INLAND RAIL

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ARTC

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

IR_1381

COVER IMAGE
Flinders Peak (view from Kagaru), Scenic Rim Region, Queensland

ACKNOWLEDGEMENT OF COUNTRY

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

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EXECUTIVE SUMMARY

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT

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Introduction

Overview

This draft Environmental Impact Statement has been prepared to assess the potential environmental, social, cultural heritage and economic impacts and benefits associated with the construction and operation of the Calvert to Kagaru Project (the Project). The Project consists of approximately 53 kilometres of new rail track in South East Queensland. It is one of 13 distinct projects that, together, make up the Inland Rail Program.

The Australian Government has committed to delivering the Inland Rail Program (Inland Rail), an interstate freight rail corridor between Melbourne and Brisbane, via central-west New South Wales and Toowoomba in Queensland. Inland Rail is significant national transport infrastructure, which will enhance Australia's existing rail network and serve the interstate freight market.

The Inland Rail route is approximately 1,700 kilometres and will involve:

- Using the existing interstate rail corridor through Victoria and southern New South Wales
- Upgrading approximately 400 kilometres of existing rail corridor, mainly in western New South Wales
- Providing approximately 600 kilometres of new rail corridor through northern New South Wales and South East Queensland.

The Calvert to Kagaru section of the Inland Rail Program lies within a greenfield rail corridor and is described as one of the 'missing links' in the Inland Rail Program by connecting two other Inland Rail projects:

- Helidon to Calvert project in the north-west, connecting to the Queensland Rail West Moreton System near Calvert
- Kagaru to Acacia Ridge and Bromelton project to the south-east, connecting to the existing operational Sydney to Brisbane Interstate railway line at Kagaru.

This Environmental Impact Statement documents the environmental impact assessments undertaken by the Australian Rail Track Corporation (ARTC). The objective of the Environmental Impact Statement is to ensure that all relevant environmental, social and economic impacts of the Project are identified and assessed to demonstrate that the Project is based on sound environmental principles and practices.

The Environmental Impact Statement has followed the process established by the *State Development and Public Works Organisation Act 1971* (Qld). The Environmental Impact Statement specifically responds to the Terms of Reference for the Project issued by the Queensland Coordinator-General in December 2017. The Environmental Impact Statement also addresses matters relevant to the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) and Referral 2017/7944, pursuant to the Bilateral Agreement between the Commonwealth and State of Queensland.

The Proponent

ARTC is the proponent for the Project. ARTC was created after the Australian and State governments agreed in 1997 to form a 'one-stop shop' for all operators seeking to access to the national interstate rail network. Since its formation, ARTC has focused on infrastructure investment and the modernisation of the rail network. This work has extended to building and upgrading existing track to allow for the capacity that the market requires.

ARTC plays a critical role in the transport supply chain and in the overall economic development of Australia, managing and maintaining 8,500 kilometres of rail network across five states, investing in building, extending and upgrading the rail network to get freight off the road and onto rail. The ARTC network supports industries and businesses that are vital to the nation's economy by facilitating the movement of a range of commodities including general freight, coal, iron ore, other bulk minerals and agricultural products.

As the operator and manager of Australia's national rail freight network, ARTC has successfully delivered more than $5 billion in capital upgrades to the national rail freight network. Having emerged from this period of significant investment and network growth, ARTC has now been tasked with developing a program to deliver Inland Rail under the guidance of the Department of Infrastructure, Transport, Regional Development and Communications.[1]

Contact details for the Inland Rail Program are as follows:

Inland Rail
Australian Rail Track Corporation
ABN: 75 081 455 754
Level 16, 180 Ann Street
Brisbane QLD 4000

GPO Box 2462
Brisbane QLD 4001

Telephone: 1800 732 761

Further information on ARTC can be found at: **artc.com.au**.

1. Department and Minister titles current at the time of writing.

Project Rationale

Justification

Australia is heavily reliant on efficient and reliable supply chains to provide competitive domestic freight links and gateways for international trade.

At present, there is no continuous inland rail link between Melbourne and Brisbane. Interstate rail freight currently travels between Melbourne and Sydney via Albury, and then between Sydney and Brisbane, generally along the coast. Long transit times are endured since the existing network cannot accommodate highly efficient, long double-stacked trains. Inland Rail provides a significant opportunity to change the fundamentals of the freight logistics supply chain in Australia:

- Freight volumes on Australia's east coast are forecast to more than double by 2050—existing road and rail networks will not be able to cope with this increase in freight without further investment
- The existing rail line between Melbourne and Brisbane travels along the coast is constrained by passing through the congested hub of Sydney and an inability to accommodate double-stacked trains
- The coastal rail corridor cannot provide a service that is competitive with road transport and capacity constraints are likely unless significant capital works are undertaken
- Relying on road for freight transport will result in increasing safety, environmental and community impacts
- Without action, the cost of congestion on urban roads to the wider community could be more than $50 billion each year by 2031 with the demand on many key urban roads and rail corridors exceeding capacity by this time.

Inland Rail will transform the way freight is moved around the country, connect regional Australia to markets more efficiently, drive substantial cost savings for producers and consumers, and deliver significant economic benefits.

Previous studies and investigations have considered alternatives to the Inland Rail Program, including progressive road upgrades for road freight, maritime shipping, air freight, or other rail solutions such as upgrading the existing east coast railway. Overall, constructing an inland railway was the preferred option.

Benefits of Inland Rail and the Project

Inland Rail presents a unique opportunity to establish a competitive freight system by providing trunk rail infrastructure that supports a network of intermodal terminals and local sidings to distribute goods at a national, regional and local level.

The service that Inland Rail is offering (referred to as the 'service offering') is central to the delivery and competitiveness of Inland Rail and reflects the priorities of freight customers.

The key characteristics of the Inland Rail service offering are:

- **Transit time**—24 hours or less from Melbourne to Brisbane
- **Reliability**—98 per cent of goods will be delivered on time by connecting road freight, or available to be picked up at the rail terminal or port when promised
- **Price**—cheaper relative to road transport, as a combined cost of access to the rail network, rail haulage and pick-up and delivery
- **Availability**—services available with departure and arrival times that are convenient for customers.

As a component of the larger Inland Rail Program, the potential benefits of the Calvert to Kagaru Project will be fully realised when considered with the benefits of the full Melbourne to Brisbane alignment. Key benefits specific to the Project include:

- Employment for up to 620 people in construction, including people living in the vicinity of the Project and in nearby local government areas, with indirect employment also likely to be stimulated
- Training opportunities provided by ARTC and the development of career pathways for young people, Indigenous people and unemployed people, who are disadvantaged in the labour market
- Opportunities for local, regional and Indigenous businesses to participate in the Project's construction supply chain
- Development of labour force skills and business capacity that will enable future employment and business growth opportunities for businesses in the region
- Potential to catalyse improved employment and business opportunities by stimulating the establishment of businesses or industry precincts such as the Ebenezer Industrial Area
- Opportunities in secondary service and supply industries, such as retail, hospitality and other support services, for businesses in proximity to the Project.

Consequences of not proceeding with the Project

The continuing growth in freight demand calls for urgent attention. Without a decision to make a step-change in rail efficiency and performance, pressure on the road networks will continue to increase, freight costs will continue to rise, consumers will pay more for products, and productivity in important industrial sectors could decline. If investment in the east coast rail corridor or the Inland Rail freight corridor is not undertaken to increase capacity and minimise supply chain costs, additional risks are highly likely to eventuate. For example:

- There will be an increase in the number of trucks on urban and regional roads to move increasing freight volumes
- Larger trucks, such as B-doubles and B-triples will be mixing with smaller passenger vehicles on major highways
- Governments will need to invest heavily in major arterial and rural roads to cater for worsening road traffic
- An increase in the number and size of heavy vehicles on roads will require governments to spend more on maintenance and upgrades
- Greater truck volumes may result in more accidents causing injury or death on roads
- Carbon emissions and noise pollution will increase as road traffic increases
- Without an incentive to invest in rail supply chains, companies will potentially be locked into road-based logistic options.

The benefits of implementing the Inland Rail Program provide a strong justification for the Project to proceed.

Project Approvals

Environmental assessment

This draft Environmental Impact Statement documents the environmental impact assessments undertaken by ARTC to support the delivery of the Project. An environmental impact assessment is a systematic analysis of a proposed development in relation to existing environmental values.

The objective of the Environmental Impact Statement is to ensure that all potential environmental, social and economic impacts of the Project are identified and assessed and to demonstrate that the Project is based on sound environmental principles and practices. The Environmental Impact Statement includes a Draft Outline Environmental Management Plan, which provides the framework to implement mitigation measures to avoid or minimise adverse impacts.

Queensland approval process

On 10 May 2017, ARTC submitted an Initial Advice Statement to the Queensland Coordinator-General to apply for a 'Coordinated Project' declaration under the *State Development and Public Works Organisation Act 1971* (Qld). On 16 June 2017, the Project was declared a 'coordinated project, for which an EIS is required'.

The Terms of Reference for the Project was approved under Section 30 of the *State Development and Public Works Organisation Act 1971* (Qld) and was released on 8 December 2017. The Terms of Reference provides the general and specific matters that ARTC must address in the Environmental Impact Statement. The draft Environmental Impact Statement has been prepared in response to the Terms of Reference.

Commonwealth approval process

The Project was deemed to be a 'controlled action', which means that it also requires to be assessed and approved under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) before it can proceed. The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined as 'matters of national environmental significance'. The controlling provision for the Project is listed threatened species and communities under sections 18 and 18A of the Act, as determined in the Referral Reference 2017/7944 for the Project.

As the Project has the potential to impact on both Commonwealth and State environmental matters, the Environmental Impact Statement will be assessed under the Bilateral Agreement between the Commonwealth and the State of Queensland (Section 45 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth)) using the information presented in the Environmental Impact Statement.

Submissions on the Environmental Impact Statement

Any person, group or organisation can make a submission about the Project's Environmental Impact Statement to the Office of the Coordinator-General during the public notification period that will be considered by the Coordinator-General in evaluating the Environmental Impact Statement.

Under the *State Development and Public Works Organisation Act 1971* (Qld), a properly made submission must:

- Be made in writing
- Be received on or before the last day of the public notification period
- Be signed by each person who makes the submission
- State the name and address of each person who makes the submission
- State the grounds of the submission and the facts and circumstances relied on in support of those grounds.

A person wishing to make a submission about the Environmental Impact Statement should also:

- Clearly state the matter(s) of concern or interest and list points to help with clarity
- Reference the relevant section(s) of the Environmental Impact Statement
- Ensure the submission is legible.

Submissions regarding this Environmental Impact Statement should be addressed to:

The Coordinator-General
C/- EIS Project Manager—
Inland Rail, Calvert to Kagaru
Coordinated Project Delivery
Office of the Coordinator-General
PO Box 15517
CITY EAST QLD 4002
Telephone: 13 QGOV (13 74 68)

Submissions can also be made electronically at the following email address:

inlandrailc2k@coordinatorgeneral.qld.gov.au

Electronic submissions are still required to meet the properly made requirements of the *State Development and Public Works Organisation Act 1971* (Qld).

For further enquiries, please contact
Telephone: 13 QGOV (13 74 68).

After the public notification period, the Queensland Coordinator-General considers the draft Environmental Impact Statement, all properly made submissions, and any other material that the Queensland Coordinator-General considers relevant to the Project. The Queensland Coordinator-General must then decide whether or not to accept the draft Environmental Impact Statement as final under Section 34A of the *State Development and Public Works Organisation Act 1971* (Qld) and issue a notice advising of the decision.

Where the Queensland Coordinator-General decides not to accept the draft Environmental Impact Statement as EIS, the Coordinator-General must request additional information and advise whether or not public notification of the additional information is required under Section 34B(2) of the *State Development and Public Works Organisation Act 1971* (Qld).

Where the Queensland Coordinator-General requests further information under Section 34B(2) of the *State Development and Public Works Organisation Act 1971* (Qld), a revised draft Environmental Impact Statement is provided and public notification undertaken, where required.

When the Queensland Coordinator-General accepts the draft Environmental Impact Statement as final, the Queensland Coordinator-General will evaluate the it, any submissions, any other relevant information and prepare a report that evaluates the Environmental Impact Statement.

The Australian Government Minister for the Environment will receive a copy of the Queensland Coordinator-General's Evaluation Report to use when deciding whether to approve the Project, with or without conditions, under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

The process for environmental impact assessment and consultation is in Figure 1, showing the stages of the Environmental Impact Statement approval process.

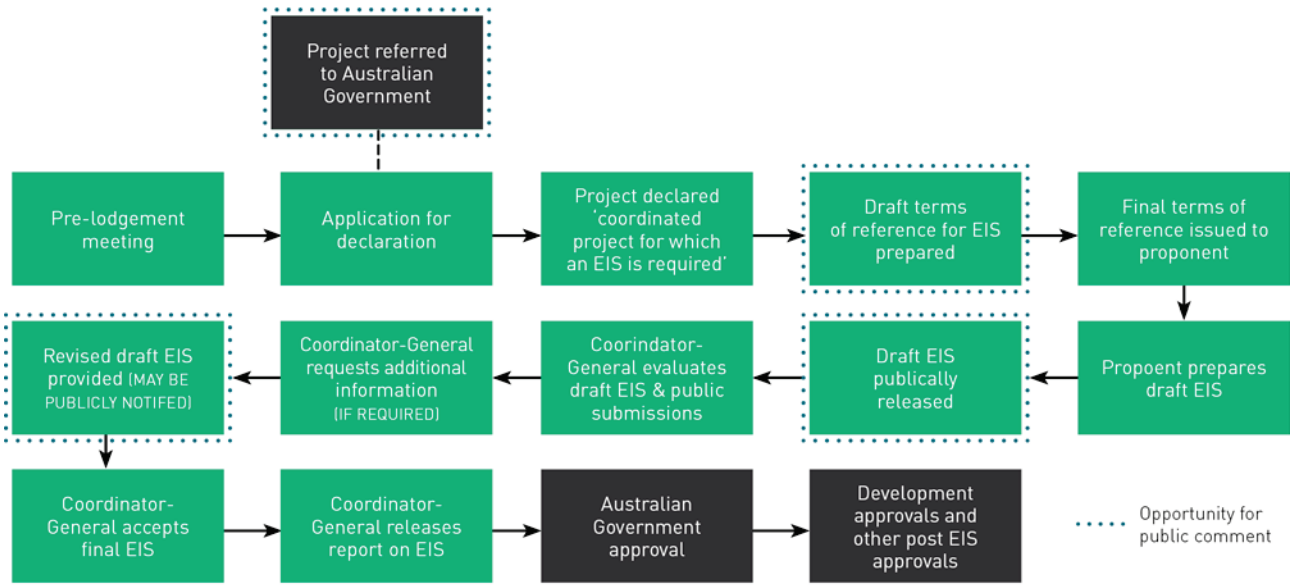


FIGURE 1: THE ENVIRONMENTAL IMPACT ASSESSMENT AND CONSULTATION PROCESS UNDER THE *STATE DEVELOPMENT AND PUBLIC WORKS ORGANISATION ACT 1971* (QLD) AND THE *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999* (CTH)

Assessment Approach

The draft Environmental Impact Statement has taken a conservative approach to identifying the potential impacts of construction and operation of the Project, including cumulative impacts. This has involved defining the study area, reviewing relevant studies, reports and spatial datasets, and undertaking field assessments and modelling.

Where environmental impacts have been identified through the assessment process, efforts have been made, where practicable, to avoid or minimise those impacts through development of the design. Where attempts to avoid or minimise impacts through design have a limited effect, further proposed mitigation measures have been outlined to implement in future phases of the Project, including detailed design, construction and commissioning and operation. Proposed measures relevant to detailed design and construction and commissioning are documented in Chapter 23: Draft Outline Environmental Management Plan.

The need for environmental offsets to address adverse residual impacts was also assessed. A consolidated description of commitments to implement management measures including monitoring and offsets is provided in Appendix E: Proponents Commitments.

Opportunities to maximise the economic and social benefits of the Project have been identified and include local employment, local industry participation, and opportunities for complementary investment with continued community benefits. These opportunities are further detailed in the Social Impact Management Plan, and associated action plans.

Community and Stakeholder Engagement

Stakeholders and members of the community have helped to shape the scope of this Environmental Impact Statement by providing submissions on the draft Terms of Reference, the Project referral under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), and by participating in community consultation processes that have been ongoing during the preparation of this draft Environmental Impact Statement.

The consultation program for the Project was structured to inform individuals and groups directly and indirectly affected by the Project. The consultation process was also structured to allow input from:

- Stakeholder groups with specific interests in the Project, such as Traditional Owners, community groups (via Community Consultative Committee meetings (as members and observers), and ARTC's online Social PinPoint and CollabMap tools) and via industry associations
- Australian Government departments, Queensland Government departments and agencies, and local governments with either a regulatory or an advisory role relevant to the design, construction or operation of the Project.

Stakeholder and community feedback and comments have informed the preparation of this Environmental Impact Statement including:

- Identifying community values and local conditions in proximity to the Project
- Assessing potential benefits and impacts of the Project's construction and operation
- Identifying strategies to minimise or avoid potential impacts and maximise or enhance potential benefits.

Community consultation is an ongoing process to inform the community about the Project and involve them throughout the life of the Project.

Project Description

Overview

The Project is a new railway, connecting the existing Queensland Rail West Moreton System rail corridor with the existing Interstate Line at Kagaru. The Project starts within the Queensland Rail West Moreton System rail corridor to the east of Calvert where it heads to the south-east, traversing through Lanefield, Rosewood, Lower Mount Walker, Ebenezer, Willowbank, Purga, Peak Crossing and Washpool. The Project then traverses the Teviot Range, through Undullah until it joins the existing Interstate Line at Kagaru.

The key components of the Project are:

- Approximately 53 kilometres of single-track, dual-gauge rail line with four crossing loops, initially constructed for 1,800 metre-long double-stacked trains, and designed not to preclude the future extension of crossing loops to accommodate 3,600 metre trains
- A 1,015 metre tunnel through the Teviot Range and bridges to accommodate the topography and to cross waterways and other infrastructure
- Tie-ins to the existing West Moreton Railway Line and to the existing operational Sydney to Brisbane Interstate railway line at the Project boundaries
- Allowance for a future connection to the Ebenezer Industrial Area at Willowbank
- Construction of associated rail infrastructure, including maintenance sidings and signalling infrastructure to support the Advanced Train Management System
- Rail crossings, including level crossings, grade separations and road overbridges, occupational and private crossings, fauna crossing structures, signage, and fencing
- Significant embankments and cuttings along the length of the alignment
- Ancillary works, including road and public utility crossings and realignment (excluding enabling works)
- Construction worksites, laydown areas and access roads.

Enabling works are those works undertaken by or for third parties, primarily for the relocation or re-provision of public utilities, or existing Queensland Rail rail assets. These works are not part of Project works. These works will be undertaken in accordance with the relevant environmental or regulatory framework applicable to the works or public utility.

The estimated capital expenditure for construction of the Project is approximately $648 million.[2]

Local context

The Project is located within the Ipswich City Council, Logan City Council and Scenic Rim Regional Council local government areas in South East Queensland (refer Figure 2).

The Project will generally be located within the Southern Freight Rail Corridor, which was gazetted in November 2010 as future railway land under the *Transport Infrastructure Act 1994* (Qld). Extensive public consultation and technical, environmental and cultural heritage studies were undertaken before the Southern Freight Rail Corridor was gazetted. The Southern Freight Rail Corridor forms the basis for the Environmental Impact Statement investigation corridor (refer Figure 2 and Table 1).

Multi-criteria analysis was undertaken as part of the Environment Impact Statement and design development processes to refine the alignment within the Environmental Impact Statement investigation corridor and, potentially, outside the Southern Freight Rail Corridor, if there was the opportunity for significant efficiencies in constructability and reduction in environmental impacts to be realised. The resulting Project design and disturbance footprint was assessed in the Environmental Impact Statement. Table 1 defines the key terminology used across the Environmental Impact Statement assessments.

2. The EIS includes an estimated capital cost profile of approximately $648 million, consistent with the *Inland Rail Programme Business Case* (ARTC, 2015a) and is an estimate of direct construction costs—including, but not limited to: delivering environmental and heritage commitments; fencing and earthworks; tunnels and tunnel services; formation and roadworks; structures; track works (loops and crossings); delivery works (incidentals and utilities); and supply of track, sleepers and turnouts.

   The Project is expected to represent an investment of up to $1.2 billion—this figure includes both direct construction costs and indirect costs. Indirect costs include items such as: design services, Contractor overhead and margins, contingency, and escalation.

   The total investment figure also includes ARTC Program costs such as project management, train control systems, property requirements and insurances.

   The total investment figure makes provision for expected Project contingency and risk.

   Further detail on the economic impact assessment is located in Chapter 17: Economics and Appendix S: Economic Impact Assessment Technical Report.

Relationship to other Inland Rail Projects

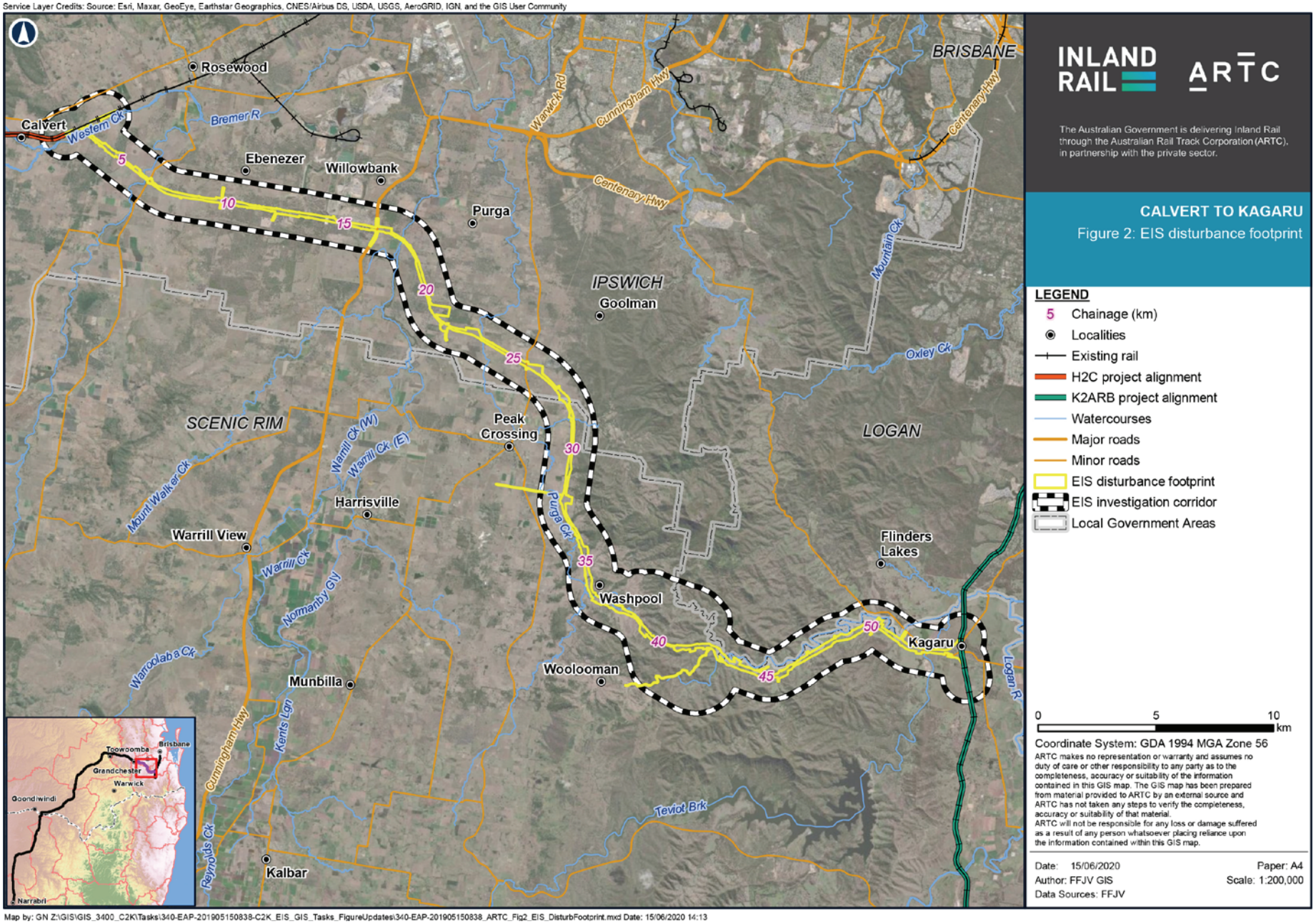
The Project forms part of the overall Inland Rail Program and is one of the missing links across the program.

At its northern limit, the Project will connect into the Helidon to Calvert project. An Environmental Impact Statement is currently being prepared for this project. At its southern limit, the Project will connect to the Kagaru to Acacia Ridge and Bromelton project. A decision is yet to be made about whether this project will also be subject to an Environmental Impact Statement process.

The Project does not have a direct relationship with any other coordinated projects, major projects or developments. However, it will provide connectivity opportunities between the existing Queensland Rail West Moreton System and ARTC Interstate lines, as well as being a potential catalyst for the development and growth of regional intermodal hubs, such as those associated with InterLinkSQ, Willowbank Industrial Area and Bromelton Intermodal Hub.

TABLE 1: TERMINOLOGY USED ACROSS THE ENVIRONMENTAL IMPACT STATEMENT

Term	Definition
Environmental Impact Statement investigation corridor	An approximate 2 kilometre-wide study area, 1 kilometre either side of the proposed rail alignment. The Environmental Impact Statement investigation corridor includes the disturbance footprint, which encompasses all areas where works are proposed, including both permanent and temporary works, and land within a 1 kilometre radius either side of the proposed rail alignment. The Environmental Impact Statement investigation corridor is slightly wider around Chainage 38 to Chainage 45 to accommodate for the options analysis that was undertaken for the Teviot Range crossing. Refer Figure 2.
Disturbance footprint	The disturbance footprint includes: ▸ Permanent disturbance footprint: The rail corridor includes the rail tracks and associated infrastructure as well as other permanent works associated with the Project (for example where changes to the road network are required) ▸ Temporary disturbance footprint: The permanent disturbance footprint and any temporary storage and laydown areas to be used on a temporary basis during the construction phase. Refer Figure 2.
Technical study areas	Some technical assessments used a different study area to the Environmental Impact Statement investigation corridor or disturbance footprint depending on the requirements of the environmental aspect being assessed.


Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Rosewood
Calvert
Western Ck
Bremer R
Ebenezer
Willowbank
Purga
Warwick Rd
Cunningham Hwy
Centenary Hwy
BRISBANE
Mountain Ck
IPSWICH
Goolman
Oxley Ck
SCENIC RIM
Peak Crossing
LOGAN
Warrill Ck (W)
Warrill Ck (E)
Mount Walker Ck
Harrisville
Warrill View
Purga Ck
Flinders Lakes
Warrill Ck
Normanby Gly
Washpool
Kagaru
Warroolaba Ck
Munbilla
Woolooman
Logan R
Kents Lgn
Teviot Brk
Reynolds Ck
Kalbar
5
10
15
20
25
30
35
40
45
50
Toowoomba
Brisbane
Grandchester
Warwick
Goondiwindi
Narrabri
INLAND RAIL
ARTC
The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.
CALVERT TO KAGARU
Figure 2: EIS disturbance footprint
LEGEND
5 Chainage (km)
Localities
Existing rail
H2C project alignment
K2ARB project alignment
Watercourses
Major roads
Minor roads
EIS disturbance footprint
EIS investigation corridor
Local Government Areas
0
5
10
km
Coordinate System: GDA 1994 MGA Zone 56
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Paper: A4
Author: FFJV GIS
Scale: 1:200,000
Data Sources: FFJV
Map by: GN Z:\GIS\GIS_3400_C2K\Tasks\340-EAP-201905150838-C2K_EIS_GIS_Tasks_FigureUpdates\340-EAP-201905150838_ARTC_Fig2_EIS_DisturbFootprint.mxd Date: 15/06/2020 14:13

Design features

The key characteristics of the Inland Rail Program service offering are reliability, price, transit time and availability. To help achieve this service offering, ARTC has applied a consistent set of design requirements and parameters across the Inland Rail Program.

Key design features are described in the following sections.

Rail

The rail component of the Project is 53 kilometres of new, single-track, dual-gauge railway—standard gauge (1,435 millimetre) and narrow gauge (1,067 millimetre). Typically, the Project will use a ballasted track system, with continuously welded 60 kilograms per metre rail, resilient fasteners, rail pads and concrete dual-gauge, full-depth sleepers at 600 millimetre centres.

Figure 3 shows a typical section for a dual-gauge ballasted track.

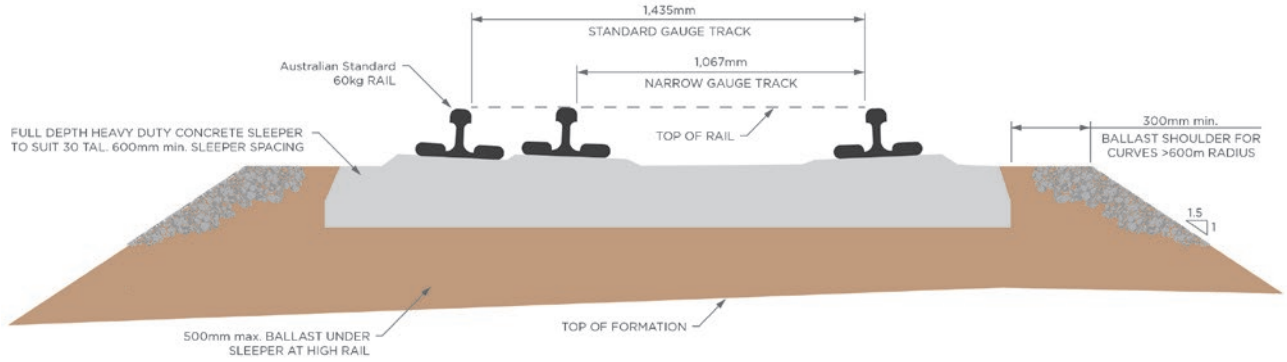

FIGURE 3: INDICATIVE DESIGN FOR NEW TRACK

Tunnel

A 1,015 metre tunnel will be built through the Teviot Range to facilitate the required gradients due to the undulating terrain in this area.

Supporting infrastructure is proposed at the western portal area of the tunnel and includes:

- A substation building for power supply and distribution to electrical equipment
- Fire water tanks and a pump station for the tunnel's hydrant system
- Emergency services staging area.

A tunnel control centre will also be located at one of the tunnel portals, but it will be mostly unmanned.

Crossing loops

Crossing loops are places on a single-line track where trains travelling in opposite directions can pass each other. The crossing loops for the Project are double-ended and are connected to the main track at both ends. Figure 4 shows an indicative design for crossing loops and maintenance sidings.

In operation, one train enters a crossing loop through one of the turnouts and idles at the other end, while the other train continues along the mainline track to pass the stationary train.

The Project proposes four crossing loops. The proposed locations for the crossing loops are:

- Ebenezer
- Purga Creek
- Washpool Road
- Undullah.

The location of crossing loops was informed by the operational modelling for the Inland Rail Program and considered how close the loops are to sensitive receptors and existing infrastructure and allowing flexibility for future extension.

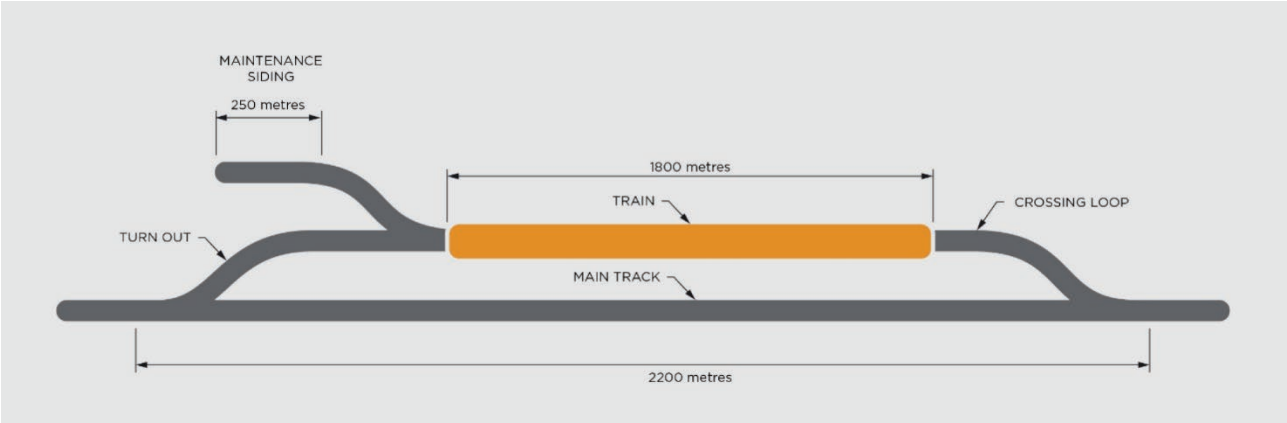

FIGURE 4: INDICATIVE DESIGN FOR CROSSING LOOP AND MAINTENANCE SIDING

Turnouts

Turnouts allow trains to be guided from one track to another. The anticipated locations for turnouts include:

- Queensland Rail West Moreton System connection near Calvert towards Rosewood: a 1 in 16 narrow gauge turnout will be installed to connect to the existing narrow gauge track in an easterly direction towards Rosewood.
- Sydney to Brisbane Interstate Line connection at Kagaru: a 1 in 16 dual gauge turnout will be installed to connect to the existing dual-gauge track in a northerly direction towards Acacia Ridge. A 1 in 16 dual gauge turnout with standard gauge turnout leg will be installed to connect in a southerly direction towards Bromelton.
- Turnouts to crossing loops: a 1 in 16 dual gauge turnout will be at both ends of the four crossing loops. An additional turnout (1 in 10) will be required for a maintenance siding at each crossing loop.

Bridges

Bridge structures are needed so that water, vehicles and, in some cases, stock and pedestrians can cross the rail corridor. The bridges are either rail-over-watercourse, rail-over-road, or road-over-rail structures, depending on local topography and rail or road alignment requirements. The type of bridge proposed for a specific location depends on a range of factors, such as topography, road usership, rail and road alignments at the crossing point, and access requirements.

Bridges have been provided for all major watercourse crossings along the Project alignment to minimise impacts to the local riverine system and to avoid having to divert watercourses.

Twenty-seven new bridge structures are required for the Project, including:

- 16 rail-over-watercourse
- 3 rail-over-road
- 5 rail-over-watercourse-and-road
- 3 road-over-rail.

The new bridge structures will typically be founded on piles supporting in-situ reinforced concrete substructures. The bridges are of varying lengths and spans. Bridge superstructures will typically be formed from pre-stressed concrete girders (pre-stressed concrete slab span and pre-stressed concrete Super-T) with in-situ reinforced concrete decks incorporating walkways, guardrails and barriers, as shown in Figure 5.

FIGURE 5: TYPICAL PIER WITH PRE-STRESSED CONCRETE SUPER-T GIRDER (LEFT) AND TYPICAL PIER WITH PRE-STRESSED CONCRETE SLAB SPAN (RIGHT)

Cross-drainage infrastructure

Cross-drainage infrastructure has been incorporated into the design where the alignment intercepts existing drainage lines and watercourses. The type of cross-drainage structure used depends on various factors such as the natural topography, rail formation levels, design flow and soil type. Cross-drainage structures, including culverts, have been designed to meet the design criteria of a 1% Annual Exceedance Probability event. Annual Exceedance Probability refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood may be calculated to have a 1% chance of occurring in any one year, is described as 1% Annual Exceedance Probability.

Culverts are structures that allow water, either in a watercourse or drainage line, to pass under the rail alignment. Culverts are incorporated into the design as part of the cross-drainage solution to ensure no additional permanently ponded areas will be created upstream of the Project. Culverts also help to maintain overland flow paths for surface water. Culverts will be a mix of reinforced concrete pipe culverts and reinforced concrete box culverts. Scour protection measures will generally be installed around culvert entrances and exits, on disturbed stream banks, and around waterfront land to avoid erosion. A typical section of a cross drainage culvert is shown in Figure 6.

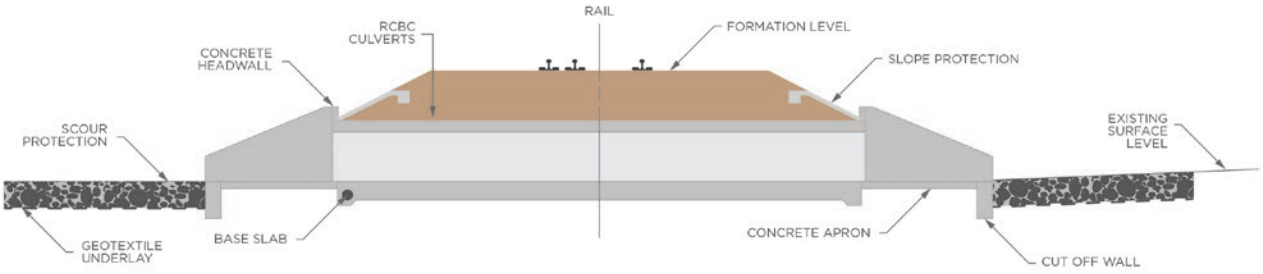

FIGURE 6: TYPICAL SECTION OF A CROSS-DRAINAGE CULVERT

Longitudinal drainage

Longitudinal drainage removes water that has percolated through the track ballast and diverts surface water runoff to the nearest bridge or culvert before it reaches the subgrade—that is the ground under the rail-related structures. Without adequate track drainage, the subgrade may become saturated, weakening and perhaps leading to failure of the subgrade.

Two types of track drainage are proposed:

- Embankment drains—longitudinal drains adjacent to the track in embankments (refer Figure 7)
- Catch drains—longitudinal drains on the uphill-side of cuttings (refer Figure 8).

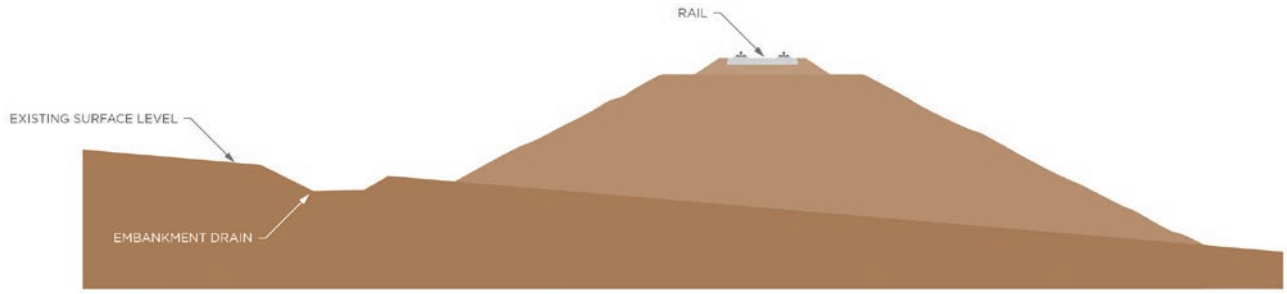

FIGURE 7:TYPICAL LONGITUDINAL DRAINAGE FOR RAIL FORMATION ON TOP OF AN EMBANKMENT

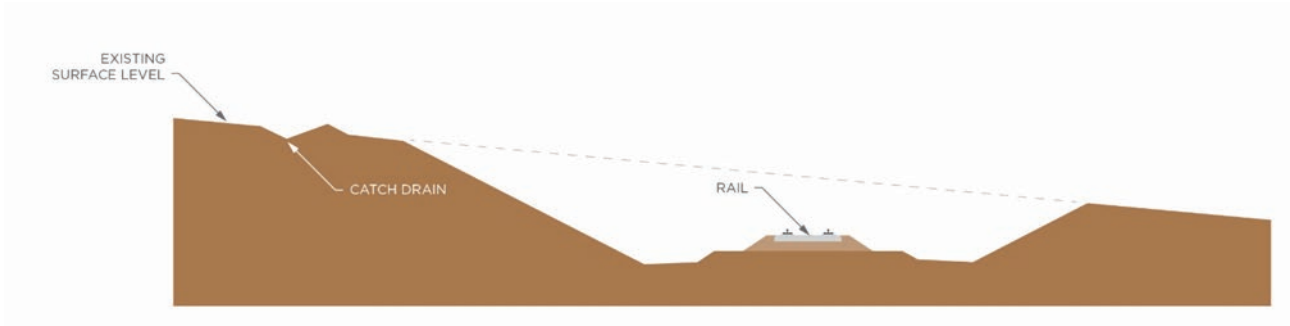

FIGURE 8: TYPICAL LONGITUDINAL DRAINAGE FOR RAIL FORMATION WITHIN A CUT

Public road–rail interfaces

The Project requires the crossing of both State-controlled roads managed by the Department of Transport and Main Roads, and local government roads managed by Ipswich City Council, Scenic Rim Regional Council and Logan City Council.

The appropriate road-rail interface treatment has been assessed on a case-by-case basis for design purposes, with consideration given to current and future usage of the existing asset, its location relative to other crossings of the rail corridor and the road and rail geometry at the crossing location. ARTC has also taken into consideration State and national guidelines and strategies by the Office of the National Railway Safety Regulator and the Department of Transport and Main Roads that focus on avoiding building any new level crossings or minimising any proposal to construct a public level crossing on a new rail line. Potential treatments include:

- Grade separation—roads and rail cross each other at different heights so that traffic flow is not affected. Grade separations are either road-over-rail or rail-over-road.
- Passive or active level crossings:
  - Passive level crossings have static warning signs, for example stop signs or give-way signs that are visible on approach. This signage is unchanging with no mechanical aspects or light devices
  - Active level crossings have flashing lights and some have boom barriers for motorists and automated gates for pedestrians. Active level crossing devices are activated before and during a train passing through the level crossing
  - Crossing consolidation, relocation, diversion or realignment is where existing road–rail interfaces may be closed, consolidated into fewer crossing points, relocated or diverted.

Preferred options for formed public road–rail interface treatments currently applied over the length of the Project include a mix of active and passive level crossings, crossing consolidation, realignments or diversions, and grade separation.

Private road–rail interfaces

The Project interfaces with 96 private (occupational) accesses. The impact on each individual property will differ and ARTC will continue engaging with landholders to find ways to minimise disturbance to properties, which includes access to properties.

The final number of crossings within private property will be determined during detailed design. The design and layout of occupational crossings will be based on the following considerations:

- Feedback from consultation with landholders about specific property requirements
- Safety standards such as criteria for minimum sight distances for trains and vehicles
- Alternative access arrangements
- Rail design and landform
- Stock movements
- Vehicle access requirements, such as farm machinery and frequency of use.

Typical treatments will include:

- Underpasses for stock passage or multiple-use vehicles, subject to topography
- At-grade level crossings
- Diversion to adjacent public roads or public road crossings.

Rail maintenance access roads

Rail maintenance access roads are required to facilitate maintenance for critical infrastructure, such as turnouts, and to provide access for emergency recovery. Figure 9 shows the positioning and typical formation of a rail maintenance access road.

The Project has a considerable number of bridge abutments that will need access for inspection and maintenance; therefore, a surface-level access road has been proposed unless there are other reasons for providing a formation level access road. From a surface level access road, access to the formation level at abutments can be achieved by provision of stairs or bridge walkways. This solution has been proposed to avoid the need for turnarounds at each bridge abutment, considerable lengths of formation level roads and ramps, and additional service roads to connect with public roads.

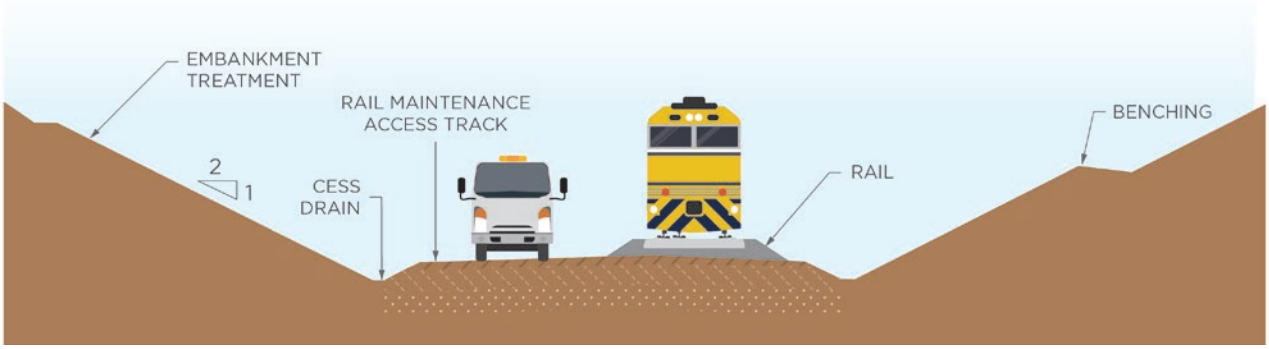

FIGURE 9: TYPICAL SECTIONAL DIAGRAM OF RAIL FORMATION SHOWING A RAIL MAINTENANCE ACCESS TRACK

Utility and services interfaces

There are 183 utilities and services within the disturbance footprint that will potentially be impacted by the Project, including communications, electricity, oil and water, owned by multiple entities.

Utility owners have different requirements and drivers for how the Project should treat these impacted assets. It is also common for impacted assets owned by the same utility owner to have varying requirements depending on the characteristics and criticality of each asset to the owner.

Fencing

Fencing will be provided for the extent of the rail corridor, primarily to limit access to the railway. Fencing will extend between the corridor and the land adjoining the railway, with any specific requirements designed in consultation with the adjoining landholders.

As the Project comprises substantial greenfield works in rural agricultural and grazing areas, standard rural fencing will typically be provided according to ARTC's fencing procedure, 'Boundary Fencing ETM-17-02'.

Fencing will act to protect adjoining land from trespass and help prevent stock on such adjoining land from gaining access to the railway. Where superior fencing is required, for example where tracks are proximate to roads or communities, or where trespass is anticipated, a 1.8 metre chain-link boundary fence may be provided.

Gates will be provided at suitable corridor entry and exit locations for convenient access across the alignment.

Signalling and communications

A safeworking system consisting of signalling and communications equipment will be installed to ensure the safe movement of trains will be delivered as part of the Inland Rail Program. This system will consist of signals, indicators, signs, detection, monitoring and control equipment on track, beside the track and in enclosures in the rail corridor. The safeworking system will most likely be monitored and controlled from an existing ARTC train control centre.

Environmental treatments

Fauna exclusion fencing, sediment basins, scour protection, noise mitigations and waterway crossings considerate of fish passage will be installed as part of the Project.

Land requirements

The land required for the Project is a corridor with a minimum width of 40 metres. Some wider sections of corridor are required to accommodate earthworks, drainage structures, rail infrastructure, access tracks and fencing. The corridor will extend to a maximum width of 340 metres in the undulating terrain between the eastern end of the tunnel and the Undullah Road crossing. The corridor is generally wider through this area due to large earthwork cut and fill sections, and the allowance for a tunnel access road to the eastern portal, as well as drainage structures, rail infrastructure, access tracks and fencing.

Although ARTC is applying for approval to build infrastructure to accommodate trains up to 1,800 metres in length, infrastructure will be designed so as not to preclude the future extension of crossing loops to accommodate 3,600 metre trains. ARTC intend to acquire the land for future 3,600 metre crossing loop extensions with the initial land acquisition; however, the approval for the construction of future 3,600 metre crossing loops will be subject to a separate approval process in the future. This assessment is based on 1,800 metre train lengths.

Temporary tracks will be used to access Project construction sites. Where required, these temporary tracks will be retained to serve as rail maintenance access roads during Project operations.

Land requirements for construction will also include temporary workspaces, site offices and laydown facilities. Laydown areas will be located approximately every 5 kilometres, avoiding 1% Annual Exceedance Probability floodplains where possible. Larger sites will be located approximately every 20 kilometres. Additional laydown areas of approximately 2,500 m^2 will support bridge construction. Laydown areas will also be required to support Flash Butt Welding or rail assembly of a minimum of 1,000 metre x 200 metre in area.

Embankments and cuttings

Embankments and cuttings will be required in response to topographical constraints along the length of the alignment. Constructing the foundation of the railway line will require earthworks and engineering fill to provide a platform designed for the rail. This work will use heavy earthmoving plant and equipment.

Material sourcing

Established quarries will be used to source construction materials. Six operational quarries have been identified as potentially suitable for use as material source locations during construction activities. Investigations into additional quarry material sources will continue throughout the detailed design phase. Options have been identified to reuse excess cut material within the Project and will be further investigated during detailed design.

Construction activities

Construction is planned to commence in late 2021; however, a number of factors could impact the Project and delay the start of construction to 2022.

The construction program consists of several stages and activities:

- Site preparation—vegetation clearing, establishing site compounds and ancillary facilities, installing temporary and permanent fencing, installing drainage and water management controls, and establishing construction access tracks and temporary haul roads
- Civil works—bulk earthworks, which may involve blasting and hydraulic rock-breaking, construction of cuts and embankments, construction of tunnel portals and the main line tunnel, installation of permanent drainage controls, construction of bridge and watercourse crossing structures
- Track works—installing ballast, sleepers and rails
- Rail systems infrastructure and wayside equipment—installing signals, turnouts and asset monitoring infrastructure
- Commissioning—integrating testing and handover needed to achieve operational readiness
- Clean-up and restoration—works to stabilise, reinstate and rehabilitate temporary works areas.

Construction hours

Construction work will be undertaken during the following hours:

- Monday to Friday: 6.30 am to 6.00 pm
- Saturday: 6.30 am to 1.00 pm
- No work Sundays and public holidays.

Works outside these primary Project construction hours may occur throughout the duration of the construction program, subject to performance criteria and may involve:

- Delivery of concrete, steel, and other construction materials delivered to site by heavy vehicles
- Movements of heavy plant and materials
- Spoil haulage
- Tunnelling activities
- Arrival and departure of construction staff during shift change-overs
- Roadworks to arterial roads
- Traffic control crews, including large, truck-mounted crash attenuator vehicles, medium rigid vehicles, and lighting towers
- Incident response including tow-trucks for light, medium, and heavy vehicles.

Construction workforce

Construction of the Project is expected to require a workforce of up to 620 personnel. The size and composition of the construction workforce will vary depending on the activities being undertaken and the staging strategy. The core construction workforce will consist of professional staff, supervisors, trades workers and plant operators, with earthworks crews, bridge structure teams, capping and track-works crews working at different periods though the construction phase.

Accommodation camps for the construction workforce are not proposed because it is anticipated that the construction and operation workforce will be sourced locally or accommodated in the Logan, Ipswich and Scenic Rim regions.

The larger Inland Rail Program is expected to generate 16,000 jobs with an average of 800 jobs per annum over a 10-year construction period. An average of 700 additional jobs per annum is anticipated over 50 years of Inland Rail's operation.

Operation

Inland Rail as a whole will be operational when all 13 Inland Rail projects are complete. The Project will be managed and maintained by ARTC; however, train services will be provided by a variety of operators.

The hours of operation for Inland Rail are anticipated to be 24-hours a day, seven days a week. When Inland Rail starts operation, it is anticipated that the Project will be used by an average of 33 train services per day, increasing up to 47 train services per day in 2040. Annual freight tonnages will similarly increase, from approximately 39 million tonnes per year in 2026 to 59 million tonnes per year in 2040.

During operation of the Project, standard rail maintenance activities will be undertaken. Typical maintenance activities include:

- Minor maintenance works, such as bridge inspections, culvert cleanouts, sleeper replacement, rail welding, rail grinding, ballast profile management, track tamping and clearing and slashing the rail corridor
- Major periodic maintenance such as ballast cleaning, formation works, reconditioning of track, turnout replacement, and correction of track level and line.

Decommissioning

The Project is expected to be operational for in excess of 100 years. The decommissioning of the Project cannot be foreseen. However, if the Project, or elements of it, are subject to plans for decommissioning, it is envisaged the works would be undertaken in accordance with a decommissioning plan, which would be developed in consultation with relevant stakeholders and regulatory authorities.

Sustainability

In recognition of the role the Inland Rail Program has in demonstrating sustainability leadership, ARTC has developed an *Environment and Sustainability Policy*. The sustainability commitments embedded into the *Environment and Sustainability Policy* have guided the Project's approach to sustainability and are supported by identified targets for Inland Rail projects as part of the program-wide Sustainability Strategy. This includes the implementation of a Sustainability Management Plan for the Project, and the pursuit of an 'Excellent' rating against version 1.2 of the Infrastructure Sustainability Council of Australia's *Infrastructure Sustainability rating scheme* for the Program.

Key Findings of the Environmental Impact Statement

Land use and tenure

Land use in the vicinity of the Project is predominantly grazing land, with other agricultural uses including irrigated cropping, grazing modified pastures, and irrigated modified pastures. Specific land uses include the Purga Quarry, the Ipswich Motorsports Precinct, the Ivory's Rock Conventions and Events Centre, and intensive animal husbandry. The tenure of land within the land use study area is predominantly freehold.

The Scenic Rim important agricultural area is within the land use study area at Peak Crossing and Kagaru. Areas of Agricultural Land Class A and Class B also intersect portions of the land use study area.

The construction and operation of the Project has the potential to directly and permanently impact land use and tenure. Potential impacts include:

- Changes in tenure and acquisition of property
- Disruption to land subject to native title claims
- Temporary and permanent changes in land use, including the loss of agricultural land and disruption to agricultural practices
- Impacts to accessibility, including impacts on the road network and to private property access
- Disruption, relocation and modification to services and utilities.

The Project is also likely to result in a number of benefits to land use: supporting future industries, improving access to and from regional markets, and acting as a catalyst for development in the area.

As shown in Table 2, of the 175 properties within the Project's permanent disturbance footprint, 112 properties are within the Southern Fright Rail Corridor. Of these properties, 50 are already owned by the Department of Transport and Main Roads. Some 121 private lots of freehold property will need to be partially or wholly acquired for the Project. Additional properties may also be acquired where impacts cannot be avoided, appropriately mitigated or acquisition is agreed in consultation with affected landholders.

Consultation with affected landholders and communities has been key to understanding the operational arrangements of individual properties. The rail alignment has been positioned within the Southern Freight Rail Corridor and aligns with roads and property boundaries, where possible, to minimise the severance of land parcels, and reduce potential property impacts, particularly private access, services, or farm operational arrangements.

ARTC will continuing engaging with stakeholders including resource interest holders, utility providers and landholders.

The disturbance footprint will be further refined during detailed design to that required to safely construct, operate and maintain the Project, and minimise land acquisition, severance and disruption to land use, tenure and transport networks.

TABLE 2: LAND ACQUISITIONS WITHIN THE PERMANENT DISTURBANCE FOOTPRINT

Tenure and ownership	Number of properties within permanent disturbance footprint
Properties within permanent disturbance footprint, within gazetted SFRC	
Freehold in ownership of DTMR	50
Freehold, private property	59
Lands Lease	2
Reserve	1
Properties within permanent disturbance footprint, outside of gazetted SFRC	
Freehold	62
Lands Lease	1

Land resources

A desktop assessment of the existing land resources was undertaken, supplemented by field assessments of soil for salinity, acid sulfate soils, and sodic, dispersive and cracking clay soils. A quantitative and qualitative risk assessment of soil properties, including agricultural and problematic soils and contaminated land was undertaken. The assessment identified:

- Five distinct soil types occur in the land resources study area: vertosols, sodosols, dermosols, chromosols and rudosols. Sodosols, chromosols and dermosols are the most susceptible to dispersion and have the potential for severe erosion along hillsides
- No acid sulfate soils or acid rock were found
- There is a medium-to-high potential hazard of salinity.

Potential sources of land contamination in the vicinity of the alignment include agricultural activities, quarries, landfilling and waste disposal, the existing rail corridor, and road crossings. Additionally, 17 properties within the land resources study area are listed on the Environmental Management Register as potential sites for other types of contamination.

Potential impacts of the Project on land resources include:

- Permanent change to landform and topography, influencing the ability to retain and move water within soil catchment systems
- Loss of soil-related natural resources, including agricultural lands
- Unexpectedly encountering acid sulfate soils or acid rock
- Degrading soil resources with invasive flora and fauna
- Increased salinity causing water table salting, irrigation water salting, and erosion scalding
- Disturbance of existing contaminated land
- Creation of new contaminated land resulting from Project activities.

Residual impacts of the Project on land resources are anticipated to be low, except for changes to landform and topography, loss of soil resources, and the potential for disturbance of existing contaminated land.

To address the residual impacts:

- During detailed design, the disturbance footprint will be further refined to that required to safely construct, operate and maintain the Project, and minimise impacts to land resources, including potential fragmentation and sterilisation of Class A agricultural land, Class B agricultural land and Important Agricultural Areas
- Undertake further geotechnical and soil surveys during detailed design to characterise soil and ground conditions across the disturbance footprint
- The following plans will be developed and implemented:
  - Contaminated Land Management Strategy
  - Erosion and Sediment Control Plan
  - Construction Environmental Management Plan
  - Construction Spoil Management Plan
  - Reinstatement and Rehabilitation Plan.

Landscape and visual amenity

The landscape and visual impact assessment was investigated through a desktop analysis and field work, analysis of geographical information systems, visibility analysis mapping and the preparation of illustrative cross-sections and visualisations.

The landscape between Calvert and Kagaru is highly varied, comprising intensive irrigated agriculture, dry croplands and pastures interspersed with a network of rivers and creeks, set against the distinctive backdrop of forested hills created by the Teviot and Little Liverpool Ranges.

The main landscape and visual impacts of the Project are the removal of vegetation, raised embankments and creation of new rail bridges.

Ten 'landscape character types' were identified within the study area. Eight of these character types will potentially be affected by the Project. A significant impact will be on Forested Uplands due to extensive cut-and-fill and tunnelling within the forested landscapes of the Teviot Range, south of Flinders Peak.

'Visual receptors' is the term used to describe people who 'view' a particular area either regularly (such as residents) or casually (such as tourists). For much of the study area, there are relatively few visual receptors as the landscape is mostly comprised of isolated farmsteads set on large private farms. However, some settlements are within the potential viewshed of the Project including Calvert, Peak Crossing and Harrisville. Visual impacts of the Project will be typically contained by vegetation, including along creek lines and localised undulations in landforms. However, there are elevated and panoramic views over the alignment from the Forested Uplands, particularly from walking trails around Flinders Peak. Elsewhere, there are fairly open views across the rural landscape from the network of local roads and highways, including the Cunningham Highway, Rosewood–Laidley Road and Ipswich–Boonah Road.

The Project is unlikely to cause any significant lighting impacts during its construction and operational phases.

Landscaping and rehabilitation of disturbed areas will be undertaken in accordance with the Project's landscape design, Reinstatement and Rehabilitation Plan and the Landscape and Rehabilitation Management Plan, which will define performance criteria required from rehabilitation.

Flora and fauna

The ecology assessment included a desktop analysis, field assessments and predicted habitat mapping, followed by an assessment under Commonwealth and State guidelines to determine if the Project will have a significant residual impact on prescribed environmental matters including matters of national environmental significance and matters of state environmental significance.

The ecology study area includes habitat for one 'threatened ecological community' and 35 threatened species listed under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* and the *Nature Conservation Act 1992*. A number of 'endangered', 'of concern', and 'least concern' regional ecosystems are also within the ecology study area and are protected under the *Vegetation Management Act 1999* (Qld).

Sixty-two sensitive environmental receptors were identified within the ecology study area. These receptors varied from broad-scale receptors such as protected areas and bioregional corridors, down to finer species-scale receptors, including threatened ecological communities and conservation-significant flora and fauna species. These receptors were grouped into 'high', 'moderate' and 'low' sensitivity categories based on factors such as conservation status, exposure to threatening processes, resilience, and representation in the broader landscape.

The Project has the potential to impact on sensitive environmental receptors, predominantly during the construction phase, via:

- Habitat loss and degradation from vegetation clearing and removal
- Fauna species injury or mortality
- Reduction in biological viability of soil to support growth due to soil compaction
- Displacement of flora and fauna species from invasion of weed and pest species
- Reduction in the connectivity of biodiversity corridors
- Edge effects
- Habitat fragmentation
- Barrier effects
- Noise, dust, and light
- Increase in litter (waste)
- Aquatic habitat degradation
- Erosion and sedimentation.

Proposed mitigation measures for the Project were identified to reduce the significance of the potential impacts on the sensitive environmental receptors. Following the application of the mitigation hierarchy (i.e. avoid, minimise, mitigate), which included a range of measures and management plans, the residual impacts to the identified sensitive environmental receptors were generally reduced.

However, some Project activities may have cumulative, irreversible or permanent impacts on some sensitive environmental receptors, even with environmental management measures. For example, additional mitigation measures are not likely to significantly reduce impacts associated with the loss of vegetation as a result of clearing or removal, resulting in residual impacts.

Assessment of sensitive environmental receptors against Commonwealth or State significant impact assessment criteria, indicates that the following matters will be subject to significant residual impacts as a result of the Project:

- Matters listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (matters of national environmental significance):
  - Threatened ecological community: Swamp Tea-tree (*Melaleuca irbyana*) Forest of South East Queensland
  - Flora: Lloyd's Olive (*Notelaea lloydii*)
  - Fauna: Spotted-tail Quoll (*Dasyurus maculatus maculatus*); Australian Painted Snipe (*Rostratula australis*); Collared Delma (*Delma torquata*); Swift Parrot (*Lathamus discolor*); Red Goshawk (*Erythrotriorchis radiatus*); Brush-tailed Rock-wallaby (*Petrogale penicillata*); Koala (*Phascolarctos cinereus*); Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Prescribed matters for the State of Queensland:
  - 'Endangered' or 'of concern' regional ecosystems
  - Regulated vegetation (Category B (other than grassland) within a defined distance from the defining banks of a relevant watercourse or relevant drainage feature)
  - Remnant vegetation intersection with a *Vegetation Management Act 1999* wetland
  - Essential habitat
  - Connectivity areas
  - Protected habitat for the following species:
    - Bailey's Cypress Pine (*Callitris baileyi*)
    - Slender Milkvine (*Marsdenia coronata*)
    - Swamp Tea-tree (*Melaleuca irbyana*)
    - Glossy-black Cockatoo (*Calyptorhynchus lathami*)
    - Powerful Owl (*Ninox strenua*).

Provisions of offsets for the matters of national environmental significance with significant residual impacts will be required under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) Offsets Policy. For matters of state environmental significance, impacts to prescribed matters that are considered to constitute significant residual impacts will need to be offset consistent with the *Environmental Offsets Act 2014* (Qld).

The Environmental Impact Statement includes ARTC's Environmental Offset Strategy—Qld (Strategy). This strategy informs the development of offset delivery components including an Environmental Offset Delivery Plan and Offset Area Management Plans. An Environmental Offsets Delivery Plan will be developed and implemented by ARTC prior to construction.

Other mitigation measures to be implemented include:

- Flora and fauna surveys to verify previous surveys and assessments, refine potential offset calculations, inform micro-siting of infrastructure, support secondary approvals and establish baseline conditions against which relevant outcomes of the Reinstatement and Rehabilitation Plan can be compared
- Fauna passage locations and associated rehabilitation areas will be refined in the design to maintain infrastructure permeability, particularly at the six key locations identified as part of the Environmental Impact Statement assessment process to maintain and/or reestablish habitat connectivity
- Landscape design establishes the requirements for rehabilitation of disturbed areas for habitat re-creation, landscaping and stabilisation, including for riparian zones and informs the development of the Reinstatement and Rehabilitation Plan and the Landscape and Rehabilitation Management Plan
- Develop and implement the Flora and Fauna sub-plan within the Construction Environmental Management Plan
- Develop and implement the Reinstatement and Rehabilitation Plan and the Landscape and Rehabilitation Management Plan
- Develop a Post-construction Matters of National Environmental Significance Monitoring Plan in consultation with relevant stakeholders. The Post-construction Matters of National Environmental Significance Monitoring Plan will define for the threatened ecological community or other matters of national environmental significance: habitat location, reference condition, assessment framework, infrastructure elements (for example erosion and sediment control devices, fauna crossing structures), corrective actions, completion criteria and monitoring timeframes.

Air quality

The construction and operation of the Project has the potential to impact existing air quality. Predicted air emissions from the construction phase of the Project were assessed qualitatively and dispersion modelling assessed line source emissions—operational emissions from freight trains travelling along the track.

In the construction phase of the Project, dust sources will be variable and transitory. The potential for impacts will depend on the proximity of sensitive receptors. The assessment determined that, without mitigation, there is a potential 'low risk' of human health impacts from the construction of the Project, but a 'medium risk' of impacts from dust deposits. By implementing the proposed mitigation measures, the impacts to air quality from both dust deposits and human health will not be significant. Proposed mitigation measures for the construction phase as part of the Project design and Construction Environmental Management Plan include:

- Water sprays to reduce dust emissions from the excavation and disturbance of soil and materials, vehicle travel on unsealed roads, and loading and unloading of materials
- Rehabilitation of exposed areas
- Minimum separation distances for the location of fuel storage tanks.

The assessment of the operational phase assumed that a number of the operational management measures already required by the Queensland Rail West Moreton System (required by the *South West Supply Chain (Queensland Rail West Moreton System) Coal Dust Management Plan*), will apply to the Project when used for coal transport. For example, 'veneering' of coal wagons is currently required on the Queensland Rail West Moreton System. Veneering involves applying a biodegradable, non-toxic binding agent onto the surface of loaded coal wagons, which forms a crust over the coal that minimises coal dust lifting off in transit.

Assessments show that during the operation phase, compliance for all pollutants is predicted for all traffic-volume scenarios, if veneering is used. Without veneering, the annual objectives are predicted to be exceeded. Therefore, it is expected that veneering will be required. No other mitigation measures are proposed.

The potential for the operational phase of the Project to impact tank water quality was also specifically investigated. Investigation of dust emissions showed the *Australian Drinking Water Guidelines* will be met by a significant margin at all receptors.

Prior to commencement of operational activities involving coal transport, engagement will be undertaken with existing stakeholders and members of the South West Supply Chain about to coal dust management and monitoring practices.

Surface water quality

The Project is located within the Bremer River and Logan River catchments, and the alignment is expected to cross a number of watercourses[3] including Western Creek, Bremer River, Warrill Creek, Purga Creek, Sandy Creek, an un-named tributary of Purga Creek, and Teviot Brook.

Existing surface water conditions were determined via a desktop study of publicly available data, complemented by water quality samples.

Construction activities may result in increased salinity, debris, contaminants, erosion and sedimentation within watercourses. Water discharged from the tunnel may also cause changes to water quality. If rehabilitation is inadequate, these impacts are likely to be exacerbated.

Measures to manage impacts to surface water quality include developing and implementing the Construction Environmental Management Plan, an Erosion and Sediment Control Plan, a Reinstatement and Rehabilitation Plan and a construction water quality monitoring program.

A surface water monitoring framework will be developed as part of the Construction Environmental Management Plan and the construction water quality monitoring program. This framework will identify monitoring locations at discharge points and selected locations in watercourses near where works are being undertaken. The surface water monitoring framework will outline water quality objectives, standards and parameters to measure any changes to water quality.

Hydrology and flooding

A hydrology and flooding assessment was undertaken by reviewing existing assessments, modelling the environment without the Project, and modelling the environment with the Project. The results were then compared to the flood impact objectives, which were also used to guide the design of the Project.

Stakeholders provided photographic records and anecdotal evidence of previous flood extents and impacts on watercourses, as well as commentary on historical flood events. This information allowed:

- Recalibration of hydrologic and hydraulic models for the watercourses within the study area allowing the Project to more accurately assess impacts and identify appropriate mitigation measures as part of the Environmental Impact Statement
- Identification of appropriate mitigation measures, with bridge and culvert structures designed and located to maintain existing surface water flow paths and flood flow distributions, and avoid unacceptable increases in peak water levels, flow distribution, velocities and duration of inundation.

The Project may cause changes to the existing flood regime, such as: changes in peak water levels and associated inundation; concentration of flows; redirection of flows; increased velocities leading to localised scour and erosion; and changes to duration of inundation or increased depth of water.

To mitigate flooding impacts, the Project has been designed to achieve a 1% Annual Exceedance Probability flood immunity,[4] while minimising unacceptable impacts on the existing flooding and drainage regime. Bridges and culverts have been designed and located to maintain existing surface water flow paths and flood flow distributions, and to avoid unacceptable increases in peak water levels, flow distribution, velocities and duration of inundation. The predicted impacts on the flood regime generally comply with the Project's flood impact objectives.

Acceptable localised impacts will ultimately be determined during detailed design on a case-by-case basis, in consultation with stakeholders and landholders using the flood impact objectives as a guide.

The Australian and the Queensland governments established an independent international panel of experts for flood studies (the Panel) to provide advice to the Commonwealth and the Queensland Government on the flood models and designs developed by ARTC for Inland Rail in Queensland.

As an advisory body to government, the Panel is independent of the ARTC in respect of the development, public consultation and approvals for the Inland Rail EIS process. Relevant submissions received from public notification of the draft EIS will be provided to the Panel for consideration as part of its review.

Information on the Panel may be viewed at: **tmr.qld.gov.au/projects/inland-rail/independent-panel-of-experts-for-flood-studies-in-queensland.**

3. A river, creek, or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events:
   - In a natural channel, whether artificially modified or not, or
   - In an artificial channel that has changed the course of the stream.

   It also includes weirs, lakes and dams.
4. 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 average recurrence interval. For example, the 1% Annual Exceedance Probability flood event is equivalent to the 100-year average recurrence interval flood event.

Groundwater

The central portion of Project is underlain by Gatton Sandstone, which forms the topographic high of the Teviot Range. West of the Teviot Range, the Project is underlain by the Jurassic-aged Walloon Coal Measures. East of the Teviot Range, the Project is underlain by the Koukandowie Formation and Walloon Coal Measures. Along the length of the Project, relatively thin deposits of Quaternary alluvial sediments occur near surface water features.

The water table is typically a subdued version of the topography, with the depth to groundwater increasing under topographic highs (for example the Teviot Range) and is shallower in lower-lying reaches such as close to surface water drainage lines.

Stock watering, drinking water and aquatic ecosystems were identified as the groundwater environmental values of relevance to the groundwater study area.

The groundwater assessment for the Project included a desktop review, geotechnical and hydrogeological site investigations, assessment of potential short- and long-term impacts and an assessment of the significance of these impacts. Modelling assessed potential groundwater ingress and drawdowns associated with a free-draining (unlined) Teviot Range Tunnel, portals, and cuts.

A desktop survey of registered groundwater bores identified 65 groundwater bores (43 'existing' and 22 'abandoned') within 1 kilometre either side of the proposed alignment. A groundwater bore survey will be undertaken during the detailed design phase to confirm all groundwater bores within the groundwater study area.

The construction and operation of the Project has the potential to impact groundwater and groundwater users due to:

- Loss of, or damage to, registered bores
- Changes to groundwater levels and flowpaths from embankment loading
- Reduced groundwater levels due to seepage into cuttings and Teviot Range Tunnel
- Changes to groundwater quality from spills and uncontrolled releases, or from acid rock drainage
- Subsidence/consolidation due to groundwater extraction, dewatering or loading
- Vegetation removal and surface alteration affecting recharge/discharge and increasing associated salinity risks.

A range of mitigation measures will be implemented, including site inspections before construction of cuts, visual examination of surface outcrops for sulfide minerals or evidence of sulfide mineralisation, and regular groundwater monitoring during the construction phase as per the Groundwater Monitoring and Management Plan, developed and implemented for the Project.

The assessment concluded that after mitigation measures are implemented, the residual significance for the majority of potential impacts identified is expected to be low. A moderate residual significance remains for the potential for construction to locally alter or reduce groundwater levels, or introduce contaminants.

Noise and vibration

Both construction and operational noise and vibration impact assessments have been undertaken for the Project. These assessments included consideration of airborne noise, construction blasting, ground-borne vibration, tunnel construction, ground-borne noise, construction road traffic noise, and assessment of the potential residual noise and vibration impacts with implementation of proposed mitigation measures.

Ambient noise monitoring was conducted at 10 locations within the noise and vibration study area during November 2018. This monitoring included both long-term monitoring and short-term attended measurements. The long-term monitoring was used to identify existing sources of noise within the study areas, quantify and characterise the existing noise environment and establish background noise levels referenced in establishing relevant noise criteria.

Criteria were established to determine acceptable levels of noise and vibration from construction and operational activities at a 'sensitive receptor'. Examples of sensitive receptors include residential dwellings, schools and childcare centres, places of worship, hospitals, open space—passive use (for example parkland, bush reserves) and open space—active use (for example sports field, gold courses). Industrial land use was classified as a sensitive receptor for vibration emissions and was not included as a sensitive receptor within the airborne noise impact assessments.

A total of 906 sensitive receptors were included in the study area for the construction noise and vibration assessment and 1,350 sensitive receptors were included in the study area for the railway noise and vibration assessment. The number of sensitive receptors varies due to the geographical extent of the study areas applied in the assessments.

Construction noise and vibration

The construction noise and vibration assessment identified the potential for the established criteria to be exceeded at various sensitive receptors, while construction activities are conducted nearby. The number of sensitive receptors affected at any one time and the duration of the impact depends on the type of works and the progression of works along the alignment.

Reasonable worst-case construction scenarios have been assessed for each of the main construction activities. The worst-case impacts are:

- Construction noise (earthworks) during non-standard work hours is predicted to exceed the criteria at 781 sensitive receptors
- Construction vibration criteria is expected to be exceeded at 71 sensitive receptors during non-standard hours
- Construction traffic on 18 roads in the study area is predicted to exceed the established noise criteria
- Ground-borne noise or vibration from tunnel construction is not expected to exceed the established criteria at any sensitive receptors
- There are no predicted exceedances of ground-borne noise or vibration from tunnel construction at any sensitive receptors
- Blasting charge masses are not known at this stage. Therefore, maximum allowable instantaneous charge masses have been provided at indicative distances from sensitive receptors.

Specific mitigation measures will be incorporated into the Construction Noise and Vibration Management Plan for works during both standard and non-standard hours. Construction progress and planned activities will be regularly communicated to local residents/stakeholders, particularly when noisy or vibration-generating activities are scheduled, such as vibratory compaction and piling. Where the application of mitigation measures is found to not be sufficient to reduce noise and vibration impacts to acceptable levels, additional mitigation measures will be investigated and implemented, in consultation with affected sensitive receptors.

Based on the construction noise assessment and proposed mitigation, construction noise impacts at 45 per cent of receptors are not predicted to be feasibly mitigated to below the appropriate criterion by physical attenuation alone. This includes the consideration of the worst case construction works scenarios during non-standard work hours. However, these residual impacts present will be temporary and will stop when construction finishes. Managing residual impacts will be undertaken in consultation with the affected landholders.

Operational noise and vibration

The operation of rail freight trains is a recognised source of noise and vibration that could potentially impact the sensitive receptors surrounding the Project. The assessment determined that noise emissions from railway operations—rolling stock, crossing loops and level crossings—would achieve the assessment criteria from DTMR's *Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastructure* and ARTC's noise management criteria at the majority of sensitive receptors.

Noise levels have been predicted to be up to 14 dBA above the assessment criteria and trigger a review of noise mitigation measures at 59 sensitive receptors at the time of the Project's opening (2026) and an additional six sensitive receptors for the design year 2040. Sensitive receptors that exceed the assessment criteria are located along the alignment, generally within 300 metre of the proposed rail line. Based on the predicted noise levels and the remoteness of the sensitive receptors, property controls such as architectural property treatments and upgrades to property fencing are considered feasible and reasonable measures to reduce railway noise impacts. Where sensitive receptors are isolated along the alignment, it is usually not practicable to construct rail noise walls or noise barriers.

While treatment of property can ameliorate potential noise impacts within the internal environment of receptor buildings, the external rail noise levels have the potential to be clearly audible above the ambient noise environment within relatively close proximity of the rail corridor, such as the initial 300 metre from the rail corridor.

The assessment of ground-borne vibration identified that vibration levels are expected to be within the assessment criteria further than 16 metre from the outer rail line. Any sensitive receptors within 16 metre of the outer rail are likely to be within the disturbance footprint of the Project infrastructure. The ground-borne noise assessment criteria from surface railway operations may be triggered where receptors are within 50 metre of the outer rail line, noting that at this distance the noise environment is expected to be dominated by airborne noise that would mask the ground-borne noise content.

Railway operations within the Teviot Range Tunnel were assessed to meet the adopted airborne noise, ground-vibration, and ground-borne noise criteria, based on the features adopted in the track design for the tunnel.

Operational fixed-infrastructure noise (i.e. operation of tunnel ventilation fans) is predicted to meet the *Environmental Protection (Noise) Policy 2019* acoustic quality objectives at all sensitive receptors.

The Project will result in seven new road sections and nine road section upgrades. Only one of these—the upgrade of a section of the Ipswich–Boonah Road—is predicted to result in an exceedance of the noise criteria at one sensitive receptor (residence).

During detailed design, noise and vibration levels will be further assessed, to verify mitigation requirements at sensitive receptors.

A program of noise and vibration monitoring will be conducted when railway operations commence.

Social

The purpose of the social impact assessment was to identify how the Project may affect local and regional communities, and how the Proponent and its contractors will work with stakeholders to enable mitigation of negative social impacts and enhancement of Project benefits.

The social impact assessment drew on the results of ARTC's stakeholder engagement processes, as well as targeted social impact assessment engagement activities. Stakeholders who were engaged include directly affected and nearby landholders, Traditional Owners, government agencies, businesses, and community, environmental, and economic groups.

Potential social impacts at a local level include:

- Property impacts such as land acquisition and the severance of productive agricultural land
- Community conflict relating to the Project, which may affect community cohesion and family networks
- Amenity impacts due to noise, vibration, dust, changes to the landscape and increased traffic
- Traffic delays during construction of bridges, level crossings and other Project infrastructure
- Periodic traffic delays at level crossings during operations, potentially delaying emergency service vehicles en-route to an emergency.

At a regional level, potential impacts identified include:

- If multiple infrastructure projects are constructed at the same time, there may be a significant draw on trades and construction labour
- Demand for local health and emergency services is likely to increase during the construction phase
- Introducing a freight rail line between Calvert and Kagaru may increase the risk of road–rail accidents, although it is considered the Project will have an overall positive impact on road safety
- Use of the Boonah to Ipswich Trail and its connectivity with the Flinders Peak Conservation Park may be disrupted.

In contrast, the local community will benefit from construction and operation of the Project. The Project will generate employment for up to 620 people over the construction period. This employment is expected to contribute to financial and housing security, self and family care, and create social connections. Training opportunities will also be provided for people who are disadvantaged in the current labour market, including young people and Indigenous people. Local businesses will have the opportunity to supply the Project with fuels, equipment, quarried material, and services including fencing, electrical installation, rehabilitation and landscaping, maintenance and trade services.

A Social Impact Management Plan has been developed to address social impacts, invest in local communities and offset impacts on distributional equity. The Social Impact Management Plan provides the processes and mechanisms to:

- Provide guidance for the mitigation of negative impacts on stakeholders and communities
- Incorporate stakeholder inputs on mitigation and enhancement strategies
- Support adaptive management of social impacts, by enabling communication between stakeholders and the Project during the detailed design, pre-construction and construction process, to identify any need for improvements to management measures
- Describe ARTC's initiatives and partnership opportunities that will maximise local employment and business opportunities and bring about long-term benefits for local communities.

The Social Impact Management Plan includes five action plans:

- Community and Stakeholder Engagement
- Workforce Management
- Housing and Accommodation
- Health and Community Wellbeing
- Local Business and Industry.

Each action plan includes objectives and desired outcomes, mitigation measures, and the timing for delivery of these mitigation measures.

Economics

The economic impact assessment undertaken for the draft Environmental Impact Statement established and examined the existing economic environment and local context to form the basis to measure the economic impacts. It identified and assessed potential economic benefits and impacts on affected local and regional communities and businesses. It also assessed the economic significance of the Project on the regional, state and national economies through computable general equilibrium modelling and evaluated the potential cumulative impacts on local and regional economies resulting from the construction and operation of related projects, including adjacent Inland Rail Projects.

It is noted that the economic impact assessment was largely completed before the economic shock associated with the 2020 Q2 market conditions. In particular, the baseline representation of the economy does not account for the 2020 Q2 market conditions.

The Project will support regional and local development through:

- Opportunities to encourage, develop and grow local businesses, including Indigenous businesses, supplying resources and materials for the construction and operation of the Project
- Opportunities in secondary service and supply industries, such as retail, hospitality and other support services, for businesses close to the Project. Expansion in construction activity is also likely to support temporary flow-on demand and spending from the construction workforce in the local community
- The potential to unlock the construction of ancillary and complementary infrastructure, industrial development and logistics operations within the local area. Specifically, the Project may act as a significant catalyst for development in the planned and existing industrial areas at the Ebenezer Regional Industrial Area, Willowbank Industrial Estate, and the Bromelton State Development Area
- Offering opportunities to support the local agricultural industry by driving savings in freight costs, improving market access, and reducing the volume of freight vehicles on the region's road network.

The Project is forecast to provide a total $166.22 million[5] in incremental benefits. These benefits result from improvements in freight productivity, reliability and availability, and benefits to the community from crash reductions, reduced environmental externalities, and road decongestion benefits.

The Project will promote regional economic growth across the Greater Brisbane region. Using labour market trends and projected construction sector activity, it is likely that the labour market conditions that will prevail during the construction phase will be closer to those characterised by a 'slack' labour market scenario. Under this scenario, the real Gross Regional Product over the construction phase is projected to be $355 million higher than the baseline level. Under a slack labour market scenario, the Project is also expected to deliver an additional 482 direct and indirect jobs per year over the construction period, over and above the 620 jobs created over the construction period.

ARTC is committed to enhancing the economic benefits of the Project while avoiding, mitigating or managing any adverse economic impacts. The Social Impact Management Plan outlines the actions that ARTC will undertake or require its contractor to undertake to manage the social and socio-economic impacts of the Project, while enhancing the Project benefits and opportunities. The Social Impact Management Plan includes a Local Business and Industry Action Plan.

Cultural heritage

Indigenous heritage

As a requirement of the Indigenous heritage component of the Project's Terms of Reference, one or more Cultural Heritage Management Plans was required to be developed with the relevant Aboriginal Parties for the disturbance area and be approved by the Chief Executive of the Department of Aboriginal and Torres Strait Islander Partnerships.

This process was undertaken by ARTC with the Jagera People in March 2019 and between February and June 2018 with the Yuggera Ugarapul People, in accordance with the requirements of Part 7 of *the Aboriginal Cultural Heritage Act 2003* (Qld), and the *Cultural Heritage Management Plan Guidelines*. The resulting Cultural Heritage Management Plans (CLH017009) entered into with the Yuggera Ugarapul People Registered Native Title Claimant as the Aboriginal Party for the vast majority of the cultural heritage study area will allow for the identification, assessment and management of Aboriginal cultural heritage in the study area.

These Cultural Heritage Management Plans have been approved under the *Aboriginal Cultural Heritage Act 2003* (Qld) and consequently meet all the requirements for the identification, assessment and management of Indigenous heritage under the Terms of Reference. The Cultural Heritage Management Plans are confidential and will not be made available as part of the Environmental Impact Statement process.

5. 2019 present value terms at a 7 per cent discount rate

Searches of the Department of Aboriginal and Torres Strait Islander Partnerships' database indicates there are 45 reported Aboriginal cultural heritage sites within 1 kilometre of the cultural heritage study area. The majority of these sites consist of stone artefacts—either isolated finds or clustered in scatters—followed by landscape features, resource areas and grinding grooves.

Non-Indigenous heritage

An assessment of non-Indigenous heritage values and impacts was undertaken using a combination of register searches and historical and archival research. The assessment identified 13 Areas of Interest within the cultural heritage study area, including five registered local heritage places, which were inspected and assessed against the relevant criteria.

Ten of the 13 Areas of Interest were assessed as having local heritage significance, meaning that they have '*aesthetic, historic, scientific, or social value for past, present or future generations*'. These Areas of Interest were mostly related to local pastoral and dairying industries and include yards, huts, creameries and dwellings. Potential impacts on heritage sites can be divided into two main types:

- Direct impacts: if a heritage place or site is located directly in a development area or would be physically impacted by the development. Direct impacts include the demolition or substantial alteration of a building or the disturbance of an archaeological site
- Indirect impacts: alter the surrounding physical environment in such a way that a heritage place or site is affected. Indirect impacts can include vibration from construction activities or subsequent traffic loads, as well as additional water runoff or sediment deposition due to changing hydrology.

Seven places were identified as being at risk of direct impacts, with the other six places identified at risk of indirect impacts. The assessment found that, with appropriate mitigation measures, the Project impacts could be reduced to neutral or slight for identified sites.

Direct impacts to non-Indigenous places as a result of the Project are most likely to occur during site preparation as part of the construction phase. Clearing and stripping activities may impact heritage values within the disturbance footprint. Indirect impacts may occur during any phase of the Project, when construction, operation, or decommissioning activities result in excessive dust, noise or vibration that damages heritage structures.

The accepted methodology for managing impacts on heritage places is to avoid wherever possible, minimise as far as is practical, and then mitigate where avoidance and minimisation is not possible. Potential impacts were assessed using the International Council on Monuments and Sites' standard guidelines both before and after the implementation of mitigation measures.

Traffic, transport and access

During the construction phase, materials, equipment and personnel will mainly be transported via existing State-controlled roads and local government roads. Construction materials and equipment will be delivered to centralised laydown areas along the alignment, which have been designed with vehicle accessibility and safe manoeuvrability in mind.

The results of construction traffic analysis indicate:

- Four State-controlled roads within the traffic, transport and access study area are expected to have construction traffic exceed 5 per cent of the existing traffic levels
- Thirty-seven local government roads are expected to have construction traffic exceed 5 per cent of the existing traffic levels; however, the impact on many of these roads is expected to be minimal because the high percentage of construction traffic is a function of low existing traffic volumes
- One cycle route on Warwick Road between Cunningham Highway and Saleyards Road is expected to experience construction traffic in excess of 5 per cent of the background traffic
- One road (Warwick Road) along a public transport route is expected to have construction traffic exceed 5 per cent of background traffic
- Due to the low frequency of long-distance coach services and existing school bus routes, the impacts on these services are expected to be minimal.

Certain sections of the Project will generate construction-related traffic volumes that are in excess of 10 per cent of the background traffic during the construction phase and the Project may potentially cause a minor change in the level of service for some road sections during each year of construction. However, it is not expected that the Project will generate any need to upgrade the local road network for such a short duration of impact, but adequate traffic and road use management strategies and mitigation measures will be required. A Traffic Management Plan will be developed before construction activities start.

Impacts to the road network during the operation of the Project are expected to be negligible, because of the low volumes of traffic associated with operation of the Project. Traffic is expected to be limited to a small maintenance crew using rail maintenance access roads to inspect the new track once a month.

Hazard and risk

The Project has incorporated risk identification and assessment practices throughout the design development phase and ARTC has a strong commitment to implementing and maintaining appropriate safety practices throughout operations. Hazards were identified for each of the Project phases and evaluated qualitatively to determine residual risks after the implementation of risk management strategies and mitigation measures. With the implementation of mitigation measures, many hazards were determined to have a low residual risk. No risks were assessed as having a high residual risk.

Potential hazards assessed as having a medium residual risk included:

- **Natural hazards**: bushfire; flooding; severe weather events; landslide, sudden subsidence or movement or rocks or soil; natural events exacerbated by climatic conditions; and impacts of the Project on greenhouse gas emissions
- **Project hazards**: employee fatigue and/or heat stress; rail accidents caused by increased rail movements; increased use of road vehicles for the Project; increased number of interfaces between live trains and road users including pedestrians and land users; construction and use of the Teviot Range Tunnel; interaction with existing services underground and overhead; health and environmental impacts from contaminated land (construction); and interference with emergency access.
- **Dangerous goods and hazardous chemicals**: transport of dangerous goods freight during operations and the potential use of explosives for construction, particularly for the Teviot Range Tunnel.

A medium residual risk is considered tolerable if reduced as far as practicable given the low frequency of occurrence (or probability or likelihood) or minor impact if the event occurred after the mitigations were implemented.

ARTC's existing Emergency Management Procedure, which provides a systematic approach to incident response and recovery or incident investigation on the ARTC network, will be applied to the Inland Rail Program and the Project. An Incident Management Plan will be developed for the Inland Rail Program to detail the procedures and resources for responding to and managing emergencies. The Emergency Management Procedure itself will be used for emergency management including emergency response and emergency planning.

Waste and resource management

The construction phase will generate the majority of the Project's waste through vegetation clearing, topsoil stripping, excavation and the demolition of existing structures. Municipal solid waste will be generated by activities at construction locations and on multiple work fronts.

Established waste management facilities close to the Project are located at Swanbank, Willowbank, New Chum, Greenbank and Logan. These facilities were assessed for their potential to service the Project. The capacity of these waste facilities is sufficient to accommodate waste generated from the Project. When construction timing is confirmed, waste acceptance criteria and available and permissible annual disposal rates will be determined in consultation with the waste facility operators.

The Project design calculates that 5,859,671 cubic metres of cut material will be produced during construction, primarily from surface works. A calculated 4,237,167 cubic metres of this cut material is estimated to be suitable for immediate re-use as general earth fill, as per ARTC's Earthworks Material Specification. An excess of 1,622,504 cubic metres of spoil will be managed or treated with the potential for re-use. In line with the Project's spoil management hierarchy, the Environmental Impact Statement has assumed a worst-case scenario that spoil cannot be repurposed in other parts of the Inland Rail Program and will be transported by road to waste receiving facilities. This scenario is unlikely to occur and re-use within the Inland Rail Program will be pursued as the best use of spoil material created by the Project.

With the exception of spoil, no other significant waste streams have been identified for the Project. As waste streams are not considered significant, they have been categorised at a broad level and will be managed in accordance with standard industry practice and accommodated within the capacity of existing waste management arrangements close to the Project.

In combination with mitigation measures, the quantity of waste generated by the Project during operation will be typical of the current networks of freight rail and assumed to be insignificant compared to waste quantities generated during construction.

The identified waste streams will be managed through waste avoidance and mitigation strategies to minimise potential impacts on surrounding environmental values and sensitive receptors, in accordance with the *Waste Reduction and Recycling Act 2011* (Qld) waste management hierarchy, avoiding or reducing as highest preference, followed by re-use, recycle, recover energy, treat, and dispose as the least preferable option. A Waste Management Sub-plan will be developed as part of the Construction Environmental Management Plan, which will guide these strategies. In addition, a Spoil Management Strategy has been prepared as part of the Environmental Impact Statement.

Cumulative impacts

When a number of projects are being undertaken at the same time in a similar location, they can cause 'cumulative impacts'. The cumulative impact assessment for the Project considered nine projects that have the potential to contribute to cumulative impacts. The cumulative impact assessment relies on publicly available information, and depending on the level of information available, conservative assumptions about a project's impact have been adopted (for example area of vegetation to be cleared).

Potential cumulative impacts on environmental aspects are considered to be of low significance, except the potential cumulative impacts on the following environmental aspects:

- Landscape and visual amenity
- Flora and fauna
- Cultural heritage
- Waste and resource management
- Skilled labour supply
- Traffic and transport.

Potential cumulative impacts associated with the loss of biodiversity and cultural heritage aspects within the respective areas of interest are common to all projects in the cumulative impact assessment; therefore, these impacts are cumulative by nature. Similarly, projects in the landscape and visual amenity cumulative impact assessment are likely to exacerbate impacts from the Project through combined, successive and sequential views of adjoining projects.

The potential cumulative impacts associated with spoil disposal when considering the Inland Rail projects in isolation is recognised as being of greater than low significance. It is, however, expected that in detailed design and execution phases, the adjacent Inland Rail projects will have significant opportunity to coordinate spoil management and reduce the volumes required to be disposed outside project areas.

The expansion in construction activity and employment within the region, with a subsequent increase in temporary and non-resident population, has the potential to increase demand for a range of local infrastructure and services, including housing, healthcare, childcare, and education. Further, spending on consumer-orientated products by the construction workforce has the potential to benefit local retail businesses by increasing their trading levels.

All projects included in the cumulative impact assessment have overlapping construction schedules. This is likely to increase traffic and congestion on certain roads within the traffic area of impact, as well as decrease the availability of skilled labour over the short term.

Each of the projects considered by the cumulative impact assessment will be required to mitigate and manage potential cumulative impacts to acceptable levels.

The proposed combined delivery approach for the Gowrie to Helidon, Helidon to Calvert and Calvert to Kagaru Projects provides opportunities to coordinate the management of cumulative impacts generated as a result of construction traffic movements, workforce requirements, spoil management and reuse, and identification and protection of environmental offsets.

Approach to Environmental Management

A Draft Outline Environmental Management Plan has been prepared for the Project to:

- Provide an environmental management framework to enable the identified environmental and social outcomes to be achieved for the detailed design, pre-construction, construction and commissioning
- Establish the subsequent process for the preparation and implementation of the Outline Environmental Management Plan and Construction Environmental Management Plan.

The Draft Outline Environmental Management Plan includes discipline-specific sub-plans, drawing on the outcomes of the environmental assessments documented in the draft Environmental Impact Statement. The Draft Outline Environmental Management Plan establishes the framework for the outline Construction Environmental Management Plan and the Construction Environmental Management Plan. The draft Outline Environmental Management Plan identifies:

- Environmental outcomes
- Performance criteria
- Proposed mitigation measures
- Monitoring requirements.

Aspects addressed in the draft Outline Environmental Management Plan include: land use and tenure; land resources; landscape and visual amenity; flora and fauna; air quality; surface water and hydrology; groundwater; noise and vibration; cultural heritage; traffic, transport and access; hazard and risk; waste and resource management. Social and economic matters are addressed under the Social Impact Management Plan.

Any conditions imposed by the Coordinator-General in the Environmental Impact Statement evaluation report or by the Australian Government Minister for the Environment (or delegate) will need to be incorporated into future versions of the Outline Construction Environmental Management Plan and the Construction Environmental Management Plan to ensure that all works are authorised and consistent with those conditions.

Conclusion

The Project, and the Inland Rail Program as a whole, provides a 'step change' opportunity to revolutionise the capacity and mode of freight travel in Australia. Inland Rail offers a safe and sustainable solution to existing freight bottlenecks and provides opportunities for complementary development to maximise the economic growth opportunities associated with the Project.

As part of the wider Inland Rail Program, the Project will help relieve pressure on existing road and rail corridors by providing part of a continuous rail freight route between Melbourne and Brisbane. The service offering will be competitive with road freight (i.e. a Melbourne to Brisbane transit time of less than 24 hours, with a reliability of 98 per cent), and will better connect regional farms with domestic and international export markets.

The Project is consistent with the objectives of the *Environment Protection and Biodiversity Conservation Act 1999*, including providing for the protection of matters of national environmental significance. The Project aligns with the core objectives and the guiding principles of Ecologically Sustainable Development, is consistent with the *Queensland Freight Strategy*, the *Inland Rail Business Case* and Australian Government expectations.

The Environmental Impact Statement has undertaken a conservative and 'worst case' approach to identifying the potential impacts of the Project, including cumulative impacts. This demonstrates the adoption of the precautionary principle. Where environmental impacts have been identified through the assessment process, efforts have, in the first instance, been made when practicable to avoid or minimise those impacts through development of the design. Where attempts to avoid or minimise impacts through design have been of limited effect, further mitigation measures have been nominated for implementation during future phases of the Project. This demonstrates the integration of the principle of conservation of biological diversity and ecological integrity in the impact assessment process.

With regards to intergenerational equity, as part of the wider Inland Rail Program, the Project would benefit existing and future generations by providing a safer, more efficient, means of transporting freight between Melbourne and Brisbane. Conversely, should the Project (and therefore Inland Rail) not proceed, the principle of intergenerational equity may be compromised. Future generations would experience increasingly worse safety and environmental impacts due to continued growth in road transport between Melbourne and Brisbane.

The principle of improved valuation, pricing and incentive mechanisms requires that environmental factors should be included in the valuation of assets and services. It is difficult to place a monetary value on the Project's environmental impacts. However, the value placed on environmental resources within and surrounding the alignment is recognised in the environmental investigations undertaken to inform the Project design and mitigation measures. The estimated costs associated with environmental design and mitigation measures have also been built into the overall Project cost.

Opportunities have also been identified through the assessment to maximise the potentially significant economic and social benefits of the Project, through local employment, local industry participation and opportunities for complementary investment that provides for continued community benefit.

Overall the Project, and the wider Inland Rail Program, provides significant opportunity to deliver long-term and substantial economic benefits for Australia's future, by connecting regional and urban markets to buyers and increasing the capacity of the existing passenger and road network.

The delivery of the Project will provide a safe and sustainable solution to Australia's freight challenge, while seeking to minimise adverse environmental, social and economic impacts. The Environmental Impact Statement demonstrates that the residual impacts and benefits can be appropriately managed and therefore it is recommended that the Project should proceed, subject to reasonable and relevant conditions that reflect the proponent's commitments as listed in Appendix E: Proponent Commitments.