drawdowns, yield, and water quality. This would be undertaken to ensure that the potential water source is sustainable, and that the quality parameters are acceptable. If any of these parameters indicate that the potential water source would not be suitable, or that there would be risks to the proposal in terms of timing or prohibitive costs, alternative water sources would be considered.

If the Phase 1 and preliminary site assessments indicate that the potential water source is suitable, a detailed supply scenario would be finalised, and any relevant approvals would be sought as described in section 7.2.1.

New mitigation measure D6.4 commits ARTC to confirming appropriate sources for construction water prior to construction, in consultation with relevant stakeholders, and seeking appropriate approvals and agreements.

7.3.4 Waste

ISSUE

Waste handling

Need to confirm with each local council that adequate space is available to receive waste generated from the proposal such that local services will not be compromised. If not, alternatives should be considered.

Response

Section 24 of the EIS noted that the exhibited proposal would be designed, constructed and operated so that wastes are managed according to the waste minimisation hierarchy:

- avoidance, where possible
- treated, as required and reused on-site
- recycled, either within the process or off-site
- where other alternatives are not possible, wastes would be disposed of at appropriately licensed waste management facilities.

The preferred infrastructure would be consistent with this approach.

Waste management facilities that could be used to dispose of waste from the preferred infrastructure are listed in section 24.2.2 of the EIS. The facilities that would be used would be confirmed by the construction contractor, based on the suitability of waste and available capacity at relevant facilities.

As per mitigation measure D15.1, detailed design would include measures to minimise excess spoil generation. This would include a focus on optimising the design to minimise spoil volumes, and the reuse of material on-site.

7.4 Office of Environment and Heritage

7.4.1 Biodiversity

ISSUE

Biodiversity credits

The total biodiversity credit liability should be finalised prior to determination and specified in the project approval.

Response

In response to this submission and other queries from the Office of Environment and Heritage regarding the biodiversity assessment undertaken as part of the EIS (Technical Reports 3, 4 and 5) an addendum to the biodiversity assessment was prepared in October 2018 and is appended to this report (Appendix F). An updated BioBanking Credit Calculator was also provided with this addendum.

As detailed in Appendix F updated vegetation mapping undertaken during preparation of the addendum has resulted in a total of:

- 499.477 hectares of impacts on native plant community types (PCTs), equating to 22,960 ecosystem credits
- 473.35 hectares of impact to endangered ecological communities listed under the *Environment Protection and Biodiversity Conservation Act 1999*
- 94.84 hectares of impact to koala habitat, equating to 2466 species credits
- 364 species credits requirements for finger panic grass *(Digitaria porrecta)*
- 3080 species credits for creeping tick-trefoil *(Desmondium campylocaulon)*
- 1898 species credits for Belson's panic *(Homopholis belsonii).*

The biodiversity impact assessment undertaken as part of the EIS (Technical Reports 3, 4 and 5) and the updated vegetation mapping undertaken as part of the addendum (Appendix F) considered biodiversity impacts within the proposal site and additional assessment areas (referred to as the Development Footprint within the biodiversity assessment reports). section 2.2 of the EIS, defined the proposal site for the exhibited proposal as having a width of 30 metres, providing for a 15 metre buffer on each side of the alignment centreline. Section 2.2 of the EIS also defined the additional assessment areas outside of the proposal site, noting that they included areas of about 60 metres around culverts/underbridges and the proposed bridges, and about 120 metres around level crossings. Some additional areas were also considered to provide flexibility for future planning and design work. These additional assessment areas were only considered for the biodiversity and heritage assessments.

In developing the preferred infrastructure ARTC has considered learnings from the Parkes to Narromine project, which is currently under construction, and expanded the potential construction footprint beyond the proposal site and additional assessment areas defined in the EIS, to allow for ancillary works including fence relocations, signalling upgrades, utilities relocation and the provision of a rail maintenance access road. These works are described in the preferred infrastructure project description (Appendix B). In estimating the additional construction area required to construct these ancillary features ARTC has taken a conservative approach and it is likely that the final construction footprint would be much smaller. Further refinement of the potential construction footprint would be undertaken as the design develops and construction planning commences.

As noted in the screening assessment undertaken in chapter 10 of this report, this expansion of the potential construction footprint generally does not change the outcome of the impact assessments undertaken as part of the EIS. However, it does expand the potential area for biodiversity impacts and the associated offset requirements. Therefore, the biodiversity credit requirements for the preferred infrastructure have been updated based on this expanded area and are provided in Appendix G.

As noted in Appendix G, the expanded construction footprint includes areas that were not previously assessed as part of the biodiversity assessment undertaken for the EIS. Therefore, vegetation mapping and threatened species habitat calculations for areas outside of the previously surveyed extents are based on desktop assessment.

In summary, the expansion of the construction footprint has resulted in a total of:

- 931.74 hectares of impacts on native plant community types (PCTs), equating to 42,861 ecosystem credits
- 528.74 hectares of impact to confirmed threatened ecological communities listed under the *Environment Protection and Biodiversity Conservation Act 1999*. Portions of vegetation zones 5 and 6 are likely to conform to the Poplar Box Grassy Woodland on Alluvial Plains endangered ecological community, which was recently listed on 4 July 2019.
- 173.79 hectares of impact to koala habitat, equating to 4519 species credits
- 11 778 species credits requirements for finger panic grass *(Digitaria porrecta)*
- 5467 species credits for creeping tick-trefoil *(Desmondium campylocaulon)*
- 23 738 species credits for Belson's panic *(Homopholis belsonii)*.

To ground-truth the above results, once the final construction footprint is confirmed further field survey would be undertaken prior to construction in any areas that have not been previously subject to field survey. These surveys would be undertaken in accordance with the requirements for the Framework for Biodiversity Assessment, and the biodiversity credits would be recalculated based on the results. This is committed to through new mitigation measure D3.3, and is consistent with the transitional biodiversity offset arrangements that would apply to the preferred infrastructure. Impacts on matters of national environmental significance will be addressed as part of this approach and offsets would be calculated accordingly.

Additionally, as committed to through mitigation measure D3.2 detailed design and construction planning would minimise the construction footprint and avoid impacts on native vegetation, including significant ecological entities (including threatened ecological communities and threatened species habitat), as far as practicable.

ISSUE

Impacts to biodiversity outside of the approved development footprint should be assessed and offset through a modification application.

Response

As noted in the above response, any construction areas outside of those areas previously assessed as part of the biodiversity assessment for the exhibited proposal would be subject to additional field survey. These revisions will be analysed through a Consistency Assessment, triggering a modification application only where the preferred infrastructure is to be modified so that it is inconsistent with the approval for the infrastructure.

The potential impacts would be offset in accordance with the Biodiversity Offset Strategy for the preferred infrastructure (provided in Appendix I).

ISSUE

Spoil mounds should be placed in areas that conform to section 9.4 or 9.5 of the FBA, and it should be demonstrated that their placement will not impact on flood behaviour.

Response

As noted in section 2.2.10 of Appendix B, excess material from construction would be used in a number of ways, with spoil mounds being the least preferred option. Spoil would be principally managed by integrating material into construction of the formation and, where this not possible, into the edge of the formation. Current earthworks volumes indicate that there would be a very limited amount of excess spoil. Spoil from the creation of cess drains would be included into the formation.

If mounds are constructed for the preferred infrastructure they would be placed in disturbed areas within the rail corridor. The potential for biodiversity impacts in these areas were assessed as part of the EIS in accordance with the Framework for Biodiversity Assessment and were also considered in the addendum assessment provided in Appendix F.

As spoil placement within the rail corridor could provide a topographical barrier, it could intercept a small volume of local sheet flow, which would be directed around the base of the spoil. Provided the spoil placement is correctly designed and located, the potential impacts on flows as a result of this minor redirection of flows would be negligible compared to regional flow behaviour.

The design refinements have largely avoided the need to create spoil mounds, with the landform design refined to guide surface water into the drainage system. Accordingly, spoil, would be placed within the rail corridor, but not within areas where the placement would unacceptably adversely affect flooding.

The design and location of any spoil mounds required would be confirmed during finalisation of the detailed design, when the location and volume of spoil material is better understood.

While it would not be possible to design the preferred infrastructure to achieve a zero impact on flooding, the preferred infrastructure would seek to establish reasonable impacts that do not affect the use of adjacent land.

As per revised mitigation measure D6.1, ARTC commits to refine the design features of the preferred infrastructure to not materially worsen existing flooding characteristics, and to undertake detailed flood modelling to consider the potential changes to overland flow paths and storage impacts associated with spoil placement.

ISSUE

Temporary impacts on biodiversity values and the subsequent biodiversity offset requirements must be determined using the BioBanking credit calculator prior to determination

Information entered into the calculator regarding the magnitude of these impacts must be justified in accordance with the FBA.

Response

The biodiversity assessments undertaken subsequent to the exhibition of the EIS have considered temporary impacts as well as permanent impacts (refer to Appendix F and Appendix G).

ISSUE
Insufficient information has been provided to determine whether impacts on biodiversity have been appropriately assessed and offset.

OEH should be provided with information from the 287 rapid vegetation assessments, and the high-resolution aerial photography used to inform the vegetation mapping by the RTS stage.

The FBA requires that the extent of native vegetation in the 550-metre buffer area and within the development site must be mapped. OEH has analysed these shapefiles using ADS40 imagery and the Border Rivers Gwydir/ Namoi State Vegetation Map. There appears to be areas of native vegetation that have not been captured by the proponent in their native vegetation data layers.

Justification of the vegetation mapping data layers and outcomes should be provided.

Response

The above issue was resolved in consultation with the Office of Environment and Heritage in September 2018 and the outcomes of the resolution are provided in the addendum biodiversity report dated October 2018 (Appendix F).

However, as noted above, the biodiversity assessment, including the addendum assessment, for the exhibited proposal has been updated based on the preferred infrastructure and is provided in Appendix G.

ISSUE
There are a number of locations along the development footprint where there may be the potential to avoid impacts on recorded threatened flora species.

Avoiding impacts on Belson's panic would be a positive outcome.

Response

In accordance with mitigation measure D3.2, ARTC commits to minimising the construction footprint so as to avoid or reduce impacts on native vegetation (including threatened species) as far as practicable.

Opportunities to adjust the development footprint to avoid or reduce impacts on Belson's panic would be explored during the detailed design process.

ISSUE
Biodiversity offset credits for creeping tick-trefoil must be retired based on the area of habitat occupied by the species, rather than on an individual plant count basis.

Response

ARTC confirms that, in accordance with the requirements of the FBA credits for creeping tick-trefoil would be retired based on area.

ISSUE
Justification should be provided as to why a broader range of PCTs have not been included in the species polygon for the koala.

Response

The addendum to the biodiversity assessment (provided in Appendix F) considered a broader range of PCTs in the species polygon for the koala, including refuge habitat. This same approach was also used for the biodiversity assessment undertaken for the preferred infrastructure (Appendix G).**ISSUE**
Include figures of the two additional impact areas (Jones Avenue overbridge and North Star Extension Area) in the RTS.

Include details of site-based flora assessments to support the statement that impacts will be confined to exotic grasslands.

Response

The addendum to the biodiversity assessment (provided in Appendix F) considered the two additional impact areas and provided details of site-based flora assessments. Where the information was relevant to the assessment undertaken for the preferred infrastructure, this has also been considered in Appendix G.

ISSUE
The culvert and bridge works pre-clearance survey methodology for micro-bats should be amended to state that culverts and bridges will be inspected after dusk when the bats have dispersed, and entrances should be blocked off at that time.

Handling of micro-bats should be avoided where possible.

Disturbance to culverts and bridges that are micro-bat maternity sites should not occur until the end of the maternity period when the bats have dispersed.

Response

The CEMP outline provided in Appendix K has been amended to include reference to these measures.

ISSUE

To ensure timely retirement of offset credits, Phase 2 of the BOS should be finalised prior to determination, and Phase 3 should be finalised prior to the commencement of construction.

Biodiversity offset credits should be secured in a more timely manner.

The proponent should place a 'credits wanted' request on the BioBanking register immediately so that potentially interested parties can be engaged as soon as possible.

Response

Mitigation measure D3.1 commits ARTC to finalising the biodiversity offset strategy for the proposal in accordance with the requirements of the Framework for Biodiversity Assessment and the *NSW Biodiversity Offsets Policy for Major Projects*, and seeking approval for the strategy from the DPI&E prior to the commencement of construction work that would result in the disturbance of relevant ecological communities, threatened species, or their habitat, unless otherwise agreed.

Phase 1 of the Biodiversity Offset Strategy provided in the EIS (in Appendix L) identifies the offset requirements for the proposal and the proposed delivery approach. It considers the availability of suitable offsets, and defines the next steps. A copy of this strategy is provided in Appendix I of this report.

Phase 2 of the strategy will be prepared as part of the detailed design, and prior to commencement of construction. Phase 2 will involve confirming the biodiversity credits, providing preliminary field inspection outcomes for the proposed offset site/s, and condition, key threats and likely management actions for the site/s.

Phase 3 of the strategy will be prepared and submitted for approval within 12 months of the commencement of construction. The phase 3 strategy will define the final offset site/s in detail, confirm the PCTs and species credits at the site/s, provide final biodiversity credit calculator outputs, and a detailed offset site management plan.

The endorsed offset site/s would be legally secured within two years of the commencement of construction.

ISSUE

Credits for this proposal will need to be retired in accordance with the BC Act.

Response

Credits for this proposal have been calculated in accordance with the FBA. However, due to the repeal of the TSC Act credits will be retired in accordance with the BC Act.

7.4.2 Hydrology and flooding

ISSUE

Additional modelling should consider both free outlet and tailwater conditions for a range of flood events up to one per cent AEP (annual exceedance probability).

The tailwater effect in culverts should be reviewed as a sensitivity analysis in subsequent hydrological and hydraulic modelling work to be undertaken.

Response

The flooding assessment undertaken as part of the EIS (refer to chapter 15 and Technical Report 6) involved review and modelling of existing conditions. This identified that the floodplain areas within the vicinity of the proposal site are typically broad and relatively flat, meaning that ground levels downstream of the proposal site are comparable to those upstream.

As a result, when tail water levels are elevated (ie during a large-scale regional flood event), flood levels upstream of the proposal site would also be elevated. This means that flows through the culverts and over the rail line would be small and inconsequential in the context of the regional flood flow, especially for larger flood events such as the 0.5 and 0.2 per cent AEP events. If an analysis of tail water conditions during different size flooding events was undertaken, the analysis would underestimate the range of potential impacts associated with the proposal, and potentially result in undersized culverts.

In contrast, the flood modelling assessment undertaken for the EIS considered the occurrence of local catchment flooding with free flowing outlet conditions. This allowed for estimation of the likely maximum impacts on flood levels, in particular, upstream flood conditions. Therefore, the adopted method is considered to provide an estimate of the maximum (worst-case) culvert size required to minimise changes to upstream flood levels.

Potential changes to downstream flood levels would be minimised by incorporating suitably designed energy dissipation measures. Such measures, when correctly designed and installed, would reduce the flow velocities downstream of the culverts, reducing erosion and scouring, and promoting the spread of downstream flood flows to depths and widths comparable to the existing conditions.

In addition to the above, it should be noted that the flooding impacts reported in the EIS were based on preliminary hydrological modelling undertaken in advance of detailed survey of the rail corridor and ground levels upstream and downstream of the preferred infrastructure site. Further detailed flooding modelling has since been undertaken to inform the design of the preferred infrastructure and is provided in Appendix E and summarised in section 11.2.

As described in Appendix E this flood modelling addresses local and regional flood events, including consideration of tailwater conditions. The detailed design of the proposed culverts, formation level, and downstream energy dissipaters were inputted into the detailed flood modelling, to estimate the potential changes in flood levels upstream and downstream of the preferred infrastructure site. As a result of this additional modelling refinements to the design of the culverts, formation level, and downstream energy dissipaters have been undertaken to minimise the estimated impacts on flood levels and extents. This is described further in Appendix E.

Mitigation measure D6.1 commits ARTC to continue to refine the proposal design features to not materially worsen existing flooding characteristics, where feasible and reasonable, up to and including the one per cent AEP event.

ISSUE

Continue liaison with Moree Plains Shire Council to fully assess the relative impacts of the proposed upgrade and future assessments on subsequent phases of design (rail embankment and hydraulic structures).

Response

ARTC acknowledges the need for on-going consultation. Mitigation measure D6.1 commits to undertaking flood modelling during detailed design in consultation with the relevant local councils. Additional consultation with councils has informed the design of the preferred infrastructure and will continue to occur as the design developments.

7.4.3 Aboriginal heritage

ISSUE

Community monitoring is preferred rather than excavation and artefact analysis. The Registered Aboriginal Parties should participate in a monitoring program for those areas identified for archaeological excavation.

Response

Mitigation measure D8.4 has been amended to remove reference to excavation. The amended measure states that if the detailed design identifies the potential for disturbance below the depth of existing disturbance, further consideration would be given to the potential for archaeological impacts. Measures to manage these impacts would be developed in consultation with Aboriginal parties for inclusion within the Aboriginal cultural heritage management plan.

7.5 Heritage Council of NSW

7.5.1 Non-Aboriginal heritage

ISSUE

The main justification for demolition of the rail bridges presented in the EIS is that there are numerous examples of the steel Pratt truss bridge type within NSW. However, these are a diminishing resource, and it is the Heritage Council's preference that the rail bridges be retained and strengthened rather than demolished.

Response

Section 6.3.3 of the EIS noted that new bridges are required over Croppa Creek and the Gwydir and Mehi rivers as the existing bridges do not meet Inland Rail requirements.

Issues associated with the existing bridges include:

- the existing steel truss girders are not compatible with Inland Rail vertical clearance requirements
- there are a number of structural defects in the existing bridge associated with timber degradation
- the existing piers would be unable to handle Inland Rail design loadings.

The Mehi River and Gwydir River bridges are listed on ARTC's section 170 register and are considered to have local significance. Both bridges are steel Pratt truss bridges. The Croppa Creek bridge was identified as a potential heritage item by the non-Aboriginal heritage assessment of the proposal (Technical Report 9). The Croppa Creek bridge comprises a steel span constructed half-through bridge on concrete piers.

However, as noted in section 1.3 of this report ARTC has refined the design with the aim of addressing a number of issues raised in submissions, while also minimising potential impacts. To facilitate delivery of this refined design the Narrabri to North Star has been divided into two phases, the first of which is the preferred infrastructure (the subject of this report). As described in the preferred infrastructure project description (provided in Appendix B), only the Croppa Creek bridge would be replaced as part of the preferred Infrastructure. The Gwydir River and Mehi River bridges are no longer within the preferred infrastructure site. Therefore, the response to this issue is focussed on the removal of the Croppa Creek bridge only. Approval for the replacement of the Gwydir and Mehi river bridges would be sought as part of Phase 2 (described further in section 8.4).

As noted in section 6.3.3 of the EIS, an assessment of the potential options to upgrade and/or provide a new bridge over Croppa Creek was undertaken as part of the design process. The following options were identified and assessed:

- **Base case** – this option would involve a combination of partial demolition and upgrade of the existing structure. A retrofitted ballast top superstructure would be fitted on to the existing piers.
- **Option 1** – Offline: this option would involve building a new bridge about 10 metres to the east of the existing bridge. The rail track would be realigned for a distance of about 250 metres to 280 metres on each side of the bridge, to meet the new bridge approach spans. The existing bridge would be removed once construction and commissioning of the new bridge is complete.
- **Option 2** – Online: this option would involve building a new bridge in the same location as the existing bridge, and upgrading the rail tracks and formation along the existing alignment. The existing bridge would be removed prior to construction of the new infrastructure. The new bridge would be wider than the existing bridge.

It is noted that options 1 and 2 both involve removing the existing bridge structure. This was considered necessary for the following reasons:

- Retention of the existing structure would be a safety risk to the community as the structures continue to degrade with time and could collapse. The risk would be to ARTC personnel or members of the public who seek unauthorised access to the bridge.
- Retention of the existing structure would require ongoing maintenance costs and would increase the potential for vandalism and graffiti (which also presents a safety risk).
- If the existing piers were retained (in addition to the construction of new piers), there would be the potential for an increase in local flooding extent and frequency and associated scour issues.
- If the existing piers were retained, additional bridge spans would be required, which would result in increased costs.

A multi-criteria analysis of the options was undertaken. Table 6.1 in the EIS lists the advantages and disadvantages associated with each option, which provided the basis for assessing the options.

The assessment concluded that option 2 (the online option) is preferred.

The potential heritage impacts of removing the existing Croppa Creek bridge structure was assessed by Technical Report 9, and the results were summarised in chapter 18 of the EIS.

The heritage assessment noted that although the Croppa Creek bridge is not heritage listed, the bridge retains its original fabric and is of local significance as a significant component of infrastructure, and a good example of a steel bridge constructed on a pioneer line using American bridge technology.

The heritage assessment concluded that, although the bridge is part of a decreasing resource there are other similar examples, both regionally and throughout NSW. Additionally, the bridge is not easily accessible and there are no significant easily accessible views to the underbridge as there are no access roads and no road crossings of Croppa Creek in the vicinity.

As noted in section 6.3.3 of the EIS, with regards to the existing structure, ARTC would explore opportunities to reuse the existing structure elsewhere on their network. This is confirmed by amendments to mitigation measure D9.2, which commits to mitigate impacts on the bridges as follows:

- A photographic/archival recording would be undertaken of the all listed heritage items in accordance with Heritage Division publications *How to Prepare Archival Records Of Heritage Items* and *Photographic Recording of Heritage Items using Film or Digital Capture*.
- A photographic/archival recording would be undertaken of all identified potential heritage items in accordance with ARTC's Archival Recording Standard.
- The photographic recording would include contextual photographs showing the relationship between the rail line and this item.
- Adaptive reuse of representative features of the bridge over Croppa Creek would be investigated during detailed design.

ISSUE

A strategy for the ongoing conservation, care and management of steel truss bridges on the ARTC network should be developed as a priority.

Response

As noted above, removal of the steel truss bridges over Mehi and Gwydir rivers is no longer part of the preferred infrastructure and the heritage assessment undertaken as part of the EIS concluded that there are many steel truss bridges in NSW. Some comparable steel truss rail bridges were described in section 5.3 of Technical Report 9.

The bridge over Croppa Creek is the only bridge that would be removed and replaced as part of the preferred infrastructure. While, of potential heritage significance, as identified by the heritage assessment undertaken for the EIS, this underbridge is not heritage listed, and is an example a steel span constructed half-through bridge, rather than a steel through bridge as per the Mehi and Gwydir river bridges. Additionally, given the majority of the remaining Inland Rail construction in NSW would be in greenfield sites, with the exception of the Mehi and Gwydir river bridges removed during Phase 2, there are unlikely to be more bridges removed during construction of Inland Rail. As a result, ARTC considers that such a strategy is not warranted. However, mitigation measure D9.2 commits ARTC to mitigating the impacts on the bridge over Croppa Creek as outlined in the response above. The same approach would be adopted for Phase 2 of the Narrabri to North Star project.

ISSUE

There is potential for construction and operational vibration impacts at Moree Station.

Response

The potential for structural vibration impacts at Moree Station was considered by the noise and vibration assessment (described in chapter 12 of the EIS) and the non-Aboriginal heritage assessment (described in chapter 18 of the EIS) undertaken for the exhibited proposal. This assessment is generally relevant to the preferred infrastructure as the potentially vibration inducing activities would largely remain unchanged.

The EIS noted that there would be the potential for vibration impacts during construction at Moree Station. The vibration assessment concluded that although vibration limits are not expected to exceed the proposal specific structural damage criteria, mitigation measures are recommended to minimise the potential for any impacts. The management of vibration during construction would be undertaken in accordance with the approach defined by the Inland Rail Construction Noise and Vibration Management Framework. Further information on the framework with respect to the management of vibration is provided in section 12.5 of the EIS.

The management of the potential for vibration impacts at Moree Station during construction is confirmed by relevant mitigation measures. In accordance with mitigation measure D4.2, where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and vibration monitoring would be carried out in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework, to ensure vibration levels remain below appropriate limits for that structure. For heritage listed items such as Moree Station, in accordance with mitigation measure D9.5, the detailed assessment would specifically consider the heritage values of the structure, in consultation with a heritage specialist, to ensure sensitive heritage fabric is adequately monitored and managed.

The potential for structural vibration impacts during operation was considered by the noise and vibration assessment undertaken for the EIS. No potential operational impacts on Moree Station were predicted.

While the potential for works at Moree Station were identified for the exhibited proposal, the proposed works have been further defined as part of the preferred infrastructure, and as per the preferred infrastructure project description (provided in Appendix B), would include works to the eastern platform as well as a security fence and upgrade of the pedestrian crossing. Therefore, mitigation measure D9.1 has been revised to include the requirement for a Statement of Heritage Impact by an appropriately qualified and experienced heritage consultant.

The potential for structural vibration impacts during operation was considered by the noise and vibration assessment undertaken for the EIS. No potential operational impacts on Moree Station were predicted. This is still relevant to the preferred infrastructure as the operational arrangements at Moree Station remain unchanged.

ISSUE

The use of 'high significance' in the assessment of the Aboriginal fringe camp at the Mehi River Bridge is not in accordance with Heritage Council guidelines.

Response

The non-Aboriginal heritage significance assessment undertaken as part of the EIS was undertaken in accordance with relevant Heritage Council guidelines with the exception of consideration of the archaeological research potential and significance of the Steel Bridge Camp. The use of 'high significance' in relation to the potential for dispersed artefacts associated with Aboriginal life at the former Steel Bridge Camp was used with reference to its high archaeological research potential (appropriate terminology) which is predominantly in relation to Aboriginal cultural values and significance.

The Steel Bridge Camp was assessed in the Aboriginal cultural heritage and archaeological assessment undertaken as part of the EIS (Technical Report 8), by representatives of the registered Aboriginal parties and earlier by Kelton (in An archaeological over-view of the proposed State Highway 17, Newell Highway – Moree Eastern 'Outer' Bypass, Moree, 1999) as having high Aboriginal cultural significance / high significance to the Moree Aboriginal community – terminology used when discussing Aboriginal cultural heritage values and significance.

The significance of potential artefacts associated with the fringe camp is closely connected to Aboriginal cultural significance (which is correctly referred as being high) and cannot be separated from this significance. The use of the term 'high' has flowed through into the non-Aboriginal assessment because of the close connections and identified high importance of the Aboriginal cultural values.

As discussed in the non-Aboriginal assessment undertaken as part of the EIS (Technical Report 9), evidence relating to Aboriginal settlement following 'contact' with European settlers is considered to be of significance under both the *Heritage Act 1977* and the *National Parks and Wildlife Act 1974*. The non-Aboriginal assessment recommended that the non-Aboriginal heritage management plan provide further details of the required archaeological management of the potential evidence for archaeological deposits associated with the Steel Bridge Camp, should any such deposits be identified during works, and would include any requirement for an archaeological methodology and research design to be approved by the Heritage Council. This methodology was considered appropriate by the Heritage Division.

However, as noted previously the works associated with Mehi Bridge are no longer part of the preferred infrastructure, therefore the above issue is no longer considered relevant.

ISSUE

The need for an AHIP should be determined.

Response

As noted in section 3.4.1 of the EIS, in accordance with section 115ZG (now section 5.23) of the *EP&A Act*, as the preferred infrastructure is State significant infrastructure, an Aboriginal heritage impact permit would not be required.

ISSUE

Further consideration of heritage impacts during detailed design is required, including ongoing input from heritage specialists and the Heritage Division.

An updated heritage impact assessment would be required if any heritage items and potential heritage items located near the proposal site would be directly impacted during construction.

Response

The potential impacts of the construction and operation of the exhibited proposal on non-Aboriginal heritage was subject to a detailed assessment, undertaken in accordance with the SEARs and relevant guidelines. The results of the assessment were provided in Technical Report 9. The report did not identify the need for any additional assessment, however a range of mitigation and management measures were recommended to minimise and manage the impacts identified. The potential impacts on non-Aboriginal items due to the preferred infrastructure would generally be as per those identified for the exhibited proposal, with the following exceptions:

- works at the heritage listed Moree Station have been further defined
- no works are proposed to the heritage listed bridges over Mehi and Gwydir rivers.

Non-Aboriginal heritage mitigation measures are listed in Table 13.1 to Table 13.3 of this report.

To minimise the potential for accidental impacts, mitigation measure C10.1 commits to marking the boundary of Moree, Edgeroi, Bellata, and Gurley stations, Edgeroi Woolshed, and the surveyor's trees, on plans and clearly defining it during construction.

As per mitigation measure D9.1, the detailed design of the proposal would minimise the potential for impacts on Moree Station, and would have regard to, and be sympathetic with, its heritage significance. This mitigation measure has been amended to include the requirement for input to the design by an appropriately qualified and experienced heritage architect and preparation of a Statement of Heritage Impact.

Mitigation measure D9.6 commits to developing an unexpected finds procedure to provide a consistent method for managing any unexpected heritage items.

Other mitigation measures are provided in Table 13.1 and Table 13.2.

ISSUE
A suitably qualified heritage architect must be integrally involved in the detailed design for all proposed components.

Response

Mitigation measure D9.1 has been amended to state that input to the detailed design of Moree Station would be sought from an appropriately qualified and experienced heritage architect.

ISSUE
A Rail Bridge Conservation and Management Strategy must be developed that outlines both operational and heritage considerations and applies a methodology to determine which of the rail bridges represent better candidates for long-term conservation within the ARTC rail network.

Response

A response to this issue is provided above.

ISSUE
The demolition of the Mehi River Underbridge at Moree is not supported. The underbridge is a visible landmark from the Moree Bypass (A39) and should be retained as an example of a steel Pratt truss bridge constructed on the Pioneer Line using American Bridge Technology. The bridge should either be strengthened or duplicated. If the bridge is to be duplicated, the new structure should be located to the east of the existing bridge to retain sightlines from the A39.

Response

As noted above the removal of the bridge at Mehi River is no longer part of the preferred infrastructure. Therefore, the above issue is no longer considered relevant to the preferred infrastructure.

ISSUE
Any new bridge structures constructed should incorporate design elements from the existing steel truss bridge design to mitigate visual impact.

Response

As noted above the removal of the bridges over Mehi and Gwydir rivers are no longer part of the preferred infrastructure, and the remaining bridge with heritage potential (Croppa Creek bridge) is not heritage listed. However, mitigation measure D9.2 has been amended to include a commitment to investigating an adaptive reuse strategy for the Croppa Creek bridge.

ISSUE
Heritage elements within the Moree Railway Station must be protected during construction works.

Response

As per mitigation measure D9.1, the detailed design of the proposal would minimise the potential for impacts on Moree Station, and would have regard to, and be sympathetic with, its heritage significance. Additionally, the mitigation measure commits to further assessment if construction works to Moree Station have the potential to cause direct impacts.

ISSUE
Photographic archival recording must be carried in accordance with the NSW Heritage Division publications *How to Prepare Archival Records of Heritage Items* and *Photographic Recording of Heritage Items using Film or Digital Capture*.

Response

As per mitigation measure D9.2, photographic recording of all listed heritage items would be undertaken in accordance with Heritage Division publications *How to Prepare Archival Records Of Heritage Items* and *Photographic Recording of Heritage Items using Film or Digital Capture*, while photographic recording of all potential heritage items would be undertaken in accordance with ARTC's Archival Recording Standard for all potential heritage items which is consistent with the NSW Heritage Division's publications.

7.6 Transport for NSW

7.6.1 Assessment and approval

ISSUE
The proposed grade-separated crossings at Jones Avenue in Moree and the replacement crossing on the Newell Highway would be subject to final Roads and Maritime Services approval.

Response

Noted. In addition, mitigation measure D2.2 commits ARTC to seek input from relevant stakeholders prior to finalising the detailed design of those aspects of the proposal that impact on the operation of road and transport infrastructure managed by these stakeholders. This includes the Jones Avenue and Newell Highway overbridges.

7.6.2 Preferred infrastructure features and design

ISSUE

As the State's third busiest freight route it is essential that each level crossing is properly examined on an individual basis including the use of the Australian Level Crossing Assessment Model and identified risks are mitigated. The individual identification of level crossing risk and mitigation during the current assessment phase is a key recommendation of this response.

Response

As described in section 1.4.2 of the preferred infrastructure project description (provided in Appendix B) ARTC have undertaken stage 2 of the level crossing strategy.

Based on the outcomes of stage 2, the preferred infrastructure design addresses each level crossing individually to respond to issues such as:

- vertical and horizontal geometry resulting from the revised track design and drainage requirements
- design vehicle movements and potential short stacking between the rail corridor and adjacent roads
- anticipated traffic growth, reflecting advice provided by councils.

ARTC has prepared a Level Crossing Treatment Methodology to provide stakeholders with further detail regarding ARTC's decision-making process in relation to the selection of treatments for level crossings (refer to Appendix L). As detailed in this methodology ARTC would continue to use the Australian Level Crossing Assessment Model to assess public level crossings. This would consider factors such as future road traffic numbers, vehicle type, train numbers, speeds, and sighting distances. In addition, for public crossings, ARTC would work with the relevant roads authority to take into consideration future development plans and other important local factors.

In addition, mitigation measure D2.2 commits ARTC to seek input from relevant stakeholders prior to finalising the detailed design of those aspects of the proposal that impact on the operation of road and transport infrastructure managed by these stakeholders. This includes level crossings and the potential treatments.

7.6.3 Traffic, transport and access

ISSUE

The update of predicted traffic forecasts, inclusion of ALCAM assessment index for existing and predicted future years, any additional safety features, and preferred treatment options is requested.

Response

A response to this issue is provided above.

In addition, mitigation measure O8.1 commits to implementing a safety awareness program to educate the community regarding safety around trains.

ISSUE

The traffic impact assessment in the EIS used traffic volumes from 2008 for the section of the Newell Highway within the study area. This data is considered old and an addendum report should be developed with up to date traffic counts. It is noted the proponent made an allowance for growth (section 3.3) although the rate applied or its justification is not discussed.

Response

The traffic, transport and access assessment undertaken as part of the EIS (Technical Report 1) used the traffic data for parts of Newell Highway that was available at the time of the assessment, namely traffic volume data (annual average daily traffic) published in 2008.

Roads and Maritime subsequently provided unpublished sample count data from April 2012 for similar locations (between Bellata and Gurley, and north of Croppa Moree Road) and a comparison has been undertaken between the data from 2008 and that from 2012 in section 3.3 of this report.

The comparison indicated that the daily traffic volumes in 2012 were higher than in 2008. However, the data for the Newell Highway was only used in a very limited way in the EIS. It was relied on by the traffic, transport and access assessment to provide context, and assess the broad level of service on the highway (as described in sections 3.3.4 and 5.3.3 of Technical Report 1).

The 2012 data does not change the calculated level of service for the Newell Highway during construction, with these traffic volumes well within the range for a level of service B as described by Technical Report 1. In addition, the intersection analysis undertaken as part of the assessment (described in sections 3.4 and 5.4.3 of Technical Report 1) was based on 2016 traffic surveys, with an allowance for future growth. Therefore, further assessment using the 2012 data is considered to be unnecessary.

ARTC notes that in order to inform the level crossing risk assessment process undertaken as part of the detailed design of level crossings updated traffic counts including a breakdown between light and heavy vehicles will also be collected for all public roads.

ISSUE

A recommendation is made for traffic delay analysis to be completed for 3600 metre trains to assist Transport for NSW in long term planning for the Bullus Drive / Newell Highway Intersection and the Alice Street/ Gwydir Highway Intersections.

Response

As described in section 1.1.2 of the preferred infrastructure project description (provided in Appendix B), the preferred infrastructure involves construction of a single-track standard gauge railway, with crossing loops to accommodate double-stacked freight trains up to 1800 metres long only. While components of the construction would include infrastructure to accommodate possible future augmentation, including a possible future requirement for 3600 metre trains, this is not part of the preferred infrastructure for which approval is being sought.

Mitigation measure D2.2 commits ARTC to seek input from relevant stakeholders prior to finalising the detailed design of those aspects of the preferred infrastructure that impact on the operation of road and transport infrastructure managed by these stakeholders.

ISSUE

The proponent will be required to undertake private financing and construction of the Jones Avenue Bridge

Transport for NSW has provided a number of requirements that construction of the Jones Avenue overbridge will be required to meet.

Response

Noted. ARTC will be funding the design and construction works associated with the Jones Avenue overbridge.

Additionally, mitigation measure D2.2 commits ARTC to seeking input from relevant stakeholders (including Narrabri Shire Council, Moree Plains Shire Council, Gwydir Shire Council, Roads and Maritime, and Transport for NSW) prior to finalising the detailed design of those aspects of the preferred infrastructure that impact on the operation of road and transport infrastructure under the management of these stakeholders. This includes input regarding the inclusion of design criteria, where relevant.

ISSUE

The proponent will be required to undertake private financing and construction of the Newell Highway overbridge.

Transport for NSW has provided a number of requirements that construction of the Newell Highway overbridge will be required to meet.

Response

Noted. See above response.

ISSUE

A formal agreement in the form of a Works Authorisation Deed (WAD) will be required between the proponent and Roads and Maritime prior to any works commencing within the Newell Highway road reserve. Roads & Maritime Services approval is required.

Response

Noted.

ISSUE

The Waterloo Creek crossing loop appears to be within 60 metres of the Newell Highway. Any new crossing loops should be at least 60 metres distance from Newell Highway. This would allow for any future new road intersections with the highway (to eliminate any short stacking issues).

Response

As per the exhibited proposal the preferred infrastructure involves the construction of five new crossing loops at Bobbiwaa, Waterloo Creek, Tycannah Creek, Coolleearllee and Murgo. Of these crossing loops, the Bobbiwaa, Waterloo Creek, and Tycannah Creek crossing loops are within proximity to the Newell Highway (refer to Figure 1.6, Figure 1.7 and Figure 1.8 in Appendix B of this report). The crossing loops would be located roughly parallel to the existing track.

As described in section 6.3.2 of the EIS, a multi-criteria assessment was undertaken to determine the location of the crossing loops, as part of the exhibited proposal. This was based on network capacity requirements and taking into account local constraints. Considerations included:

- future train lengths
- minimising impacts on level crossings
- existing structures currently recommended to be retained
- distance to a receiver (noise)
- earthwork cut and fill volumes
- access
- geometry.

The final location of the crossing loops was further refined as part of the preferred infrastructure, in consultation with Transport for NSW and Roads and Maritime.

Construction of the rail portion of the preferred infrastructure, including these crossings loops, is proposed to occur within the existing 30 metre rail corridor. This is a pre-existing operational rail corridor and has operated alongside the existing highway corridor. This approach to locating infrastructure and construction is proposed to help reduce the impact to surrounding landholders and minimise the requirement for any alteration to property, including any additional acquisitions.

However, through the refinement of the crossing loops location as part of the preferred infrastructure the locations have shifted to the north and south of the corridor to reduce or avoid conflicts with other infrastructure, including intersections, where possible.

ISSUE

The Camurra hairpin curve should be decommissioned and removed after the rail realignment. Removal of the hairpin would remove a structure near the highway and therefore a potential road hazard.

Response

As described in the preferred infrastructure project description provided in Appendix B works on the Camurra bypass are no longer part of the preferred infrastructure. Therefore, the above issue is no longer considered relevant to the preferred infrastructure.

7.7 Geological survey of NSW

7.7.1 Consultation

ISSUE

Application for renewal of petroleum licences within the study area has been sought, and consultation with the intersected and nearby title holders should be ongoing.

Response

Noted. Consultation with licence holders would be undertaken during detailed design and construction as part of the consultation process for the preferred infrastructure, in accordance with mitigation measure D11.6.

7.8 Moree Plains Shire Council

7.8.1 Consultation

ISSUE

A detailed consultation strategy and plan should be prepared to include landholders as well as other stakeholders.

Response

As described in section 4.1.2 of the EIS, ARTC has developed a *Communication and Engagement Plan – Narrabri to North Star* to guide engagement with the local community. Further information is provided in section 4.5 of this report.

Mitigation measure D11.6 commits to ongoing consultation with the community and relevant stakeholders. As per the mitigation measure:

- Landowners and occupants would be consulted in accordance with the communication management plan for the preferred infrastructure (described in chapter 4 of the EIS), to ensure that owners/ occupants are informed about the timing and scope of activities in their area; and any potential property impacts/changes, particularly in relation to potential impacts on access, services, or farm operational arrangements.
- The results of consultation would be incorporated in the individual property agreements as appropriate.
- Consultation would be undertaken with landowners affected by level crossing changes and agreement obtained, where required.

Where relevant, consultation would address surface water and flood management, the relocation of utilities and infrastructure, construction activities and temporary land access requirements, acquisition requirements, and the management and mitigation of construction and operational noise and vibration.

ISSUE

Local contractor and Indigenous community input should occur.

Response

As noted above, mitigation measure D11.6 commits to ongoing consultation with the community and relevant stakeholders. As described in chapter 21 of the EIS ARTC has an ongoing commitment to social engagement. ARTC are currently developing and finalising a social performance program for Inland Rail as a whole, which includes specific outcomes associated with participation by local and Aboriginal industries.

7.8.2 Proposal need

ISSUE

Although Council supports Inland Rail and the proposal, it has a number of concerns that should be fully addressed.

Response

Issues and concerned noted in the submission have been addressed in sections 7.8.1 and 7.8.3 to 7.8.11.

7.8.3 Proposal alternatives

ISSUE

An eastern bypass is the preferred option given the long-term nature of the proposal. Council accepts that the through-town route is preferred, provided that all amelioration measures outlined in the submission are implemented by way of approval conditions.

Response

As described in section 6.2 of the EIS, option development has been an integral part of the overall design process for the exhibited proposal. An iterative process of option selection, design development, and evaluation has been undertaken to define the proposal to date, including the preferred infrastructure. As described in section 6.3.7 of the EIS, an assessment of bypass options was undertaken during the design process.

Five options were assessed for a new section of rail corridor to the east of Moree. The options differed according to the distance from Moree, the connection locations, and the amount of new track that would be required (ranging from 12.4 to 20.7 kilometres of new track). The assessment concluded that the preferred bypass option would be Option 5, which involved 12.4 kilometres of new track including the Camurra bypass. This option was located closest to the Moree township.

Further information on the bypass options and the criteria used to assess the options was provided in section 6.2.7 of the EIS.

To identify the preferred option to minimise the potential impacts of the proposal on Moree, a multi criteria analysis was undertaken to compare the preferred Moree connectivity option (including the Jones Avenue overbridge) with the preferred bypass option. The following broad ranges of qualitative and quantitative criteria were used:

- Constructability and schedule: considers construction duration, access, and complexity, resources, interface with operational railway and staging opportunities.
- Environmental impacts: considers the ecological impacts (flora, fauna and habitats), visual impacts, noise and vibration impacts, flooding and waterway impacts and the effect on air quality and greenhouse gas emissions.
- Community and property impacts: considers property impacts, Aboriginal and non-Aboriginal heritage, heritage, impact on community, community response and current and future land use and links to economic impacts.
- Approvals and stakeholder engagement: considers planning and approval requirements, State and Australian Government agency buy-in, local government buy-in, other statutory and regulatory approvals and service authorities, such as utilities.
- Construction costs: considers costs of trackwork and crossings, earthworks and fencing, utilities, culverts, bridges, noise walls, environmental issues, contractor costs and client costs.

The multi-criteria analysis concluded that the Moree connectivity option (including the Jones Avenue overbridge) was the overall preferred option for the exhibited proposal. This has not changed for the preferred infrastructure.

The concept design for the preferred infrastructure addresses the amelioration measures outlined in the submission. As committed to through mitigation measure D2.2 ARTC would continue to consult with relevant stakeholders including Moree Plains Shire Council prior to finalising the detailed design of those aspects of the preferred infrastructure that impact on the operation of road and transport infrastructure under the management of these stakeholders.

7.8.4 Proposal features and design

ISSUE

A full investigation should be undertaken of grade separation for the Gwydir Highway/Inland Rail crossing (noting this would need a review of the intersection with the current Moree bypass).

Response

As described in section 6.2 of the EIS, option development has been an integral part of the overall design process for the exhibited proposal. An iterative process of option selection, design development, and evaluation has been undertaken to define the proposal to date, including the preferred infrastructure. As described in section 6.3.7 of the EIS a number of options were considered in consultation with Moree Plains Shire Council to address connectivity issues at Moree. This included consideration of a bypass of the Gwydir Highway to the south of Moree including an overbridge over the rail corridor. However, the Gwydir Highway Bypass option and the largest scope of all the potential options and the potential benefits were well beyond addressing connectivity issues across the rail corridor. Therefore, this option was considered beyond the scope of Inland Rail.

On the 17 June 2016 a stakeholder discussion was held between GHD, ARTC, Moree Plains Shire Council and Local Emergency Services members, the context of which was to discuss all Moree connectivity options with key stakeholders and identify a preferred option.

The outcome of this meeting was that an in-town overbridge was considered the preferred scale of option to address the connectivity issues and that the location of Jones Avenue was agreed as most suitable. Further information regarding the multi-criteria analysis undertaken to inform this decision is provided in section 6.3.7 of the EIS.

Consequently, ARTC believes that this investigation and options assessment has already been undertaken and addressed.

The design of the Jones Avenue overbridge for the preferred infrastructure has been refined in consultation with relevant stakeholders and ARTC would continue to engage with relevant stakeholders (i.e. Moree Plains Shire Council, Road and Maritime, affected landholders) as appropriate.

ISSUE

Both formal and informal level crossings need to be addressed to minimise the potential for farm severance impacts.

Response

Following exhibition of the EIS, ARTC prepared a Level Crossing Treatment Methodology to provide stakeholders with further detail regarding ARTC's decision-making process in relation to the selection of treatments for level crossings. Further information on the proposed works is provided in section 1.4.2 of Appendix B while the Level Crossing Treatment Methodology is provided in Appendix L.

Mitigation measure D2.1 commits that the detailed design of the preferred infrastructure would minimise the potential for impacts on the surrounding road and transport network, and property accesses. Mitigation measure D11.6 commits ARTC to consult with landowners affected by the preferred infrastructure, where appropriate, including in relation to impacts on access, services, or farm operational arrangements. This would include consultation with relevant landowners that are particularly affected by changes to level crossings.

As described in section 21.4.3 of the EIS, changes to property access roads may be required in some locations as a result of the rationalisation of level crossings. The closure of some level crossings may result in changes to how landholders and livestock move around their property, which in turn might impact agricultural activities and the operation of agricultural businesses. Where an existing access to or within a property is proposed to be removed, altered, or severed, additional works to reinstate access to the property would be undertaken (refer to section 1.4.2 of Appendix B).

As described in sections 3.4 and 6.3.4 of the EIS, any closure of level crossings needs to be undertaken in accordance with the requirements of the *Transport Administration Act 1988*. Private level crossings cannot be closed unless there is an alternative means of legal access to the property, and the landowner has been consulted with. Additionally, public level crossings cannot be closed without the approval of the relevant road manager. All level crossing closures in NSW require ministerial approval.

The majority of the proposed closures that form part of the scope of the preferred infrastructure relate to private level crossings where discussions have already commenced with the respective landowners.

7.8.5 Traffic, transport and access

ISSUE

Grade separated access is required to ensure emergency service access at all times to East Moree. The proposed Jones Avenue overpass would address this in part, however emergency vehicles will need to wait for a 3.2 km train to complete crossing.

Response

The Jones Avenue overbridge, together with upgrades to level crossings, was identified as the preferred connectivity option for Moree, following consultation with relevant stakeholders including emergency services providers. The Jones Avenue overbridge would be constructed as part of the preferred infrastructure to improve access across the rail corridor.

It is noted that the preferred infrastructure for which approval is being sought involves operating double-stacked freight trains up to 1800 metres long and 6.5 metres high. While the preferred infrastructure would be designed and constructed to accommodate future expansion, including a possible future requirement for 3600 metre long trains (as described in section 1.1.2 of Appendix B), longer trains (including those with a length of 3.2 km) are not part of the preferred infrastructure for which approval is being sought.

ISSUE

The Jones Avenue overpass should be designed to cater for heavy vehicles. At a minimum, this should include access for B-double vehicles, although ideally grade separation for high productivity vehicles should also be provided.

Response

The Jones Avenue overbridge would have the capacity to accommodate heavy vehicles if required, and is expected to be used on a regular basis by buses and emergency vehicles (as necessary). However, the main purpose of the bridge is to improve access across the rail corridor, not to facilitate heavy vehicle access. It is not appropriate to encourage everyday use of Jones Avenue east of Frome Street by heavy vehicle traffic, and a load limit would be put in place for this purpose.

If both Gwydir Highway and Bullus Drive level crossings were blocked for an extended period, heavy vehicle access via Jones Street could be managed with appropriate temporary traffic control measures in place if required.

Wide load access between Edward Street and the Newell Highway is available via Jones Avenue (west) and Frome Street.

The detailed design of Jones Avenue overbridge will include ongoing consultation with relevant stakeholders (i.e. Moree Plains Shire Council and Roads and Maritime), as required.

ISSUE

Impacts on the local road network of the use of the Jones Avenue overbridge should be modelled and assessed, including impacts on heavy vehicle movements.

Response

As noted in section 6.3.1 of this report, the traffic, transport and access undertaken as part of the EIS considered the potential traffic and road network impacts of the Jones Avenue overbridge.

A response to this issue is provided in section 6.3.1.

ISSUE

Insufficient attention has been given to the potential impacts of the Jones Avenue overpass on adjoining properties, and the need to maintain appropriate property access during construction.

Response

Potential impacts on access were considered in chapters 9, 20 and 21 in the EIS. Section 21.4.2 of the EIS noted that changes to the movement of traffic and access arrangements as a result of the construction of the Jones Avenue overbridge could result in a temporary increase in the distance travelled and delays for some road users. In particular, residents and businesses on the eastern side of Moree are expected to experience these temporary impacts. This is still relevant to construction of the preferred infrastructure.

As per mitigation measure D2.1, ARTC commits to minimise the potential for impacts on the surrounding road and transport network during detailed design.

Mitigation measure D2.2 commits to consulting with relevant stakeholders (including Moree Plains Shire Council, Roads and Maritime, and landowners) prior to finalising the detailed design of those aspects of the preferred infrastructure that impact on the operation of road and transport infrastructure under the management of these stakeholders. The measure has been amended to also include the need for consultation in relation to individual property access arrangements.

Management measures relevant to local access arrangements would be defined in the CEMP (in the traffic, transport and access management sub-plan), which would be developed in consultation with relevant stakeholders.

ISSUE

In full operation, the rail corridor would be a significant barrier to the east–west movement of regional high productivity vehicles. This is a particular issue given the minimal vehicle stacking distances between the Newell Highway and the rail corridor.

Consideration should be given to contributing to a grade separated overpass of the railway corridor south of Moree to facilitate high productivity vehicle access, in line with the transport study funded under the Murray-Darling Regional Economic Diversification Program.

Response

The preferred infrastructure involves upgrades to an existing rail corridor, and would not introduce additional barriers to the east-west movement of vehicles. The traffic, transport and access assessment undertaken as part of the EIS (Technical Report 1), which was undertaken in accordance with the SEARs, recognised that traffic volumes on the road network are likely to increase during harvesting season. The assessment included a sensitivity assessment for seasonal variation in potential traffic impacts and is still relevant to the preferred infrastructure.

The assessment concluded that the increased delay at some intersections and level crossings is expected to have a localised impact only. In particular, through movements on the Newell Highway are not likely to be affected. It also noted that the preferred infrastructure is expected to have a positive impact on the road network by relocating some of the road freight task to rail, thereby reducing the heavy vehicle freight traffic on the roads both within the study area and in the greater NSW network.

The detailed design of the preferred infrastructure, including that of level crossings, will include consultation with the relevant stakeholders as appropriate.

ISSUE

Additional upgrades are also required to facilitate traffic from the Carnarvon Highway reaching existing and proposed intermodals and industrial areas, noting a primary access is the Gwydir Highway level crossing.

Response

Facilitating road access to intermodal terminals and industrial areas does not form part of the scope of this preferred infrastructure.

Mitigation measure D12.2 has been amended to include a commitment to work with relevant stakeholders to identify opportunities to facilitate local access between Inland Rail, Moree Gateway, and other intermodal facilities, where feasible and reasonable.

ISSUE

Roads need to be restored to the same condition post-construction as pre-construction. A dilapidation survey needs to be prepared prior to the commencement of construction.

Movement of construction vehicles can potentially create major damage to black soil roads during or shortly after rain events.

Response

The CEMP outline provided in Appendix K of this report has been updated to include a requirement for the traffic, transport and access management sub-plan to include measures to minimise impacts on local roads, including the condition of roads. It includes a requirement to prepare a road dilapidation report for all local public roads proposed to be used by heavy vehicles, and measures to restore any impacted roads to their pre-existing condition.

ISSUE

Construction needs to minimise disruption for local landholders' access, including as a result of road damage and construction traffic movements that clash with key local road movements (eg during harvest).

Response

Mitigation measure C2.2 commits to maintaining access to individual residences, services and businesses, and access for livestock across the rail corridor, during construction. Where alternative access arrangements need to be made, these would be developed in consultation with affected property owners/occupants.

7.8.6 Noise and vibration (amenity)

ISSUE

Consideration should be given to the development of a compensation scheme together with appropriate acoustic treatments to address buildings that would not be compliant at the ultimate design year, including compensation for higher energy costs associated with air conditioning.

Response

The EIS recognised that there would be the potential for noise impacts during construction and operation of the exhibited proposal. Additional noise assessment has also been undertaken for the preferred infrastructure and is provided in appendix D and summarised in chapters 11 and 12. This additional assessment has also recognised the potential for noise impacts during construction and operation of the preferred infrastructure.

To manage the potential operational impacts identified, the assessment for the preferred infrastructure has further defined potential mitigation options. In addition, a comprehensive range of management and mitigation measures would be implemented, including the ARTC's Environmental Management System, the Inland Rail NSW Construction Noise and Vibration Management Framework, the preferred infrastructure specific CEMP and OEMP, and the mitigation measures listed in Table 13.1 to Table 13.3 of this report.

7.8.7 Air quality

ISSUE

Regional baseline air quality monitoring should be undertaken during the design phase and prior to construction.

Unsealed roads are a major potential dust generator and need to be addressed by the construction environmental management plan.

Response

The results of the assessment of the potential air quality impacts of the proposal are summarised in chapter 13 of the EIS. The assessment concluded that the main potential impact on air quality during construction would occur as a result of the generation of dust from construction works and the movement of equipment and machinery. This is still relevant to the construction of the preferred infrastructure as the construction activities are generally the same. These issues would be managed by implementing the air quality management controls specified by the air quality management sub-plan in the CEMP. This includes measures to manage the impacts of vehicle movements.

Mitigation measure C5.2 commits to implementing road watering and/or other stabilising approaches where sensitive receivers are located within 150 metres of construction works, or visible dust is generated from vehicles using unsealed access roads.

7.8.8 Hydrology and flooding

ISSUE

Need to minimise the time-impact of additional flooding on local roads and agricultural land.

Response

As described in section 1.3 of this report additional flooding modelling has been undertaken to minimise the flood impacts associated with the exhibited proposal, and has informed the design of the preferred infrastructure. The results of this modelling are provided in Appendix E and summarised in section 11.2.

As part of the modelling undertaken to refine the design, detailed hydrological and hydraulic models were developed using available survey and ground level data. The modelling undertaken for the preferred infrastructure used a comprehensive approach calibrated to regional flow gauge data, which assessed multiple storm event and design scenarios, as described in Appendix E.

The revised flood modelling addresses updated flood management objectives which include consideration of flood duration impacts along with flood levels and velocity. These objectives balance the change in flooding that would result from alterations to the railway line, level crossings and associated drainage with the ultimate objective being to minimise adverse outcomes to people, property and infrastructure.

The revised flooding assessment concluded that based on the preferred infrastructure:

- the flood management objectives relating to increase in flood levels, flood velocity and duration during a one per cent AEP event (detailed in Appendix E) would be met at all public roads with the exception of Buckle Road in Croppa Creek and a local access road in Gurley
- the flood management objectives relating to increase in flood levels, flood velocity and duration during a one per cent AEP event would be met within the majority of agricultural land located adjacent to the rail corridor.

As per mitigation measure D2.1, the detailed design of the preferred infrastructure would continue to be refined to minimise the potential for impacts on the surrounding road and transport network. Mitigation measure D2.2 commits ARTC to consult with Council regarding the final design and potential impacts on the road network. Mitigation measure D6.1 includes a commitment to refine the design to minimise flood impacts.

Additionally, the separating of the Narrabri to North Star into the preferred infrastructure and Phase 2 (described further in section 8.4 of this report) defers consideration of the Mehi-Gwydir floodplain to Phase 2. This also defers a number of the flood considerations raised by Moree Plains Shire Council. These considerations would be included in the basis of design criteria for Phase 2.

ISSUE

Detailed attention to culvert design is necessary at design stage. This needs to reflect the specific characteristics of local soils and erosion characteristics.

Response

As described in the flood study report provided in Appendix E further modelling has been undertaken to refine the culvert design for the preferred infrastructure. Further geotechnical assessment is also proposed as part of the detailed design, the findings of which would be used to inform the formation design, including the design of culverts. However, the detailed design process is ongoing and would continue post-approval.

Additionally, as per mitigation measure D3.4, watercourse crossing structures, including culverts, would be designed in accordance with the guideline *Why do fish need to cross the road? Fish passage requirements for waterway crossings* (Fairfull and Witheridge, 2003) and the minimum design requirements specified in Table 5.1 of Technical Report 3 of the EIS.

ISSUE

A management plan for culvert and drain maintenance (including clearing as necessary) should be conditioned.

Response

Noted. Culvert and drainage maintenance requirements would be captured by the OEMP which would be prepared for the preferred infrastructure (as described in section 27.2 of the EIS) and also be managed through the implementation of ARTC operational procedures *ETE-09-01- Structures Inspection* and *ETE-09-02 Structures Inspection Procedure*.

ISSUE

The increase in the number of dwellings impacted is unacceptable.

Response

As described in section 1.3 of this report additional flooding modelling has been undertaken to minimise the flood impacts associated with the exhibited proposal, and has informed the design of the preferred infrastructure. The results of this modelling are provided in Appendix E and summarised in section 11.2.

The revised flooding assessment found that four buildings/structures would potentially be inundated during the predicted one per cent AEP flood event. This is a significant reduction when compared with buildings that would have been inundated during operation of the exhibited proposal, as identified in the EIS (about 30 buildings). This includes:

- three houses (two near Curley Creek and one near Croppa Creek)
- one school in Croppa Creek.

All 4 of the above buildings currently experience flooding above 10 millimetres during the one per cent AEP flood event. During smaller, more frequent events flood levels at these buildings would either reduce or they would no longer be flooded. With the exception of the school these impacts are overall considered to be minor. Flood level increases at the school are due to a raised level crossing at this location. The design would be further refined to resolve this issue.

The preferred infrastructure would avoid impacts that would unacceptably affect the use of adjacent land or compromise the safety of residents. Mitigation measure D6.1 commits ARTC to continue to further refine the preferred infrastructure design features to not materially worsen existing flooding characteristics, where feasible and reasonable, up to and including the one per cent AEP event. The detailed design would continue to aim to achieve improved flood resilience and performance of the rail line, while not causing material flooding impacts in adjacent land, including inundation of dwellings.

ISSUE

Detailed design needs to address the 2012 washout.

Response

As described in section 4.2.5 of Technical Report 6, historical observations of flooding, including the 2012 event, were considered in the development of the flood modelling. These observations of flooding have also been considered in the flooding undertaken to inform the preferred infrastructure (provided in Appendix E and summarised in section 11.2), and in the design of the upgraded formation and longitudinal drainage.

Additionally, the aim of the preferred infrastructure is to achieve a flood resilience of one per cent AEP, wherever possible. This would minimise the potential for any future washout events.

ISSUE

Council is keen to work with ARTC through the detailed design phase to improve flooding outcomes.

Response

Council's request to continue to work with ARTC is noted. Mitigation measure D6.1 includes a commitment for flood modelling and mitigation as part of detailed design to be undertaken in consultation with key stakeholders including the relevant local council.

ISSUE

Council commissioned an independent review of the flooding assessment, which identified a number of issues and concerns, additional to those identified above.

Response

Responses to the key issues raised are provided below.

The full range of design events across the Gwydir floodplain was not assessed

As described in section 6 of Technical Report 6, detailed flood modelling was undertaken for the one per cent and ten per cent AEP flood events within the Gwydir and Mehi rivers. As the EIS was based on the concept design the modelling was undertaken with the intent of identifying the potential impacts of the exhibited proposal on the minor (ten per cent AEP) and major (one per cent AEP) flood events only.

However, as described above, further modelling has been undertaken following exhibition of the EIS, and has included the development of a calibrated model for the Gwydir-Mehi floodplain in conjunction with Council. Design outcomes for the floodplain would be addressed as part of Phase 2 of the Narrabri to North Star project.

Surveyed floor data was not used

Surveying of all potentially flood affected dwellings was considered unnecessary at the time the EIS assessment was undertaken as the design of the formation and cross drainage structures had not been finalised and was being further adapted to minimise impacts on affected dwelling.

As noted above, additional modelling has been undertaken to inform the design of the preferred infrastructure. The results of this modelling are provided in Appendix E and summarised in section 11.2. As noted in Appendix E this flood modelling used refined topographic data rather than surveyed floor data. However, given the omission of the Phase 2 section and the results of the additional flood modelling that determined only four properties would be impacted compared with the 30 properties in and around Moree identified for the exhibited proposal, a review of floor heights is no longer considered required.

The preferred infrastructure would avoid impacts that would unacceptably affect the use of adjacent land or compromise the safety of residents. Mitigation measure D6.1 commits ARTC to continue to further refine the preferred infrastructure design features to not materially worsen existing flooding characteristics, where feasible and reasonable, up to and including the one per cent AEP event. If the potential for impacts on dwellings is identified following consultation with impacted landowners and/or further refinement of the design for the preferred infrastructure, then floor levels would be surveyed to determine the extent of impact. This would be undertaken with reference to the flood design criteria in Appendix E.

The preferred infrastructure would result in flood level increases at three residential buildings and one school that currently experience flooding above 10 millimetres during the one per cent AEP flood event. During smaller, more frequent events flood levels at these buildings would either reduce or they would no longer be flooded. Therefore, these impacts are considered to be minor

Impacts on the community in Moree have not been properly reported or quantified

Consideration was given to regional flooding impacts in the Moree area (based on flooding from the Gwydir and Mehi rivers) and the combined regional and local flooding impacts in section 6 of Technical Report 6, and were summarised in section 15.3.5 of the EIS. The assessment found that in the Moree area rail overtopping would marginally increase, there would be no additional impacts on the community due to flooding along Newell Highway, flood depths and extents around Moree would remain generally consistent with existing conditions and an additional 23 buildings would potentially be inundated.

The omission of Phase 2 from the preferred infrastructure now defers consideration of the impacts of flooding on the communities within the Gwydir-Mehi floodplain. As described above, further modelling has been undertaken following exhibition of the EIS, and has included the development of a calibrated model for the Gwydir-Mehi floodplain in conjunction with Council. Design outcomes for the floodplain would be addressed as part of Phase 2 of the Narrabri to North Star project.

7.8.9 Land use and property

ISSUE

It is unclear whether specific property resumption is required.

Response

A limited amount of property acquisition would be required to construct the preferred infrastructure.

Potential property acquisition requirements for the exhibited proposal were described in sections 7.5 and 20.3.2 of the EIS. Land requirements have been further refined for the preferred infrastructure, and are described in section 1.5 of Appendix B. Some additional land is required for the preferred infrastructure compared with the original estimates for the exhibited proposal.

Additional land would be required to accommodate:

- revisions to level crossings
- the upgraded track alignment
- the proposed cul-de-sac at the end of Joyce Avenue, which is required to construct the Jones Avenue overbridge
- infrastructure associated with the above.

At this stage of the design process, it is estimated that the land requirements for the preferred infrastructure would affect the following in the Moree Plains local government area:

- Private properties – 6 lots across 6 properties would be partially affected
- Government-owned land – 10 lots would be partially affected.

The indicative land requirements for the preferred infrastructure, and the reasons for the requirements associated with each lot, are described in Appendix H. The areas shown are estimated land requirements. The final acquisition areas would be confirmed during detail design in consultation with landowners.

ISSUE

Detailed consideration needs to be given to biosecurity in the construction and operation environmental management plans. Weeds of local and regional significance also require careful consideration, as does the development of strict protocols to prevent weed movement during construction and operation.

Response

In accordance with mitigation measure D11.7, the biodiversity management plan included in the CEMP would detail measures to minimise the potential for biosecurity risks during construction. Relevant measures would also be included in the OEMP.

The CEMP outline provided in Appendix K of this report has been updated to include reference to the *NSW Biodiversity Act 2015*, and relevant factsheets.

7.8.10 Socio-economic impacts

ISSUE

The impacts of the through town route on the Moree community (severance, impacts on emergency services access, community cohesion, corridor security, and amenity impacts) have not been fully resolved in the Environmental Impact Statement.

Response

The potential impacts of the exhibited proposal, including the section along the existing rail corridor within Moree, were assessed by the EIS in accordance with the SEARs and relevant assessment guidelines. Potential traffic, transport and access impacts were assessed by Technical Report 1 – Traffic, transport and access assessment, and the results were summarised in chapter 9.

The socio-economic assessment provided in chapter 21 of the EIS and Technical Report 11 included a review of potential direct and indirect impacts on the community (including residents and businesses), and described measures proposed to be implemented to minimise impacts on the community.

Section 21.4.3 of the EIS noted that the Jones Avenue overbridge was included in the exhibited proposal to allow for continuous and safe access between the east and the west for both vehicles and pedestrians. This assessment is still relevant to the preferred infrastructure. The overbridge may help to address community concerns regarding the potential for further severance caused by additional trains using the rail corridor.

As described in chapter 21 of the EIS, potential socio-economic impacts would continue to be avoided by:

- designing, constructing and operating the preferred infrastructure to minimise the potential for amenity impacts arising from traffic, noise and vibration, air quality, and visual amenity, including the implementation of mitigation measures
- minimising the potential for safety issues by implementing the mitigation measures
- implementing the socio-economic management and mitigation measures
- communicating with local residents and other relevant stakeholders to provide advance notice of construction activities and associated impacts, and provide information on the operation of the preferred infrastructure.

As described in section 21.4.3 of the EIS, the main potential for community amenity impacts relates to the increase in train movements along the preferred infrastructure site.

Changes to access, noise levels, air pollution, and visual changes from the presence of the proposal may impact on the amenity for the surrounding community.

Potential amenity impacts were considered in chapters 9, 11, 13, 19, and 21 of the EIS. Appropriate mitigation measures would be implemented during detailed design, construction and operation of the proposal to mitigate potential impacts on adjacent sensitive receivers. The mitigation measures that would be implemented are provided in section 13.1 of this report.

The approach to managing impacts during construction and operation is described in section 27.2 of the EIS. This would include implementing the mitigation measures, ARTC's Environmental Management System, the Inland Rail NSW Construction Noise and Vibration Management Framework, and the preferred infrastructure specific CEMP and OEMP.

ISSUE

The proposed Jones Avenue overpass on its own is not considered adequate to address severance impacts.

Response

As described in section 6.2 of the EIS, option development has been an integral part of the overall design process for the exhibited proposal, as it has for the preferred infrastructure. An iterative process of option selection, design development, and evaluation has been undertaken to define the preferred infrastructure.

As described in section 6.3.7 of the EIS, an assessment of options to minimise the potential impacts of the proposal on Moree was undertaken during the design process. The objective of the assessment was to consider options to minimise the impacts of the proposal on the Moree community. The options considered opportunities to improve vehicular, pedestrian, cyclist, and emergency vehicle access between the areas of Moree on either side of the existing rail corridor, and included an examination of an eastern deviation around the Moree urban area.

In addition to the do nothing option, the following connectivity options were assessed:

- level crossing upgrades
- footbridge(s)
- emergency vehicle only access
- Gwydir Highway detour
- Gwydir Highway bypass
- road overbridges within Moree.

Engagement with Moree Plains Shire Council and local emergency services identified that the provision of a road bridge over the rail corridor (a road overbridge), together with level crossing upgrades, would be the preferred solution to the connectivity issues. Three road overbridge options were assessed:

- Option 1: Jones Avenue overbridge – involves a three span bridge between Jones Avenue and Tycannah Street; spanning the rail corridor, Gosport Street, and the Moree Bypass.
- Option 2: Newell Highway (Frome Street) to Tycannah Street overbridge.
- Option 3: Newell Highway (Frome Street) to Bullus Drive overbridge.

The assessment concluded that the upgrade of existing level crossings, and provision of an additional road access across the corridor via a new overbridge at Jones Avenue, was the preferred connectivity option. This has not changed for the preferred infrastructure. Further information on the above options and the criteria used to assess the options is provided in section 6.2.7 of the EIS.

Engagement with Council has been ongoing throughout development of the preferred infrastructure. This engagement has considered:

- the need for pedestrian and vehicular crossings of the rail corridor in Moree in light of land use patterns
- Council's strategic planning for logistics and multi-modal activities
- transport planning for road freight vehicles.

The preferred infrastructure design, including the design of Jones Avenue overbridge, has been refined as a result of this ongoing consultation. As an outcome of this consultation which included CPTED workshop feedback, the potential for informal pedestrian connections between the proposed overbridge and Dingwall Place would be removed as part of the preferred infrastructure.

ARTC has also continued to engage with Council and Transport for NSW regarding options for an east–west heavy vehicle bypass of Moree, including integration of such a bypass with a potential intermodal terminal. ARTC commits to further engagement regarding these options, including the possibility of revising crossings of the railway line to improve connectivity.

Once Inland Rail is operating, the Jones Avenue overbridge is required to provide an alternative light vehicle and pedestrian route to the Alice Street and Bullus Drive crossings between East Moree and Moree. As such, the connection is not required until 2025, the scheduled year of opening of the full Inland Rail service.

ARTC commits to collaborating with Moree Plains Shire Council to review the functionality and location of crossings of the railway line to establish preferred crossing arrangements that will have regard to community expectations for connectivity, safety and a reduction in severance. An additional mitigation measure (D2.4) has been included to this effect.

ISSUE

Considerable design detail on the Jones Avenue overpass is required

Response

While refinements of the design have occurred as part of the preferred infrastructure design development the detailed design process would involve further resolution of the design for the preferred infrastructure, including the Jones Avenue overbridge. This would include the development of detailed plans and design drawings. Further consultation would be undertaken with relevant stakeholders during detailed design.

ISSUE

A grade separated pedestrian overpass is required to minimise potential severance impacts, and service the existing pedestrian movement path via Anne Street.

Response

As noted above, footbridges were one of the connectivity options considered as part of the process of identifying options to minimise the potential impacts of the preferred infrastructure on Moree. The preferred option identified in consultation with relevant stakeholders (including Council) was the provision of an overbridge at Jones Avenue, together with level crossing upgrades.

As described in section 7.3.3 of the EIS the Jones Avenue overbridge would include a shared pedestrian/cycle path. Additionally it is proposed to upgrade the pedestrian level crossing associated with Alice Street, plus the pedestrian level crossing adjacent to Moree Station to active controls. The preferred level crossing treatments would be further refined during detailed design, in consultation with relevant stakeholders, as committed to through mitigation measure D2.2.

7.8.11 Health and safety (security)

ISSUE

To achieve adequate corridor security, security fencing is required along the length of the through town section, between Bullus Drive and the Mehi River Bridge.

Response

Fencing requirements are currently being confirmed as part of the detailed design process, in consultation with adjacent landholders, the relevant council and other infrastructure owners. Fencing would be required to provide a higher level of corridor security given the anticipated number of train movements, to prevent safety issues for people and animals.

In Moree, it is anticipated that noise attenuation structures would be provided where required (expected to be north of Alice Street) instead of fencing. Elsewhere in Moree, the need for fencing is currently being confirmed in consultation with relevant stakeholders (including council, emergency services and community representatives). The aim is to establish practical solutions and reach a consensus with relevant parties on a suitable solution for addressing safety issues between Bulluss Drive and the Mehi River bridge.

In accordance with mitigation measure D16.1, a hazard analysis would be undertaken during detailed design to identify risks to public safety from the preferred infrastructure, and how these can be mitigated through safety in design.

In addition, mitigation measure O8.1 commits to implementing a safety awareness program to educate the community regarding safety around trains. This would including a focus on residents in Moree, particularly those living on eastern side of town, to ensure that residents are aware of the safety concerns associated with trains passing through town and encourage use of the Jones Avenue overbridge.

ISSUE

All grade separated crossings need full security, including throw screens, lighting, CCTV.

Response

The detailed design process would include consideration of the design of appropriate security features on the Jones Avenue and Newell Highway overbridges, in consultation with relevant stakeholders (including Council and Roads and Maritime). As noted in section 1.3.2 of the preferred infrastructure project description (provided in Appendix B), the Jones Avenue overbridge would include throw screens on both sides of the bridge.

As noted above, mitigation measure D16.1 commits to undertaking a hazard analysis during detailed design, to identify risks to public safety from the preferred infrastructure, and how these can be mitigated through safety in design.

In addition, mitigation measure O8.1 commits to implementing a safety awareness program to educate the community regarding safety around trains. This would include a focus on residents in Moree, particularly those living on eastern side of town, to ensure that residents are aware of the safety concerns associated with trains passing through town, and encourage use of the Jones Avenue overbridge or relevant active control pedestrian level crossings.

ISSUE

Double footpaths with shared cycle capacity should be provided on any road-based overbridge.

Response

As described in section 1.3 of the preferred infrastructure project description (Appendix B) the concept design for the Newell Highway overbridge includes a road pavement consisting of two lanes with a width of 3.5 metres each, and two shoulders with a width of 2.5 metres each while the concept design of the Jones Avenue overbridge includes a road pavement consisting of two lanes with a width of 3.5 metres each, northern and southern shoulders with widths of one metre and 1.4 metres, respectively, and one 1.5 metre wide shared pedestrian/cycle path with kerb separation on the northern side of the bridge.

The detailed design process would include consideration of the design of pathways on the Jones Avenue and Newell Highway overbridges in consultation with relevant stakeholders. Mitigation measure D2.2 commits ARTC to consulting with relevant stakeholders (including Moree Plains Shire Council, Roads and Maritime, and landowners) prior to finalising the detailed design of those aspects of the preferred infrastructure that impact on the operation of road and transport infrastructure under the management of these stakeholders.

Provision of the Jones Avenue overbridge would create a formalised and safe pedestrian crossing of the railway line and Newell Highway between Alice Street and Bulluss Drive. This linkage would enhance connectivity between residential areas east of the highway/railway and the cluster of schools in south Moree, which are generally located west of Frome Street and accessible off Jones Avenue.

As described above ongoing consultation with Council and other stakeholders has been undertaken during refinement of the preferred infrastructure, addressing CPTED and pedestrian movement matters.

7.9 Narrabri Shire Council

7.9.1 Traffic, transport and access

ISSUE

Need to ensure that the proposal would not impact on the operation of the Newell Highway and travel times during operation.

Response

The potential impacts of the proposal on traffic were assessed in Technical Report 1 and summarised in chapter 9 of the EIS. Peak hour modelling of Bullus Drive/Newell Highway undertaken as part of the traffic assessment found that the level of service A would be maintained. It was noted that additional delays could be experienced by traffic seeking to turn off the Newell Highway due to queued traffic obstructing progress along Bullus Drive, however assuming vehicles use the queuing areas and do not obstruct the through traffic lanes, Newell Highway traffic should not be delayed. The assessment also found that additional delays at the level crossing at Burrington Road/Newell Highway are not expected to impact this intersection. For the Newell Highway overbridge, the assessment found that for most road users, the operational situation would be essentially identical to the existing bridge. This assessment is still relevant to the preferred infrastructure as the key design features that could impact traffic along Newell Highway remain largely unchanged.

The Newell Highway overbridge would be designed in consultation with Roads and Maritime, to deliver the required standards for this portion of the Newell Highway.

Mitigation measure D2.1 commits to ensuring that the detailed design of the preferred infrastructure minimises the potential for impacts on the surrounding road and transport network, and property accesses. Mitigation measure D2.2 commits ARTC to seeking input from relevant stakeholders (including Narrabri Shire Council, Moree Plains Shire Council, Gwydir Shire Council, Roads and Maritime, and Transport for NSW) prior to finalising the detailed design of those aspects of the preferred infrastructure that impact on the operation of road and transport infrastructure under the management of these stakeholders.

ISSUE

Minimising delays to traffic at level crossings, and ensuring adequate space to queue safely, is essential.

Response

Following exhibition of the EIS ARTC prepared a Level Crossing Treatment Methodology to provide stakeholders with further detail regarding ARTC's decision making process behind the choice of treatments for level crossings. This methodology is provided in Appendix L. The level crossing methodology involved reviewing all crossings along the preferred infrastructure site to determine the works required to meet relevant crossing standards, guidelines, and Inland Rail operational criteria.

ARTC has a consistent process for selecting level crossing safety improvements. The process includes:

- conducting site visits and assessments
- seeking input from road authority or land owners
- designing a proposed solution (safety treatment)
- seeking feedback from road authority or landowner.

Implementation of the Level Crossing Treatment Methodology has informed the preferred infrastructure. Further information regarding what is proposed for level crossings within the preferred infrastructure site is provided in section 1.4.2 of Appendix B.

As the design of public level crossings is further refined ARTC would continue to use the Australian Level Crossing Assessment Model, which considers factors such as future road traffic numbers, vehicle type, train numbers, speeds, and sight distances. Updated traffic counts would also be sourced as part of this process.

Mitigation measure D2.1 commits ARTC to minimising potential impacts on the surrounding road and transport network during detailed design, and mitigation measure D2.2 commits ARTC to consulting with relevant stakeholders during this process.

ISSUE

Site specific construction traffic management plans should be required.

Response

Mitigation measure C2.1 commits to developing and implementing a traffic, transport and access management sub-plan as part of the CEMP in consultation with (where relevant) local councils, Roads and Maritime, Transport for NSW, and local public transport/bus operators.

ISSUE

During harvest time, the major storage sites and heavy vehicle transport companies should be given prior warning of works that will affect truck movements.

Response

Mitigation measure C2.2 commits to maintaining access to residences, services and businesses during construction. Where alternative access arrangements need to be made, these would be developed in consultation with affected property owners/occupants.

Mitigation measure D11.6 commits to continued consultation with key stakeholders regarding the proposal, in accordance with the communication plan described in chapter 4 of the EIS.

Mitigation measure C2.5 provides for consultation during construction with a particular focus on access. This measure requires that:

- Consultation with relevant stakeholders would be undertaken regularly to facilitate the efficient delivery of the proposal and to minimise congestion and inconvenience to road users. Stakeholders would include the relevant local council, bus operators, Roads and Maritime, emergency services, and affected property owners/occupants.
- The community would be notified in advance of any proposed road and pedestrian network changes through signage, the local media, and other appropriate forms of communication.
- Where changes to access arrangements are required, ARTC would advise landowners/occupants and consult with them in advance regarding alternative access arrangements.

ISSUE

Council should be informed of all changes to level crossings and detours during construction.

Response

As described above, ARTC has implemented the Level Crossing Treatment Methodology, which involved consulting with each council to confirm their preferred approach. Further information regarding what is proposed for level crossings within the preferred infrastructure site is provided in section 1.4.2 of Appendix B.

Mitigation measure D2.2 commits ARTC to continuing to seek input from relevant stakeholders, including local councils, prior to finalising the detailed design of those aspects of the preferred infrastructure that impact on the operation of road and other transport infrastructure under the management of these stakeholders.

As described above, mitigation measure C2.5 provides for consultation during construction with a particular focus on access.

ISSUE

Any new track required at level crossings should be constructed on the western side. Council should be specifically consulted on any instances where this is not possible.

Response

The majority of the preferred infrastructure involves upgrading the track at its existing location within the rail corridor. sections of new track within the rail corridor are proposed at Gurley and Moree stations (realignments) and at Bobbiwaa, Waterloo Creek, Tycannah Creek, Coolleearllee, and Murgo (new crossing loops). Of these sections, only the realignment at Moree Station coincides with a level crossing location.

As described above consultation has been undertaken with Council as part of implementation of the Level Crossing Treatment Methodology. Mitigation measure D2.2 commits ARTC to continuing to seek input from relevant stakeholders, including local councils, prior to finalising the detailed design of those aspects of the preferred infrastructure that impact on the operation of road and other transport infrastructure under the management of these stakeholders.

Additionally, mitigation measure O2.1 commits ARTC to reviewing operation of the level crossings that have been subject to changes to confirm that the infrastructure is appropriate for the traffic conditions.

7.9.2 Noise and vibration

ISSUE

The implementation of noise and vibration mitigation measures should be required as a condition of consent.

Response

Mitigation measure C4.1 commits ARTC to implementing the all feasible and reasonable noise and vibration mitigation measures during construction. The measure also requires any activities that could exceed the construction noise management levels and vibration criteria would be managed in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework, the noise and vibration management sub-plan and the Construction Noise and Vibration Impact Statements.

Mitigation measure D4.4 commits ARTC to undertaking an operational noise and vibration review to guide the approach to identifying feasible and reasonable mitigation measures to incorporate in the detailed design.

7.9.3 Hydrology and flooding

ISSUE

Flood modelling should be undertaken to confirm the extent of impacts on properties.

Response

A hydrology and flooding assessment was undertaken as part of the EIS to determine and assess the potential operational hydrology and flooding impacts of the exhibited proposal. The results of this assessment were provided in Technical Report 6 and were summarised in chapter 15 of the EIS. The assessment included modelling of the potential impacts.

The results of the assessment in terms of potential impacts on properties were summarised in section 15.3.5 of the EIS. The results indicated that within the Narrabri Shire local government area three structures (one house, one shed associated with a petrol station and one agricultural shed/outbuilding) located about 15 kilometres north of Narrabri, and two houses (one with two nearby sheds) located on the northern edge of Bellata, would potentially be inundated during the predicted one per cent AEP flood event.

However, it is noted that the flooding impacts reported in the EIS were based on preliminary hydrological modelling, which was undertaken in advance of obtaining detailed survey data for the rail corridor, including ground levels upstream and downstream of the exhibited proposal site.

As described in section 1.3 of this report additional flooding modelling has been undertaken to minimise the flood impacts associated with the exhibited proposal, and has informed the design of the preferred infrastructure. The results of this modelling are provided in Appendix E and summarised in section 11.2.

The additional flooding assessment determined that no buildings within the Narrabri Shire local government area would experience a flood level increase of more than 10 millimetre increase during the predicted one per cent AEP flood event.

Mitigation measure D6.1 commits ARTC to continue to refine the design of the preferred infrastructure to not materially worsen existing flooding characteristics, where feasible and reasonable, up to and including the one per cent AEP event. The detailed design would aim to achieve improved flood resilience and performance of the rail line, while not causing material flooding impacts in adjacent land, including inundation of dwellings.

ISSUE

Flood mitigation measures should be implemented to ensure that impacts are appropriately managed.

Response

As committed to in mitigation measure D6.1, design features will continue to be refined to not worsen existing flooding characteristics, where feasible and reasonable, up to and including the one per cent AEP event. Any flood modelling and mitigation would be undertaken in consultation with the relevant council.

7.9.4 Land use and property

ISSUE

Landowners should be fully consulted in relation to any property acquisition and land access requirements.

Response

Where any legal access to a property is permanently affected mitigation measure D2.1 commits ARTC to either providing an alternative access, or where there is not possible, undertaking negotiations with the landowner for acquisition in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991*.

Mitigation measure D11.2 commits to undertaking all property acquisitions in consultation with landowners, and in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991*.

ISSUE

The operation of rural properties should not be detrimentally effected by operation.

Response

Impacts to adjacent land users during operation of the exhibited proposal were considered in chapters 9 (traffic, transport and access), 11 and 12 (noise and vibration), 13 (air quality) 15 (hydrology and flooding), 20 (land use), 19 (landscape and visual) 21 (socio-economic) and 25 (health and safety) of the EIS. These assessments are generally still relevant to the preferred infrastructure as operational arrangements remain unchanged. Mitigation measures were provided to minimise the potential for any of the identified impacts on rural property operation and are summarised in section 13.1 of this report.

ISSUE

Council reiterates the availability of accommodation in Narrabri and Boggabri for construction personnel, and asks that it be consulted during preparation of the workers housing and accommodation plan.

Response

Noted. Mitigation measure D11.3 commits to the preparation of a workforce housing and accommodation plan which would include the requirement to consult with councils regarding the availability of accommodation.

PART C

Preferred infrastructure report

8. Context for the Preferred infrastructure

ARTC has refined a number of aspects of the proposal as exhibited in the EIS in response to issues raised in submissions, during consultation, and as a result of further design work. This section provides the context and justification for these changes. The Preferred infrastructure is described in section 9. The potential impacts of these changes are considered in sections 10 to 12.

8.1 Statutory context

The statutory context and approval requirements for the proposal are described in Chapter 3 of the EIS. The project is critical State significant infrastructure and requires assessment and approval in accordance with Division 5.2 of the EP&A Act.

This report has been prepared in accordance with section 5.17(6) of the EP&A Act, which specifies that

'The Secretary may require the proponent to submit to the Secretary:

a) a response to the issues raised in those submissions, and

b) a preferred infrastructure report that outlines any proposed changes to the State significant infrastructure to minimise its environmental impact or to deal with any other issue raised during the assessment of the application concerned.'

Section 5.17(6) provides for changes to an exhibited project (referred to as the 'exhibited proposal' in this report) in the form of a preferred project (referred to as 'preferred infrastructure' in this report), to respond to issues raised during the assessment or minimise the environmental impact. In accordance with section 5.17(6)(b) the exhibited proposal has been revised to minimise its environmental impacts and address issues raised during exhibition.

8.2 Preferred infrastructure – key changes and justification

The key differences between the preferred infrastructure and the exhibited proposal are:

- omission of the section of corridor between Moree and Camurra North (now referred to as 'Phase 2' to allow additional consideration of the potential impacts on hydrology and suitable design responses and mitigation (see section 8.2.1)
- changes to the alignment of the track to further minimise the potential for hydrological, traffic, operational noise, ecological and construction impacts (see section 8.2.2)
- changes to locations of level crossings, crossing loops and associated rail sidings improve road/rail safety and address the integration with other infrastructure (see section 8.2.3)
- design changes to the Jones Avenue overbridge as a result of community and stakeholder consultation post exhibition
- refinement of operational noise and vibration impacts assessment and clarification of locations where noise mitigation measures are anticipated
- refinements of the construction methodology and program to limit conflicts with grain freight requirements through the summer period.

Further justification for the key changes is provided in the following sections. Chapter 9 provides a detailed description of the changes.

8.2.1 Project extent and flooding issues

ARTC has developed an assessment process to allow a safe and efficient determination of appropriate flood resilience across the Inland Rail program. The process involves an initial assessment of the existing flood resilience for each water crossing, and where this currently has a flood resilience of one per cent annual exceedance probability (one per cent AEP) or higher, this standard is maintained. However, where the flood resilience is currently less than one per cent AEP, a decision is made on the acceptability of the existing situation and an appropriate upgrade provided (if required) to achieve the design flood resilience.

The implications of adopting a flood resilience lower than one per cent AEP are assessed by a risk assessment. This involves assessing a range of risk factors to determine if it is feasible to lower the flood resilience while maintaining an acceptable risk of damage to the track and risk of closure by flooding. The risk assessment uses a multi-criteria analysis to combine a number of criteria and concludes with an acceptable risk. The increased risk, as a result of lowering the flood resilience, is considered in conjunction with the cost. The end result of this analysis is a flood resilience that balances the cost of construction and the risk from a range of criteria.

Constructing the preferred infrastructure across floodplains and watercourses will affect flood flow patterns. The design must ensure that these impacts are kept within acceptable limits. Appropriate design will also be undertaken to ensure that water velocities and downstream impacts are modelled and managed.

The proposal scope has been revised to omit a section of corridor between Moree and Camurra North (chainages 665.920 to 681.00 km) across the Mehi-Gwydir floodplain. The EIS identified the potential for flooding impacts, mainly located in this area. The proposed phasing of the proposal allows for further design revision in conjunction with more detailed assessment of potential flood impacts and refinement of the design to minimise these impacts.

As an outcome of these investigations, and to facilitate delivery of the proposal, ARTC divided the proposal into two phases. ARTC is currently seeking approval to undertake Phase 1, which is referred to as the preferred infrastructure in this report.

8.2.2 Horizontal and vertical realignment

Horizontal realignment of the track has occurred at number of locations to ease the curves of the existing alignment and enable higher design speeds to be achieved for mainline rail traffic.

Following the issue of the updated guideline *Australian Rainfall and Runoff 2016*, and as a result of further engagement with stakeholders, revised hydrological modelling was completed. This resulted in an increase in design flows and flood levels at the rail corridor. To maintain the flood resilience of the rail infrastructure, the design has been revised to include a lift of the vertical alignment at about 28 locations. Consequently, upgraded drainage outcomes have been established, along with changes to level crossings and bridges.

In locations where a lift of the line is not required for flood management purposes, a general 300 millimetre lift of the track would occur to allow for installation of new componentry and increased ballast depth. This approach minimises the need to cut the existing formation to an excessive level and supports efficiencies in earthworks.

8.2.3 Crossing loop changes

The relative position of crossing loops to level crossings has been revised as a consequence of the level crossing assessment process (see Appendix B). The necessity of maintaining road connectivity was balanced against the safety objective to minimise the number of level crossings and the operational capacity of the line in terms of transit times, run times of sections, and where there is a need for trains to pass one another.

8.3 Key features of the Preferred infrastructure

In general terms the preferred infrastructure is consistent with the exhibited proposal, being the upgrade of the railway line between Narrabri and North Start, including the reconstruction of rail infrastructure and associated ancillary works and the mitigation of impacts on adjacent properties, infrastructure and services.

The key features of the preferred infrastructure include:

- upgrading the track, track formation, culverts and underbridges, within the existing rail corridor, in two sections:
  - between Narrabri and Alice Street in Moree (a distance of about 93 kilometres)
  - between Camurra North and North Star (a distance of about 80 kilometres)
- realigning the track within the existing rail corridor at Gurley and Moree stations
- providing five new crossing loops within the existing rail corridor at Bobbiwaa, Waterloo Creek, Tycannah Creek, Coolleearllee, and Murgo
- removing the existing bridge and providing a new rail bridge over Croppa Creek
- realigning about 1.5 kilometres of the Newell Highway near Bellata, and providing a new road bridge over the existing rail corridor (the Newell Highway overbridge)
- providing a new road bridge over the existing rail corridor at Jones Avenue in Moree (the Jones Avenue overbridge).

Further information on the preferred infrastructure is provided in Chapter 9 and Appendix B.

8.4 Phase 2 of the Inland Rail Narrabri to North Star Project

Phase 2 consists of the section between Moree and Camurra North (chainages 665.920 to 681.00 km). Phase 2 will be subject to a separate application and assessment process. The works for Phase 2 are permissible without development consent under *State Environmental Planning Policy (Infrastructure) 2007*.

The Phase 2 works constitute State significant infrastructure under *State Environmental Planning Policy (State and Regional Development)* 2011. As a result, Phase 2 will be subject to approval by the NSW Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act. ARTC will submit a State significant development application and seek the SEARs to define the assessment requirements for Phase 2. ARTC also intends to seek a declaration from the Minister for Planning and Public Spaces that Phase 2 is critical State significant infrastructure, consistent with Phase 1 and various other NSW sections of Inland Rail.

The need for a referral and approval under the EPBC Act will be confirmed as part of the assessment process for Phase 2.

Once SEARs are received, Phase 2 would be assessed by preparing an EIS in accordance with the SEARs and any EPBC Act controlled action requirements. The EIS would be publicly exhibited in accordance with the requirements of Division 5.2 of the EP&A Act.

The timing of Phase 2 is subject to ARTC's commercial requirements and delivery of the overall Inland Rail program.

Should there be a delay between completing construction of the preferred infrastructure and commencing construction of Phase 2, existing rail movements through the Phase 2 corridor (between Moree and Camurra North) would continue during this period. It is noted that these movements would be limited to lighter weight rail traffic due to existing track limitations.

9. Preferred infrastructure – operational features

This section summarises the preferred infrastructure's operational features and construction methodology compared with the exhibited project's operational features. A detailed description of the preferred infrastructure is provided in Appendix B, including how the preferred infrastructure would be constructed and operate.

9.1 Design features

This section summarises the preferred infrastructure's operational features and construction methodology compared with the exhibited project's operational features. A detailed description of the preferred infrastructure is provided in Appendix B, including how the preferred infrastructure would be constructed and operate.

9.1.1 Key Preferred infrastructure features within the existing rail corridor

The key features within the rail corridor proposed as part of the exhibited proposal and those proposed as part of the preferred infrastructure are summarised in Table 9.1.

TABLE 9.1: KEY FEATURES WITHIN THE RAIL CORRIDOR

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Track upgrading	
The existing track would be upgraded within the existing rail corridor for a distance of about 188 kilometres. All of the existing track would be upgraded in some way. This would involve a combination of: ▸ track reconstruction ▸ skim reconditioning ▸ skim plus reconditioning. Ballast would be reused in the construction of track formation, with any geotechnically unsuitable ballast being used for the formation of spoil mounds.	The existing track would be upgraded within the existing rail corridor for a distance of about 93 kilometres between Narrabri and Moree, and about 80 kilometres between Camurra North and North Star. Upgrading the existing track (and associated works) between Moree and Camurra North is no longer part of the preferred infrastructure. All of the existing track would be upgraded through track reconstruction. All ballast would be reused in the construction of the track formation. Unsuitable ballast would be blended with other materials from the formation and stabilised with lime if necessary to create the required geotechnical properties to allow reuse. The height of the railway formation would be changed at various locations to improve flood resilience. The horizontal alignment of the track would be changed at various locations to ease curves.
Track realignment / Station works	
At Bellata, Gurley, and Moree stations the rail line would be reconfigured within the existing rail corridor. At Bellata Station, the realignment works would involve reconfiguring the existing crossing loop to allow trains on the main rail line to bypass the platform with sufficient clearance. At Gurley and Moree stations, the realignment works would involve moving the existing track about 125 millimetres away from the existing station platform to allow Inland Rail trains to pass the station platform. The eastern side of the platform at Moree Station may need to be upgraded.	At Gurley and Moree stations the rail line would be reconfigured within the existing rail corridor. The realignment works at these stations would be as per the exhibited proposal. No works are proposed at Bellata Station. The eastern side of the platform at Moree Station would be straightened and potentially resurfaced. Additional works near Moree Station would involve upgrading the existing pedestrian level crossing at the northern end of the station with an automated gated zig-zag maze route. The works at Moree Station are shown on Figure 9.1.

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Additional works near Moree Station involve upgrading the existing pedestrian level crossing at the northern end of the station to include gates with lights and bells to alert passengers of approaching trains.	At Edgeroi and Gurley stations, the existing decommissioned platforms and station buildings and/or huts would be removed. A new mitigation measure, D5.2, has been added to allow for hazardous materials surveys to be undertaken prior to any building removal.
Culverts and underbridges	
There are 211 culverts and 17 underbridges along the rail alignment within the exhibited proposal site. The majority of these structures (187 culverts) need to be replaced. In addition, 24 of the culverts are proposed to be either retained or extended, pending further assessment. Seven new culverts would also be built along the new alignment at the Camurra bypass. Culverts would be constructed of concrete, and would consist of three types. Underbridges would be constructed of reinforced concrete with a ballast top.	There are 177 culverts and eight underbridges along the rail alignment within the preferred infrastructure site. The majority of these structures (171 culverts and seven underbridges) need to be replaced. In addition, six of the culverts and one of the underbridges are proposed to be retained. Fifty new culverts would also be built along the rail alignment to improve flood resilience. The Camurra bypass is no longer part of the preferred infrastructure (deferred for further consideration in Phase 2).
Crossing loops	
Five new crossing loops are proposed at Bobbiwaa, Waterloo Creek, Tycannah Creek, Coolleearllee, and Murgo. The loops would be constructed as new sections of track roughly parallel to the existing track. They would each be about 2200 metres long, to fit the design length of the train (1800 metres).	As per the exhibited proposal five new crossings loops are proposed at Bobbiwaa, Waterloo Creek, Tycannah Creek, Coolleearllee, and Murgo. However, the locations of the crossing loops have been refined so that there are no interactions between the crossing loops and driveways, roads and other access points. The change in crossing loop locations between the exhibited proposal and the preferred infrastructure are shown in Figure 9.2.
Turnouts	
New turnouts would be provided at the beginning and end of each crossing loop (ten in total) as well as at Bellata Station. Eighteen turnouts would also be replaced at existing siding locations.	Ten new turnouts would be provided as per the exhibited proposal; however, no works are proposed at Bellata Station. All turnouts would be replaced at existing siding locations.
New bridges	
New bridges would replace the existing bridges over Mehi and Gwydir rivers and Croppa Creek. The existing bridges would be removed prior to construction to allow construction of the new bridges on the same alignment.	A new bridge would replace the existing bridge over Croppa Creek. No works are proposed to the bridges over Mehi and Gwydir rivers (deferred for further consideration in Phase 2). The design of Croppa Creek bridge would be as per the exhibited proposal with some minor modifications (type of bridge structure, length and height).

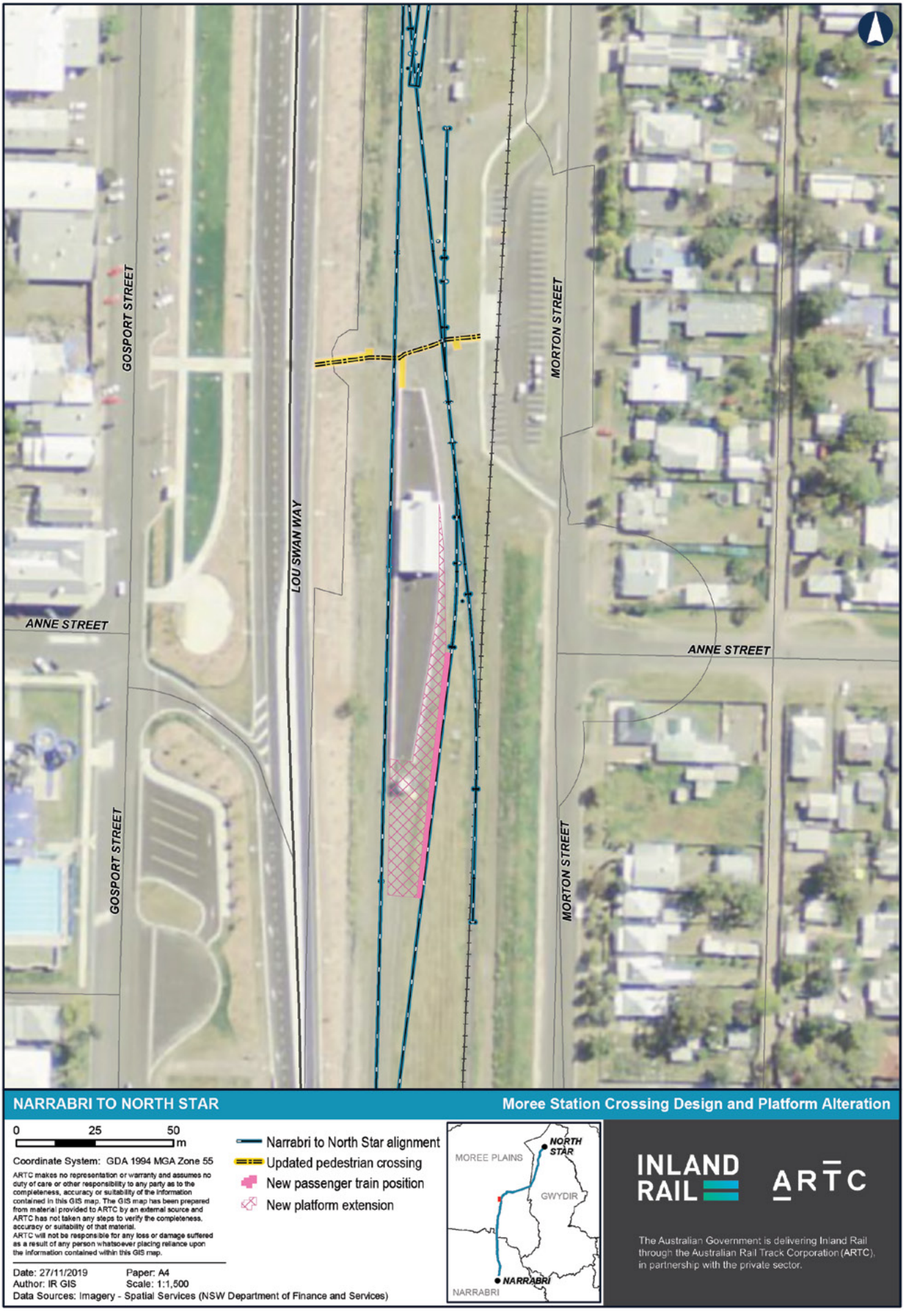

FIGURE 9.1: WORKS AT MOREE STATION

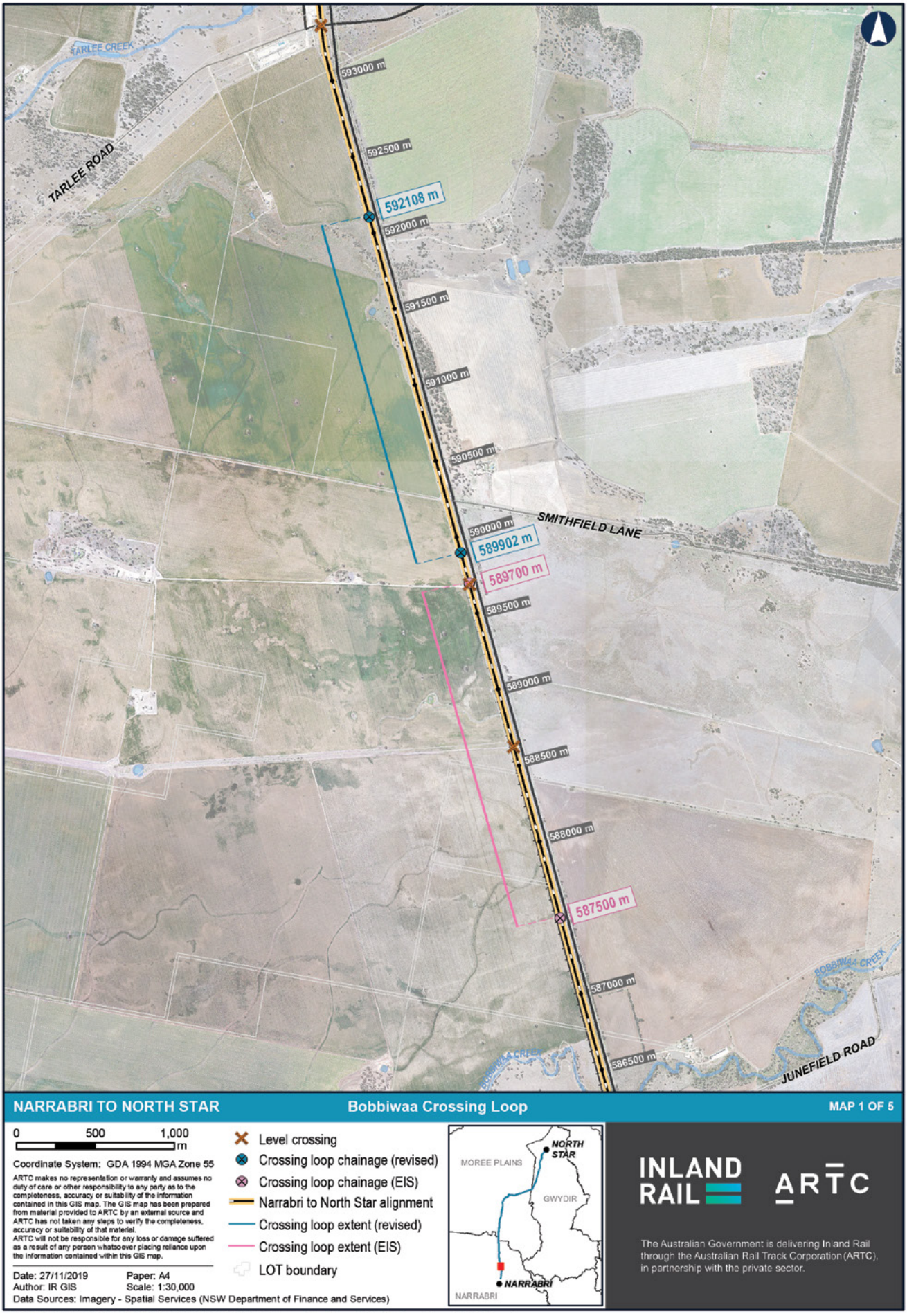

FIGURE 9.2: CHANGE IN CROSSING LOOP LOCATIONS BETWEEN EXHIBITED PROPOSAL AND PREFERRED INFRASTRUCTURE


631500 m
631000 m
630748 m
630500 m
630400 m
630000 m
629500 m
629000 m
628526 m
628500 m
628200 m
628000 m
627500 m
WATERLOO CREEK
NARRABRI TO NORTH STAR
Waterloo Creek Crossing Loop
MAP 2 OF 5
0
400
800
m
Coordinate System: GDA 1994 MGA Zone 55
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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: 27/11/2019
Paper: A4
Author: IR GIS
Scale: 1:20,000
Data Sources: Imagery - Spatial Services (NSW Department of Finance and Services)
Level crossing
Crossing loop chainage (revised)
Crossing loop chainage (EIS)
Narrabri to North Star alignment
Crossing loop extent (revised)
Crossing loop extent (EIS)
LOT boundary
MOREE PLAINS
NORTH STAR
GWYDIR
NARRABRI
NARRABRI
INLAND RAIL
ARTC
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658000 m
657617 m
657500 m
657000 m
656500 m
656000 m
655400 m
655396 m
655000 m
654500 m
654000 m
653500 m
653200 m
653000 m
NARRABRI TO NORTH STAR
Tycannah Creek Crossing Loop
MAP 3 OF 5
0
500
1,000
m
Coordinate System: GDA 1994 MGA Zone 55
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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.
Level crossing
Crossing loop chainage (revised)
Crossing loop chainage (EIS)
Narrabri to North Star alignment
Crossing loop extent (revised)
Crossing loop extent (EIS)
LOT boundary
Date: 27/11/2019
Author: IR GIS
Paper: A4
Scale: 1:25,000
Data Sources: Imagery - Spatial Services (NSW Department of Finance and Services)
MOREE PLAINS
NORTH STAR
GWYDIR
NARRABRI
NARRABRI
INLAND RAIL
ARTC
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VALLAROI CREEK
741000 m
740500 m
740000 m
739500 m
TUMBA ROAD
739000 m
738885 m
738500 m
738300 m
738000 m
737500 m
736662 m
736500 m
PLEVNA ROAD
736000 m
ROPPA CREEK ROAD
ROPPA CREEK
NARRABRI TO NORTH STAR
Coolleearllee Crossing Loop
MAP 4 OF 5
0
500
1,000
m
Coordinate System: GDA 1994 MGA Zone 56
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Date: 27/11/2019
Paper: A4
Author: IR GIS
Scale: 1:25,000
Data Sources: Imagery - Spatial Services (NSW Department of Finance and Services)
Level crossing
Crossing loop chainage (revised)
Crossing loop chainage (EIS)
Narrabri to North Star alignment
Crossing loop extent (revised)
Crossing loop extent (EIS)
LOT boundary
MOREE PLAINS
NORTH STAR
GWYDIR
NARRABRI
NARRABRI
INLAND RAIL
ARTC
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WONGABINDIE ROAD
CALIMPA ROAD
WONGABINDIE ROAD
694000 m
694500 m
695000 m
695500 m
696000 m
696500 m
696700 m
697000 m
697134 m
697500 m
698000 m
698500 m
699000 m
699356 m
699500 m
CREAMIN CREEK
NARRABRI TO NORTH STAR
Murgo Crossing Loop
MAP 5 OF 5
0
500
1,000
m
Coordinate System: GDA 1994 MGA Zone 56
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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: 27/11/2019
Author: IR GIS
Paper: A4
Scale: 1:30,000
Data Sources: Imagery - Spatial Services (NSW Department of Finance and Services)
Level crossing
Crossing loop chainage (revised)
Crossing loop chainage (EIS)
Narrabri to North Star alignment
Crossing loop extent (revised)
Crossing loop extent (EIS)
LOT boundary
MOREE PLAINS
NORTH STAR
GWYDIR
NARRABRI
NARRABRI
INLAND RAIL
ARTC
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9.1.2 Key Preferred infrastructure features outside the existing rail corridor

The key features outside the rail corridor proposed as part of the exhibited proposal and those proposed as part of the preferred infrastructure are summarised in Table 9.2.

TABLE 9.2: KEY FEATURES OUTSIDE THE RAIL CORRIDOR

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Newell Highway overbridge	
A new road overbridge is proposed to enable the Newell Highway to pass above the rail corridor with sufficient clearance for double stacked Inland Rail trains to pass beneath. The overbridge would consist of about 1.5 kilometres of new two-lane road with a design speed of 100 kilometres per hour and a maximum grade of four percent. It would include a bridge structure and two tie-ins.	As per the exhibited proposal with the following key changes: ▸ design speed of 120 kilometres per hour (vs 100 kilometres per hour) ▸ 37 metres long (vs 83 metres long for exhibited proposal) with a refined bridge structure design ▸ Includes a one metre wide median strip ▸ Includes vertical protection screens.
Camurra bypass	
A new 1.6 kilometre section of track would be built at Camurra outside the existing rail corridor to allow trains to bypass the existing hairpin curve.	No works would be undertaken on the Camurra bypass (deferred for further consideration in Phase 2).
Jones Avenue overbridge	
Construction of a road overbridge and road connections between Jones Avenue to the west of the rail corridor (between Warialda Street and Joyce Avenue) and Tycannah Street to the east of the road corridor. The overbridge would enable road traffic to pass over Gosport Street, the Moree Bypass, and the rail corridor. Truck access to the industrial area south of Jones Avenue would be maintained or appropriate alternative access routes created. The overbridge would consist of about 620 metres of new road with a design speed of 50 kilometres per hour, and would include a bridge structure and two tie-ins. Construction of the road overbridge would involve modifications to the intersection of Joyce and Jones Avenues (west of the rail corridor).	A road overbridge would be provided as per the exhibited proposal with some minor modifications to the design (shoulder width and embankment dimensions). The overbridge would enable road traffic and pedestrians to pass over Gosport Street, the Moree Bypass, and the rail corridor. The overbridge would also enable temporary heavy vehicle use in instances where there is a blockage of the existing level crossings. Construction of the road overbridge would involve removal of the intersection between Joyce and Jones Avenues (west of the rail corridor). The northern end of Joyce Avenue would be converted to a cul-de-sac, with access to Joyce Avenue via the existing intersection with Frome Street to the south.

9.1.3 Ancillary works and infrastructure

Ancillary works and infrastructure proposed as part of the exhibited proposal and those proposed as part of the preferred infrastructure are summarised in Table 9.3.

TABLE 9.3: ANCILLARY WORKS AND INFRASTRUCTURE

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Track drainage	
Drainage in the form of a cess drain would be installed within the rail corridor adjacent to the track. Cess drains are proposed where the upstream catchment has an area of 5000 square metres or greater, and is within 25 metres of the rail line.	Longitudinal drainage in the form of cess and toe drains would be installed within the rail corridor adjacent to the track. Culverts would also be provided beneath roads at levels crossings to provide local drainage connectivity and the continuity of cess drains. Localised open channels would be provided to manage surface water flows at level crossings and direct cess drainage to suitable cross culverts or public drainage discharge points.
Spoil mounds	
Excess material resulting mainly from the excavation of track formation and cess drains would be stockpiled along the rail corridor. Spoil mounds would be designed to have a maximum height of two metres (about one metre above the top of the rails), and in some cases, may need to be located on both sides of the rail track.	Excess material (spoil) would be used as follows: 1. Reconstruction of the track formation to the design's vertical alignment (the preferred option) 2. Spread within the rail corridor 3. Formation of spoil mounds for any excess spoil remaining after options 1 and 2 are implemented. Current estimates of earthworks and spoil volumes indicate that there would be a very limited amount of excess spoil remaining after the track formation is reconstructed. See section 2.2.10 of the preferred infrastructure project description (Appendix B) for further information regarding how spoil would be used during construction.
Level crossings	
Works at the majority of the 86 level crossings (41 private and 46 public) along the proposal site are required. In summary: ▸ 2 private level crossings and 6 public level crossings would be considered for consolidation ▸ 16 private level crossings would be upgraded ▸ 23 private level crossings and 26 public level crossings would retain their existing treatments ▸ 13 public level crossings would have gates and require call access to open.	Works at the majority of the 72 level crossings (34 private and 38 public) along the preferred infrastructure site are required. ▸ In summary: ▸ 8 private level crossings and 1 public level crossings would be consolidated or closed ▸ 1 private level crossings and 13 public crossings would be upgraded ▸ 25 private level crossings and 24 public level crossings would retain their existing treatments.
New fencing	
Existing fencing along the rail corridor would be replaced as required. Where the corridor abuts a public road, fencing would be installed on the field side only. Along sections of the rail line in Moree noise attenuation structures would be constructed instead of fencing.	▸ Existing fencing would be replaced as per the exhibited proposal. ▸ Noise attenuation structures would be constructed instead of fencing at the following locations: ▸ Bellata ▸ Gurley ▸ Moree ▸ Croppa Creek ▸ North Star.

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Signage	
Signage would be replaced as required.	As per the exhibited proposal.
Rail maintenance access roads	
No rail maintenance access roads were proposed as part of the exhibited proposal.	The preferred infrastructure provides for a rail maintenance access roads within the corridor.

9.1.4 Land acquisition

The land requirements for the exhibited proposal comprised a total of three privately owned lots. Land requirements have been further refined for the preferred infrastructure, resulting in some additional land being required for the preferred infrastructure compared with the original estimates for the exhibited proposal.

It is estimated that the land requirements for the preferred infrastructure would be as follows:

- Private properties – 16 lots across 14 properties would be partially affected. Five of these properties are owned by GrainCorp.
- Government-owned land – 13 lots would be partially affected, owned by the Country Rail Infrastructure Authority, State Rail Authority, Transport for NSW and the State of NSW.

Additional land would be required to accommodate:

- revisions to level crossings
- the upgraded track alignment
- the proposed cul-de-sac at the end of Joyce Avenue, which is required to construct the Jones Avenue overbridge
- infrastructure associated with the above.

Temporary occupation of land adjacent to the final rail corridor would also be required to facilitate construction.

Further information regarding the land requirements for the preferred infrastructure is provided in section 1.5 of the preferred infrastructure project description (Appendix B of this report).

9.2 Operation

Operation of the preferred infrastructure would be as described in section 7.6 of the EIS and in the preferred infrastructure project description provided in Appendix B of this report.

9.3 Construction

The following aspects of the preferred infrastructure construction methodology would be as per the exhibited project:

- the approach to avoiding or minimising impacts during construction (described in section 8.1.1 of the EIS and in Appendix B of this report)
- the construction methodology for the following aspects:
  - track works including track upgrading (for track reconstruction only), track realignment works, culvert replacement, crossing loops and turnouts and track drainage (described in section 8.2.2 of the EIS and Appendix B of this report)
  - Croppa Creek bridge (described in section 8.2.4 of the EIS and Appendix B of this report)
  - Newell Highway overbridge, with the exception of the installation of vertical protection screens for the preferred infrastructure (described in section 8.2.4 of the EIS and Appendix B of this report)
- the construction methodology associated with:
  - site establishment (described in section 8.2.1 of the EIS and Appendix B of this report)
  - testing and commissioning (described in section 8.2.9 of the EIS and Appendix B of this report)
  - finishing works/reinstatement (described in section 8.2.10 of the EIS and Appendix B of this report).
- construction materials, plant and equipment and servicing requirements
- access to compounds, alternative public transport arrangements and haul routes.

The following sections highlight the differences between aspects of the construction methodology for the preferred infrastructure compared with the exhibited project.

9.3.1 Construction methodology

Table 9.4 summarises the construction methodology for the preferred infrastructure compared with that for the exhibited proposal for those aspects that have changed.

TABLE 9.4: CONSTRUCTION METHODOLOGY

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Construction footprint	
The proposal site for the exhibited proposal was the area that would be directly impacted by the construction of the proposal and includes the location of operational infrastructure. It is generally considered to have a width of 30 metres, providing for a 15 metre buffer on each side of the alignment centreline. The proposal site was assumed to include all the required track and associated infrastructure, cess drains, haul roads, culverts, level crossings, and spoil mounds. The proposal site also includes the location of construction compounds. The following additional assessment areas outside the proposal site were also considered for the biodiversity and heritage assessments as there was the potential for disturbance to occur in these areas during construction– an approximate 60 metre buffer around culverts/underbridges and the new bridges over the Mehi and Gwydir rivers and Croppa Creek; an approximate 120 metre buffer around level crossings, and some additional areas to provide flexibility for future planning and design work. These areas did not form the proposal site for the purposes of the EIS.	In developing the preferred infrastructure ARTC has considered learnings from the Parkes to Narromine project, which is currently under construction, and expanded the potential construction footprint beyond the proposal site and additional assessment areas defined in the EIS, to allow for ancillary works including fence relocations, signalling upgrades, utilities relocation and the provision of a rail maintenance access road. These works are described in the preferred infrastructure project description (Appendix B). The inclusion of these additional areas has increased the potential construction footprint for the preferred infrastructure by about 1,000 hectares compared with the exhibited proposal footprint. In estimating the additional construction area required to construct these ancillary features ARTC has taken a conservative approach and it is likely that the final construction footprint would be much smaller. Further refinement of the potential construction footprint would be undertaken as the design develops and construction planning commences.
Rail maintenance access road	
Construction of a rail maintenance access road was not proposed as part of the exhibited proposal.	The construction methodology for the rail maintenance access roads are provided in section 2.2.2 of Appendix B.
Underbridges	
Underbridge replacement would involve: ▸ install substructure components including bored/ precast concrete/ steel piles beneath the existing structure ▸ during a track possession remove existing superstructure (including girders) and substructure components (abutments and piers) and store at nominated locations within the rail corridor ▸ install any new substructure precast concrete components on the new substructure/ piles ▸ place new girders (concrete) on the new concrete substructures ▸ place ballast, sleepers and rail on top of the new bridge and tamp and profile the ballast under and around the sleepers and weld up tracks ▸ install guard rails as required.	Generally as per the exhibited proposal with the exception that the existing superstructure would be removed first unless piling can be undertaken prior during possession windows.

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Jones Avenue overbridge	
Construction of the bridge would generally involve: ▸ bridge works ▸ embankment and pavement works ▸ finishing and landscaping works.	Construction of Jones Avenue would be as per the exhibited proposal with the exception that removal of buildings may be required in Joyce Avenue to facilitate the truncation of Joyce Avenue. Building removal works would be undertaken at the same time as finishing and landscaping of the bridge. The construction methodology for the building removal works is provided in section 2.2.7 of Appendix B. A new mitigation measure, D5.2, has been added to allow for hazardous materials surveys to be undertaken prior to any building removal.
Signalling and communications	
Limited signalling and communications works were proposed for the exhibited proposal.	Construction of the preferred infrastructure would require upgrades to the overhead electrical network to supply power to infrastructure and the provision of new cable signal runs. The construction methodology for the signalling and communications works is provided in section 2.2.8 of Appendix B.
Earthworks	
Earthworks would be required for the construction of the majority of the exhibited proposal features. Excess spoil was proposed to be formed into spoil mounds that would be located on the outer edge of the rail corridor.	As per the exhibited proposal earthworks would be undertaken for construction of the majority of preferred infrastructure features. However, excess material (spoil) would be used as follows during construction: ▸ to widen the track formation ▸ in the construction of the rail maintenance access roads ▸ spread within the rail corridor. The creation of spoil mounds would be a last resort and the location, sizing and design of the mounds, if required, would be determined during detailed design.

9.3.2 Construction timing, staging and working hours

Table 9.5 highlights the differences between the construction timing, staging and working hours for the preferred infrastructure compared with the exhibited proposal.

TABLE 9.5: TIMING, STAGING AND WORKING HOURS

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Timing	
Construction of the proposal would commence once all necessary approvals are obtained, and the detailed design is complete. It is anticipated that construction would take about 24 months, commencing in mid 2018, and concluding in mid 2020.	Construction of the preferred infrastructure would commence once all necessary approvals are obtained, the detailed design is complete and contractor engagement finalised. It is anticipated that construction would take about 44 months, commencing in late 2020 and concluding in mid 2024.

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Staging	
It is anticipated that works would commence north of Moree, then move north of Narrabri in stages, as follows: ▸ Stage 1 – Camurra to North Star ▸ Stage 2 – Narrabri to Bellata ▸ Stage 3 – Bellata to Moree South ▸ Stage 4 – Moree South to Camurra. Construction of the Newell Highway overbridge, the Camurra bypass, and the Jones Avenue overbridge would be undertaken in parallel with the above stages. In general, roster possessions are proposed involving 16 days of rail closure followed by five days of open rail. Bus services and road haulage would replace passenger and freight (including grain) rail services.	Works between Moree and Camurra North are no longer part of the preferred infrastructure (deferred to Phase 2). Construction would be completed in three stages: ▸ Stage 1 – Penneys Road to Narrabri. ▸ Stage 2 – Camurra to North Star. ▸ Stage 3 – Penneys Road to Moree South. The above staging timing has considered the grain harvest and peak grain freight movement period so that grain movements during the grain freight season would be able to use rail services, unless otherwise agreed with grain handlers. In general, the rail would be closed (full possession) during construction of the above stages, either in the areas where the works are being undertaken (the stage) or across the whole Narrabri to North Star line. Bus services and road haulage would replace passenger and freight (including grain) rail services.
Working hours	
Construction work would be undertaken during the following primary proposal construction hours: ▸ Monday to Friday: 6am to 6pm ▸ Saturday: 6am to 6pm ▸ Sundays and public holidays: 6am to 6pm. Works would also be undertaken during 24 hour possessions, where required	The primary proposal construction hours are as per those for the exhibited proposal. However, works would also be undertaken on a 24 hour basis where the following conditions are met: ▸ there are no sensitive receivers located within 700 metres of construction works and 1500 metres of bridge works ▸ an alternative arrangement with an individual or a group of impacted property occupiers has been reached ▸ a temporary rail possession is necessary to complete work for safety reasons (such as installation of T-spans at Jones Avenue) ▸ delivery of materials is required hour of hours by the NSW Police Force, Roads and Maritime Services, National Heavy Vehicle Regulator or other authority for safety reasons ▸ it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm.

9.3.3 Other construction elements

Table 9.6 highlights the differences between the compounds, resources, transport access and haulage for the preferred infrastructure compared with the exhibited proposal.

TABLE 9.6: OTHER CONSTRUCTION ELEMENTS

EXHIBITED PROPOSAL WORKS	PREFERRED INFRASTRUCTURE WORKS
Compounds	
Two types of compound areas are proposed; minor compound/storage areas (within the rail corridor) and larger compound sites (outside the rail corridor). Larger temporary compounds would be sited outside the existing rail corridor every 4.5 to 5 kilometres.	The types of compounds proposed would be as per the exhibited proposal. However, less compounds outside the rail corridor are proposed for the preferred infrastructure. Indicative compound locations are shown in Figure 2.2 in Appendix B.
Construction workforce	
For the majority of the construction period the workforce would average about 180 people.	For the majority of the construction period the workforce would average about 200 people.
Access to construction work areas	
Access to the construction work areas would mainly be from public roads or existing access routes which are located within the rail corridor. Generally, access to construction stage 2 would be from Narrabri, access to construction stage 3 and stage 4 would be from Moree and access to construction stage 1 would be from Moree and North Star. Preliminary access routes have been identified.	Access to construction work areas would generally be as per the exhibited proposal, taking into consideration the revised construction stages.
Construction traffic numbers	
Construction vehicle movements would comprise both heavy and light vehicles: ▸ About 75 light vehicles on site and 170 movements per day ▸ About 41 heavy vehicles on site and 234 movements per day. Light vehicle movements would largely be based on the amount of construction workers travelling to site each day. Based on an average workforce of 180 people, up to 180 private vehicles could travel to and from the proposal site per day. However, given the remote nature of many of the construction work areas, buses would be provided for construction workers. Workers are likely to use a combination of buses and light vehicles to travel to the proposal site.	Construction vehicle movements and numbers would be as per the exhibited proposal. However, based on an average workforce of 200 people, up to 200 private vehicles could travel to and from the preferred infrastructure site per day. As buses would be provided workers are likely to use a combination of buses and light vehicles to travel to the preferred infrastructure site. Therefore, it is considered unlikely that light vehicle numbers for the preferred infrastructure would be greater than the exhibited proposal.

10. Environmental risk and impact screening

This section provides a screening of the changes to potential impacts, originally assessed in the EIS, as a result of the preferred infrastructure. An environmental risk screening was undertaken to identify whether the preferred infrastructure would result in a change to the rating of the risks considered by the EIS. For those risks with a higher rating (compared with the EIS), an impact screening was undertaken to confirm the key potential impacts associated with these risks for the preferred infrastructure. These potential impacts form the basis for the impact assessment described in sections 11 and 12.

10.1 Environmental risk screening

An environmental risk analysis was undertaken as part of the EIS for the proposal. The analysis was undertaken in general accordance with the principles of the Australian and New Zealand Standard *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines*. It involved ranking the risks by identifying the consequence of an impact and the likelihood of that impact occurring.

The resultant risk analysis, provided as an appendix to the EIS, was used to identify key risks (considered to be those with a rating of medium or above) requiring comprehensive assessment to determine the severity of potential impacts and to identify appropriate management and mitigation measures. A detailed description of the methodology and results of the assessment are provided in Appendix B of the EIS.

The environmental risk analysis was revisited and updated, using the same methodology, based on the preferred infrastructure described in Appendix B. The purpose of this update ('environmental risk screening') was to identify any changes to the risks, which would indicate the need for further impact assessment to be undertaken.

The environmental risk screening identified changes to the risks listed in Table 10.1.

TABLE 10.1: RISK SCREENING OUTCOMES – RISKS WITH A CHANGED RATING

ENVIRONMENTAL ASPECT	POTENTIAL RISK (AS PER APPENDIX B OF THE EIS)	INITIAL (UNMITIGATED) RISK RATING	UPDATED RISK RATING
Biodiversity – construction	Direct impacts on threatened species and endangered populations and communities (terrestrial) from clearing	High	Very high
	Direct impacts on threatened species and endangered populations and communities (aquatic) from clearing	Medium	High
Noise and vibration (amenity) – Construction	Noise impacts on local residents and sensitive receivers from construction activities including out of hours works	High	Very high
Noise and vibration (amenity) – Operation	Noise impacts on local residents and sensitive receivers from the operation of trains	High	Medium
Flooding – Operation	Presence of or change to structures associated with the proposal could impact upstream and downstream local flood behaviour	High	Medium
	Change to structures associated with the proposal and track height could impact upstream and downstream regional flood behaviour	High	Medium
Aboriginal heritage – Construction	Disturbance of known or unidentified items or places of Aboriginal heritage significance	High	Very high

10.2 Environmental impact screening

The environmental risk screening identified three environmental aspects with the potential for an increase in the level of risk as a result of the preferred infrastructure:

- Biodiversity - construction
- Noise and vibration (amenity) - Construction
- Aboriginal heritage – Construction.

An impact screening was undertaken for these risks to confirm the key potential impacts associated with the risks where the impacts of the preferred infrastructure differ from the original proposal, and whether additional assessment is considered to be required. The impact screening is presented in Table 10.2. The results of the further detailed assessment that was undertaken is provided in sections 11 and 12.

TABLE 10.2: ENVIRONMENTAL IMPACT SCREENING FOR RISKS WITH A RATING CHANGE

ENVIRONMENTAL ASPECT	COMPARISON OF POTENTIAL IMPACTS OF PREFERRED INFRASTRUCTURE AGAINST THE EXHIBITED PROPOSAL	FURTHER DETAILED ASSESSMENT REQUIRED?
Biodiversity – construction	The key impact identified by the EIS (Chapter 10) was the potential for removal or temporary disturbance to native vegetation, including listed threatened communities. The preferred infrastructure involves changes to the proposal site compared with that considered by the EIS. The amount of clearing would therefore increase. As a result, an additional assessment has been undertaken as described in section 12.1 and Appendix F.	YES
Noise and vibration (amenity) – Construction	The key impact identified by the EIS (Chapter 11) was the potential for construction noise to exceed relevant criteria at numerous sensitive receivers. The preferred infrastructure involves changes to the proposal site compared with that considered by the EIS. These changes would mean than some new receivers would have the potential to be impacted. As a result, an additional assessment has been undertaken as described in section 12.	YES
Aboriginal heritage – Construction	The EIS (Chapter 17) identified four Aboriginal sites, listed on the Aboriginal Heritage Information Management System (AHIMS) database, as being located within the assessment area. Of these, two are located within the proposal site. It also identified 19 new sites within the assessment area, of which 12 are located within the proposal site. Five surveyed areas were identified as having moderate or higher archaeological potential. The preferred infrastructure involves changes to the proposal site compared with that considered by the EIS. The following sites and areas of moderate to high archaeological potential, identified by the EIS, would not be impacted by the preferred infrastructure: ▸ Steel Bridge Camp site (10-3-0032) ▸ Duffys Creek site (10-3-0035) ▸ Gwydir River terraces (survey area 42) ▸ Mehi River and terraces (survey area 56). Disturbance of additional areas outside the original proposal site has the potential to impact other listed or unlisted Aboriginal sites or areas of archaeological potential. However, the approach to mitigation and management remains the same. Direct impacts would be reduced as far as practicable by avoiding identified sites (measure D8.1). Where this is not practicable, sites would be managed (including salvage of artefacts prior to construction) in accordance with the Aboriginal cultural heritage management plan (measure D8.1). Measure D8.1 has been amended to include a	YES – to be undertaken as committed through new mitigation measure D8.6

ENVIRONMENTAL ASPECT	COMPARISON OF POTENTIAL IMPACTS OF PREFERRED INFRASTRUCTURE AGAINST THE EXHIBITED PROPOSAL	FURTHER DETAILED ASSESSMENT REQUIRED?
Aboriginal heritage – Construction (continued)	requirement to survey the additional areas that form the footprint of the preferred infrastructure, which were not surveyed as part of the EIS, to identify any new sites. The impacts to any additional sites would be managed in accordance with the Aboriginal cultural heritage management plan. Impacts to any new areas of moderate to high archaeological potential within the footprint of the preferred infrastructure would be managed in accordance with measure D8.4. This provides for the inclusion of measures to manage potential archaeological impacts in the Aboriginal cultural heritage management plan. Measure D8.4 has been amended to include a requirement to survey the additional areas that form the footprint of the preferred infrastructure to identify any new areas of archaeological significance. The impacts on any additional sites would be managed in accordance with the Aboriginal cultural heritage management plan.	

11. Operation environmental screening and assessment

This section summarises additional detailed impact assessments that were undertaken for operation of the Preferred infrastructure based on the environmental risk and impact screening described in Chapter 10.

11.1 Operational noise and vibration

11.1.1 Overview

The EIS presented an operational noise and vibration assessment (Technical Report 5) for the exhibited proposal. This assessment has been updated, where relevant for the preferred infrastructure, and is provided in full in Appendix D of this report. A summary of the main findings is provided below.

11.1.2 Methodology

The operational noise and vibration assessment has been revised to consider the following features of the design for the preferred infrastructure in comparison to the exhibited proposal:

- Track realignment changes – the preferred infrastructure horizontal alignment has optimised the distance between track and receivers, where possible
- Reduced track grade – the vertical alignment of the preferred infrastructure would have a grade of less than 1.5 per cent.
- Straighter curves – curves have been straightened along the alignment
- Removal of the section of the rail alignment from Moree to Camurra North from the preferred infrastructure proposal site (deferred to Phase 2).

Additionally, the revised operational noise and vibration impact assessment considered the potential for noise impacts due to the following elements:

- noise attenuations structures in the form of noise walls, located in Bellata, Gurley, Moree, Croppa Creek and North Star
- road traffic noise due to the operation of the Jones Avenue overbridge.

11.1.3 Operational impact assessment summary of findings

Modelling was undertaken for the preferred infrastructure to compare the existing no build (2020) noise levels with the predicted noise levels for the future build scenarios (2025 and 2040).

Modelling indicated that the RING trigger values would be exceeded at:

- 34 residential receivers and 2 non-residential receivers, compared to 110 residential receivers and 9 non-residential receivers for the exhibited proposal for the 2025 scenario
- 81 residential receivers and 6 non-residential receivers, compared to 152 residential receivers and 9 non-residential receivers for the exhibited proposal for the 2040 scenario.

Most of the RING exceedances were around the Moree, North Star and Bellata, with the remainder scattered throughout the study area. This is because there is a higher concentration of receivers located close to the preferred infrastructure site near the towns.

The noise and vibration assessment undertaken for the exhibited proposal outlined various mitigation options that could be implemented to reduce noise at the source (refer to section 11.5 of the EIS), subject to being shown to be reasonable and feasible. These indicative noise mitigation measures included the following:

- rail dampers
- track lubrication
- noise walls
- earth mounds
- architectural treatment.

The operational noise and vibration impact assessment undertaken for the preferred infrastructure has determined that the majority of the above mitigation approaches would not be feasible for a number of reasons (refer to section 4.7 of Appendix D). Therefore, modelling was undertaken to determine the potential noise impacts if noise walls were constructed in the following locations:

- Bellata, to a height of five metres above ground level
- Gurley, to a height of five metres above ground level
- Burlington Road, Moree, to a height of five metres above ground level
- Moree, between Alice Street and the Gwydir River, to a height of five metres above ground level
- Croppa Creek, with heights of between two to four metres above ground level
- North Star, to a height of five metres above ground level.

The operational noise assessment found that with noise attenuation structures in place at these locations, the RING trigger values would be exceeded at eight receivers for the 2025 scenario, compared to at 36 receivers if the structures were not in place.

Receivers predicted to exceed the noise criteria with the noise structures in place would require additional at-property noise treatment.

Barriers in Bellata, Gurley and Moree would be positioned on the opposite side of arterial roads (Newell Highway and/or Moree bypass) to sensitive receiver locations. This would lead to a moderate increase in road traffic noise due to sound reflecting off the barriers. However, the increase would be unlikely to be perceptible to receivers.

11.1.4 Revised mitigastion measures

Minor changes to mitigation measures have been made for the preferred infrastructure and a new measure has been included regarding operational noise mitigation (D4.4). These are presented in section 13.1 of this report.

11.2 Operational flooding

11.2.1 Overview

The EIS presented an operational hydrology and flooding assessment (Technical Report 6) for the exhibited proposal. The flooding assessment has been updated, where relevant for the preferred infrastructure, and is provided in full in Appendix E of this report. A summary of the main findings is provided below.

11.2.2 Methodology

The operational flooding assessment was undertaken to determine how the design of the exhibited proposal could be modified to minimise the flooding impacts identified in the EIS. The assessment considered flooding impacts based on the following features of the design for the preferred infrastructure, compared to the exhibited proposal:

- Removal of the section of the rail alignment from Moree to Camurra North from the preferred infrastructure proposal site (deferred to Phase 2).
- Culvert/underbridge locations and design
- Scour protection design.

The operational flooding assessment defined flood management objectives that apply to all flood events up to and including the one per cent AEP. Flood impacts were assessed relative to these flood management objectives.

11.2.3 Operational impact assessment summary of findings

Rail overtopping

In order to minimise the potential for rail overtopping during flood events the design for the preferred infrastructure has been further refined to raise the track formation and enhance cross drainage. As a result of these design modifications, modelling of the potential impacts of the preferred infrastructure indicates that there would be no overtopping of the rail corridor during the one per cent AEP local flood event. This is a substantial reduction compared to the existing situation where the rail corridor is currently overtopped for a length of 11 124 metres during the one per cent AEP flood event. It is also a reduction compared to the exhibited proposal which would have resulted in overtopping for a length of 1338 metres.

Public road overtopping

Flood management objectives for the preferred infrastructure have been defined for public roads as follows:

- Flood levels not to increase by more than 50 millimetres on Newell Highway and 100 millimetres on other roads
- There would be no changes to the flood hazard regime on Newell Highway and other roads
- Total flood duration would remain less than six hours for Newell Highway where currently less than this duration, and where the duration currently exceeds six hours there would be no more than a 10 per cent increase in duration.
- Total flood duration would not increase more than 10 per cent for other roads.

The revised flooding assessment concluded that based on the preferred infrastructure design, the above flood management objectives would be met at all public roads with the exception of Buckle Road in Croppa Creek and a local access road in Gurley.

Adjacent land impacts

Flood management objectives for the preferred infrastructure have been defined for adjacent land/ agricultural land as follows:

- Flood levels not to increase by more than 200 millimetres in cropping and stock paddocks
- Flood velocities are to remain below 1.0 metres/ second where currently below this figure and increase by no more than 20 per cent where existing velocities exceed 1.0 metres/second
- Total flood duration would remain less than 12 hours for cropping and stock paddocks where currently less than this duration, and where the duration currently exceeds 12 hours there would be no more than a 10 per cent increase in duration.

The revised flooding assessment concluded that based on the preferred infrastructure design, the above flood management objectives would be met at the majority of locations adjacent to the rail corridor. Predominantly, these exceedances occur on only a small proportion of each affected lot, are localised in nature and largely associated with existing watercourses and drainage paths. Where the flood management objectives are exceeded consultation with affected landowners would occur to assess the sensitivity of their land and activities to the impacts. Mitigation measure D6.1 commits ARTC to continue to further refine the preferred infrastructure design features to not materially worsen existing flooding characteristics, where feasible and reasonable, up to and including the one per cent AEP event.

Building and property impacts

Flood management objectives for the preferred infrastructure have been defined for buildings and properties as follows:

- Flood levels not to increase by more than 10 millimetres where the building is currently flooded above floor level
- Flood levels not to increase by more than 50 millimetres if the building is currently not flooded above floor level
- There is to be no increase in the duration of above floor flooding.

The revised flooding assessment found that four buildings/structures would potentially be inundated during the predicted one per cent AEP flood event, consisting of:

- three houses (two near Curley Creek and one near Croppa Creek) with flood levels increasing by between 32 millimetres to 48 millimetres
- one school in Croppa Creek, with flood levels increasing by 148 millimetres.

All four of the above buildings currently experience flooding above 10 millimetres during the one per cent AEP flood event. During smaller, more frequent events flood levels in these buildings would either reduce or they would no longer be flooded. Therefore, the impacts are overall considered to be minor.

The modelled flood level increases at the school are due to the raising of a level crossing at this location. Consistent with mitigation measure D6.1, further design refinements are currently being undertaken to modify existing culvert arrangements within the road, including those near the school access points. This would allow water to flow beneath the road, bypassing the school. Consultation will be undertaken with the school, road authorities and other stakeholders as the design.

Flood velocities and duration at buildings and properties were generally found to be compliant with the flood management objectives.

Extreme flood events

As described in section 11.2.2 the operational flooding assessment undertaken for the preferred infrastructure considered impacts associated with all flooding events up to and including the one per cent AEP event (Appendix H). To enable an understanding of flooding behaviour during extreme flood events additional flood modelling was undertaken for the following events and is provided as an attachment to the preferred infrastructure flood impact assessment:

- one per cent AEP with climate change event
- 0.05 per cent AEP event.

No modelling was undertaken for the probable maximum flood (PMF) event, which is defined as extrme flood deemed to be the maximum flood likely to occur in a particular catchment. However, these events are considered representative of the PMF because.....

The additional operational flooding assessment for the preferred infrastructure identified the following:

- During the one per cent AEP event with climate change five residential buildings and several buildings (including commercial buildings and Croppa Creek Public School) would experience increased flood levels.
- During the 0.05 per cent AEP event 19 residential buildings and several buildings (including commercial buildings and Croppa Creek Public School) would experience increased flood levels.
- Those residences and buildings that would experience an increase in flood level currently experience significant flood depth under existing conditions therefore the impacts overall are considered minor.
- During the one per cent AEP event with climate change about 271 hectares of agricultural land would experience increased flood levels, increasing to 1,703 hectares during the 0.05 per cent AEP event.
- A number of locations along Newell Highway would experience an increase in flood levels during the one per cent AEP with climate change event and the 0.05 per cent AEP event, however the majority of these locations currently experience flooding.

Mitigation measure D6.2 commits ARTC to protecting facilities and routes identified as being critical to emergency response operations from the probable maximum flood event, where feasible.

11.2.4 Revised mitigation measures

Minor changes to mitigation measures have been made for the preferred infrastructure. These are presented in section 13.1 of this report.

12. Construction environmental screening and assessment

This section summarises additional detailed impact assessments that were undertaken for construction of the preferred infrastructure based on the environmental risk and impact screening described in chapter 10.

12.1 Biodiversity impacts

12.1.1 Overview

The EIS presented a biodiversity impact assessment (Technical Reports 3, 4 and 5) for the exhibited proposal. In response to submissions from the Office of Environment and Heritage updated vegetation mapping was undertaken post exhibition of the EIS. The results of this initial updated vegetation mapping is provided in Appendix F. An updated BioBanking Credit Calculator was also provided with this addendum.

This assessment has been updated, where relevant for the preferred infrastructure, and is provided in Appendix G.

12.1.2 Methodology

In developing the Preferred infrastructure ARTC has considered learnings from the Parkes to Narromine Project, which is currently under construction, and expanded the potential construction footprint beyond the proposal site and additional assessment areas defined in the EIS.

This expansion of the potential construction footprint does expand the potential area for biodiversity impacts and the associated offset requirements. Therefore, the biodiversity credit requirements for the Preferred infrastructure have been updated based on this expanded area and are provided in Appendix G.

The expanded construction footprint includes about 1000 hectares that were not previously surveyed or assessed therefore a desktop assessment of these areas was undertaken to determine the additional impacts associated with the Preferred infrastructure on vegetation zones and species impact credits. Assumptions and limitations associated with the desktop assessment are described in Appendix G.

12.1.3 Construction impact assessment summary of findings

In summary, the expansion of the construction footprint has resulted in a total of:

- 931.74 hectares of impacts to native plant community types (PCTs), equating to 42 861 ecosystem credits
- 528.74 hectares of impact to confirmed threatened ecological communities listed under the *Environment Protection and Biodiversity Conservation Act 1999*. Portions of vegetation zones 5 and 6 are likely to confirm to the Poplar Box Grassy Woodland on Alluvial Plains endangered ecological community, which was recently listed on 4 July 2019.
- 173.79 hectares of impact to koala habitat, equating to 4519 species credits
- 11 778 species credits requirements for finger panic grass (*Digitaria porrecta*)
- 5467 species credits for creeping tick-trefoil (*Desmondium campylocaulon*)
- 23 738 species credits for Belson's panic (*Homopholis belsonii*).

The above is considered to be a conservative estimate of the potential biodiversity credit liability due to the assumptions associated with undertaking the desktop assessment component of the revised biodiversity assessment. Therefore, to ground-truth the above results, further field survey would be undertaken prior to construction in any areas that have not been previously subject to field survey.

12.1.4 Revised mitigation measures

Minor changes to mitigation measures have been made for the preferred infrastructure, including the addition of new mitigation measure D3.3 which commits to further field survey as noted above. These are presented in section 13.1 of this report.

To ground-truth the above results, once the final construction footprint is confirmed further field survey would be undertaken prior to construction in any areas that have not been previously subject to field survey. These surveys would be undertaken in accordance with the requirements for the Framework for Biodiversity Assessment, and the biodiversity credits would be recalculated based on the results.

12.2 Construction noise and vibration

12.2.1 Overview

The EIS presented a construction noise and vibration assessment (Technical Report 5) for the exhibited proposal. This assessment has been updated, where relevant for the preferred infrastructure, and is provided below with supporting information provided in Appendix C.

12.2.2 Methodology

The construction noise and vibration assessment has been revised to consider the removal of the section of the rail alignment from Moree to Camurra North from the preferred infrastructure proposal site (deferred to Phase 2). The construction noise assessment methodology used to undertake this revised assessment is consistent with that described in Technical Report 5 (of the EIS), as are all other assumptions and inputs, except where specifically stated.

The revised construction noise and vibration assessment considered the change in receiver types based on the audit of community infrastructure described in section 3.4 of the report. Further construction noise and vibration assessment was also undertaken to respond to issues raised in some submissions regarding:

- potential noise receiver types and associated potential impacts.
- sleep disturbance impacts
- the potential cumulative noise impact associated with undertaking construction activities concurrently
- human comfort vibration impacts using criteria in Assessing Vibration: A Technical Guideline (DEC, 2006a)

The above additional assessment has been based on the preferred infrastructure site.

12.2.3 Construction impact assessment summary of findings

Construction vibration impacts

Construction typically requires the use of heavy machinery, which can generate high noise and vibration levels at nearby receivers. The potential impacts may vary greatly depending on the intensity and location of construction activities, the type of equipment used, existing background noise, intervening terrain, and prevailing weather conditions.

In accordance with the assessment guidelines, potential noise impacts were predicted with a focus on those activities with the highest potential to cause noise impacts, and assuming that the loudest two items of plant for each activity operate continuously. As a result, the predictions identify worst case construction noise levels, which may not be reached, or only reached infrequently.

Potential noise emissions from construction activities were modelled for identified sensitive receivers based on various construction scenarios. In the noise and vibration impact assessment in the EIS (Technical Report 5) construction noise impacts from 16 construction scenarios (S01 to S16) were assessed. However, these scenarios have been revised based on the preferred infrastructure, resulting in the track upgrading – skim reconditioning and Camurra bypass construction scenarios being removed. The scenarios assessed for the preferred infrastructure are shown in Table 12.1. Each of these construction scenarios represent different equipment noise levels, providing an indication of how noise levels may change across the preferred infrastructure site.

TABLE 12.1: CONSTRUCTION SCENARIOS MODELLED

SCENARIO CODE	SCENARIO DESCRIPTION
S01	Site establishment works
S02	Track upgrading – track reconstruction
S03	Drainage construction
S04	Level crossings – upgrade to signalised level crossing
S05	Level crossing - upgrade passive protection (give way signs to stop signs)
S06	Level crossing consolidation
S07	Culvert replacement
S08	Underbridge replacement
S09	Croppa Creek bridge
S10	Crossing loop construction
S11	Rail station works
S12	Overbridge construction- Newell Highway
S13	Overbridge construction- Jones Avenue
S14	Post possession works

Modelling was then undertaken for each of these scenarios to predict the potential impacts during the primary preferred infrastructure construction hours. Table 12.2 Table 12.2 lists the predicted exceedances of the construction noise management levels for each activity modelled for the preferred infrastructure, and the numbers of sensitive (residential and non-residential) receivers where the 'noise affected' level may be exceeded.

The noise impact assessment undertaken in the EIS has also been updated to include the construction scenarios that may occur concurrently. Construction activities that may occur concurrently resulting in the worst case noise impacts are as follows:

- Full alignment works (S01, S02, S03, S11)
- Bridge works (S08 and S09)

These scenarios assume that all the construction activities within them could potentially be undertaken concurrently within a one kilometre section of the preferred infrastructure site. In reality this is unlikely to be the case, because the majority of the activities would occur sequentially rather than concurrently. Additionally, there are very few locations along the preferred infrastructure site where all the proposed infrastructure is located close to each other, as well as close to a sensitive receiver. The cumulative impact assessment is therefore representative of worst case conditions.

The method used to predict cumulative noise exceedances is consistent with that described in Technical Report 5 (of the EIS), as are all other assumptions and inputs. Activity based noise levels from each of the different construction scenarios within a given cumulative scenario were combined, and input into the noise model. To provide an additional measure of conservatism the highest noise impacts of these cumulative scenarios was considered to be the worst-case predicted noise impacts.

The location of sensitive receivers with predicted exceedances are shown on Figure 12.1. The results of the construction noise assessment for residential receivers are summarised in the sections below.

Predicted noise construction levels for the additional/revised receivers are presented in Appendix C (Table C.2), as is further detail regarding the assessment undertaken. Predicted noise construction levels for all identified receivers (including the additional/revised receivers) are also presented in Appendix C (in Table C.3) with the exceedances colour coded.

Where noise is above the preferred infrastructure specific construction noise management level, all feasible and reasonable work practices to minimise noise need to be implemented, and all potentially affected receivers need to be informed. If no quieter work method is feasible and reasonable, consultation with the impacted residence would be undertaken to explain the duration and noise levels of the works and any respite periods that would be provided.

TABLE 12.2: CONSTRUCTION ACTIVITY NOISE MANAGEMENT LEVEL EXCEEDANCES

	NOISE MANAGEMENT LEVEL EXCEEDANCES	
CONSTRUCTION ACTIVITY	HIGHEST PREDICTED LEVEL OF EXCEEDANCE ABOVE 35 (DB(A))	NUMBER OF RECEIVERS WITH PREDICTED EXCEEDANCES
Full alignment works	43	1522
Level crossing upgrades and consolidation	22	274
Culvert works	39	637
Bridge works	15	111
Crossing loops	27	685
Newell Highway Overbridge	13	2
Jones Avenue Overbridge	41	1097
Post possession	38	817
Cumulative works	43	1889

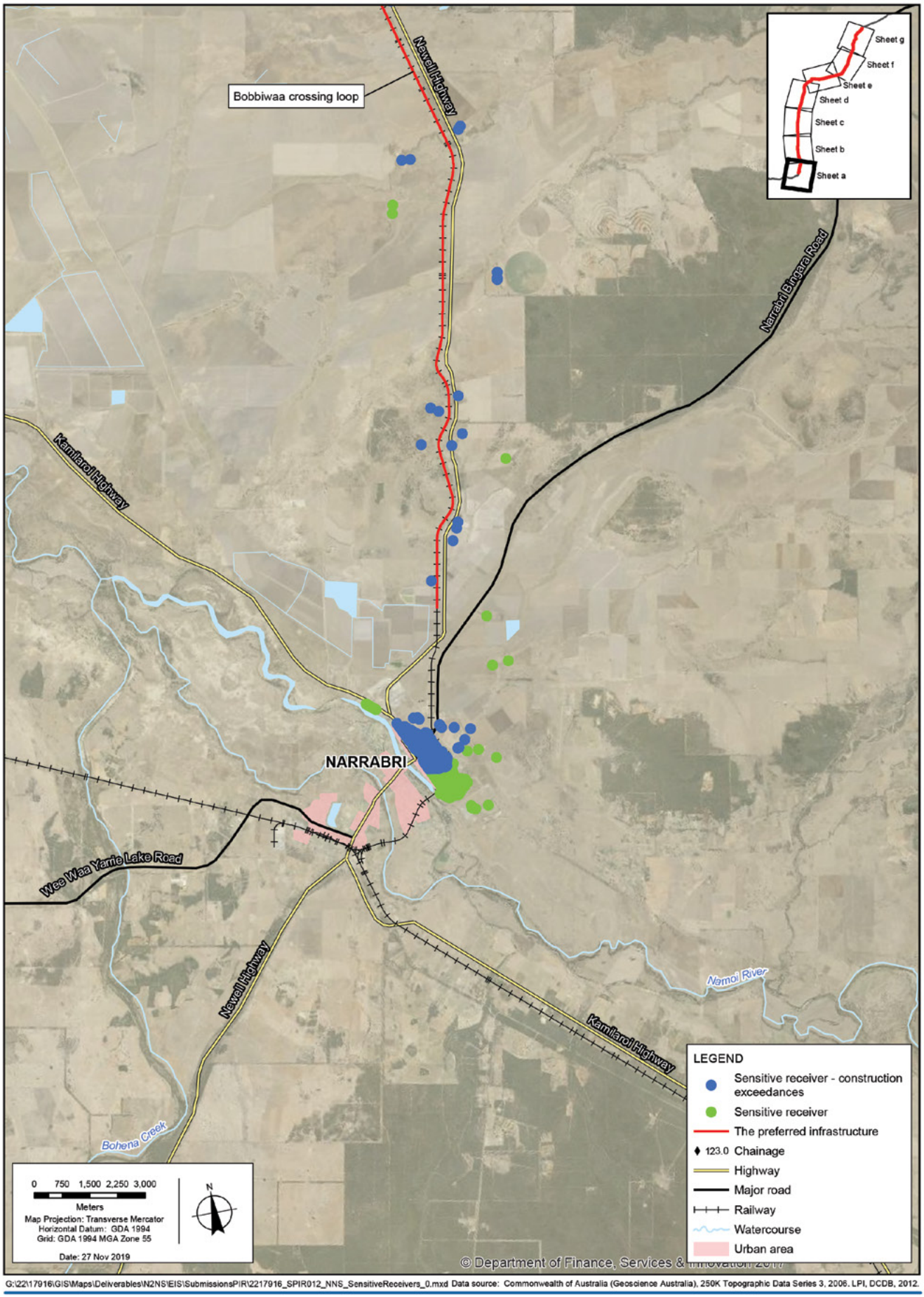

FIGURE 12.1: SENSITIVE RECEIVER LOCATIONS AND CONSTRUCTION EXCEEDANCES

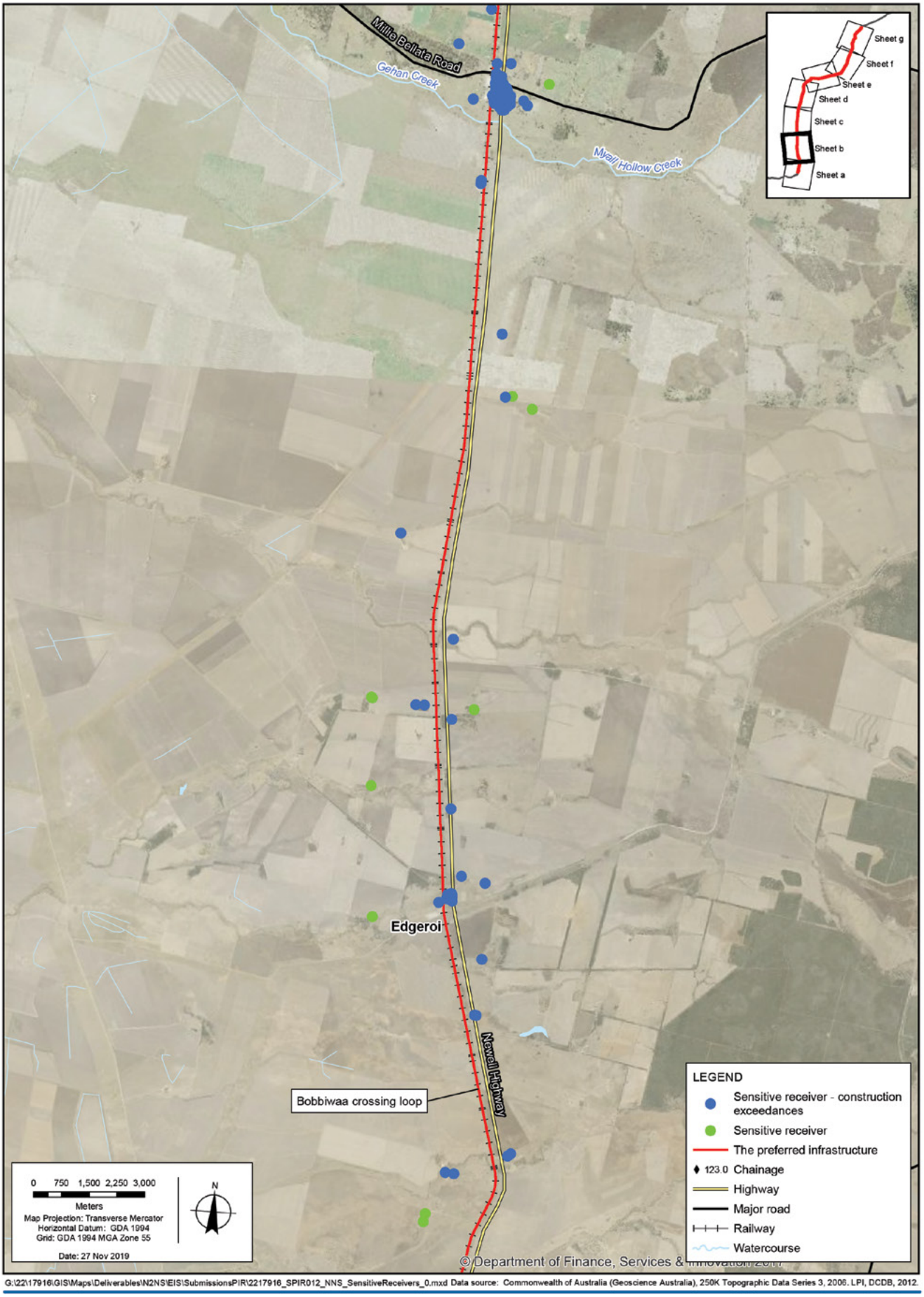

Figure 12.1b
Sensitive receiver locations and construction exceedances

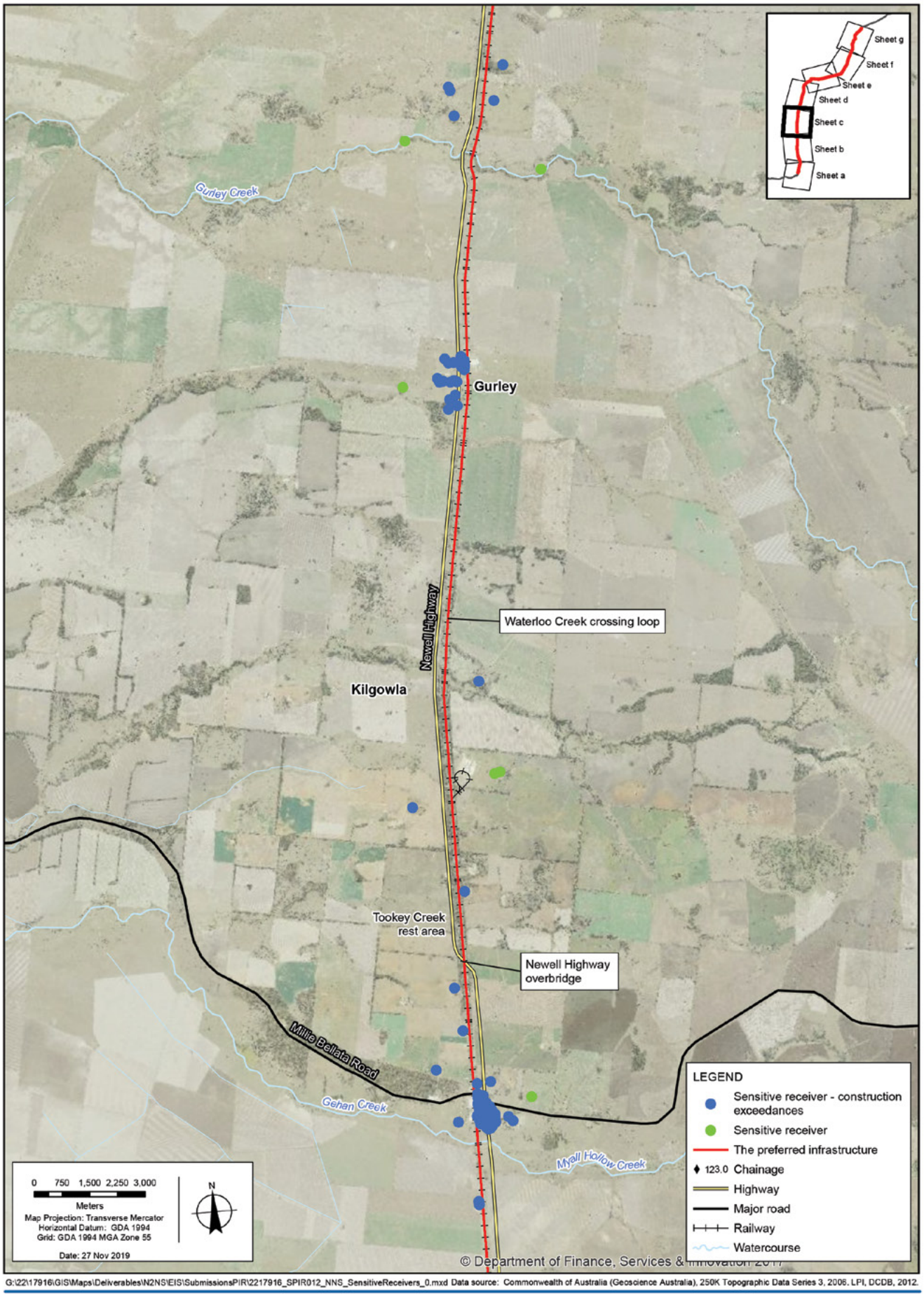

Figure 12.1c
Sensitive receiver locations and construction exceedances

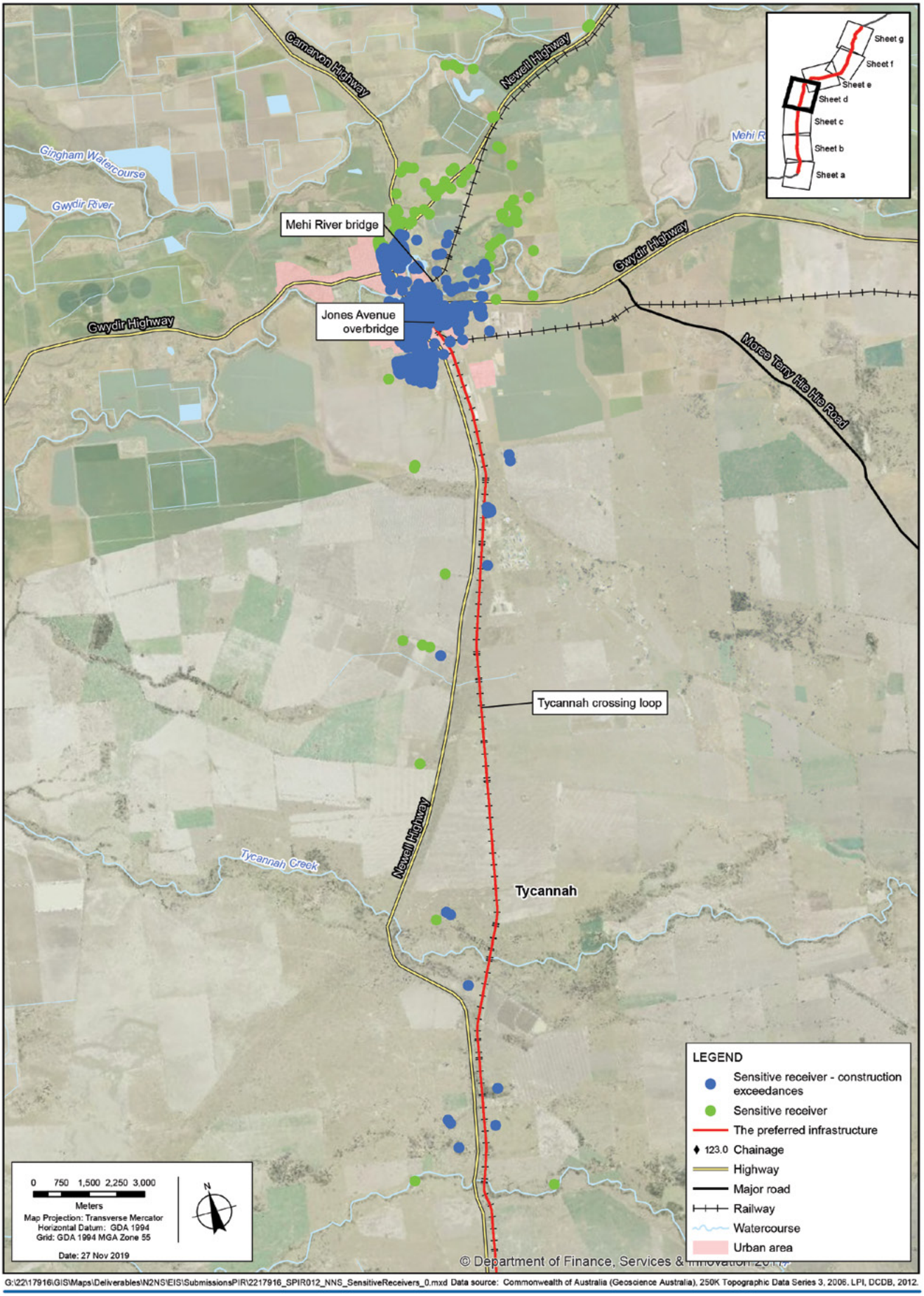

Figure 12.1d

Sensitive receiver locations and construction exceedances

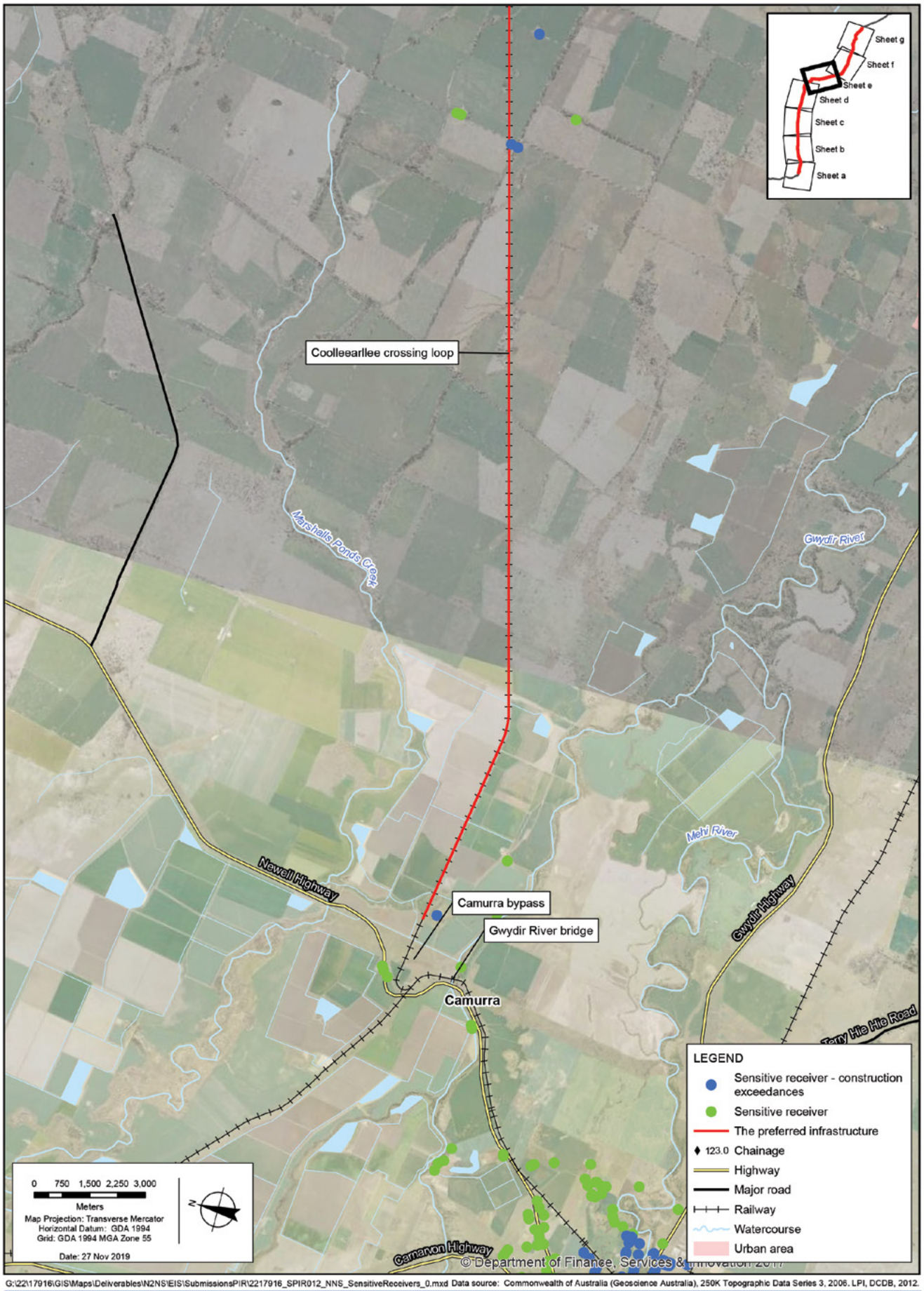

Figure 12.1e
Sensitive receiver locations and construction exceedances

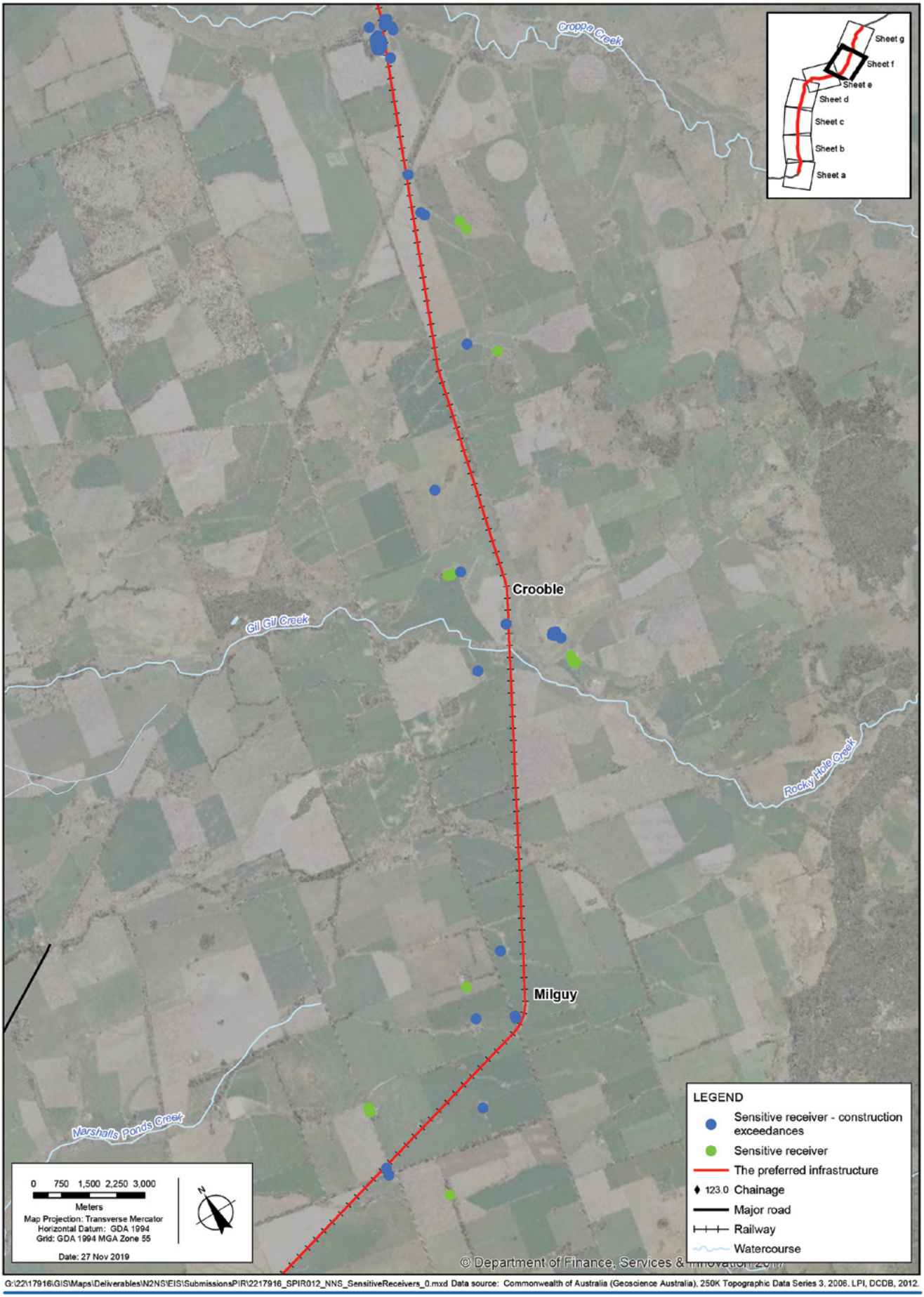

Figure 12.1f
Sensitive receiver locations and construction exceedances

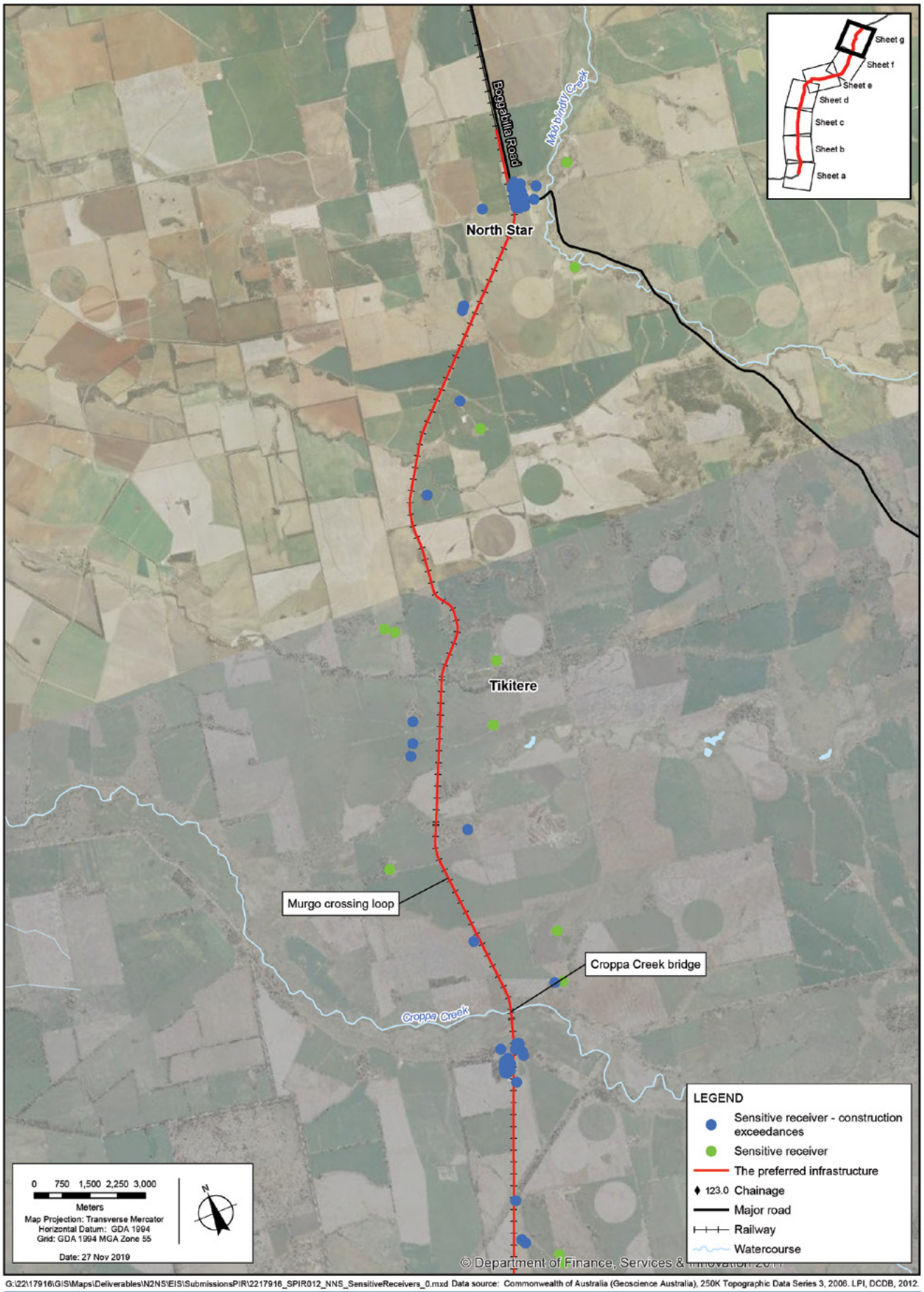

Figure 12.1g
Sensitive receiver locations and construction exceedances

Full alignment works

Activities that encompass the entire preferred infrastructure site (i.e. the full alignment), such as pre possession works (S1), full depth reconditioning (S2), and drainage construction (S3), are predicted to exceed the construction noise management levels:

- In North Star – at 37 receivers with impacts up to 27 dB (no changes compared to the EIS assessment)
- between Moree and North Star- at 50 receivers with exceedances up to 29 dB (20 less receivers compared to the EIS assessment)
- in Moree- at 891 receivers with exceedances up to 43 dB (31 less receivers compared to the EIS assessment)
- between Bellata and Moree- at 48 receivers with exceedances up to 22 dB (no changes compared to the EIS assessment)
- in Bellata- at 71 receivers with exceedances up to 23 dB (no changes compared to the EIS assessment)
- between Narrabri and Bellata- at 38 receivers with exceedances up to 24 dB (no changes compared to the EIS assessment)
- in Narrabri- at 385 receivers with exceedances up to 20 dB (no changes compared to the EIS assessment).

Level crossing upgrades and consolidation

Construction activities of crossing signalisation (S4), give way crossing upgrades (S5), and level crossing consolidation (S6) are predicted to exceed the construction noise management levels:

- in North Star- at 22 receivers with exceedances up to 18 dB (no changes compared to the EIS assessment)
- between Moree and North Star – at eight residential receivers with exceedances up to nine dB (one less receiver compared to the EIS assessment)
- in Moree – at 205 residential receivers with exceedances up to 22 dB (no change compared to the EIS assessment)
- between Bellata and Moree – at 24 residential receivers with exceedances up to 17 dB (no change compared to the EIS assessment)
- in Bellata – at 11 residential receivers with impacts up to 11 dB (no change compared to the EIS assessment)
- between Narrabri and Bellata – at four residential receivers with exceedances up to 12 dB (no change compared to the EIS assessment)
- in Narrabri – no impacts are predicted (no change compared to the EIS assessment).

While the assessment above considered reclassified receivers and the preferred infrastructure site, the assessment results were not updated to consider the revised level crossing treatment options for the preferred infrastructure (described in Appendix B of this report). Location specific impacts at each level crossing would be considered as part of the development of the construction noise and vibration impact statements.

Culvert works

Replacement and upgrade of existing culverts and underbridges (S7) are predicted to exceed the construction noise management levels:

- in North Star – at 30 residential receivers with exceedances up to 22 dB (no change compared to the EIS assessment)
- between Moree and North Star- at 10 receivers with exceedances up to 22 dB (twelve less receivers compared to the EIS assessment)
- in Moree- at 484 receivers with exceedances up to 39 dB (five less receiver compared to the EIS assessment)
- between Bellata and Moree – at 22 residential receivers with exceedances up to eight dB (no changes compared to the EIS assessment)
- in Bellata – at 66 residential receivers with i exceedances up to 16 dB (this is one more receiver compared to what was reported in the EIS, due to an reporting error)
- between Narrabri and Bellata – at 25 residential receivers with exceedances up to 19 dB (no change compared to the EIS assessment)
- in Narrabri – no impacts are predicted (no change compared to the EIS assessment).

While the assessment above considered reclassified receivers and the preferred infrastructure site, the assessment results were not updated to consider the revised culvert locations for the preferred infrastructure (described in Appendix B of this report). Location specific impacts would be considered as part of the development of the construction noise and vibration impact statements.

Bridge works

Construction of bridges and underbridges (S8 and S9) are predicted to exceed the construction noise management levels:

- in North Star – no impacts are predicted (no changes compared to the EIS assessment)
- between Moree and North Star- at 25 receivers with exceedances up to 15 dB (twelve less receivers compared to the EIS assessment)
- in Moree- at 80 receivers with exceedances up to 15 dB (559 less receivers than the EIS assessment)

- between Bellata and Moree – at two residential receivers with exceedances up to four dB (no change compared to the EIS assessment)
- in Bellata or Narrabri – no impacts are predicted (no change compared to the EIS assessment)
- between Narrabri and Bellata – at four residential receivers with exceedances up to 11 dB (no change compared to the EIS assessment)
- in Narrabri – no impacts are predicted (no change compared to the EIS assessment).

Crossing loops

Construction of crossing loops (S10) is predicted to exceed the construction noise management levels:

- in North Star – at 36 residential receivers with exceedances up to 22 dB (no changes compared to the EIS assessment)
- between Moree and North Star – at 24 residential receivers with exceedances up to 24 dB (no changes compared to the EIS assessment)
- in Moree – at 515 residential receivers with exceedances up to 27 dB (two less receivers compared to the EIS assessment)
- between Bellata and Moree – at 29 residential receivers with exceedances up to 23 dB (no changes compared to the EIS assessment)
- in Bellata – at 70 residential receivers with exceedances up to 21 dB (this is one more receiver compared to what was reported in the EIS, due to an reporting error)
- between Narrabri and Bellata – at 10 residential receivers with exceedances up to 18 dB (no changes compared to the EIS assessment)
- no impacts are predicted in Narrabri (no change compared to the EIS assessment).

The assessment results were not updated to consider the revised crossing loop locations for the preferred infrastructure (described in Appendix B of this report). Location specific impacts would be considered as part of the development of the construction noise and vibration impact statements.

Newell Highway overbridge

Construction of the Newell Highway overbridge (S12) is predicted to exceed the construction noise management levels:

- between Bellata and Moree – at two residential receivers with exceedances up to 13 dB (no changes compared to the EIS assessment)
- no impacts are predicted for other receiver areas (no change compared to the EIS assessment).

Jones Avenue overbridge

Construction of the Jones Avenue overbridge (S13) is predicted to exceed the construction noise management levels:

- in Moree – at 1,097 residential receivers with exceedances up to 41 dB (two less receivers compared to the EIS assessment)
- no impacts are predicted for other receiver areas (no change compared to the EIS assessment).

Cumulative noise impacts

Cumulative noise impacts (S01, S02, S03, S08, S09, S11) are predicted to exceed the construction noise management levels:

- in North Star – at 37 residential receivers with exceedances up to 27 dB
- between Moree and North Star – at 51 residential receivers with exceedances up to 29 dB
- in Moree – at 1,256 residential receivers with exceedances up to 43 dB
- between Bellata and Moree – at 48 residential receivers with exceedances up to 23 dB
- in Bellata – at 71 residential receivers with exceedances up to 23 dB
- between Narrabri and Bellata – at 38 residential receivers with exceedances up to 24 dB
- in Narrabri – at 385 residential receivers with exceedances up to 20 dB

Cumulative noise impacts were not assessed in the EIS assessment.

Post possession works

Post possession works (S14) such as demobilisation and site restoration, are predicted to exceed the construction noise management levels:

- in North Star – at 36 receivers with impacts up to 22 dB (no change compared to the EIS assessment)
- between Moree and North Star – at 36 receivers with impacts up to 24 dB (nine fewer receivers compared to the EIS)
- in Moree – at 410 receivers with impacts up to 38 dB (nine fewer receivers compared to the EIS)
- between Bellata and Moree – at 38 receivers with impacts up to 17 dB (no change compared to the EIS assessment)
- in Bellata – at 70 receivers with impacts up to 18 dB (no change compared to the EIS assessment)
- between Narrabri and Bellata – at 30 receivers with impacts up to 19 dB (no change compared to the EIS assessment)
- in Narrabri – at 195 receivers with impacts up to 15 dB (one fewer receiver than the EIS assessment).

Comparison to standard construction hours

As described in section 2.3.2 of the preferred infrastructure project description (Appendix B of this report), construction would be undertaken between 6 am and 6 pm, Monday to Sunday (the primary preferred infrastructure construction hours). This would include works during the following hours, which are outside the recommended standard hours for construction work provided by the ICNG:

- Monday to Friday: 6am to 7am
- Saturday: 6am to 8am and 1pm to 6pm
- Sundays and public holidays: 6am to 6pm
- 24 hours during possessions.

The ICNG recommends a construction noise management level of 35 dB(A) for works conducted outside of standard hours. Therefore, to account for the fact that the primary preferred construction hours includes works outside the standard construction hours, this more stringent level of 35 dB(A) was adopted for the proposal specific construction management level, as described in Technical Report 5 of the EIS.

A request has been received however, to provide information regarding how many sensitive receivers would be impacted:

- during standard construction hours as per those provided in the ICNG and out of hours
- during out of hours work only
- during standard construction hours only.

In response to this request, additional analysis has been carried out to collate the highest level of impact and numbers of noise impacted receivers for each of the assessed construction scenarios. The analysis considers construction activities conducted during standard hours and for out of hours work (OOHW). The criteria for OOHW is consistent across each OOHW period (evening and night) as low background noise levels result in the minimum of 35dB(A) LAeq being applied. This comparison has been undertaken for residential receivers only as the noise management levels for standard hours and OOHW within the ICNG do not apply to non-residential receivers.

Table 12.3 below indicates the numbers of residential receivers where the 'noise affected' level may be exceeded for each activity modelled for the preferred infrastructure. The number of sensitive receivers that have been impacted for different locations across the preferred infrastructure site is provided in Appendix C (Table C.9 to Table C.22) as is information regarding the value of the highest exceedances of the relevant ICNG construction noise management levels (Table C.6).

TABLE 12.3: CONSTRUCTION ACTIVITY NOISE MANAGEMENT LEVEL EXCEEDANCES AT RESIDENTIAL RECEIVERS FOR WORKS DURING STANDARD HOURS AND OOHW

	NUMBER OF RESIDENTIAL RECEIVERS WITH PREDICTED EXCEEDANCES OF THE RELEVANT ICNG CONSTRUCTION NOISE MANAGEMENT LEVEL		
CONSTRUCTION ACTIVITY	DURING STANDARD CONSTRUCTION HOURS (CNML = 40 DBA)	DURING OOHW (ALL PERIODS) (CNML = 35 DB(A))	HIGHLY AFFECTED (= 75 DBA)
Full alignment works	815	1520	3
Level crossing upgrades and consolidation	129	274	0
Culvert works	252	637	0
Bridge works	38	111	0
Crossing loops	438	684	0
Newell Highway Overbridge	1	2	0
Jones Avenue Overbridge	618	1097	1
Post possession	374	845	0
Cumulative works	1233	1886	4

Figure 12.2 below also presents the highest construction noise levels that would be experienced by individual receivers during any construction scenario for all residential receivers across the preferred infrastructure site.

Highest construction noise levels (from any scenario)

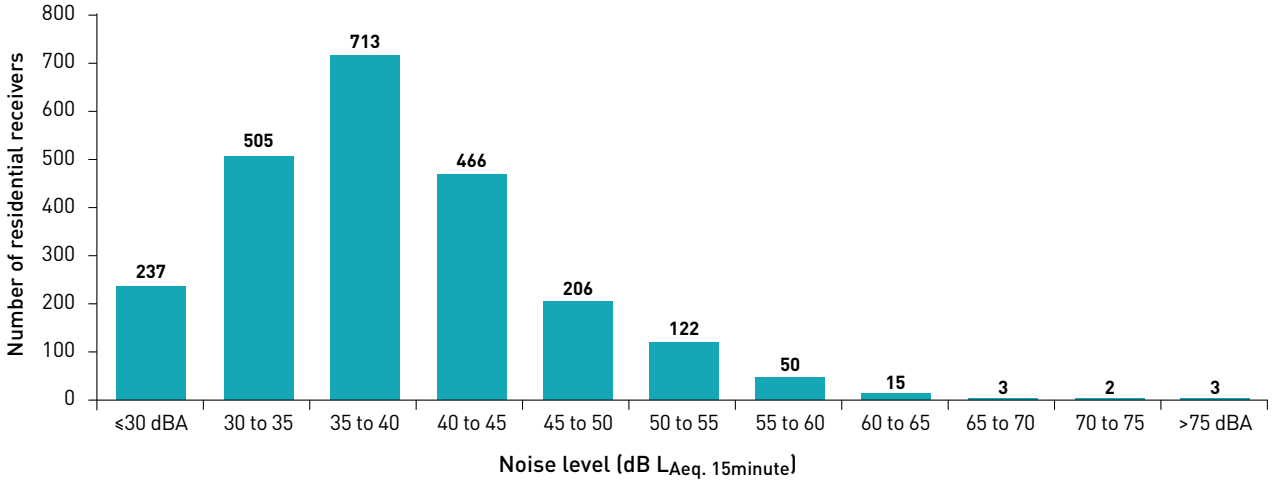

FIGURE 12.2: HIGHEST CONSTRUCTION NOISE LEVEL EXPERIENCED AT INDIVIDUAL RECEIVERS

In summary, the construction noise and vibration impact assessment for the preferred infrastructure indicates that:

- The highly affected level of 75 dB(A) LAeq is predicted to be exceeded at about three receivers.
- Rail line redevelopment construction activities are predicted to exceed the noise management level at receivers nearest to the construction footprint. Impacted receivers are within about 700 metres of the works and includes up to 1520 identified noise sensitive residential receiver locations. Noise levels are predicted to exceed the proposal specific construction management level by up to 43 dB.
- Newell Highway overbridge construction is predicted to exceed the proposal specific construction management level by up to 13 dB at two residential receivers.
- Jones Avenue overbridge construction is predicted to exceed the proposal specific construction management level by up to 41 dB at 1,097 residential receivers.
- Construction activities during the primary proposal construction hours have the potential to exceed the noise management level at non-residential sensitive receivers including educational, child care and hospital facilities. Construction noise management levels are applicable as an internal level only when the facilities are in use.
- Construction activities during the primary proposal construction hours have the potential to exceed the noise management level at recreational areas including bushland areas, parks and sporting facilities when these areas are in use.
- Construction activities during standard construction hours have the potential to exceed the noise management level at 1334 residential receivers.
- Construction activities during out of hours work have the potential to exceed the OOHW noise management level at 1878 residential receivers.
- Overall construction of the preferred infrastructure will result in less receivers being impacted then for the exhibited proposal.

Sleep disturbance impacts

The *Interim Construction Noise Guideline* (DECC, 2009) states that 'where construction works are planned to extend over more than two consecutive nights, the impact assessment should cover the maximum noise level from the proposed works'. A submission was received requesting that sleep disturbance impacts be assessed rather than the sleep awakening impacts assessed in the EIS.

Sleep awakening impacts were assessed in the EIS (Technical Report 5) based on guidance in the *Road Noise Policy* (DECCW, 2011). The *Environmental Criteria for Road Traffic Noise* (EPA, 1999) acknowledges that, based on the current level of understanding, no absolute noise level criteria have been established that correlate to an acceptable level of sleep disturbance. However, the *Road Noise Policy* suggests that internal noise levels below 50 to 55 dB(A) L_{Amax} are unlikely to cause awakening reactions, and one or two events per night, with internal noise levels of 65 to 70 dB(A) L_{Amax} (inside dwellings) are not likely to significantly affect health and wellbeing.

In response to the submission received the noise assessment has been updated to include the more conservative sleep disturbance screening method provided in the application notes of the *NSW Industrial Noise Policy* (EPA, 2000).

The *Industrial Noise Policy* application notes refer to the *Road Noise Policy*, and suggest that the external L_{Amax} or $L_{A1,1min}$ noise level should not exceed the background L_{A90} level by more than 15 dB(A). This value is used as a screening test to identify the potential for sleep disturbance (instead of sleep awakening) and is applied outside a sensitive receiver's bedroom window during the night-time period.

Table 12.4 provides a summary of the sleep disturbance and sleep awakening criteria.

TABLE 12.4: SLEEP AWAKENING AND DISTURBANCE CRITERIA

CRITERIA	L_{AMAX} CRITERIA	ASSESSMENT LOCATION
Sleep awakening (*Road Noise Policy*)	55 dB(A)	Internal
Sleep disturbance screening level (*Industrial Noise Policy*)	RBL2 +15 dB(A)	External

The assessment undertaken for the EIS has been updated for the preferred infrastructure to assess the potential for sleep disturbance impacts using the Industrial Noise Policy screening criteria. Potential exceedances of this criteria compared with exceedances of the Road Noise Policy sleep awakening criteria used in the EIS are provided in Table 12.5 for each of the proposed construction scenarios (including the worst-case cumulative scenario).

The receivers where exceedances of the criteria have been predicted are listed in Appendix C (in Tables C.4 and C5, respectively).

TABLE 12.5: EXCEEDANCES OF SLEEP AWAKENING AND DISTURBANCE CRITERIA

		FULL ALIGNMENT WORKS: S1, S2, S3, S11	S4: SIGNALISED XING	S5: GIVE WAY XING	S6:LEVEL XING REMOVAL	S7: CULVERT WORKS	S8, S9, SBRIDGE WORKS	S10 CROSSING LOOPS	S12-NEWELL HIGHWAY OVERBRIDGE	S13- JONES AVENUE OVERBRIDGE	S14: POST POSSESSION
Industrial Noise Policy sleep disturbance screening criteria	Number of exceedances	1580	272	27	1	665	117	717	2	1101	867
	Maximum predicted exceedance (dB(A))	43	22	12	9	39	15	27	13	41	38
Road Noise Policy sleep awakening criteria	Number of exceedances	73	2	0	0	11	0	23	0	43	23
	Maximum predicted exceedance (dB(A))	23	2	-	-	19	-	7	-	21	18

Construction vibration impacts

A submission was received requesting that vibration criteria from *Assessing Vibration: A Technical Guideline* (AVTG) be used to assess vibration impacts during construction rather than the British Standard (BS) *5228-2:2009 Code of practice for noise and vibration on construction and open sites – Part 2: Vibration* (BS 5228-2:2009) criteria used in the EIS.

The potential vibration impacts associated with the use of construction plant and equipment were assessed in the EIS. The full results were provided in Technical Report 5, and a summary of the results was provided in chapters 11 and 12 of the EIS. The assessment was undertaken with consideration of relevant guidelines and standards, in particular AVTG, BS 5228-2:2009; and *BS 6472:1992 Guide to evaluation of human exposure to vibration in buildings* (BS 6472:1992).

The assessment of vibration levels from intermittent construction sources is described in AVTG, which is based on BS 6472:1992. The assessment evaluates vibration dose value, which incorporates the magnitude of vibration and the length of time the source of the vibration operates. For construction, the vibration impact on a receiver can be predicted and compared to the AVTG vibration dose value criteria at various receiver types for day and night periods.

The exact details of the construction methodology for the preferred infrastructure, such as the operating duration of vibration generating equipment, are not yet known. This information would be determined during detailed design and construction planning. As a result, estimating the vibration dose values from construction sources requires a broad range of assumptions. AVTG notes that velocity values can be used as a screening method. In addition, velocity values are widely available for typical construction equipment, and are more likely to be routinely measured in relation to potential building damage. Therefore, peak particle velocity is adopted as a screening method to assess human comfort impacts from construction vibration. This was used by the noise and vibration assessment, with consideration given to the guidance in BS 5228-2.2009, which provides level categories that relate to human perception of vibration.

The assessment for the EIS provided safe-working buffer distances, within which sensitive receivers may be impacted by vibration. As described in the EIS, based on buffer distances provided in BS 5228-2.2009, vibration may be perceptible at certain times within 140 metres of general construction works, and within 120 metres of bored piling.

In response to issues raised regarding the potential for human comfort impacts, the vibration assessment was updated to include human comfort levels in accordance with BS 6472:1992, as per the approach in AVTG and based on a number of assumptions. Further information regarding the updated noise and vibration assessment is provided in Appendix C. Additionally, the results of the previous assessment, undertaken in accordance with BS 5228-2.2009, were reviewed to determine whether there would be an opportunity to further reduce the potential impacts identified in the EIS.

Safe working distances to comply with the human comfort vibration criteria are provided in Table 12.6 and Table 12.7, in accordance with BS 5228-2.2009 as per the EIS, and AVTG as per the updated assessment. The maximum values for human comfort impacts based on AVTG have been adopted. It should also be noted that in multi-level buildings vibration may be amplified through the structure to the upper floors. A doubling of the buffer distances provided in Table 12.6 would provide a conservative allowance for this possible effect where multi storey buildings are identified.

TABLE 12.6: VIBRATION BUFFER DISTANCES – INTERMITTENT VIBRATION (RESIDENTIAL)

EQUIPMENT	HUMAN COMFORT CRITERIA BASED ON BS 5228-2.2009 (1.0 MM/S)	HUMAN COMFORT BASED ON AVTG VIBRATION DOSE VALUE) (M/S1.75)			
		DAY PREFERRED VALUE 0.2 M/S1.75	DAY MAXIMUM VALUE 0.4 M/S1.75	NIGHT PREFERRED VALUE 0.13 M/S1.75	NIGHT MAXIMUM VALUE 0.26 M/S1.75
Roller	90 m	212 m	89 m	156 m	65 m
15 tonne vibratory roller	140 m	303 m	128 m	223 m	94 m
7 tonne compactor	90 m	212 m	89 m	156 m	65 m
Dozer	60 m	128 m	54 m	94 m	39 m
Backhoe	10 m	23 m	9 m	17 m	7 m
Excavator	25 m	57 m	24 m	42 m	18 m
Piling impact)	700 m	1583 m	666 m	1164 m	489 m
Piling (vibratory)[1]	110 m	767 m	101 m	147 m	83 m
Piling (bored)	120 m	275 m	116 m	202 m	85 m

Notes 1: Based on levels derived from BS 5228-2.2009. Vibratory piling based on $d^{-1.2}$ propagation relationship

TABLE 12.7: VIBRATION BUFFER DISTANCES – INTERMITTENT VIBRATION (OFFICES, SCHOOLS, EDUCATIONAL INSTITUTIONS AND PLACES OF WORSHIP)

EQUIPMENT	HUMAN COMFORT CRITERIA BASED ON BS 5228-2.2009 (1.0 MM/S)	HUMAN COMFORT BASED ON AVTG VIBRATION DOSE VALUE) (M/S1.75)			
		DAY PREFERRED VALUE 0.4 M/S1.75	DAY MAXIMUM VALUE 0.8 M/S1.75	NIGHT PREFERRED VALUE 0.43 M/S1.75	NIGHT MAXIMUM VALUE 0.8 M/S1.75
Roller	90 m	89 m	37 m	38 m	16 m
15 tonne vibratory roller	140 m	128 m	54 m	55 m	23 m
7 tonne compactor	90 m	89 m	37 m	38 m	16 m
Dozer	60 m	54 m	23 m	23 m	10 m
Backhoe	10 m	9 m	4 m	4 m	2 m
Excavator	25 m	24 m	10 m	10 m	4 m
Piling impact)	700 m	666 m	280 m	286 m	120 m
Piling (vibratory)[1]	110 m	323 m	57 m	58 m	32 m
Piling (bored)	120 m	116 m	49 m	50 m	21 m

The number of potentially impacted receivers are discussed below and provided in Table 12.8 for the worst case anticipated vibration generating equipment (vibratory roller and piling (bored)). Further information is provided in Appendix C including a figure that shows the sensitive receivers located within the buffer distances as per those provided in the AVTG (BS 6472:1992) and those provided in BS 5228-2.2009 (Figure C.2) and identification numbers for potentially impacted sensitive receivers (Table C.25).

Works in the preferred infrastructure site

Using the BS 6472:1992 criteria adopted by the AVTG, during general construction works, residential receivers may be affected by vibration within a maximum of 128 metres of the works. A total of 291 residential receivers were identified within this distance. Other sensitive land uses, such as offices, schools, educational institutions, and places of worship may be affected within 54 metres of the works. Two educational institutions and three places of worship were identified within this buffer distance.

Using the BS 5228-2.2009 criteria, during general construction works, vibration may be perceptible at certain times within 140 metres of the works. A total of 307 residential receivers, three places of worship and two educational facilities were identified within this distance.

Construction would progress along the proposal site, and vibration impacts would be experienced for relatively short times at most locations. Construction in each work area would be completed within about 8 to 10 weeks.

Measures to mitigate these potential impacts are described below.

Works involving bridge construction

Piling would be required to construct the proposed road overbridges at Jones Avenue and the Newell Highway, and the proposed rail bridge over Croppa Creek. Using the BS 6472:1992 criteria adopted by the AVTG, the boring of piles would have the potential to impact receivers located within 116 metres of the works. A total of 37 residential receivers were identified within this distance. No non-residential receivers were identified.

Using the BS 5228-2.2009 criteria, the boring of piles would have the potential to impact receivers located within 120 metres of the works. A total of 39 residential receivers were identified within this distance. No non-residential receivers were identified.

Management and mitigation of potential noise and vibration impacts

The Inland Rail NSW Construction Noise and Vibration Management Framework (provided in Appendix J) was developed to guide the management of noise and vibration during construction of Inland Rail.

Specifically, the framework identifies the requirements and methodology to develop construction noise and vibration impact statements. These would be prepared prior to specific construction activities and based on a more detailed understanding of the construction methods, including the size and type of construction equipment, duration and timing of works, and detailed reviews of local receivers if required. As described in section 11.5 of the EIS and the framework, a construction noise and vibration impact statement would include:

- a more detailed understanding of surrounding receivers, including particularly sensitive receivers such as education and child care, and vibration sensitive medical, imaging, and scientific equipment
- application of appropriate noise and vibration criteria for each receiver type
- an assessment of the potential noise and vibration impacts as a result of different construction activities
- minimum requirements in relation to standard noise and vibration mitigation measures
- noise and vibration auditing and monitoring requirements
- additional mitigation measures to be implemented when exceedances to the noise or vibration management levels are likely to occur – aimed at pro-active engagement with potentially affected receivers, provision of respite periods, and/or alternative accommodation for defined exceedance levels.

TABLE 12.8: CONSTRUCTION VIBRATION ACTIVITIES NUMBER OF POTENTIALLY IMPACTED RECEIVERS (RESIDENTIAL AND NON-RESIDENTIAL)

ACTIVITY	NUMBER OF RECEIVERS POTENTIALLY IMPACTED BY VIBRATION (BASED ON BS 5228-2.2009 (1.0 MM/S))	NUMBER OF RECEIVERS POTENTIALLY IMPACTED BY VIBRATION (BASED ON AVTG VIBRATION DOSE DAY MAXIMUM VALUE 0.8 M/S1.75)
General construction activities		
15 tonne vibratory roller	312	296
Piling (Bridges)		
Piling (vibratory)[1]	39	37

Where sensitive receivers are located within the identified buffer distances, based on the equipment likely to be used, an assessment of the potential vibration impacts would be undertaken and feasible and reasonable noise and vibration mitigation measures would be implemented in accordance with the Construction Noise and Vibration Management Framework.

Mitigation measure C4.1 commits to implementing the Construction Noise and Vibration Management Framework, and constructing the proposal, with the aim of achieving the construction noise management levels and vibration criteria identified by the noise and vibration assessment. The measure also commits to:

- All feasible and reasonable noise and vibration mitigation measures would be implemented.
- Any activities that could exceed the construction noise management levels and vibration criteria would be identified and managed in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework and the CEMP.
- Notification of impacts would be undertaken in accordance with the communication management plan for the proposal.

Mitigation measure D4.2 states that where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and vibration monitoring would be carried out in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework, to ensure vibration levels remain below appropriate limits for that structure.

Where short term works are proposed (typically impacting a receiver for less than one week) AVTG acknowledges the need to balance the level of impact with the duration of the works:

> 'When short-term works such as piling, demolition and construction give rise to impulsive vibrations, undue restriction on vibration values may significantly prolong these operations and result in greater annoyance. Short-term works are works that occur for a duration of approximately one week.'

It may be the case that some receivers near the proposal would be subject to vibratory works of short duration (for instance, during a track possession). This is particularly for the construction of linear infrastructure. As specific construction schedules are not known at this stage, the duration of works and duration of impact in an assessment period (day and night) would be refined, and potential human comfort impacts updated, in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework (as per mitigation measure C4.1).

12.2.4 Revised mitigation measures

Minor changes to mitigation measures have been made for the preferred infrastructure. These are presented in section 13.1 of this report.

PART D

Conclusion

13. Revised mitigation measures and conclusion

This section provides the revised mitigation measures based on the outcomes of the assessment provided in the preferred infrastructure report. It also provides the conclusion to the submissions and preferred infrastructure reports.

13.1 Mitigation measures

The EIS for the Inland Rail Narrabri to North Star Project (the proposal) identified the environmental management and mitigation measures that would be adopted to avoid or reduce the potential environmental impacts. These measures were summarised in section 27.3 of the EIS.

After consideration of the issues raised in the stakeholder and community submissions on the EIS, and the results of additional assessments undertaken, the mitigation measures been updated (refer to Table 13.1 to Table 13.3). The measures were updated to:

- make additional commitments based on the submissions on the EIS (refer to Part B)
- make additional commitments based on design refinements associated with the preferred infrastructure and the findings of further assessment (refer to Part C)
- make additional commitments based on additional consultation carried out during the preparation of this report
- modify the wording so that the intention is clearer.

This table supersedes the mitigation measures presented in the EIS. New mitigation measures or additions to existing mitigation measures are shown in **bold** text, with deletions shown with a ~~strikethrough.~~

The measures are broadly grouped according to the main stage of implementation. However, it is noted that the implementation of some measures may occur across a number of stages.

The conditions of approval would guide the remaining tasks for the preferred infrastructure. Some detailed design work and associated investigations are being undertaken separately from, and in parallel with, the EIS. Post-approval design, as well as construction and operation, would be undertaken in accordance with these measures and conditions of approval.

13.1.1 Detailed design and pre-construction

TABLE 13.1: UPDATED MITIGATION MEASURES – DETAILED DESIGN/PRE-CONSTRUCTION

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – DETAILED DESIGN/PRE-CONSTRUCTION
D1	**Environmental management**		
D1.1	D1.1	*CEMP*	▸ A CEMP would be prepared to detail the approach to environmental management during construction, as described in section 27.2 **of the EIS**, and in accordance with the conditions of approval.
D2	**Traffic, transport and access**		
D2.1	D2.1	*Traffic, transport and access*	▸ The detailed design of the **preferred infrastructure** ~~proposal~~ minimises the potential for impacts to the surrounding road and transport network, and property accesses. ▸ Where any legal access to a property is permanently affected and a property has no other legal means of access, alternative access to and from a public road would be provided to an equivalent standard, where feasible and practicable. Where an alternative access is not feasible or practicable, and a property is left with no access to a public road, negotiations would be undertaken with the relevant land owner for acquisition of the property in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991*. **In accordance with the Land Acquisition Act, ARTC's preference is for acquisition by agreement where practicable.**
D2.2	D2.2	*Consultation*	▸ Input would be sought from relevant stakeholders (including Narrabri Shire Council, Moree Plains Shire Council, Gwydir Shire Council, Roads and Maritime Services, **Transport for NSW**) prior to finalising the detailed design of those aspects of the **preferred infrastructure** ~~proposal~~ that impact on the operation of road and other transport infrastructure under the management of these stakeholders. **Input would be sought from relevant land owners prior to finalising the detailed design of those aspects of the preferred infrastructure that impact on individual property access arrangements.** ▸ The traffic, transport and access management sub-plan would be developed in consultation with (where relevant) local councils, Roads and Maritime Services, **Transport for NSW**, and local public transport/bus operators.
D2.3	D2.3	*Level crossings*	▸ Level crossings would be provided with warning signage, line marking and other relevant controls; in accordance with the relevant national and ARTC standards.
n/a	**D2.4**	***Severance impacts in Moree***	▸ **ARTC would identify the preferred arrangements to cross the rail corridor within Moree in consultation with MoreePlains Shire Council. The crossing will have regard to community expectations for connectivity and safety.**
D3	**Biodiversity**		
D3.1	D3.1	*Biodiversity Offset Strategy*	▸ The Biodiversity Offset Strategy for the **preferred infrastructure** ~~proposal~~ would be finalised in accordance with the requirements of the *Framework for Biodiversity Assessment* (OEH, 2014a) and the *NSW Biodiversity Offsets Policy for Major Projects* (OEH, 2014b). ▸ The offset strategy would be approved by the Department of Planning and Environment prior to the commencement of construction work that would result in the disturbance of relevant ecological communities, threatened species, or their habitat, unless otherwise agreed.

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – DETAILED DESIGN/PRE-CONSTRUCTION
D3.2	D3.2	*Direct impacts to biodiversity*	▸ Detailed design and construction planning would minimise the construction footprint and avoid impacts to native vegetation as far as practicable.
n/a	**D3.3**	***Biodiversity offset liabilities***	▸ **Further field survey would be undertaken prior to construction in any areas that have not been previously subject to field survey. These surveys would be undertaken in accordance with the requirements for the Framework for Biodiversity Assessment, and the biodiversity credits would be recalculated based on the results.**
D3.3	**D3.4**	*Riparian vegetation*	▸ Compounds and stockpile sites would be located an appropriate distance from riparian vegetation to avoid indirect impacts on aquatic habitat. This includes a minimum of 100 metres for type 1 class 1 watercourses ~~(the Mehi River and Gwydir River),~~ 50 metres for type 2 class 2 and 3 watercourses (such as Boobiwaa, Gurley and Tycannah creeks), and 10 to 50 metres for type 3 class 2 to 4 watercourses (including Croppa Creek). ▸ Direct impacts to in-stream vegetation and native vegetation on the banks of watercourses would be avoided as far as practicable.
D3.4	**D3.5**	*Fish passage*	▸ Detailed design and construction planning would minimise the potential for impacts to fish passage. To ensure that fish passage is maintained, watercourse crossing structures would be designed in accordance with the guideline *Why do fish need to cross the road? Fish passage requirements for waterway crossings* (Fairfull and Witheridge, 2003) and the minimum design requirements specified in Table 5.1 of Technical Report 3.
D3.5	**D3.6**	*Rehabilitation strategy*	▸ A rehabilitation strategy would be prepared to 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.
D3.6	**D3.7**	*Pre-clearing surveys*	▸ Pre-clearing surveys would be undertaken prior to construction. The surveys and inspections, and any subsequent relocation of species, would be undertaken and in accordance with the biodiversity management sub-plan in the CEMP.
D4	**Noise and vibration**		
D4.1	D4.1	*Noise and vibration control*	▸ The **preferred infrastructure** ~~proposal~~ would be designed with the aim of achieving the operational noise and vibration criteria identified by the noise and vibration assessment. ▸ Track features such as crossovers, turnouts, and rail joints would be avoided near vibration sensitive structures where practicable.
D4.2	D4.2	*Construction vibration*	▸ Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and vibration monitoring would be carried out in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework, to ensure vibration levels remain below appropriate limits for that structure.

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – DETAILED DESIGN/PRE-CONSTRUCTION
D4.3	D4.3	*Operational noise and vibration review*	▸ An operational noise and vibration review would be undertaken as described in section 11.5.1 **of the EIS** to guide the approach to identifying feasible and reasonable mitigation measures to incorporate in the detailed design.
n/a	**D4.4**	***Predicted operational noise and vibration impacts***	▸ **The height and extent of noise walls adjacent to the preferred infrastructure would be confirmed during detailed design with the aim of not exceeding trigger levels from the Rail Infrastructure Noise Guidelines (EPA, 2013) as far as practicable. At-property treatments would be offered either on their own or in combination with a noise wall where there are residual exceedances of the noise trigger levels.**
D5	**Soils**		
D5.1	D5.1	*Structural integrity*	▸ Foundation and batter design would include measures to minimise operational risks from shrink swell, dispersive and/or low strength soils.
n/a	**D5.2**	***Contamination***	▸ **Hazardous materials surveys would be undertaken during detailed design for all proposed demolition activities.**
D6	**Hydrology and flooding**		
D6.1	D6.1	*Flooding*	▸ The design features listed in section 15.3.1 **of the EIS** would continue to be refined to not worsen existing flooding characteristics, where feasible and reasonable, up to and including the one per cent AEP event. Detailed flood modelling would consider potential changes to: ▸ building and property inundation ▸ level crossing and road flood levels and extent ▸ overland flow paths and storage effects due to spoil **placement** ~~mounds~~ **and other infrastructure forming part of the preferred infrastructure** ~~proposal~~ ▸ flood evacuation routes. ▸ Flood modelling to support detailed design would be carried out ~~in accordance with~~ **having regard to** the guidelines listed in section 15.1.2 **of the EIS and the *Guidelines for Controlled Activities on Waterfront Land* (NSW Office of Water, 2012)**. ▸ Flood modelling and mitigation would consider floodplain risk management plans, and would be undertaken in consultation with the relevant local council, the Office of Environment and Heritage, and State Emergency Services.
D6.2	D6.2	*Emergency routes*	▸ Where feasible, facilities and routes identified as being critical to emergency response operations would be protected from the probable maximum flood level.
D6.3	D6.3	*Downstream watercourse stability*	▸ Further modelling would be undertaken during detailed design to confirm the locations downstream of culverts that require erosion protection, and the extent and type of protection required.
n/a	**D6.4**	***Water usage (private bores and surface water)***	▸ **Detailed design and construction planning would aim to minimise the use of potable water during construction.** ▸ **Appropriate sources for construction water would be determined prior to construction in consultation with relevant stakeholders, and any required approvals/agreements would be obtained.**

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – DETAILED DESIGN/PRE-CONSTRUCTION
D7	**Water quality**		
D7.1	D7.1	*Water quality*	▸ The design features listed in section 16.3.1 **of the EIS** would continue to be refined and implemented to minimise the potential impacts of the **preferred infrastructure** ~~proposal~~ on water quality.
D7.2	D7.2	*Surface water monitoring framework*	▸ A surface water monitoring framework would be developed as part of the soil and water management sub-plan in the CEMP. It would identify monitoring locations at discharge points, and selected watercourses where works are being undertaken. ▸ The monitoring framework would include the relevant water quality objectives, parameters, and criteria from Technical Report 7, and specific monitoring locations which have been identified based on the hydrological attributes of the receiving watercourse, in consultation with **the Department of Planning, Industry and Environment** ~~**(Crown Land and Water** DPI) and the EPA~~.
D8	**Aboriginal heritage**		
D8.1	D8.1	*Avoiding and minimising impacts to Aboriginal heritage*	▸ Detailed design and construction planning would avoid direct impacts to the identified items/sites of Aboriginal heritage significance where practicable. ▸ An Aboriginal cultural heritage management plan would be prepared and would include measures to minimise the potential for impacts, manage Aboriginal heritage, and procedures for any unexpected finds. ▸ The plan would be prepared in consultation with registered Aboriginal parties~~, incorporate the recommendations of the Aboriginal Cultural Heritage and Archaeological Assessment~~ and take into account the outcomes of further investigations following detailed design. ▸ The location of all construction compounds **and associated access routes** would be reviewed to ensure, as far as practicable, they are not located in areas of more than low archaeological potential.
D8.2	D8.2	*Impact to the following sites within the **preferred infrastructure** ~~proposal~~ site:* ▸ *~~Steel Bridge Camp site (10-3-0032)~~* ▸ *~~Duffys Creek site (10-3-0035)~~* ▸ *NNS IA6 to IA13* ▸ *NNS AS1 and NNS AS5 to NNS AS7*	▸ Impacts to these sites would be avoided where possible. The sites would be fenced prior to construction and their locations marked on all plans. A buffer of 10 metres around the sites would be applied for fencing. ▸ If these sites cannot be avoided, salvage of artefacts would be undertaken prior to construction in accordance with the procedures detailed in the Aboriginal Cultural Heritage and Archaeological Assessment.
D8.3	D8.3	*Impacts to site 10-6-0048 (scarred tree)*	▸ Impacts to the scarred tree (site 10-6-0048) and the dripline of the tree would be avoided. The site would be fenced prior to construction and marked on all plans.

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – DETAILED DESIGN/PRE-CONSTRUCTION
D8.4	D8.4	*Impacts to areas of moderate to high archaeological potential within the **preferred infrastructure** ~~proposal~~ site:* ▸ ~~Gwydir River terraces (survey area 42)~~ ▸ Croppa Creek and adjoining slopes and terraces (survey area 55) ▸ ~~Mehi River and terraces (survey area 56)~~	▸ If the detailed design identifies the potential for disturbance below the depth of existing disturbance, further consideration would be given to the potential for archaeological impacts. **Measures to manage these impacts** ~~If required, a detailed methodology for any subsequent archaeological excavation~~ would be developed in consultation with Aboriginal parties for inclusion within the Aboriginal cultural heritage management plan.
D8.5	D8.5	*Impacts to survey area 15 (Lower slopes - Newell Highway overbridge)*	▸ Consideration of a program of archaeological subsurface testing would be conducted within this area. Depending on the result of testing, it may be necessary to undertake salvage excavations at these locations.
n/a	**D8.6**	***Impacts to Aboriginal cultural heritage in areas not previously assessed.***	▸ **Before construction commences an Aboriginal cultural heritage assessment would be undertaken for areas of the preferred infrastructure site that were not previously assessed as part of the original assessment undertaken for the EIS (see Technical Report 5).** ▸ **Areas or items of Aboriginal cultural heritage significance identified as part of this additional assessment would be managed in accordance with the Aboriginal cultural heritage management plan (mitigation measure D8.1).**
D8.6	**D8.7**	*Unexpected finds*	▸ An unexpected finds procedure 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.
D9	**Non-Aboriginal heritage**		
D9.1	D9.1	*Impacts to Moree Station*	▸ The detailed design of the **preferred infrastructure** ~~proposal~~ would minimise the potential for impacts to Moree Station, and would have regard to, and be sympathetic with, its heritage significance. **Input to the design would be sought from an appropriately qualified and experienced heritage architect.** ▸ **~~If the detailed design for works at Moree Station identifies that impacts to the station cannot be avoided, then~~ A Statement of Heritage Impact for Moree Station would be prepared by an appropriately qualified and experienced heritage consultant.**

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – DETAILED DESIGN/PRE-CONSTRUCTION
D9.2	D9.2	*Impacts to the bridges ~~over the Mehi and Gwydir rivers and~~ Croppa Creek, underbridges, former stations, Edgeroi Woolshed*	▸ A photographic/archival recording would be undertaken of **all listed heritage items in accordance with Heritage Division publications *How to Prepare Archival Records Of Heritage Items* and *Photographic Recording of Heritage Items using Film or Digital Capture*** ~~. bridges proposed for removal, former rail station sites, and Edegeroi Woolshed in accordance with ARTC's Archival Recording Standard.~~ ▸ **A photographic/archival recording would be undertaken of all identified potential heritage items in accordance with ARTC's Archival Recording Standard.** ▸ The photographic recording would include contextual photographs showing the relationship between the rail line and these items. ▸ **Adaptive reuse of representative features of the bridge over Croppa Creek would be investigated.**
D9.3	D9.3	*Impacts to the Anzac Day crossing*	▸ Where practicable, the detailed design for the **preferred infrastructure** ~~proposal~~ would provide a level crossing at the same or a similar location as the Anzac Day Crossing south of Crooble. ▸ **Commemoration of the Anzac Day Crossing would be undertaken through placement of information signage at a suitable publicly accessible location close to the crossing.**
D9.4	n/a	~~*Impacts to the former Aboriginal fringe camp near the Mehi River bridge*~~	~~An archaeological management sub-plan would be prepared as part of the CEMP to define the measures to be implemented during construction at the former Aboriginal fringe camp site near the Mehi River bridge. The plan would provide requirements for archaeological management, including a research design methodology.~~
D9.5	D9.4	*Potential vibration impacts to heritage structures*	▸ For listed and potential heritage items where screening vibration levels are predicted to be exceeded, the detailed assessment referred to under item D4.2 would specifically consider the heritage values of the structure, ~~in consultation with a heritage specialist,~~ to ensure sensitive heritage fabric is adequately monitored and managed.
D9.6	D9.5	*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 or human skeletal remains discovered during construction.
D10	**Landscape and visual**		
D10.1	D10.1	*Landscape character and visual impacts*	▸ Detailed design would be undertaken in accordance with the design vision, objectives, and principles which underpin the concept design, and would take into account the guidelines listed in section 19.1.2 **of the EIS**.
D10.2	D10.2	*Artist impressions*	▸ Following completion of detailed design of the Jones Avenue overbridge, artist impressions and perspective drawings would be developed for consultation purposes.
D11	**Land use and property**		
D11.1	D11.1	*Property impacts*	▸ Individual property agreements would be developed in consultation with landowners/occupants, with respect to the management of construction on or immediately adjacent to private properties, **where appropriate**. These would detail any required adjustments to fencing, access, farm infrastructure, and relocation of any impacted structures, as required.

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – DETAILED DESIGN/PRE-CONSTRUCTION
D11.2	D11.2	*Acquisitions*	▸ All property acquisitions/adjustments would be undertaken in consultation with landowners and, **where relevant**, in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*. **In line with the *Land Acquisition Act*, ARTC's preference is for acquisition by agreement where practicable.**
D11.3	D11.3	*Access to properties*	▸ Access to properties would be maintained and managed in accordance with the mitigation measures listed under item D2 above.
D11.4	D11.4	*Travelling stock reserves*	▸ Local Land Services would be consulted during detailed design to understand how impacts to travelling stock reserves can be avoided during construction and operation. Alternative access arrangements would be made as required**, subject to maintaining rail safety**.
D11.5	D11.5	*Impacts to services and utilities*	▸ 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.
D11.6	D11.6	*Consultation and communication*	▸ Property owners and occupants would be consulted ~~**during the design and construction phases**~~, in accordance with the communication management plan for the **preferred infrastructure** ~~proposal~~ (described in Chapter 4 **of the EIS**), to ensure that owners/occupants are informed about the timing and scope of activities in their area; and any potential property impacts/changes, particularly in relation to potential impacts to access, services, or farm operational arrangements. ▸ The results of consultation would be incorporated in the individual property agreements as appropriate. ▸ Consultation would be undertaken with landowners affected by level crossing changes and agreement obtained, where required.
D11.7	D11.7	*Biosecurity risks*	▸ The biodiversity management plan included in the CEMP would detail measures to minimise the potential for biosecurity risks during construction.
n/a	**D11.8**	***Works potentially within Moree Airport airspace***	▸ **ARTC would contact Moree Shire Council to confirm the potential notification and/or approval requirements in relation to works within the land shown on the Obstacle Limitation Surface Map.**
D12	**Socio-economics**		
D12.1	D12.1	*Communication*	▸ Key stakeholders (including local councils, emergency service providers, public transport providers, the general community, and surrounding landowners/occupants) would continue to be consulted regarding the **preferred infrastructure** ~~proposal~~ in accordance with the communication management plan described in Chapter 4 **of the EIS**.
D12.2	D12.2	*Local access to Inland Rail*	▸ ARTC would continue to work with relevant stakeholders, including Moree Plains Shire Council, to identify opportunities to facilitate local access to Inland Rail via the Moree Gateway, **and other local facilities, where feasible and reasonable.**
D12.3	D12.3	*Accommodation*	▸ A temporary workforce housing and accommodation plan would be developed and implemented during construction. This would include a requirement for consultation to be undertaken with local accommodation providers and councils regarding the availability of accommodation, and the need to maintain some availability for non-workforce accommodation.

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – DETAILED DESIGN/PRE-CONSTRUCTION
D13	**Sustainability**		
D13.1	D13.1	*Sustainability management plan*	▸ The potential sustainability initiatives identified for the **preferred infrastructure** ~~proposal~~ would be reviewed and updated during ~~the~~ detailed design ~~stage~~. ▸ A sustainability management plan would be developed to guide the design, construction, and operation of **preferred infrastructure** ~~proposal~~, to achieve an 'excellent' rating according to the ISCA infrastructure sustainability rating tool. ▸ The sustainability management plan would incorporate the updated sustainability initiatives, and the review and reporting requirements necessary to demonstrate how sustainability has been incorporated into the **preferred infrastructure** ~~proposal~~ during design, construction, and operation.
D14	**Climate change**		
D14.1	D14.1	*Climate change risk management*	▸ The climate change risk assessment would continue to be refined as the design of the **preferred infrastructure** ~~proposal~~ progresses. ▸ The adaptation measures identified for the **preferred infrastructure** ~~proposal~~ would be reviewed, and final measures would be incorporated into the design where practicable.
D15	**Waste**		
D15.1	D15.1	*Waste management*	▸ Detailed design would include measures to minimise excess spoil generation. This would include a focus on optimising the design to minimise spoil volumes, and the reuse of material on-site.
D16	**Health and safety**		
D16.1	D16.1	*Public safety*	▸ A hazard analysis would be undertaken during detailed design to identify risks to public safety from the **preferred infrastructure** ~~proposal~~, and how these can be mitigated through safety in design.
D16.2	D16.2	*Services and utilities*	▸ The location of utilities, services and other infrastructure would be identified prior to construction to determine requirements for access to, diversion, protection and/or support.

13.1.2 Construction

TABLE 13.2: UPDATED MITIGATION MEASURES – CONSTRUCTION

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURES – CONSTRUCTION
C1	**Environmental management**		
C1.1	C1.1	*CEMP*	▸ Construction of the **preferred infrastructure** ~~proposal~~ would be undertaken in accordance with the approved CEMP.
C2	**Traffic, transport and access**		
C2.1	C2.1	*General impacts of construction activities on traffic, transport, access, pedestrians and cyclists.*	▸ A traffic, transport and access management sub-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 ▸ construction material, equipment and spoil haulage, including arrangements for oversize vehicles ▸ road pavement and access road condition management ▸ management of impacts to public transport, including school buses, pedestrian and cyclist access, and safety ▸ management of impacts to access for surrounding residents and business owners/operators ▸ arrangements for level crossings during construction ▸ road and driver safety. ▸ The traffic, transport and access management sub-plan would be developed in consultation with (where relevant) Narrabri Shire Council, Moree Plains Shire Council, Gwydir Shire Council, Roads and Maritime Services, and public transport/bus operators.
C2.2	C2.2	*Access*	▸ Access to individual residences, services and businesses, and access for livestock across the rail corridor, would be maintained during construction. Where alternative access arrangements need to be made, these would be developed in consultation with affected property owners/occupants.
C2.3	C2.3	*Emergency vehicle access*	▸ Access for emergency vehicles would be maintained along key emergency access routes throughout the construction period, with suitable alternative access arrangements provided where required.
C2.4	C2.4	*Rail traffic diversions*	▸ Diversions of existing rail traffic would be undertaken in consultation with relevant stakeholders, and alternative arrangements would be provided. ▸ **Replacement public transport services would be provided during interruptions to operation of the passenger rail service.**

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURES – CONSTRUCTION
C2.5	C2.5	*Consultation*	▸ Consultation with relevant stakeholders would be undertaken regularly to facilitate the efficient delivery of the **preferred infrastructure** ~~proposal~~ and to minimise congestion and inconvenience to road users. Stakeholders would include the relevant local council**s**, bus operators, Roads and Maritime Services, emergency services, and affected property owners/occupants. ▸ The community would be notified in advance of any proposed road and pedestrian network changes through signage, the local media, and other appropriate forms of communication. ▸ Where changes to access arrangements are required **for individual properties**, ARTC would advise **relevant** property owners/occupants and consult with them in advance regarding alternative access arrangements.
C3	**Biodiversity**		
C3.1	C3.1	*General biodiversity impacts*	▸ A biodiversity management sub-plan would be prepared and implemented as part of the CEMP. It would include measures to minimise the potential for biodiversity impacts. The sub-plan would address, as outlined below: ▸ a pre-clearing survey and tree-felling procedure ▸ procedures to manage micro-bats ▸ avoiding impacts on surrounding vegetation (item C3.2) ▸ weed management (item C3.3) ▸ dewatering of standing pools in watercourses ▸ measure to minimise impacts on aquatic ecology
C3.2	C3.2	*Avoidance of impacts – terrestrial and aquatic biodiversity*	▸ Areas of biodiversity value outside the **preferred infrastructure** ~~**proposal**~~ site would be fenced or signposted, where appropriate, to prevent the unnecessary disturbance during the construction phase.
C3.3	C3.3	*Weed management*	▸ **Priority** ~~Noxious~~ weeds would be managed in accordance with the ***Biosecurity Act 2015*** ~~*Noxious Weeds Act 1993*~~. Weeds of national environmental significance would be managed in accordance with the *Weeds of National Significance Weed Management Guide*. ▸ Any herbicides would be applied such that impacts on surrounding agricultural properties are avoided.
C3.4	C3.4	*Rehabilitation*	▸ Rehabilitation of disturbed areas would be undertaken progressively and in accordance with the rehabilitation strategy.
C4	**Noise and vibration**		
C4.1	C4.1	*Noise and vibration management*	▸ The Inland Rail NSW Construction Noise and Vibration Management Framework **(provided in Appendix J)** would be implemented, and the **preferred infrastructure** ~~proposal~~ would be constructed, with the aim of achieving the construction noise management levels and vibration criteria identified by the noise and vibration assessment. ▸ All feasible and reasonable noise and vibration mitigation measures would be implemented. ▸ Any activities that could exceed the construction noise management levels and vibration criteria would be identified and managed in accordance with the Inland Rail NSW Construction Noise and Vibration Management Framework and the CEMP. ▸ Notification of impacts would be undertaken in accordance with the communication management plan for the **preferred infrastructure** ~~proposal~~.

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURES – CONSTRUCTION
C5	**Air quality**		
C5.1	C5.1	*General air quality impacts*	▸ An air quality management sub-plan would be prepared and implemented as part of the CEMP. It would include measures to minimise the potential for air quality impacts on the local community and environment, and would address all aspects of construction, including: ▸ spoil handling ▸ machinery operating procedures ▸ soil treatments ▸ stockpile management ▸ haulage ▸ dust suppression ▸ monitoring.
C5.2	C5.2	*Construction activities and earthworks that may cause dust impacts*	▸ Where sensitive receivers are located within 150 metres of construction works, or visible dust is generated from vehicles using unsealed access roads, road watering would be implemented.
C6	**Soil and contamination**		
C6.1	C6.1	*General soil and erosion management*	▸ A soil and water management sub-plan would be prepared as part of the CEMP. It would include a detailed list of measures that would be implemented during construction to minimise the potential for soil and contamination impacts, including: ▸ allocation of general site practices and responsibilities ▸ material management practices ▸ stockpiling and topsoil management, including prompt stabilisation of spoil mounds (for example, through mixing of gypsum) ▸ surface water and erosion control practices that take into account site specific soil types (for example, dispersive soils).
C6.2	C6.2	*Contamination*	▸ A contamination and hazardous materials sub-plan would be prepared and implemented as part of the CEMP. It would include: ▸ measures to minimise the potential for contamination impacts on the local community, workers, and environment ▸ procedures for incident management and managing unexpected contamination finds (an unexpected finds protocol).
C7	**Hydrology and flooding**		
C7.1	C7.1	*Flooding*	▸ Construction planning and the layout of construction work sites and compounds would be carried out with consideration of overland flow paths and flood risk, avoiding flood liable land and flood events where possible.
C7.2	C7.2	*Water usage (private bores and surface water)*	▸ Consultation would be undertaken with relevant stakeholders (including landowners/occupants) prior to construction, and appropriate approvals and agreements would be sought for the extraction of water. Monitoring would be undertaken during extraction to ensure volumes stipulated by license requirements and/or private landholder agreements are not exceeded.

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURES – CONSTRUCTION
C8	**Water quality**		
C8.1	C8.1	*Discharge to surface water*	▸ Discharge to surface water would be undertaken in accordance with the environment protection license for Inland Rail, and would consider the hydrological attributes of the receiving waterbody.
C8.2	C8.2	*Monitoring*	▸ Water quality would be monitored during construction in accordance with the surface water monitoring framework.
n/a	**C8.3**	***Works within watercourses***	▸ **Works within or near watercourses would be undertaken with consideration given to the Guidelines for Controlled Activities on Waterfront Land (Office of Water, 2012).**
C9	**Aboriginal heritage**		
C9.1	C9.1	*Unexpected finds and human skeletal material*	▸ If potential Aboriginal items, objects, or human remains are uncovered, works within the immediate area of the item would cease, and the unexpected finds procedure would be implemented. ▸ During pre-work briefings, employees would be made aware of the unexpected finds procedures and obligations under the *National Parks and Wildlife Act 1974*.
C10	**Non-Aboriginal heritage**		
C10.1	C10.1	*Accidental impacts*	▸ To minimise the potential for accidental impacts, the boundary of Moree, Edgeroi, Bellata, and Gurley stations, Edgeroi Woolshed, and the surveyor's trees, would be marked on plans and clearly defined during construction.
C10.2	C10.2	*Unexpected finds and human skeletal material*	▸ In the event that unexpected archaeological remains, relics, potential heritage items, or human remains are discovered during construction, all works in the immediate area would cease, and the unexpected finds procedure would be implemented.
C11	**Landscape and visual**		

C11.1	C11.1	*Light spill*	▸ Temporary and any permanent lighting would designed and sited to comply with:
			  ▸ AS 4282-1997 Control of the Obtrusive Effects of Outdoor Lighting
			  ▸ Dark Sky Planning Guideline: Protecting the observing conditions at Siding Spring (Department of Planning and Environment, 2016).

C11.2	C11.2	*Spoil mounds*	▸ **If required,** spoil mounds would be shaped to reduce their angular profile and ensure that they are integrated within the landscape. Sharp transition angles in the surface profile would be avoided, and rounded profiles would be used to provide a more natural form. Grass cover would be established over the surface area in accordance with the rehabilitation strategy.
C12	**Land use and property**		
C12.1	C12.1	*Communication*	▸ Property owners/occupants would continue to be consulted during construction, in accordance with the requirements of item D10.6.
C12.2	C12.2	*Rehabilitation*	▸ The rehabilitation strategy (item D3.5) would include measures to restore disturbed sites as close as possible to the pre-construction condition or better, or to the satisfaction of landowners. ▸ Rehabilitation of disturbed areas would be undertaken progressively, consistent with the rehabilitation strategy and individual property agreements (where relevant).

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURES – CONSTRUCTION
C13	**Socio-economics**		
C13.1	C13.1	*Communication*	▸ Local residents, businesses and other stakeholders would be notified before work starts in accordance with the communication management plan, and would be regularly informed of construction activities.
C13.2	C13.2	*Workforce*	▸ Where practicable, the workforce would include workers sourced locally, and opportunities for training potential local employees would be provided. This would include exploring opportunities for local Indigenous participation in consultation with local Indigenous service providers. ▸ A zero tolerance policy relating to anti-social behaviour would be adopted for work sites. ▸ ARTC would support local employment through the Inland Rail Academy to leverage training programs, upskill local residents, educate young people and connect businesses with Inland Rail opportunities and key regional industries.
C13.3	C13.3	*Demands for goods and services*	▸ Local suppliers would be identified and approached for procurement of goods and services where practicable.
n/a	**C13.4**	***Accommodation***	▸ **Where practicable, workforce housing and accommodation would be undertaken consistent with the accommodation plan required by measure D12.3.**
C14	**Sustainability**		
C14.1	C14.1	*Procurement*	▸ Procurement would be undertaken in accordance with the ***Inland Rail Sustainable Procurement Policy*** **(ARTC, 2018), the** *Sustainable Procurement Guide* (Australian Government, 2013) and the *NSW Government Resource Efficiency Policy* (OEH, 2014b).
C14.2	C14.2	*Reporting*	▸ Sustainability reporting (and corrective action where required) would be undertaken during construction in accordance with the sustainability management plan.
C15	**Waste**		
C15.1	C15.1	*Waste management*	▸ Waste segregation bins (colour coded as listed in Table 24.7 **of the EIS**) would be located at key construction compounds where practicable, to facilitate segregation and prevent cross contamination.
C16	**Health and safety**		
C16.1	C16.1	*Storage and handling of dangerous goods*	▸ Hazardous materials and dangerous goods would be stored, handled, and transported in accordance with relevant regulatory requirements and relevant Australian Standards, including SEPP 33 thresholds. This would include a requirement to provide a minimum bund volume of 110% of the largest single stored volume within the bund. ▸ A risk management strategy would be developed to manage the potential for risks in situations where the minimum distance from sensitive receivers cannot be achieved, or the quantity of hazardous materials exceed SEPP 33 threshold levels.

13.1.3 Operation phase

TABLE 13.3: UPDATED MITIGATION MEASURES – OPERATION

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – OPERATION
O1	**Environmental management**		
O1.1	O1.1	*OEMP*	▸ An OEMP would be prepared to detail the approach to environmental management during operation, as described in section 27.2 **of the EIS** and in accordance with the conditions of approval. ▸ The **preferred infrastructure** ~~proposal~~ would be operated in accordance with the approved OEMP.
O2	**Traffic, transport and access**		

O2.1	O2.1	*Level crossings*	▸ The operation of the level crossings that have been subject to changes as part of the **preferred infrastructure** ~~proposal~~ would be reviewed after the **preferred infrastructure** ~~proposal~~ commences operation to confirm:
			  ▸ that the level of protection continues to be appropriate
			  ▸ that the infrastructure is appropriate for the traffic conditions.

O3	**Biodiversity**		
O3.1	O3.1	*Fish passage*	▸ Culverts would be regularly inspected and maintained to minimise blockage of fish passage.
O3.2	O3.2	*Weed management*	▸ Annual inspections would be undertaken for weed infestations and to assess the need for control measures. ▸ Any outbreak of **priority weeds** ~~noxious~~ and/or weeds of national environmental significance would be managed in accordance with the ***Biosecurity Act 2015*** ~~*Noxious Weeds Act 1993*~~, *the Weeds of National Significance Weed Management Guide*, and the requirements of relevant authorities.
O4	**Noise and vibration**		
O4.1	O4.1	*Operational noise and vibration*	▸ The **preferred infrastructure** ~~proposal~~ would be operated with the aim of achieving the operational noise and vibration criteria identified by the noise and vibration assessment, the requirements of the conditions of approval, and the relevant environment protection licence.
O4.2	O4.2	*Monitoring*	▸ Once Inland Rail has commenced operation, operational noise and vibration compliance monitoring would be undertaken at representative locations to compare actual noise performance against that predicted by the noise and vibration assessment. ▸ Compliance monitoring requirements would be defined as part of the operational noise and vibration review. ▸ The results of monitoring would be included in an operational noise and vibration compliance report, prepared in accordance with the conditions of approval.
O5	**Air quality**		
O5.1	O5.1	*Rail vehicle emissions*	▸ The **preferred infrastructure** ~~proposal~~ would be managed in accordance with the air quality management requirements specified in the environmental protection licence.
O5.2	O5.2	*Impacts during maintenance*	▸ Maintenance service vehicles and equipment would be maintained and operated in accordance with the manufacturer's specifications.

EIS ID NO.	FINAL ID NO.	ISSUE	MITIGATION MEASURE – OPERATION
O6	**Soils and contamination**		
O6.1	O6.1	*Soil erosion and sedimentation*	▸ During any maintenance work where soils are exposed, sediment and erosion control devices would be installed in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).
O6.2	O6.2	*Contamination*	▸ ARTC's existing spill response procedures would be reviewed to determine applicability and suitability during operation. The adopted procedure would include measures to minimise the potential for impacts on the local community and the environment as a result of any leaks and spills.
O7	**Water quality**		
O7.1	O7.1	*General water quality management*	▸ The **preferred infrastructure** ~~proposal~~ would be managed in accordance with the water quality management requirements specified in the environmental protection licence.
O8	**Socio-economics**		
O8.1	O8.1	*Community safety*	▸ A safety awareness program would be implemented to educate the community regarding safety around trains. This would focus on: ▸ community and rural property operators who cross the rail corridor to access their properties ▸ residents in Moree, particularly those living on eastern side of town, to ensure that residents are aware of the safety concerns associated with trains passing through town, and encourage use of the Jones Avenue overbridge.
O9	**Sustainability**		
O9.1	O9.1	*Sustainability*	▸ Prior to operation commencing, the sustainability management plan would be reviewed and updated, and relevant initiatives would be implemented during operation.
O10	**Climate change**		
O10.1	O10.1	*Climate change*	▸ The recommended adaptation measures would be reviewed, and a final list of adaptation measures for implementation during operation would be confirmed and implemented. ▸ Operational management and maintenance procedures would include measures relating to potential climate change risks, as listed in Chapter 23 **of the EIS**. ▸ Emerging opportunities to manage potential climate change impacts on the **preferred infrastructure** ~~proposal~~ would continue to be monitored.
O11	**Waste**		
O11.1	O11.1	*Waste management*	▸ The waste management measures listed in Table 24.8 **of the EIS** would be implemented where practicable during operation.
O12	**Health and safety**		
n/a	**O12.1**	***Bushfire, storage and handling of dangerous goods, other health and safety risks***	▸ **Operation would be undertaken in accordance with ARTC's standard operating procedures.**

13.2 Conclusion

13.2.1 The process to date

ARTC is seeking approval to construct and operate the Narrabri to North Star section of Inland Rail (the proposal) which consists of upgraded rail track and associated facilities, generally within the existing rail corridor between Narrabri and the village of North Star. The proposal forms a key component of Inland Rail.

An EIS was prepared to support ARTC's application for approval of the proposal as critical State significant infrastructure in accordance with the requirements of Division 5.2 of the EP&A Act. The EIS was publicly exhibited between 15 November and 15 December 2017.

During the exhibition period, submissions were invited from the community and other stakeholders. A total of 18 submissions were received from the community, local councils and NSW government departments and agencies. Responses to the submissions received are provided in Part C of this report.

Subsequent to public exhibition, ARTC undertook further investigations and design refinement with the aim of addressing issues raised in submissions, while also minimising potential impacts – especially in respect of flooding and traffic and access.

As an outcome of these investigations, and to facilitate delivery of the proposal, ARTC divided the proposal into two phases. ARTC is currently seeking approval to undertake Phase 1, which is referred to as the 'preferred infrastructure' in this report. The key features of the preferred infrastructure, which are shown in Figure 1.2 of Appendix B (the preferred infrastructure project description), are as follows:

- upgrading the track, track formation, culverts and underbridges within the existing rail corridor, for a distance of 93 kilometres between Narrabri and Moree, and 80 kilometres between Camurra North and North Star
- providing five new crossing loops within the existing rail corridor at Bobbiwaa, Waterloo Creek, Tycannah Creek, Coolleearllee, and Murgo
- realigning the track within the existing rail corridor at Gurley and Moree stations
- removing the existing bridge and providing a new rail bridge over Croppa Creek
- realigning about 1.5 kilometres of the Newell Highway near Bellata, and providing a new road bridge over the existing rail corridor (the Newell Highway overbridge)
- providing a new road bridge over the existing rail corridor at Jones Avenue in Moree (the Jones Avenue overbridge).

Further information on the preferred infrastructure is provided in Part C and Appendix B.

Potential impacts associated with the preferred infrastructure, where these differ for the impacts assessed by the EIS, are considered in Part C.

As an outcome of the review of submissions and the assessment of impacts presented in this report, a final set of mitigation measures is proposed. These measures are provided in section 13.1. With the implementation of these measures, and the approach to environmental management described in section 27.2 of the EIS, the potential environmental impacts of the proposal would be adequately managed.

13.2.2 Where to from here

The Department of Planning, Industry and Environment will, on behalf of the Minister for Planning and Public Spaces, review the EIS and this report. Once this review has been completed, a draft environmental assessment report will be prepared for the Secretary of the Department of Planning, Industry and Environment, which may include recommended conditions of approval.

The environmental assessment report will be provided to the Minister for Planning and Public Spaces, who will then approve the project (with any conditions considered appropriate) or refuse to give approval to the project.

A copy of this report will be made publicly available. The Minister's determination, including any conditions of approval and the environmental assessment report, will be published on the Major Projects website following determination.

14. References

Australian Standard (AS), 1997, *AS 4282-1997 Control of the obtrusive effects of outdoor lighting*

AS, 2009, *AS 4970-20069/Amdt 1-2010 Protection of trees on development sites*

AS, 2010, *AS 2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites*

ARTC, 2015, *Inland Rail 2015 - Melbourne to Brisbane Inland Rail, Attachment A: ARTC 2015 Inland Rail Programme Business Case,* Inland Rail Implementation Group Report to the Australian Government

British Standard (BS), 2009, *BS 5228-2:2009 Code of practice for noise and vibration on construction and open sites – Part 2: Vibration*

BS, 1992, *BS 6472:1992 Guide to evaluation of human exposure to vibration in buildings*

Department of Environment and Conservation (DEC), 2005, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, December 2005

DEC, 2006a, *Assessing Vibration: a technical guideline,* February 2006

DEC, 2006b, *Manual for the Identification of Aboriginal Remains*, November 2006

Department of Environment and Climate Change (DECC), 2008, *Managing Urban Stormwater Soils and Construction, Volume 2A Installation of Services and Volume 2C Unsealed roads,* January 2008

DECC, 2009, *Interim Construction Noise Guideline,* July 2009

Department of Environment, Climate Change and Water (DECCW), 2011, *Road Noise Policy*, March 2011

Department of Infrastructure, Planning and Natural Resources, 2004, *Guideline for the Preparation of Environmental Management Plans*

Department of Sustainability, Environment, Water, Population and Communities, 2013, *Sustainable Procurement Guide*

EPA, 1999, *Environmental Criteria for Road Traffic Noise*, 1999

EPA, 2000, *NSW Industrial Noise Policy,* January 2010

EPA, 2013, *Rail Infrastructure Noise Guideline* (the RING), May 2013

EPA, 2014, *Waste Classification Guidelines, Part 1: Classifying Waste*

EPA, 2015, *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*, September 2015

Fairfull, S. and Witheridge, G., 2003, *Why do fish need to cross the road? Fish passage requirements for waterway crossings,* NSW Fisheries, January 2003

Infrastructure Australia, 2015, *Australian Infrastructure Audit – Our Infrastructure Challenges*

Infrastructure Sustainability Council of Australia (ISCA), 2014, *Infrastructure sustainability rating tool*, accessed via http://isca.org.au/is-rating-scheme/is-overview/is-rating-tool/item/68-is-rating-tool

Landcom, 2004, *Soils and Construction: Managing Urban Stormwater,* Volume 1, 4th Edition, March 2004

National Environmental Protection Council (NEPC), 1998, *National Environment Protection (Ambient Air Quality) Measure*

NEPC, 2013. *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as amended by the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)

NSW Health, 2013, *Policy Directive: Exhumation of Human Remains*, December, 2013, accessed via http://www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2013_046.pdf

NSW Heritage Office, 1998, *Skeletal Remains: Guidelines for the Management of Human Skeletal Remains Under the Heritage Act 1977*

OEH, 2012, *Erosion and sediment control on unsealed roads: A field guide for erosion and sediment control maintenance practices,* June 2012

OEH 2014a, *Framework for Biodiversity Assessment*, NSW Biodiversity Offsets Policy for Major Projects, September 2014

OEH, 2014b, *NSW Biodiversity Offsets Policy for Major Projects,* September 2014

OEH, 2014c, *NSW Government Resource Efficiency Policy*, July 2014

Office of Water, 2012, *Guidelines for Controlled Activities on Waterfront Land* accessed via http://www.water.nsw.gov.au/__data/assets/pdf_file/0004/547222/licensing_approvals_controlled_activities_riparian_corridors.pdf

Roads and Maritime Services, 2011, *Technical Guideline: Temporary stormwater drainage for road construction,* December 2011

Roads and Traffic Authority of NSW (RTA), 2002, *Guide to Traffic Generating Developments*, Version 2.2, October 2002

RTA, 2010, *Traffic Control at Work Sites,* June 2010

Safe Work Australia, 2016, *How to Safely Remove Asbestos Code of Practice*, April 2016

SafeWork NSW, 2016, *Code of Practice How to Manage and Control Asbestos in the Workplace*

Standards Australia 2004, *Australian Standard (AS) 1940-2004 The storage and handling of flammable and combustible liquids,* Sydney

Standards Australia 2008, *AS 3780-2008 The storage and handling of corrosive substances*, Sydney

WorkCover NSW, 2014, *Managing asbestos in or on soil,* March 2014