INLAND RAIL

Summary of findings

Border to Gowrie

Draft Environmental Impact Statement

ARTC

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

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.

Front cover and back cover:

BROOKSTEAD ON THE SOUTHERN SIDE OF THE RAILWAY LINE

Border to Gowrie involves:

216.2km single-track railway (7km standard gauge rail and 209.2km dual gauge rail)

establishment of approximately **145km new dual gauge track**

upgrading 71.2km existing track

43 public level crossings

maintenance sidings and **signalling infrastructure**

5 crossing loops

B2G links to the North Star to NSW/QLD Border (NS2B) Project and Gowrie to Helidon (G2H) Project

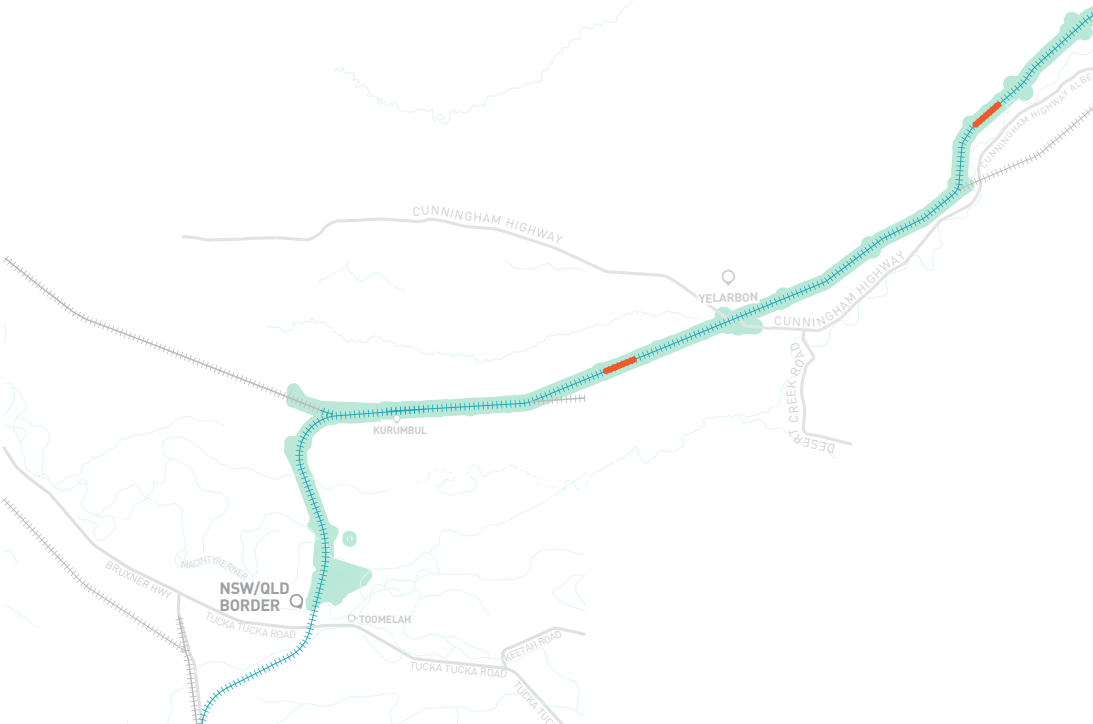
initially to accommodate **1,800m long double-stacked freight trains**

20 rail-over-watercourse bridges

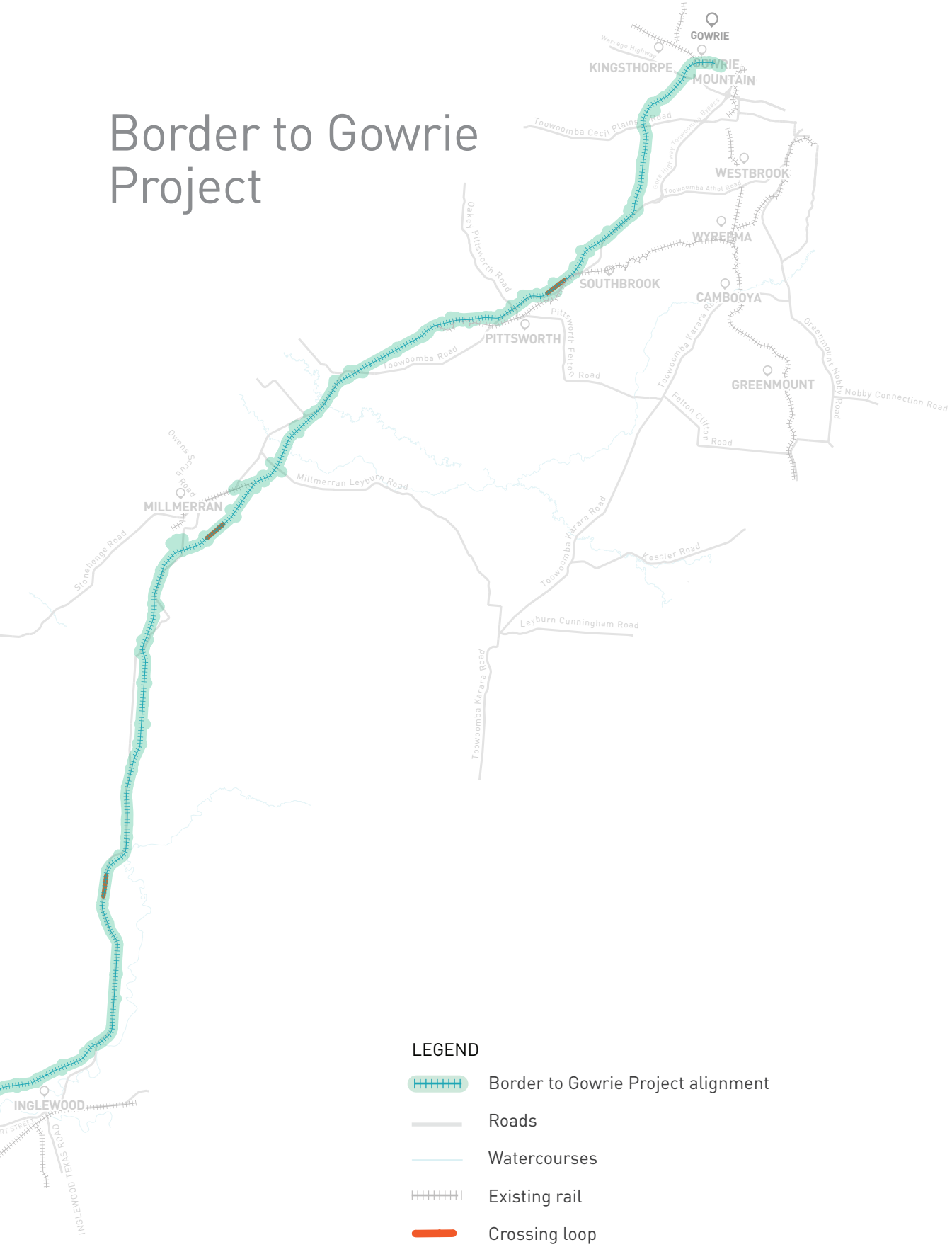
11 rail-over-road bridges

3 road-over-rail bridges

12 stock route interfaces

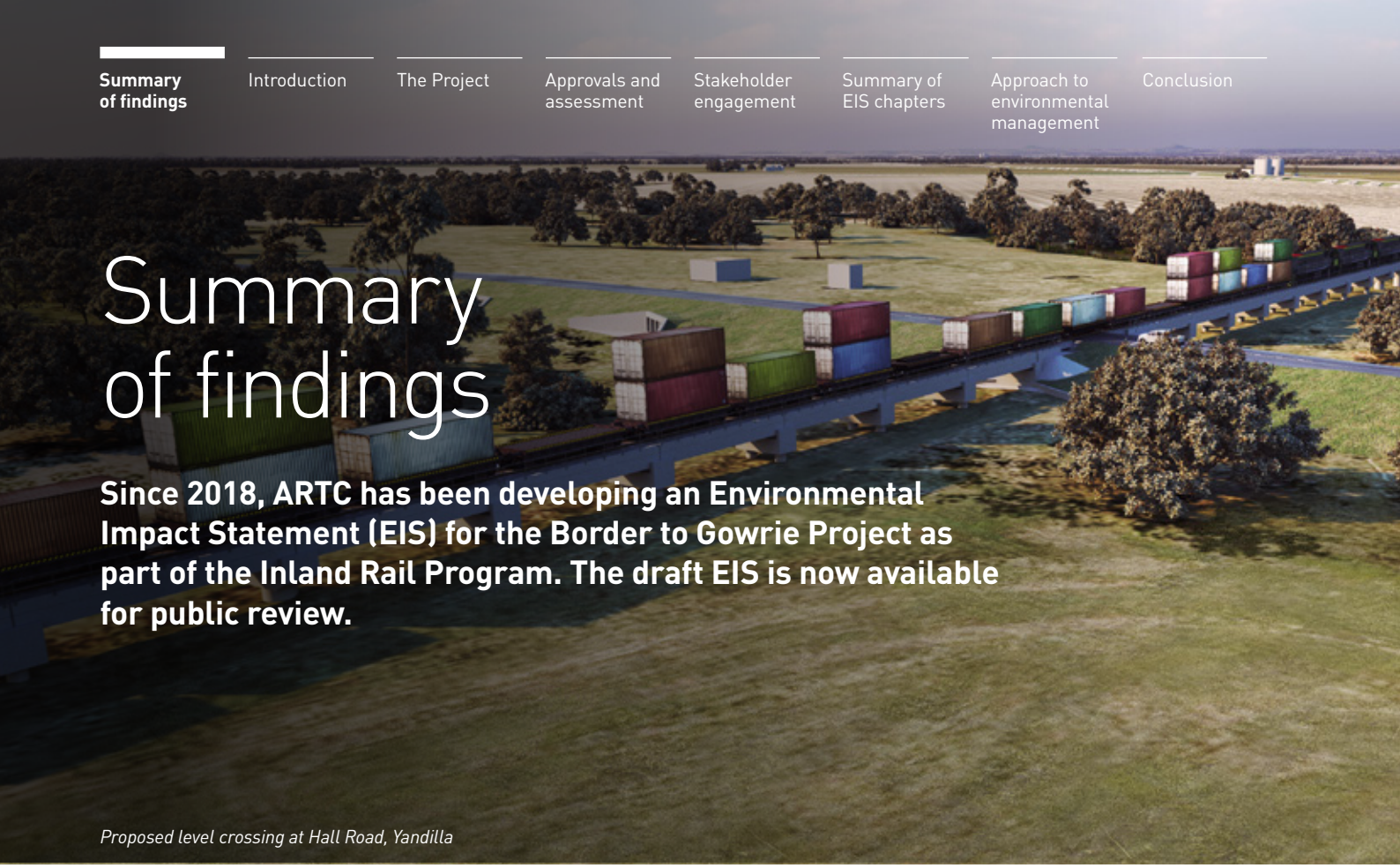


Border to Gowrie Project



LEGEND

- Border to Gowrie Project alignment
- Roads
- Watercourses
- Existing rail
- Crossing loop



Summary of findings

Since 2018, ARTC has been developing an Environmental Impact Statement (EIS) for the Border to Gowrie Project as part of the Inland Rail Program. The draft EIS is now available for public review.

Proposed level crossing at Hall Road, Yandilla

Inland Rail – Border to Gowrie Project

The Australian Rail Track Corporation (ARTC) is proposing the Inland Rail Program—13 individual projects spanning 1,700 kilometres.

By connecting interstate rail lines, Inland Rail will enable trains to travel between Melbourne and Brisbane in 24 hours or less.

The Border to Gowrie Project, located in south west Queensland, is one of the 'missing links' connecting existing rail lines to help form the complete Inland Rail network. The Border to Gowrie section includes building approximately 145 kilometres of new dual gauge track (greenfield) and upgrading 71.2 kilometres of existing rail corridor (brownfield). It will enable one of Australia's most productive farming regions to use rail to link with markets in Brisbane, Melbourne, Sydney, Adelaide and Perth more efficiently, more reliably and with larger volumes.

Purpose of this 'summary of findings'

A draft Environmental Impact Statement (EIS) has been prepared for the Border to Gowrie Project. The EIS provides a comprehensive description of:

- the current environment in the Project area
- all potential environmental impacts of the Project
- proposals to avoid, minimise, mitigate and/or offset those potential impacts.

The EIS is a robust, thorough and comprehensive document with analysis and input from technical and scientific specialists to demonstrate the Project is based on sound environmental principles and practices.

This summary of findings is a high-level overview of each chapter of the EIS. It summarises the major findings of the technical studies and shows where in the EIS more detailed information can be found.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 0: Executive Summary**
- **Appendix A: Terms of Reference**

The draft EIS is now available for public comment

The draft EIS for the Border to Gowrie Project is now available for public review.

The EIS is required by the Coordinator-General under Section 26(1)(a) of the *State Development and Public Works Organisation Act* 1971 (Cth) (SDPWO Act). The Project is also a controlled action under the *Environment Protection and Biodiversity Conservation Act* 1999 (Qld) (EPBC Act) and requires approval from the Australian Minister for the Environment.

The EIS comprises three parts:

- chapters describing the EIS process, the Project, identified environmental, social or economic aspect, environmental values, potential impacts and mitigation measures
- appendices supporting the chapters, including the Terms of Reference, management plans and specialist technical reports on identified environmental, social and economic aspects
- reference design alignment drawings.

Public review period

The draft EIS is currently in a public consultation review period. During this time, you are welcome to view and make a submission to the Office of the Coordinator-General on the draft EIS online at: **haveyoursay.dsd.qld.gov.au** or view the draft EIS at one of the locations below:

- Goondiwindi Regional Council Library, 100 Marshall Street, Goondiwindi
- Inglewood Library, 18 Elizabeth Street, Inglewood
- Toowoomba Regional Council Library, Corner Herries Street and Victoria Street, Toowoomba
- Pittsworth Library, 104 Yandilla Street, Pittsworth
- Toowoomba Regional Council Mobile Library, Old Homebush Road, Gowrie Junction and Main Street, Westbrook
- Millmerran Library, Herbert Street, Millmerran
- State Library of Queensland, Cultural Centre, Stanley Place, South Bank, Brisbane
- National Library of Australia, Parkes Place, Canberra
- Inland Rail Toowoomba office, 143–145 Margaret Street, Toowoomba
- Inland Rail Goondiwindi office, 116 Marshall Street, Goondiwindi.

Have your say

Submissions regarding this EIS should be addressed to:

The Coordinator-General

C/-EIS Project Manager
Inland Rail, Border to Gowrie
Coordinated Project Delivery
Office of the Coordinator-General
Box 15517
CITY EAST QLD 4002

Submissions can also be made electronically by emailing **inlandrailb2g@coordinatorgeneral.qld.gov.au**

Properly made submissions must be in writing, signed by the writer(s), with the name and address of each writer clearly stated. Please note, electronic submissions are still required to meet the properly made requirements of the SDPWO Act.

For further enquiries, please call **13 QGOV (13 74 68).**

ARTC help is available

If you're unable to access the EIS or supporting documents, please contact ARTC Inland Rail on **1800 732 761.**

If you need help with reading, or if English is your second language, please call **13 14 50**. This free service will help you read this document and other relevant Project information.

Introduction

The Australian Government has committed to delivering Inland Rail, a significant piece of national transport infrastructure that will enhance Australia's existing rail network and serve the interstate freight market.

The Project

The Project is a 216.2 kilometre section of new single track positioned within approximately 145 kilometres of new rail corridor and approximately 71.2 kilometres of existing rail corridor, currently used by Queensland Rail's South Western Line and Millmerran Branch Line.

The Project design responds to key environmental and social constraints and has been developed in line with engineering standards to produce a feasible rail design (the reference design), which will achieve the operating performance specifications of an efficient long-haul rail freight network.

The estimated capital expenditure for the Project is $1.1 billion (ARTC 2019). This is due to its length, total earthworks, number of road-rail interfaces and structures.

The location

The Project is located within the Goondiwindi Regional Council and Toowoomba Regional Council local government areas in south west Queensland.

The Project extends from the median point of the Macintyre River (NSW/Queensland border), approximately 18 kilometres south east of Goondiwindi. The Project runs north east via Yelarbon, Inglewood, Millmerran, Pampas, Brookstead, Pittsworth, Southbrook and Toowoomba Wellcamp Airport to Gowrie Junction, north west of Toowoomba.

The Project provides a link between the adjacent projects:

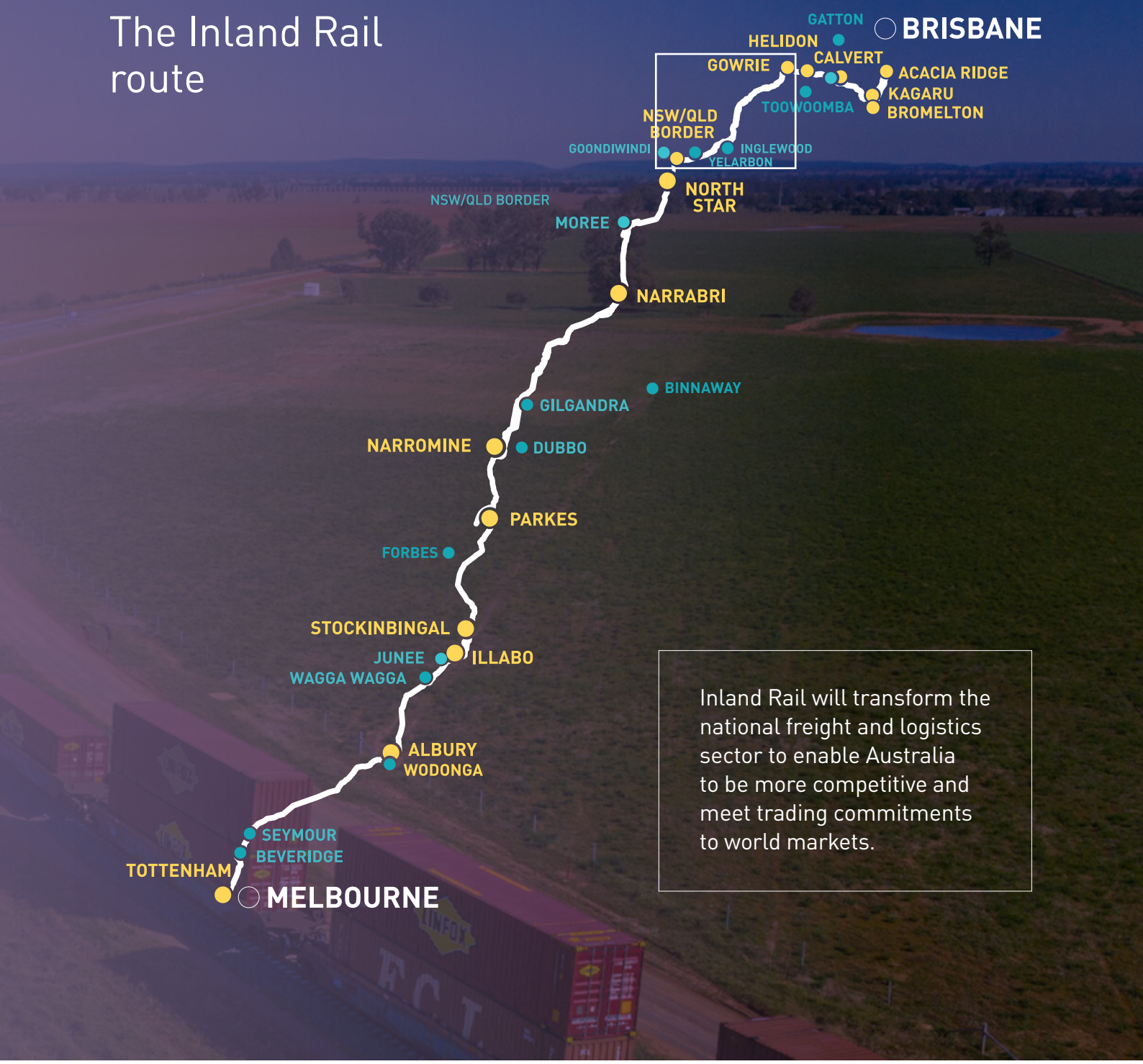
- **North Star to NSW/QLD Border**
- **Gowrie to Helidon**.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 1: Introduction**
- **Chapter 2: Project Rationale**
- **Chapter 5: Project Description**

The Inland Rail route



Inland Rail will transform the national freight and logistics sector to enable Australia to be more competitive and meet trading commitments to world markets.

The Proponent

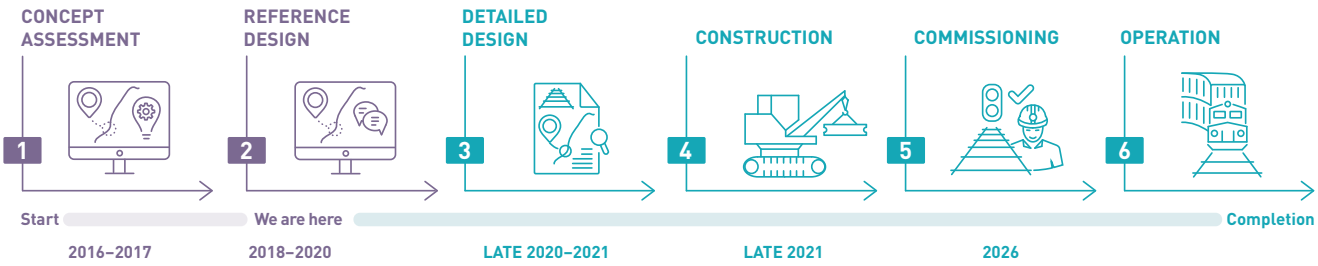
ARTC has been tasked with developing a Program to deliver Inland Rail under the guidance of the Department of Infrastructure, Transport, Regional Development and Communications.

ARTC plays a critical role in the supply chain by 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.

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.

Project timeline

Pre-construction and early works are scheduled for commencement in early 2021, with construction scheduled to commence in late 2021.



**Timeframes are indicative and are subject to change*

> The major users of Inland Rail will be producers across a range of sectors, transporting mostly domestic goods to our cities, such as fresh food, packaged goods, hardware, white goods and bulk goods like steel and paper.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LINFOX

Project description

The Project is a 216.2 kilometre section of the Inland Rail corridor between the NSW/Queensland border and Gowrie Junction.

Proposed grade separation at Chamberlain Road, Gowrie Mountain

This chapter describes the Border to Gowrie Project which is the subject of this EIS.

Corridor selection

The proposed rail corridor, as shown on design drawings in **Volume 3** of the draft EIS, is the product of corridor selection studies, multi-criteria analyses and iterative optimisation and refinement through the development of the reference design. The corridor selection process considered the following aspects:

- compliance with the Inland Rail standardised design criteria (basis of design)
- maximising use of existing rail corridors
- minimising use of private land
- minimising severance of land parcels
- avoiding sensitive environmental and social areas
- avoiding challenging topography and geological conditions
- minimising the number of watercourse crossings
- minimising the number of interfaces with existing infrastructure
- minimising impact to existing commercial and agricultural operations
- optimising railway operation.

Alternative route options considered for the Project are discussed in **Chapter 2: Project rationale.**

Want to know more?

See the following Environmental Impact Statement chapters:

Chapter 1: Introduction

Chapter 2: Project Rationale

Chapter 5: Project Description

Project terms

Throughout the draft EIS, the Project is described in terms of:

- study area
- focused area of investigation
- rail corridor
- Project footprint, including permanent and temporary components
- impact assessment area.

The study area that was identified during the concept planning phase of the Project and provided to ARTC by the Australian Government is nominally two kilometres wide. The study area formed the basis of ARTC's application to the Queensland Coordinator-General for gazettal of the Project as a 'coordinated project' under the SDPWO Act, as documented in the initial advice statement (ARTC, 2018).

In mid-2018, the community requested ARTC provide more clarity about how the Project will impact landowners. In response to the community's request, ARTC identified the focused area of investigation from preliminary results of planning, environmental and engineering investigations. The focused area of investigation, although narrower than the two-kilometre wide study area in most parts, varied in width depending on the location, constraints and results from the initial design investigations.

Further, more detailed technical investigations enabled the final rail corridor (nominally 40 metres wide, dependent on landform and infrastructure) to be identified. If the Project is approved to proceed, it is ARTC's intention that the rail corridor be gazetted as future railway land by the Queensland Government.

The Project footprint is the land required to accommodate all permanent and temporary components of the Project, being:

- **permanent footprint:** land required to accommodate rail infrastructure, road infrastructure, earthworks, rail maintenance access roads and drainage
- **temporary footprint:** land required to accommodate temporary construction phase activities, facilities and movements.

The impact assessment area is defined as the wider area including and surrounding the Project, with the potential to be directly or indirectly affected by the Project (for example, by noise and vibration, visual or traffic impacts).

The actual size and extent of the impact assessment area varies according to the nature and requirements of each specific matter. The impact assessment area adopted for the assessment of each specific matter is defined in **Chapters 7 to 20** of the draft EIS.

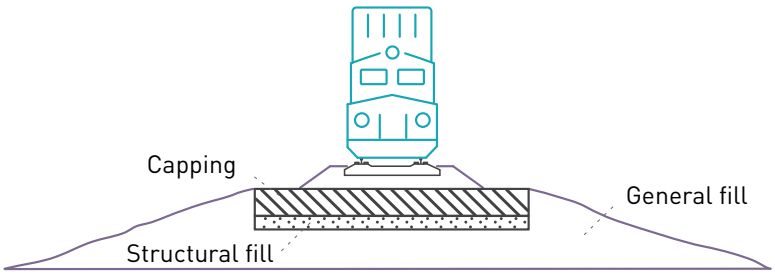
The Gore Highway, near Pittsworth, facing south east

Reference design

Terms

The key elements of the Border to Gowrie Project rail design are described in the table below.

ELEMENTS	DESCRIPTION AND PURPOSE
Rails	Continuously welded 60kg/m steel rails. Due to there being fewer joints, trains can travel faster on continuously welded steel rails than on jointed rails. Continuously welded rails also require less maintenance.
Fasteners	Fasteners are the method of fixing the rails to the sleepers.
Rail pads	Rail pads are plastic or rubber mats that are inserted between the rails and the sleepers. Their purpose is to evenly distribute the load from passing trains onto the sleepers. Rail pads also act to reduce noise and vibration impacts from passing trains.
Sleepers	Cross braces laid to provide support to the rails, and distribute the load from passing trains to the ballast and subgrade. Sleepers also hold the rails upright and keep them spaced to the correct gauge.
Ballast	Forms the trackbed which typically consists of crushed stone packed between, below and around the sleepers to: ▸ bear the load from the sleepers ▸ hold the track structure in place as trains pass by ▸ facilitate the drainage of water ▸ keep down vegetation that might interfere with trains passing by.
Formation Also referred to as the 'subgrade'	The formation consists of a layer of general fill, a layer of structural fill and a capping layer (restricts the upward migration of wet clay and silt). The depth of formation varies with local topography and railway height. The typical structure of formation is illustrated in the figure below.



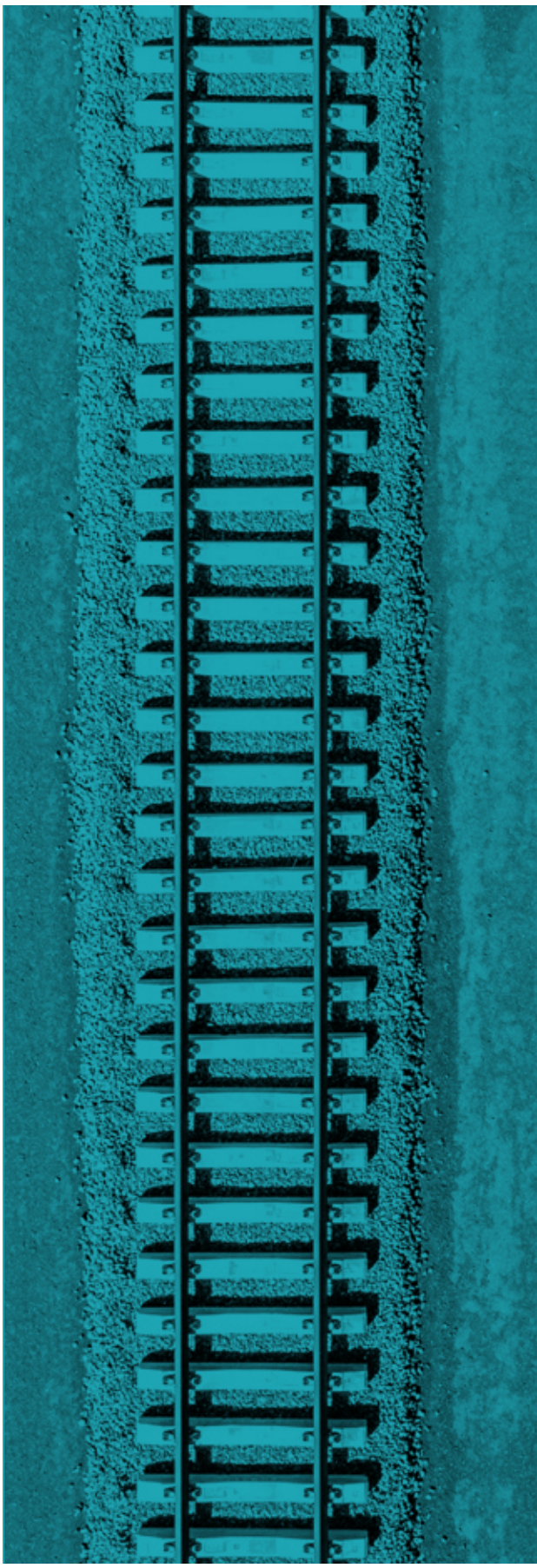
Structure of the formation

Basis of reference design – performance specifications for Inland Rail and the Project

ARTC's standardised design criteria provides guidance for consistent design across the Inland Rail Program. The basis of design acts as a primary point of reference for the design of the Project, forming a baseline for design criteria and design standards and consists of a series of performance specifications relating to Project design components.

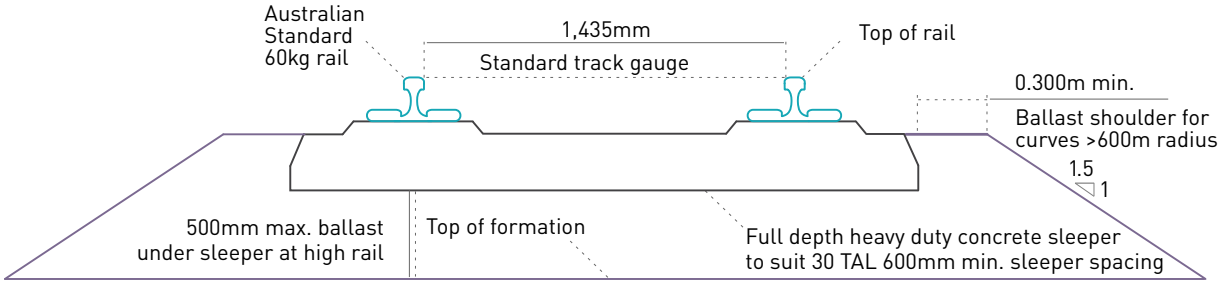
Specific design elements are described in the table below.

MINIMUM DESIGN STANDARDS	
General alignment standards	
Design speed	115km/h
Maximum grade	1:100 target, 1:80 maximum (compensated) 1:200 maximum at arrival or departure points at loops
Curve radius	1,200m target, 800m minimum
Flood immunity	Track drainage must have the capacity for a 1% AEP without overtopping the formation
Medium speed alignment standards (mountainous terrain)	
Design speed	80km/h minimum
Maximum grade	1:100 target, 1:50 maximum (compensated) 1:200 maximum at arrival or departure points at loops
Curve radius	800m target, 400m minimum
Corridor width	40m minimum
Rail	Minimum 53kg/m on existing track, 60kg/m on new or upgraded track
Concrete sleepers	Rated to 30 tonne axle load (TAL)

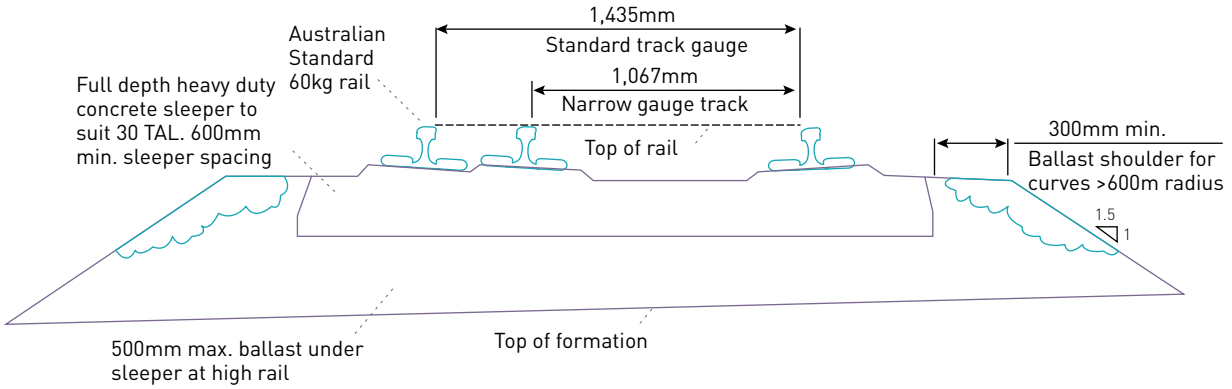


Rail

The track structure will be rail standard and narrow gauge comprising a ballasted track system (including bridges) of continuously welded rail, resilient fasteners, rail pads and concrete full-depth sleepers at 600-millimetre centres.



Typical standard gauge ballasted track cross section

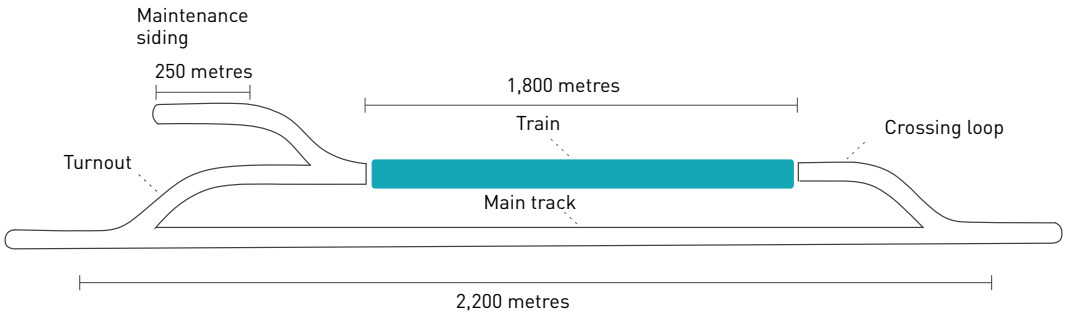


Typical dual gauge ballasted track cross section

Crossing loops

The crossing loop locations were informed by operational modelling and considered proximity to 'sensitive receptors' (people in the community who may be impacted by noise, air or visual impacts), interferences with existing infrastructure and flexibility for future extension.

The loops will be constructed as new sections of track roughly parallel to the existing track and are 2.2 kilometres long to accommodate 1,800-metre-long trains. Crossing loops have been positioned to enable future extension to accommodate 3,600-metre-long trains.

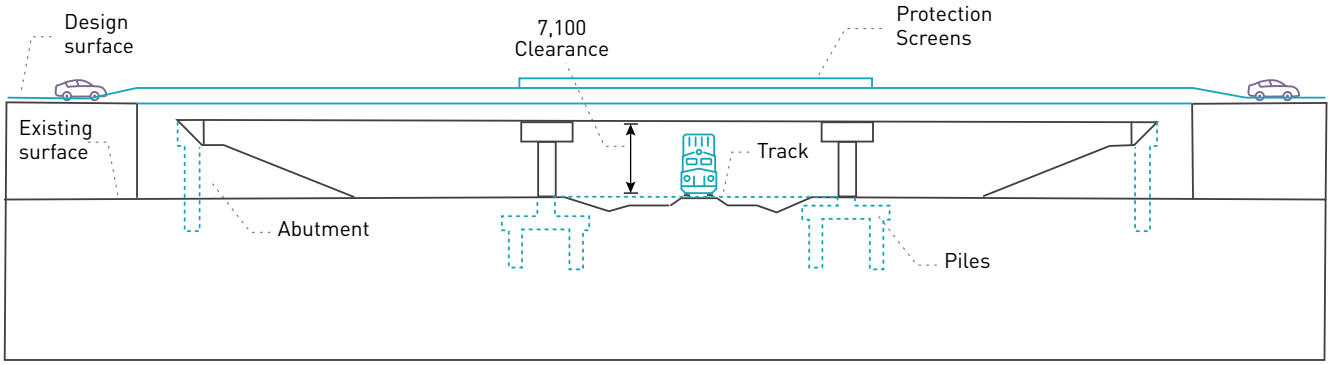


Typical layout of a crossing loop

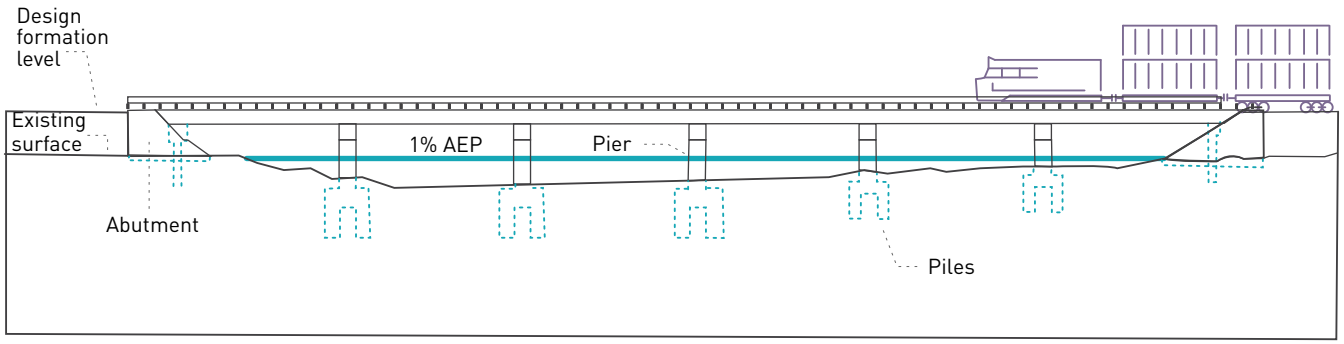
Bridges

Bridge structures allow water, vehicles and, in some cases, stock and pedestrians to cross the proposed rail corridor. Bridge structures may be rail-over-watercourse or road, or road-over-rail, depending on local topology and rail or road alignment requirements. The Project involves constructing 34 new bridge structures and does not involve the reinstatement or reconstruction of any existing bridge structures.

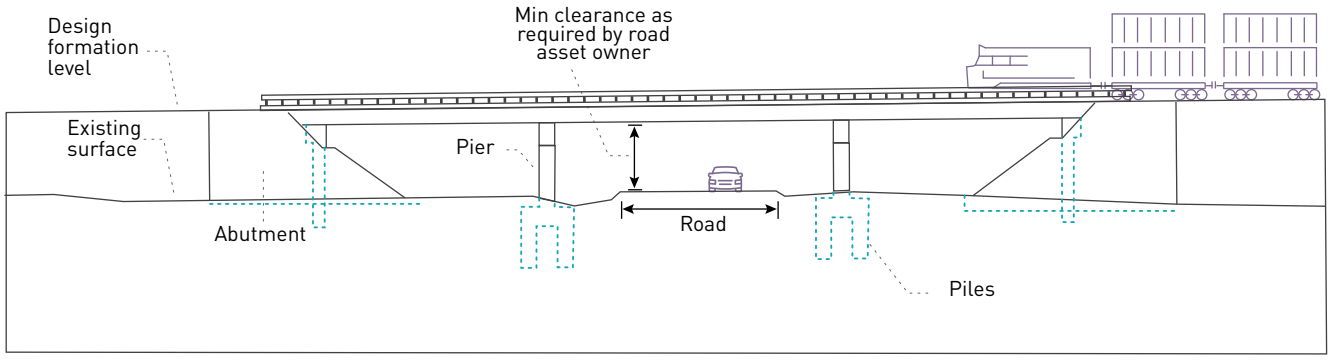
The bridge types proposed for a location depend on a range of factors, including topography, road use, rail and road alignments at the crossing point and access requirements. Bridges have been provided at all major watercourse crossings to minimise impacts to flow regimes and to avoid having to divert watercourses.



Typical section of road-over-rail bridge structure

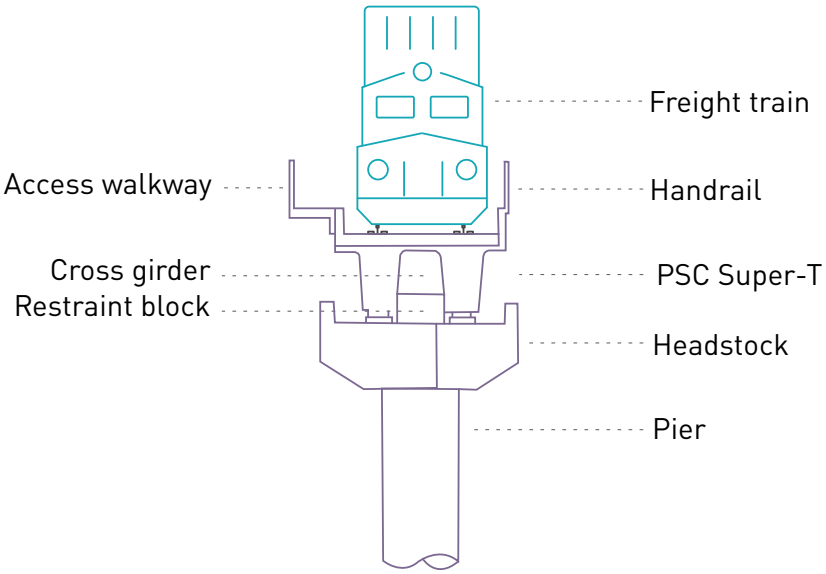


Typical section of rail-over-watercourse bridge structure

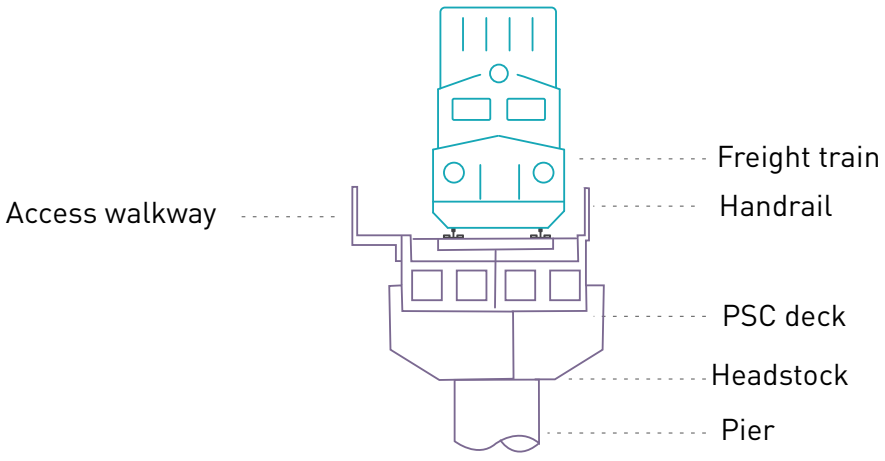


Typical section of rail-over-road bridge structure

The new bridge structures are typically on piled foundations supporting in situ reinforced concrete substructures. Bridge superstructures are typically formed from pre-stressed concrete (PSC) girders (either PSC slabs or PSC Super-T girder) with in situ concrete decks incorporating walkways, guardrails and barriers as appropriate. The bridges are various lengths and spans to suit the Project alignment and topography.



A typical section of a pier with a PSC Super-T girder



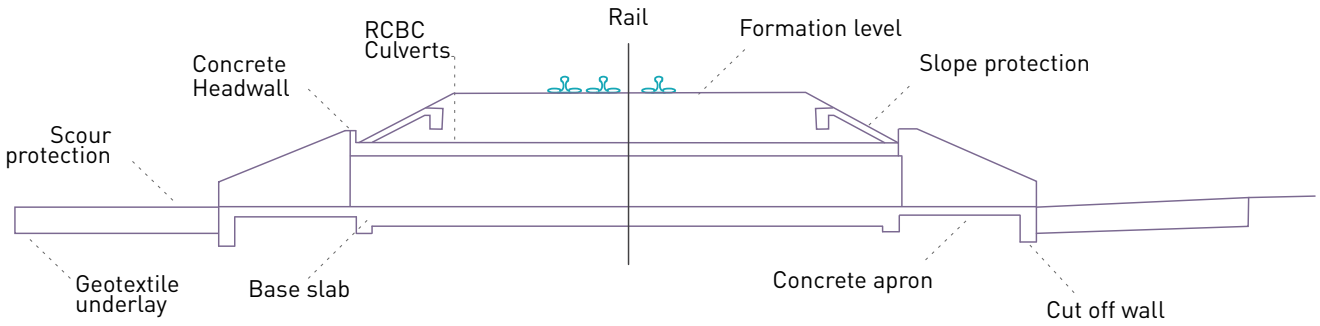
A typical section of a pier with a PSC slab span girder

Cross-drainage

Cross-drainage structures have been incorporated in the reference design where the Project intercepts existing watercourses and other drainage features. The type of cross-drainage structure included in the reference design depends on various factors such as natural topography, rail formation levels, direction of flow and soil type.

Bridges are proposed at all major waterway crossings to minimise disturbance to the existing flow regime. In some instances, bridges are provided in locations that may have multiple drainage features passing under the rail corridor, such as across the Condamine River floodplain.

Cross-drainage structures, including culverts, have been incorporated in the reference design to enable the Project to achieve the flood immunity specified in the basis of design of a 1% annual exceedance probability (AEP) event (refer to Inland Rail minimum design standards table on page 11). Culverts incorporated in the design are a mix of reinforced concrete pipe culverts and reinforced concrete box culverts. The location and design of culverts will be refined, if required, during the detailed design phase to reflect design changes throughout that process.



Typical section of a cross-drainage culvert

Scour protection measures have been included around culvert entrances and exits, on disturbed stream banks and on land bound by a watercourse to avoid erosion. Scour protection or energy dissipation measures have been specifically designed and sized for each culvert location in accordance with *Austroads Guide to Road Design (AGRD) Part 5B: Drainage—Open Channels, Culverts and Floodways* (Austroads, 2013b) with consideration for flow velocity, soil type and vegetation cover.

Scour protection measures incorporated in the reference design for culverts include:

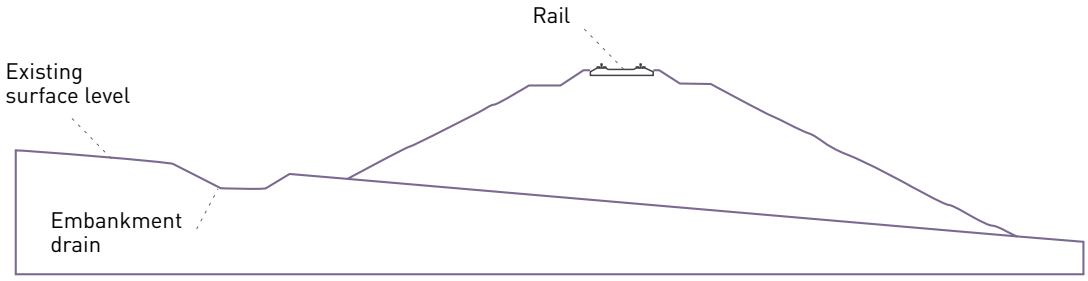
- concrete apron
- concrete wingwalls
- rock mattress scour protection, with geotextile underlay.

Longitudinal drainage

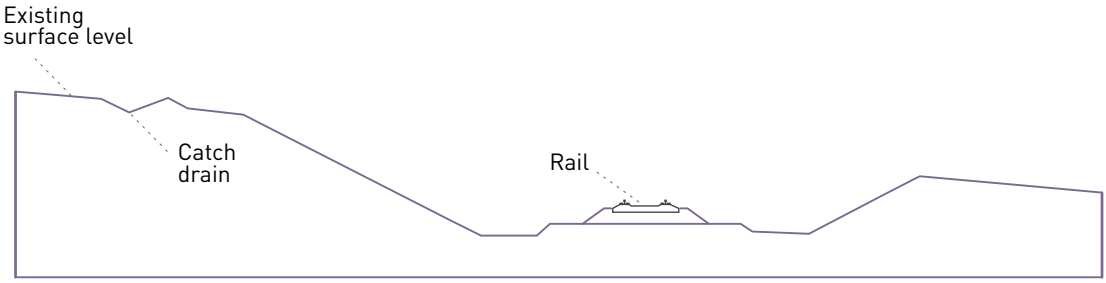
The purpose of longitudinal, or track, drainage is to remove water that has filtered through the track ballast, and to divert surface runoff to the nearest bridge or culvert location before it reaches the subgrade.

Embankment drains are longitudinal drains that run parallel to the railway and are located within the rail corridor, at the foot of the railway embankment.

Catch drains are longitudinal drains that run parallel to the railway and are located within the rail corridor, on the up-slope side of cuttings.



Typical section of embankment drain



Typical section of catch drain

Road-rail interfaces

Road-rail interfaces are points at which the rail alignment intersects a public road. The Project needs to cross state-controlled roads and local government roads.

Treatments for public road-rail interfaces can be categorised as:

- **grade separated crossings –** road and rail cross each other at different heights so traffic flow is not affected. Grade separations are either road-over-rail, or rail-over-road
- **level crossings –** road and rail cross each other at the same level. Level crossings have either passive or active controls to guide road users:
  - **passive –** have static warning signs (e.g. stop signs) visible on approach. This signage is unchanging with no mechanical aspects or light devices
  - **active –** flashing lights with boom barriers for motorists, and automated gates for pedestrians. These devices are activated prior to and during the passage of a train through the level crossing.
- **crossing consolidation, relocation, diversion or realignment –** existing road rail interfaces may be closed, consolidated into fewer crossing points, relocated or diverted. Roads will only be closed where the impact of diversions or consolidations is considered acceptable, or where the existing location is not considered safe and cannot reasonably be made safe. Approval for closures, where required, will be progressed in accordance with the requirements of the relevant legislation.

Proposed road-rail interface at Elsden Road, Brookstead

Interface with stock routes

The Project interfaces with the state stock route network in 12 locations. Locations of stock routes that intersect with the Project are identified in the table below.

LOCATION AND PROJECT INTERFACE POINT (APPROXIMATE CHAINAGE)	STOCK ROUTE ID, TYPE, STATUS AND CLASS	DESCRIPTION
Kildonan Road (NS2B)	**ID:** 005GWND **Type:** Road **Status:** Open **Class:** Primary	This stock route follows Kildonan Road. The Project alignment crosses this stock route at Kurumbul.
Rainbow Reserve and Eukabilla Road (NS2B)	**ID:** RAINBOW RESERVE **Type:** Reserve **Status:** Open **Class:** Primary	This stock reserve encompasses the Rainbow Reserve camping area and Eukabilla Road.
Wondalli–Kurumbul Road and Yelarbon–Kurumbul Road	**ID:** 081GWND **Type:** Road **Status:** Open **Class:** Secondary	This stock route is aligned along Wondalli–Kurumbul Road and parallel to Yelarbon–Kurumbul Road, which runs adjacent to the existing South Western Line rail corridor. The Project alignment crosses this stock route at the intersection of Wondalli–Kurumbul Road and Yelarbon–Kurumbul Road.
Yelarbon	**ID:** 811GWND **Type:** Road **Status:** Open **Class:** Minor and unused	The Project will require the closure of the existing active level crossing, to be replaced by a road-over-rail crossing approximately 400m to the west of the existing crossing point. This road reconfiguration will result in the severance of the current stock route. This stock route is aligned with Merton Road, the Cunningham Highway and Yelarbon–Keetah Road. The stock route crosses the existing Queensland Rail South Western Line at an active level crossing on the Cunningham Highway.
East of Sawmill Road	**ID:** RESERVE **Type:** Reserve **Status:** Open **Class:** Minor and unused	This is an isolated stock reserve, with no mapped stock route linkages. The stock reserve is bound by the Cunningham Highway to the west and east of Sawmill Road to the north. The Project involves curve easing east of Sawmill Road, which will encroach by up to 15m into the north west corner of the stock reserve. The existing Yelarbon levee extends diagonally across this stock reserve. Modifications to the existing Yelarbon levee, if they are to occur, will temporarily require works within the stock reserve.

LOCATION AND PROJECT INTERFACE POINT (APPROXIMATE CHAINAGE)	STOCK ROUTE ID, TYPE, STATUS AND CLASS	DESCRIPTION
Lovells Crossing Road	**ID:** 813GWD **Type:** Road **Status:** Open **Class:** Minor and unused	This stock route follows Lovells Crossing Road. The Project alignment crosses this stock route approximately 3km north of Inglewood.
Millmerran–Inglewood Road (Inglewood)	**ID:** 820GWD **Type:** Road **Status:** Open **Class:** Minor and unused	This stock route follows Millmerran–Inglewood Road. The Project alignment crosses this stock route twice in 10km, once at Ch 75.0km and again at Ch 85.0km.
Millmerran–Inglewood Road (Inglewood)	**ID:** 820GWD **Type:** Road **Status:** Open **Class:** Minor and unused	This stock route follows or runs parallel to the east of Millmerran–Inglewood Road. The Project alignment crosses this stock route at the point of the stock route re-joining Millmerran–Inglewood Road.
Kooroongarra–Anderson Road	**ID:** 856TOOW **Type:** Road **Status:** Open **Class:** Minor and unused	This stock route provides an east west connection to Stonehenge Road. The Project alignment crosses this stock route at the intersection of Kooroongarra–Anderson Road and Millmerran–Inglewood Road.
Millmerran–Inglewood Road (near Heckendorfs Road)	**ID:** 820TOOW **Type:** Road **Status:** Open **Class:** Minor and unused	This stock route follows Millmerran–Inglewood Road. The Project alignment crosses this stock route approximately 900m south of the intersection of Heckendorfs Road and Millmerran–Inglewood Road.
Kooroongarra Road (Commodore Mine)	**ID:** 820TOOW **Type:** Road **Status:** Open **Class**: Minor and unused	The stock route follows Millmerran–Kooroongarra Road and Millmerran–Inglewood Road. This Project alignment crosses this stock route approximately 550m north of the intersection between Millmerran–Inglewood Road, Millmerran–Kooroongarra Road and Schwartens Road.
Warrego Highway	**ID:** No ID—Unused **Type:** Road **Status:** Open **Class:** Minor and unused	This stock route follows the Warrego Highway. The Project alignment crosses this stock route approximately 700m west of the intersection between the Warrego Highway, Chamberlain Road and Jannuschs Road.

Rail maintenance access roads

Rail maintenance access roads are required to facilitate maintenance for critical infrastructure (e.g. turnouts) and provide access for emergency recovery. Formation level access has been proposed for all turnout locations and, where reasonably practical, for the full extent of crossing loops.

Engineering infrastructure/utilities

A total of 674 utilities have been identified to interface with the reference design.

Utility owners have been consulted with during the reference design process to establish potential interface impacts and to identify initial design solutions. Consultation with utility owners will continue through the detailed design phase of the Project.

Fencing

A variety of fencing types are required for the Project according to functional requirements.

Fencing will be provided for most of the rail corridor and its primary purpose is to limit access to the railway. Fencing will act to protect adjoining lands from trespass and to prevent stock on adjoining land from gaining access to the railway. Fencing is to extend between the corridor and lands of owners or occupiers adjoining the railway, with any specific requirements to be designed in consultation with the adjoining landowner.

As the Project comprises substantial greenfield works in rural agricultural and grazing areas, standard rural fencing will typically be provided. Fencing will not be provided across flood-prone areas due to the risk of debris being caught in the fencing during flood events. Instead, guideposts will be used to demarcate the extent of the rail corridor across the floodplain.

Where there is stock on a property, the focus will be on installing appropriate fencing and gates to keep the stock out of the rail corridor.

Maintaining effective fauna movement across the rail corridor has been an important design consideration for the Project. A preliminary fauna movement provision and fencing strategy has been prepared. The intent of this strategy is to identify fauna movement and fencing opportunities that are to be investigated further during the detailed design phase to confirm the appropriateness of each solution at the nominated location. Fauna movement opportunities identified for the Project are classified as:

- at-grade crossing, via track crossing
- overpass, via canopy bridge
- underpass at rail bridge location.

The rail alignment runs parallel to an existing wild dog check fence. The wild dog check fence will need to be reinstated on the north west side of the rail corridor boundary in six locations as rectification for severance of this fence.

The Project intersects the Darling Downs–Moreton Rabbit Board fence when traversing through the locality of Clontarf. The rabbit fence will need to be reinstated and a rabbit trap will be set up in this location.

Signalling and communications

The Project will be operated using Advanced Train Management System (ATMS), a communications-based safeworking signalling system currently being developed by ARTC.

The ATMS will consist of signalling and communications equipment to ensure the safe movement of trains on the Inland Rail network. 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 be monitored and controlled by one or more of ARTC's network control centres currently located in Adelaide, Junee and Newcastle.

Construction

Key components (early works and construction phase), including quantities, are outlined in the table below.

COMPONENT	QUANTITY
Accommodation camps	3
Bridge laydowns	35
Track laydown area	39
Cut volume (total)	12,525,038m³ (rail and road)
Maximum cut depth	29.7m
Fill volume (total)	12,250,669m³ (rail) 1,096,670m³ (road)
Maximum fill depth	24.5m
Bridge crossings	34
Bridge length (total)	11,653m
Culverts	Reinforced concrete box culverts: 961 cells in 121 locations Reinforced concrete pipes: 1,934 pipes in 222 locations
Concrete batching plants	2 sites nominated. Only 1 expected to be required
Flash butt welding facilities	1 site nominated If a second is desirable, opportunities to share the flash butt welding facility established for the adjoining Gowrie to Helidon project will be explored
Refuelling	150,000 litres storage capacity (distributed across 12 sites)

**Quantities specified here are reflective of the reference design for the Project and may be subject to change through the detailed design and construction approach development process.*

Construction hours

The construction program will largely be based on the following worksite hours for general construction activities:

- Monday to Friday 6:30am–6:00pm
- Saturday 6:30am–1:00pm
- No work Sundays and public holidays

Track possessions may occur on a seven day/ 24-hour calendar basis, subject to agreement with Queensland Rail.

There may be circumstances where work outside the above standard hours, including night works, will be required. Work outside standard hours will only be undertaken where consultation with the local community has been undertaken.

Workforce

Workforce on site for the Project is estimated to peak at 950 full-time equivalents between weeks 50 and 70. The average number of full-time equivalent workforce on site across the full construction period is more than 400 people.

Non-resident workforce accommodation

The accommodation requirements for workforce in the northern extent of the Project is expected to be sufficiently met by accommodation available in Toowoomba, Southbrook and Pittsworth. Existing accommodation is not readily available in the southern section of the proposed alignment. Construction of the Project is expected to generate demand for non-resident workforce accommodation at Turallin, and in proximity to the townships of Inglewood and Yelarbon. Each facility will hold up to 300 staff during peak construction weeks (150 on average).

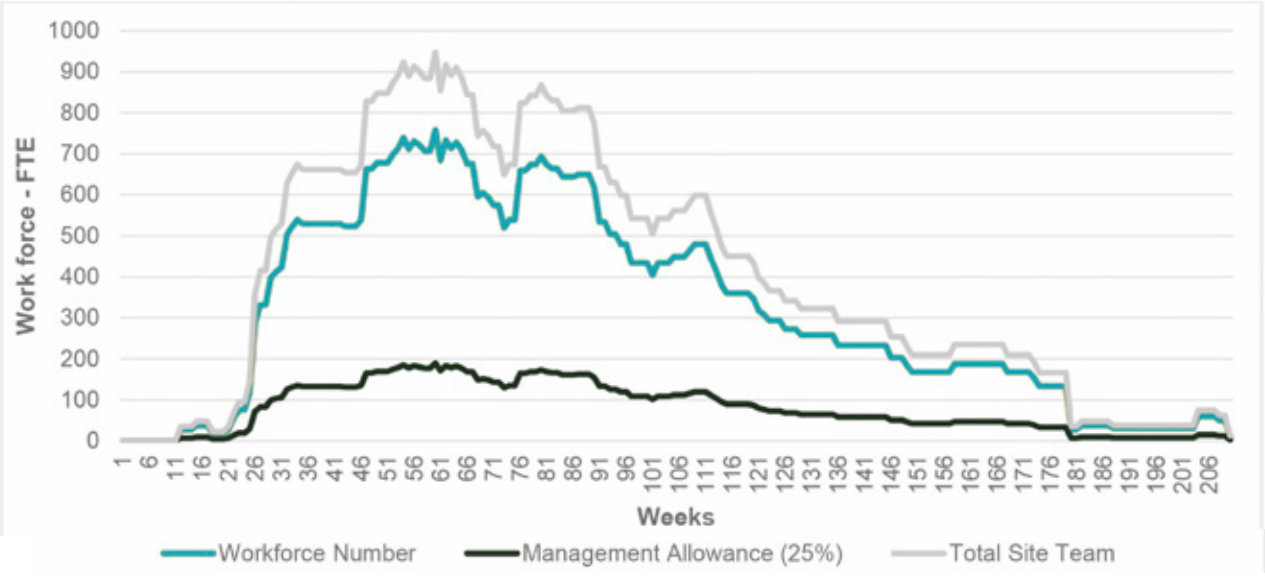
Laydown, stockpile and storage areas

Laydown areas will be located approximately every five kilometres (avoiding 1% AEP floodplains where possible).

Laydowns have been identified along the length of the Project to facilitate direct access to and from the rail corridor. The laydown areas will act as a centralised point for all material storage, such as for fuel storage areas and site office compounds. Establishing temporary laydown areas will involve clearing, grubbing, topsoil stripping, installing environmental controls, laying hardstand material, and constructing parking areas and access tracks.

Each laydown has been positioned to avoid or minimise potential impacts to the surrounding environment and community. However, by virtue of the requirement of laydown areas for constructing bridges, some laydown areas must be within floodplains and near water sources.

Excess material resulting mainly from the excavation of track formation and cess drains will be temporarily stockpiled along the rail corridor. The stockpiles will be located as close as possible to the source of the excavated material and will be formed into permanent spoil mounds, spread out to minimise height.



Expected site workforce

Access and haulage

The cut and fill of earthworks is balanced as much as possible to:

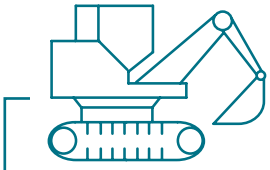
- minimise long-haul truck movements
- reduce project costs and schedule impacts
- adopt sound sustainable practices
- reduce environmental impacts.

Access tracks will be established within the construction footprint to access laydown areas and structure locations.

Haulage routes within the construction corridor, parallel to the rail alignment, will be used where possible and, where required, converted to permanent rail maintenance access roads.

Local roads will only be used where essential.

Maximum haul distances for scrapers is generally limited to two kilometres. Haul distances greater than five kilometres will require the use of either road trains on gazetted roads and/or the use of dump trucks where direct access to the rail corridor is available.

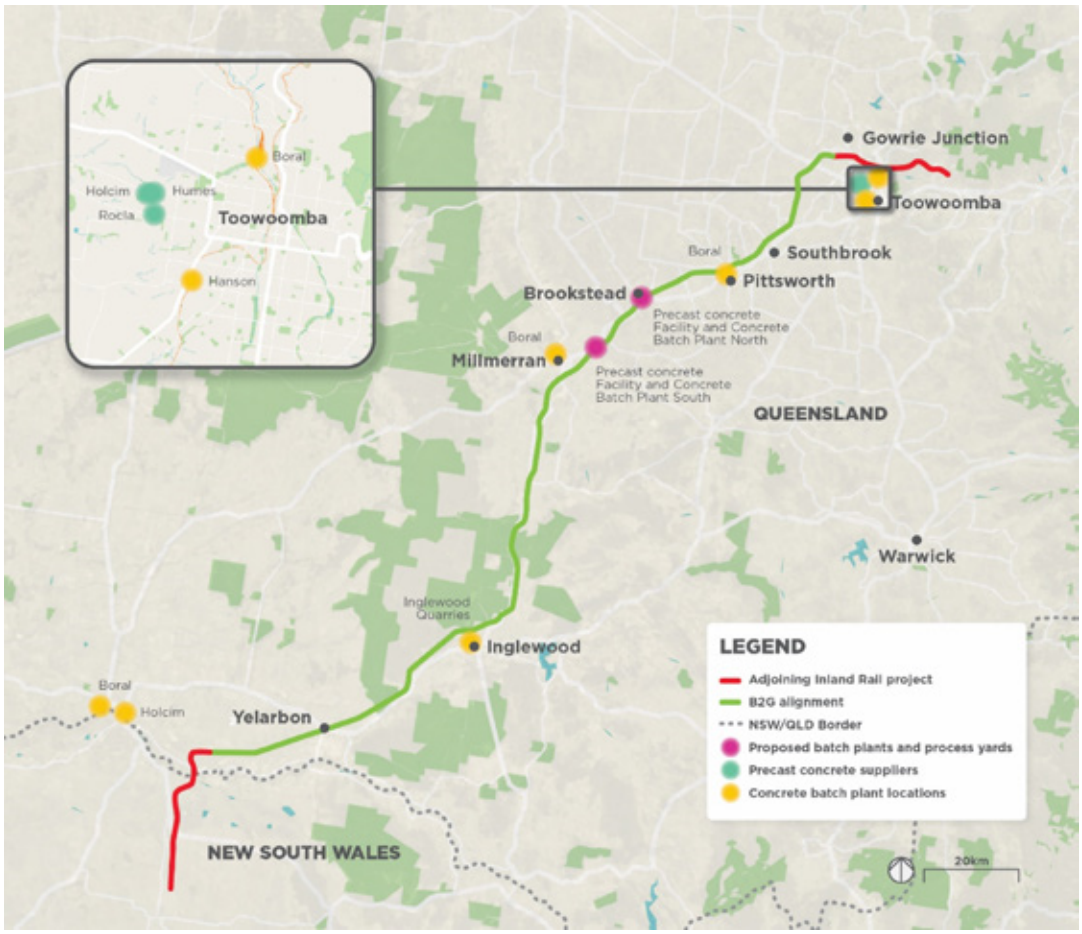


EARTHWORKS	VOLUME (m^3)
Total cut	12,250,669
Total fill requirement	13,347,339

Concrete batching

Two locations have been identified as potential pre-cast concrete facilities and concrete batch plants for the Project. The proposed locations are immediately north and south of the Condamine River floodplain outside the 1% AEP flood line at:

- the Gore Highway and Dieckmann Road (north)
- the Gore Highway (south).



Established concrete suppliers and locations for the proposed precast concrete facility and concrete batch plant

Construction water and sourcing

Water will be required for construction, including earthworks, concrete production and track works.

ARTC recognises water sourcing and availability is critical to supporting the construction program. Sources of construction water will be finalised during the detailed design and tender phases of the Project (post-EIS) and will be dependent on:

- climatic conditions in the lead up to construction
- confirmation of private water sources made available to the Project by landowners under private agreement
- confirmation of access agreements with local governments for sourcing of mains water.

Options for the sourcing of construction water, subject to availability, are anticipated to include:

- commercial, licensed water supplies where capacity exists
- public surface water storages, i.e. dams and weirs
- permanently (perennial) flowing watercourses
- privately held water storages, i.e. dams or ring tanks, under private agreement
- existing registered and licensed bores
- treated water, e.g. from wastewater treatment plants
- new bores established to service the Project under appropriate water licence or entitlement (least preferred option).

An assessment of the suitability of each source will need to be made for each construction activity requiring water, based on the following considerations:

- legal access
- volumetric requirement for the activity
- water quality requirement for the activity, e.g. accommodation will need potable water
- source location relative to the location of need.

CONSTRUCTION ACTIVITY	ASSUMED RATE	VOLUME (ML)[1]
Rail earthworks	190L/m³	**2,412**
Road earthworks	190L/m³	**191**
Concrete batching	200L/m³	**16.50[2]**
Track works	10L/m	**2.16**
	Total:	**2,621.66**

Construction activity and indicative volume of water required

Borrow pits and quarries

Nineteen potential material source locations have been identified for use during construction. These sites consist of seven external operational licensed quarries and 12 potential borrow pit sites. The viability and feasibility of accessing material from these locations will be confirmed during the detailed design phase of the Project (post-EIS).

Standard earthmoving equipment such as trucks and bulldozers will be used to extract material from borrow pits and quarries.

Landscaping and rehabilitation

The *Inland Rail Landscape and Rehabilitation Strategy* (available from **inlandrail.com.au**) establishes governing landscape objectives and principles and outlines landscape and rehabilitation treatment solutions for the various phases of the Project. This includes the rail corridor and secondary infrastructure, as well as construction access, site compounds, accommodation camps, borrow pits or other enabling works.

Opportunities for beneficial re-use of construction facilities, such as laydown areas and accommodation camps, will be investigated through consultation with local governments and relevant stakeholders, or a progressive decommissioning of these sites will occur so reinstatement and revegetation activities can commence as soon as possible.

Commissioning

Testing and commissioning (checking) of the rail line and communication/signalling systems will be undertaken to ensure all systems and infrastructure are designed, installed and operate according to ARTC and Queensland Rail's operational requirements.

For connections to the existing Queensland Rail and ARTC networks, a testing and commissioning plan will address the existing signalling systems and need to be approved by Queensland Rail and ARTC.

Commissioning of trackworks will require completed inspection and test plans, clearance reports, weld certification, rail stressing records, as-built documentation and track geometry reports.

Operation

Operational activities will include:

- the use of the railway for freight purposes
- operation and maintenance of safety systems
- signalling
- general track and infrastructure maintenance.

The hours of operation are anticipated to be on a 24 hour/seven-day calendar.

The operational workforce of about 10–15 employees will be based at provisioning centres outside the immediate vicinity of the Project.

Train control will be managed via ARTC's existing control centres. Train services will be provided by a variety of operators and will include a mix of grain, bulk freight and other general transport.

Train speeds will vary according to axle loads and track geometry, and range from 80km/hr to 115km/hr.

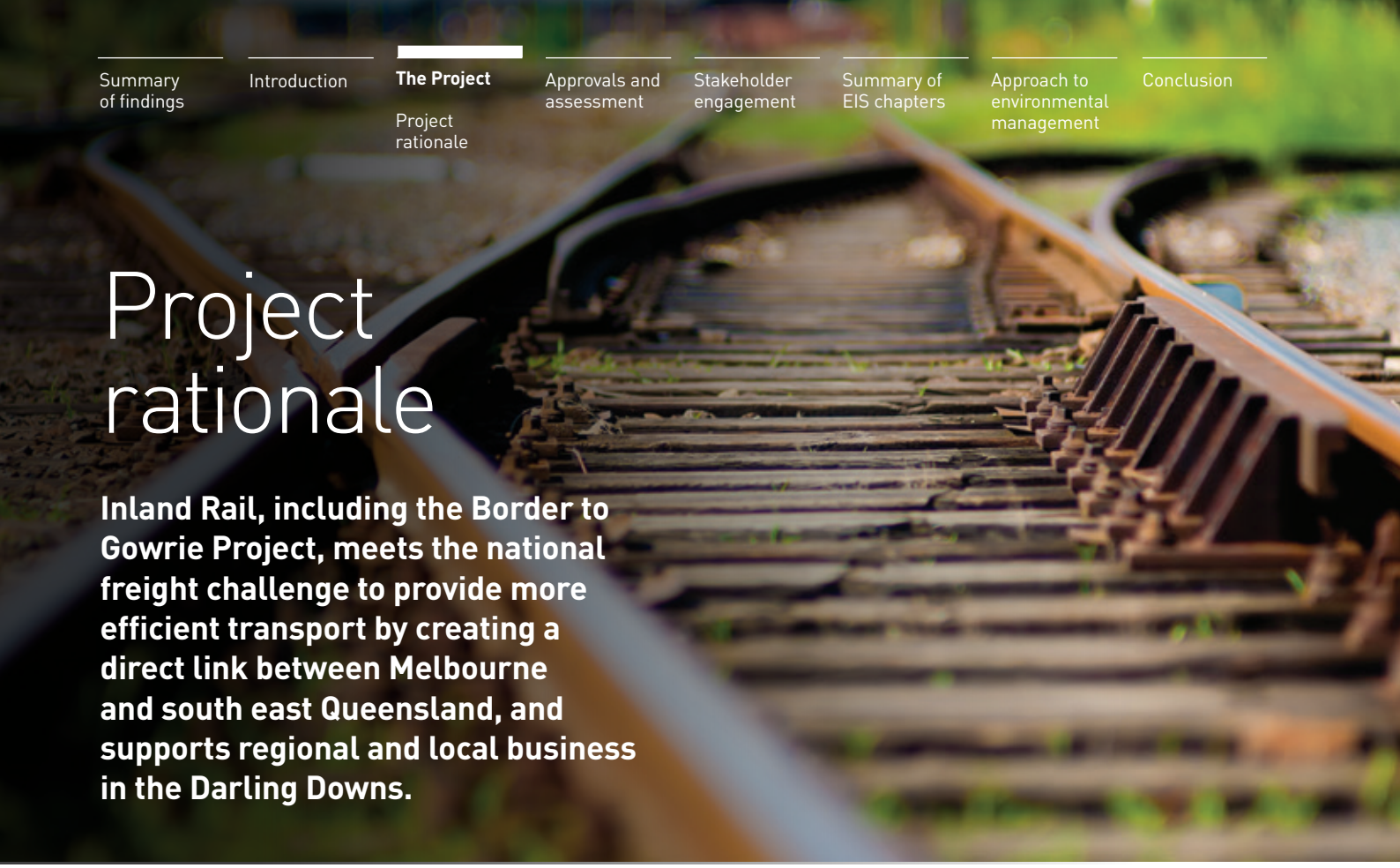
Proposed borrow pit and quarry locations

> Once operational, about 14 train services per day are estimated. This is likely to increase to an average of 20 trains per day in 2040, and up to 25 per day during peak operational periods. Annual freight tonnages will increase in parallel, from approximately 14.2 million tonnes per year in 2026 to 21.8 million tonnes per year in 2040.

Standard ARTC maintenance activities will be undertaken during operations. These activities will occur on a scheduled basis or in response to unplanned requirements, (e.g. maintenance following adverse weather events).

Decommissioning

The Project is expected to be operational for in excess of 100 years, so the decommissioning of the Project cannot be foreseen at this time and is therefore not considered as a Project phase in this EIS.



Project rationale

Inland Rail, including the Border to Gowrie Project, meets the national freight challenge to provide more efficient transport by creating a direct link between Melbourne and south east Queensland, and supports regional and local business in the Darling Downs.

This chapter describes the rationale for the Border to Gowrie Project in the context of the project locality and the broader Inland Rail Program.

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.

Australia faces increasing pressure to efficiently, effectively and safely transport ever increasing volumes of freight, especially between our major cities. The east coast comprises 18 million residents or 79% of Australia's total population and export trade through east coast ports is estimated to contribute approximately $260 million annually.

> 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

Justification for Inland Rail

Currently, there is no continuous inland rail link between Melbourne and Brisbane. Interstate rail travels between Melbourne and Sydney, via Albury and between Sydney and Brisbane along the coast. The existing north south coastal railway does not have the capacity to meet the future demand for freight due to congestion and the inability to accommodate double-stacked trains, which will impact freight productivity, transport costs and passenger services.

In comparison to trucks, Inland Rail will deliver freight:

- in times close to those achieved by trucks
- cheaper than trucks
- with reliability and predictability comparable to trucks.

This means fewer long-haul heavy vehicles on road networks.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 2: Project Rationale**

Consequences of not proceeding with Inland Rail

Not progressing with Inland Rail would potentially hinder the national economy. The continuing growth in freight demand requires urgent attention. Without making a step-change in rail efficiency and performance, pressure on the road networks will increase, freight costs will rise, consumers will pay more for products, and productivity in important sectors could decline.

Without Inland Rail, road would increasingly become the dominant mode, with rail becoming less relevant. A continued over-reliance on road transport to meet the future east coast freight task will increase the vulnerabilities to demographic changes that are, even today, driving shortages of long-distance truck drivers and increasing costs.

What Inland Rail will offer

ARTC's service offering is central to the delivery and competitiveness of Inland Rail and reflects the priorities of freight customers. Developed in consultation with key market participants and stakeholders, the key elements to be delivered by Inland Rail for competitive and complementary service offering compared to other modes are:

Direct benefits

- improved access to and from regional markets
- reduced costs for the market
- improved reliability and certainty of transit time
- increased capacity of the transport network
- reduced distances travelled
- improved safety
- improved sustainability and amenity for the community.

Indirect benefits

- create a step-change in the Australian freight network
- be a catalyst for growth
- provide benefits for metropolitan and regional areas
- be an enabler of complementary market-driven investments.

TRANSIT TIME

Requires a transit time between Melbourne and Brisbane of less than 24 hours and an express capability that is competitive with road

RELIABILITY

Requires 98% reliability for freight customers

PRICE

Requires competitive pricing for freight customers

AVAILABILITY

Requires suitable train paths at the times that meet the needs of the market

Supporting regional and local business

At a regional level, the Project has the potential to be a catalyst for growth and development through:

- opportunities to encourage, develop and grow Indigenous, local, and regional businesses through the supply of resources and materials for the construction and operation of the Project (e.g. borrow and ballast materials, fencing, electrical installation (excluding rail systems), rehabilitation and landscaping, cleaning and maintenance of construction and accommodation facilities)
- opportunities in secondary service and supply industries (such as retail, hospitality and other support services) for businesses near the construction footprint (including opportunities to supply the proposed accommodation camps). The construction activity is also likely to support additional temporary flow-on demand and additional spending by the construction workforce in the local community
- as part of the Inland Rail Program, the Project has the potential to stimulate business and industry development at the Toowoomba Enterprise Hub in Wellcamp. By providing efficient transport access to intrastate and interstate markets, the Project may act as a catalyst for further private sector investment in this area, particularly for freight and logistics operations. The further development of the Toowoomba Enterprise Hub has the potential to unlock greater economic activity in the region, such as through promoting greater international export opportunities via Toowoomba Wellcamp Airport
- the Project comprises upgrades and new dual gauge track to create a more direct rail freight corridor for freight operators. As a critical link of the broader Inland Rail Program, the Project offers 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.

Preferred alignment – study area

On 21 September 2017, the Australian Government announced the Wellcamp–Charlton corridor via Brookstead, Pittsworth and Wellcamp to be the preferred corridor to take forward into the design development and approvals process. This two-kilometre wide study area has been the basis for the reference design presented in the Border to Gowrie Project EIS.

Inland Rail versus other freight transport

The following alternatives were assessed during the preparation of the Inland Rail Program Business Case:

Maritime shipping

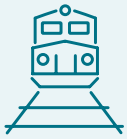
would not provide the same potential economic benefits and opportunities to inland communities that can be provided by Inland Rail

Air freight

has a limited role to play in the transport of bulky or heavy goods on the Melbourne to Brisbane corridor, but will continue to play a crucial role for small, high-value and time-dependent goods

Road freight

will continue to contribute to Australia's freight task, unless substantial additional investment is made in road infrastructure, it will be unlikely to meet the longer-term needs of Australia's freight task by itself, due to significant local and regional capacity constraints



Rail is the solution

Inland Rail would meet Australia's future freight challenge and bring significant and positive national benefits by boosting national productivity and economic growth, while promoting better safety and environmental outcomes.

2020 Cecil Plains route review

The 2020 review of the proposed alternative route via Cecil Plains further assessed whether an alternative could enhance the Inland Rail service offering for the Border to Gowrie section.

The Inland Rail Border to Gowrie Alternative Route Comparison Review is available online at **inlandrail.gov.au** and showed an alternative route via Cecil Plains is more than 25 kilometres longer, would add at least 17 minutes to the travel time, increase costs by more than $472 million and would reduce the reliability of the Inland Rail service.

This assessment provides assurance to the community that all possible alternative routes have been thoroughly considered.

Border to Gowrie solution to the freight challenge

The continuing growth in freight demand, particularly within and between major capital cities (Melbourne and Brisbane), presents an urgent challenge.

Alternative alignments to other Queensland destinations have been raised through stakeholder engagement but, while they may fulfil other freight supply chain objectives, they will not service the immediate and long-term need for commodity transport from the Melbourne to south east Queensland markets.

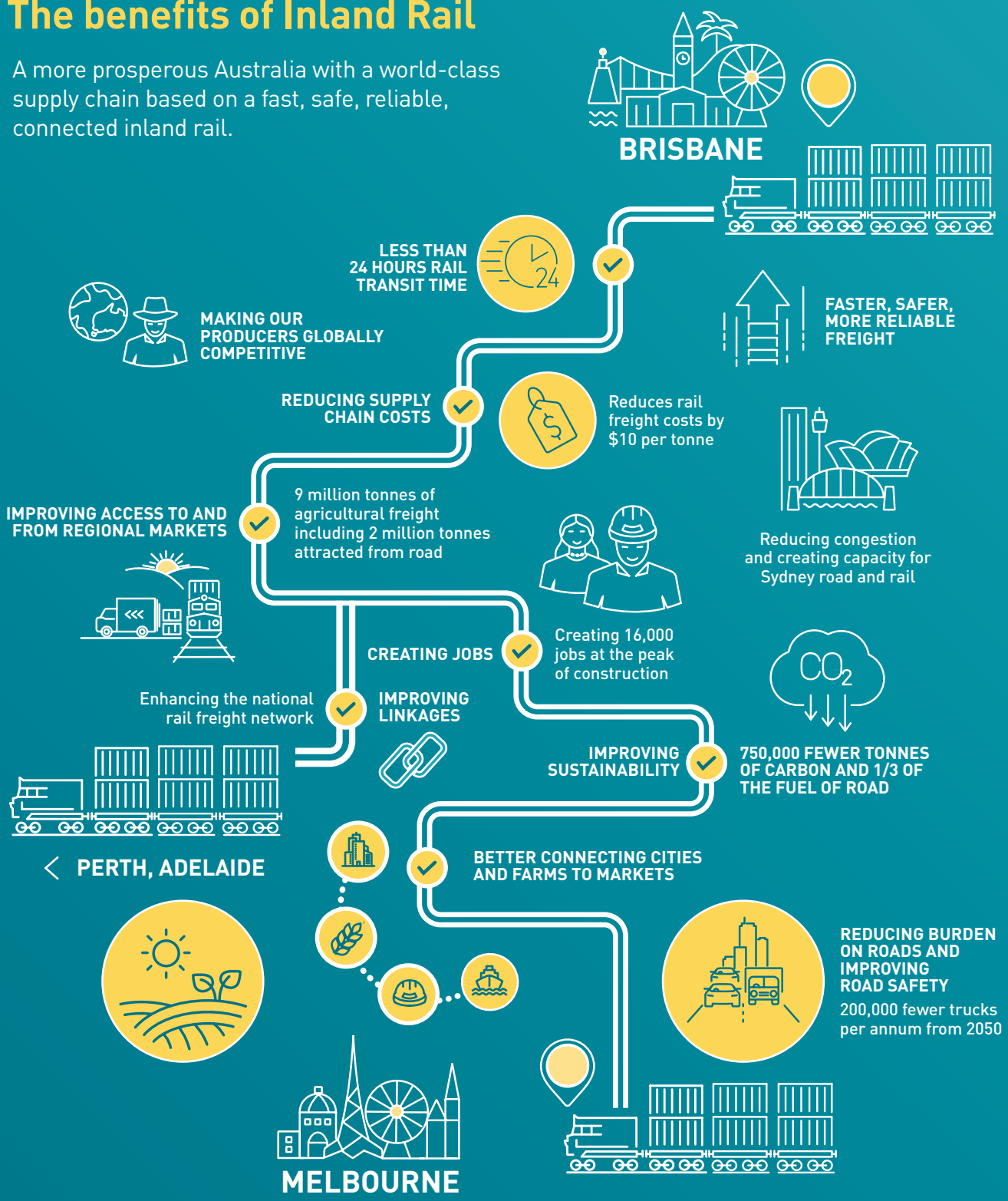
The Border to Gowrie dedicated rail freight transport corridor, as proposed, has been aligned to provide as direct a freight route as possible and provides the most competitive alternative to road or the current coastal rail route.

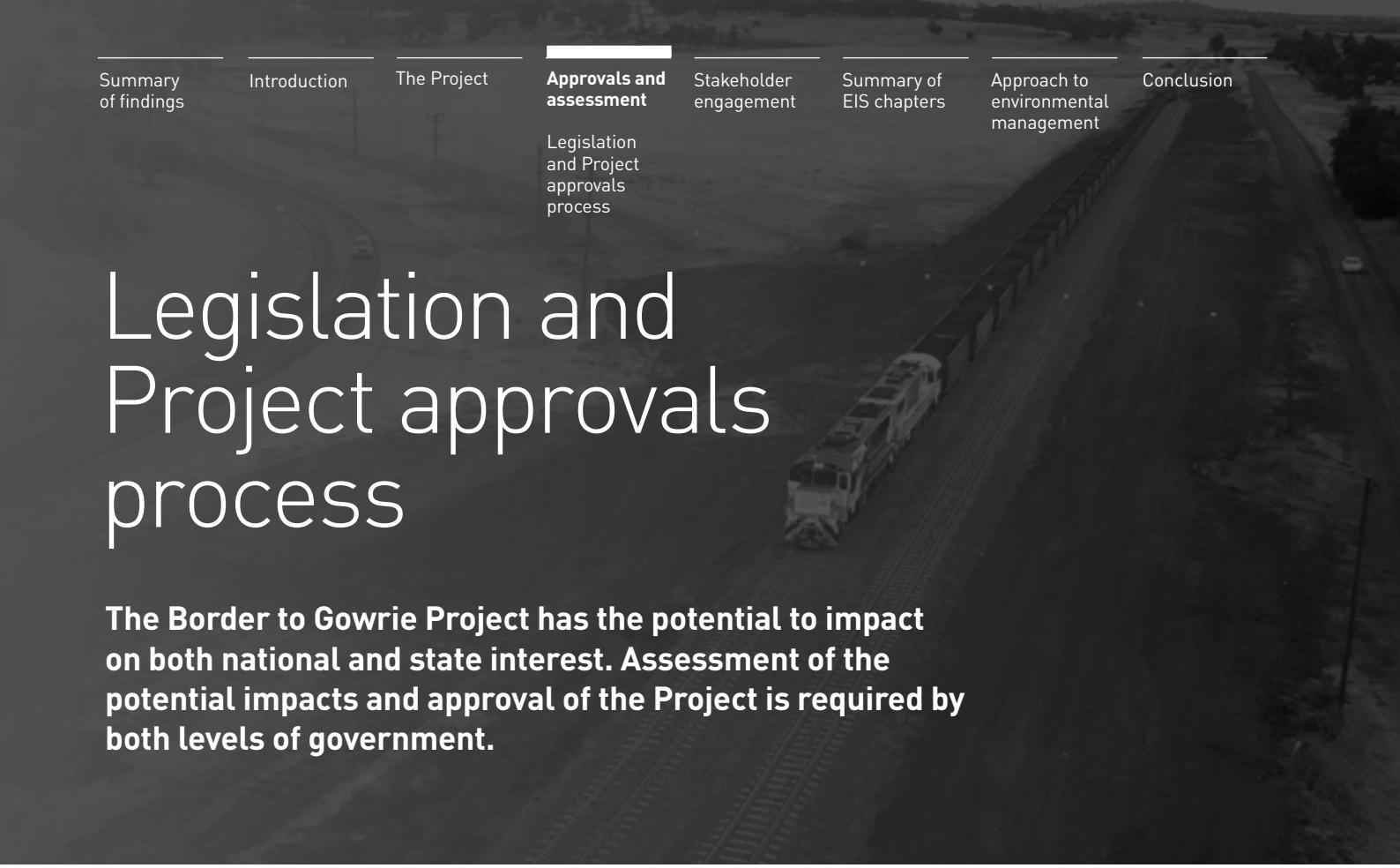
The Project has long been identified in national strategic freight planning as the link needed to support Australia's economic objective of providing an efficient freight supply chain in the global market. Further, the Project has been demonstrated to meet and support Queensland's freight and transport planning.

The Project will support local and regional business in the Darling Downs by providing a freight transport solution that connects the network of existing and future intermodal terminals.

The benefits of Inland Rail

A more prosperous Australia with a world-class supply chain based on a fast, safe, reliable, connected inland rail.





Legislation and Project approvals process

The Border to Gowrie Project has the potential to impact on both national and state interest. Assessment of the potential impacts and approval of the Project is required by both levels of government.

This chapter provides an overview of the legislation that applies to the Project and outlines approvals triggered under legislation.

The primary purpose of this EIS is to provide sufficient information to enable the Queensland Coordinator-General and Australian Government Minister for the Environment to evaluate and assess the Project under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) respectively, and for recommendations to be made regarding approvals required by the Project under other legislation. The approvals that are being sought as part of the EIS process are:

LEGISLATION	APPROVAL
State Development and Public Works Organisation Act 1971	Coordinator-General's EIS evaluation report
Environment Protection and Biodiversity Conservation Act 1999	Approval for the taking of a controlled action for the purposes of the relevant controlling provision (listed threatened species and communities) under Section 18 and 18A of the EPBC Act

Queensland Government and Australian Government legislation and approvals

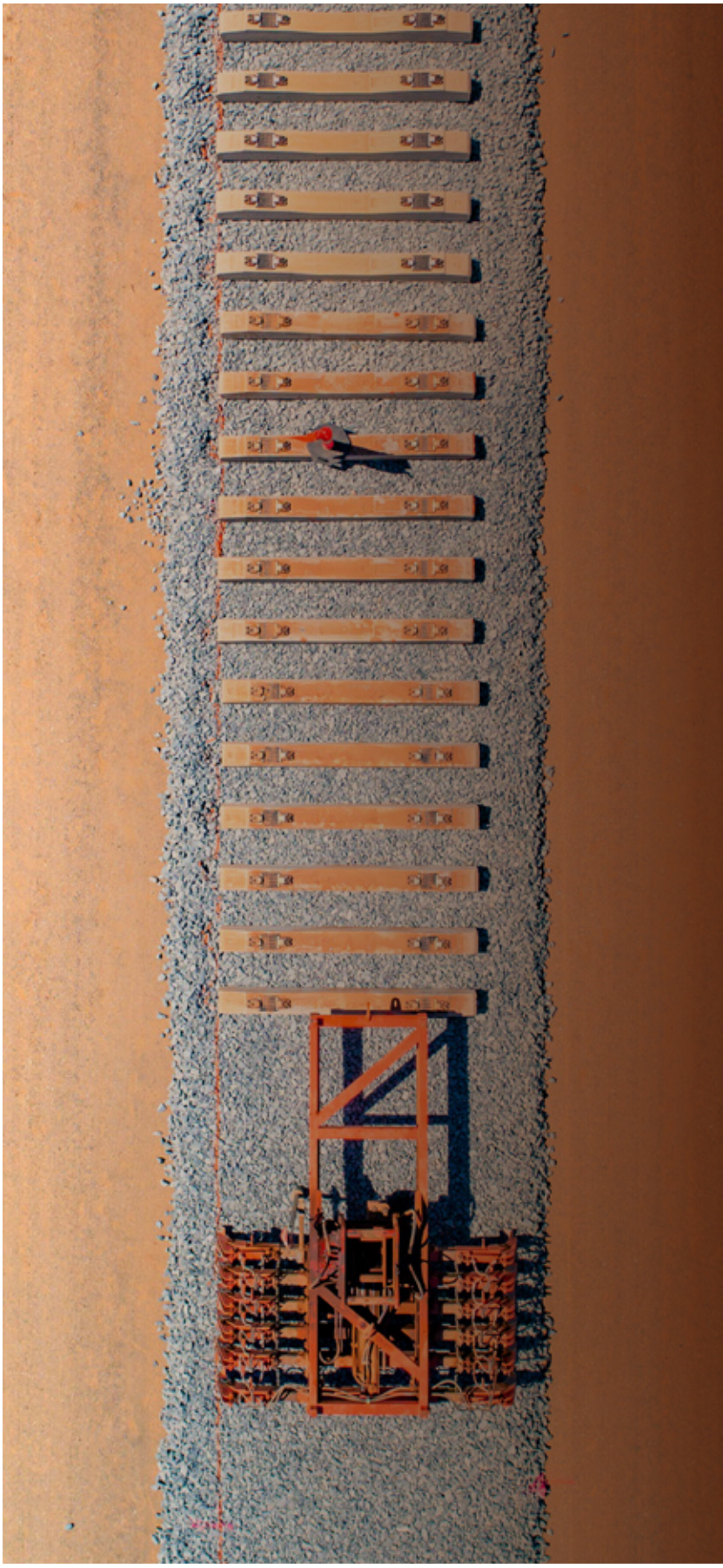
Want to know more?

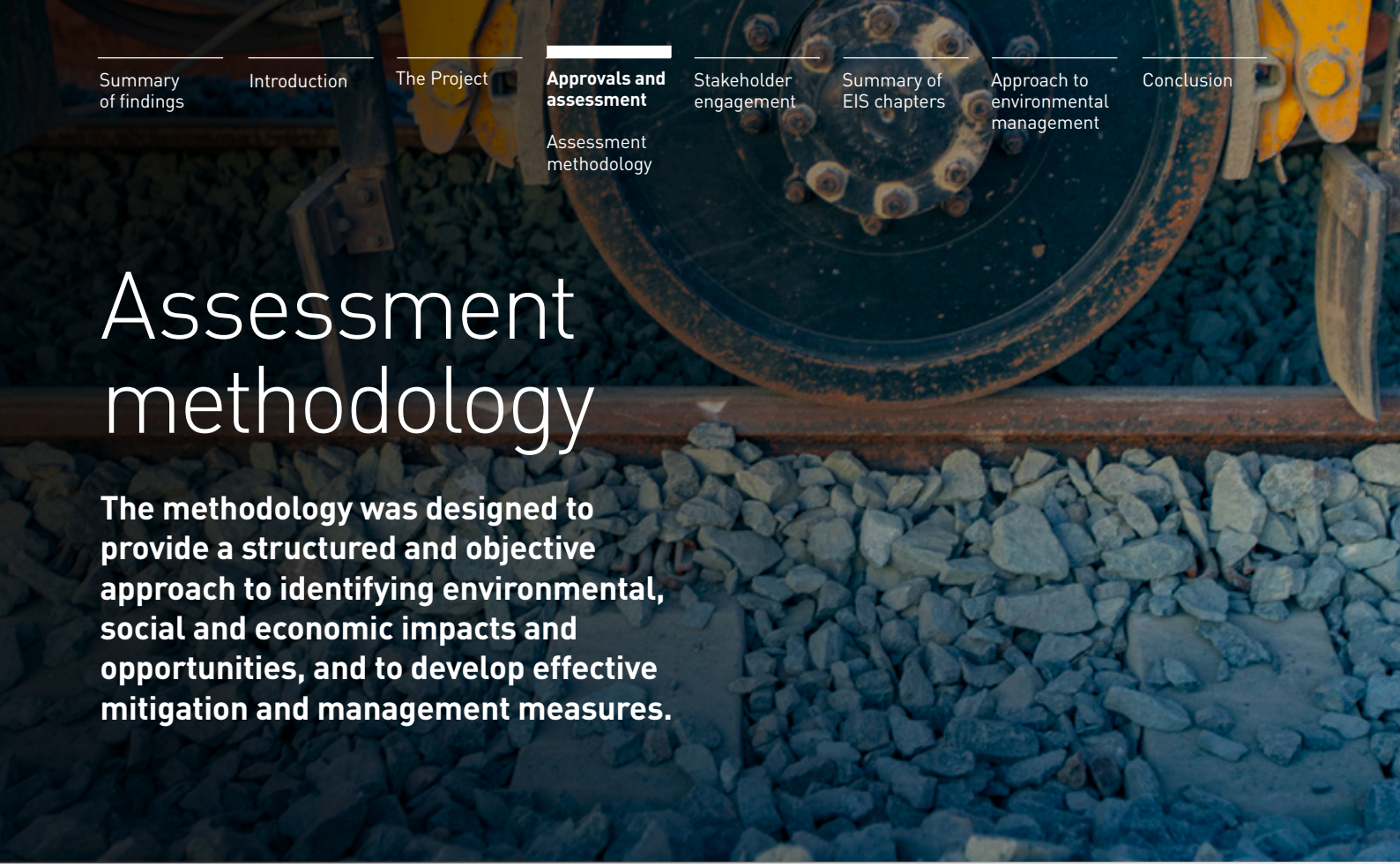
See the following Environmental Impact Statement chapters:

- **Chapter 3: Legislation and Project Approvals Process**

The Project will trigger the requirement to obtain a number of approvals, permits and authorities under Queensland legislation.

In the event the Project is approved, ARTC will seek to obtain these approvals after completion of the EIS process, once detailed design has been sufficiently progressed.





Assessment methodology

The methodology was designed to provide a structured and objective approach to identifying environmental, social and economic impacts and opportunities, and to develop effective mitigation and management measures.

This chapter describes the methodology used to assess potential impacts and opportunities as a result of the Project in accordance with the Border to Gowrie EIS Terms of Reference.

Corridor selection

During the corridor selection process, multi-criteria analyses and comparative cost estimates were used to assess potential impacts associated with a range of route options for the Project. The methodology adopted for the corridor selection process is discussed separately in **Chapter 2: Project Rationale.**

Assessment methods

The assessment methodology has been designed to provide a structured and objective approach to identifying environmental, social and economic impacts and opportunities, develop effective mitigation and management measures, and maximise Project benefits.

Three methods were used to assess potential impacts and opportunities:

- **compliance assessment** (quantitative)
- **risk assessment** (qualitative)
- **significance assessment** (qualitative).

For each project-specific matter, a decision tree was used to select the appropriate impact assessment method. Project-specific matters are defined in section 11 of the Border to Gowrie Terms of Reference and include flora and fauna, social, and the like. In some cases, the assessment method was adapted to meet the needs of the project-specific matter.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 2: Project Rationale**
- **Chapter 4: Assessment Methodology**
- **Chapter 21: Cumulative Impacts**
- **Chapter 22: Outline Environmental Management Plan**

Compliance assessment

Type: Quantitative

Relevance: Used where compliance with a known guideline or standard (e.g. published limits or thresholds) can be quantitatively assessed

Project-specific matters:

- land use and tenure
- land resources (soil properties)
- air quality (operation)
- hydrology and flooding
- noise and vibration
- traffic, transport and access
- economics.

The compliance assessment method was applied to project-specific matters with quantifiable impacts (e.g. emissions and discharges from Project infrastructure and activities). Mapping, modelling and data (publicly available and field verified) were used to assess compliance with performance criteria adopted from applicable legislation, statutes, guidelines or policies.

Risk assessment

Type: Qualitative

Relevance: Used where an impact may occur

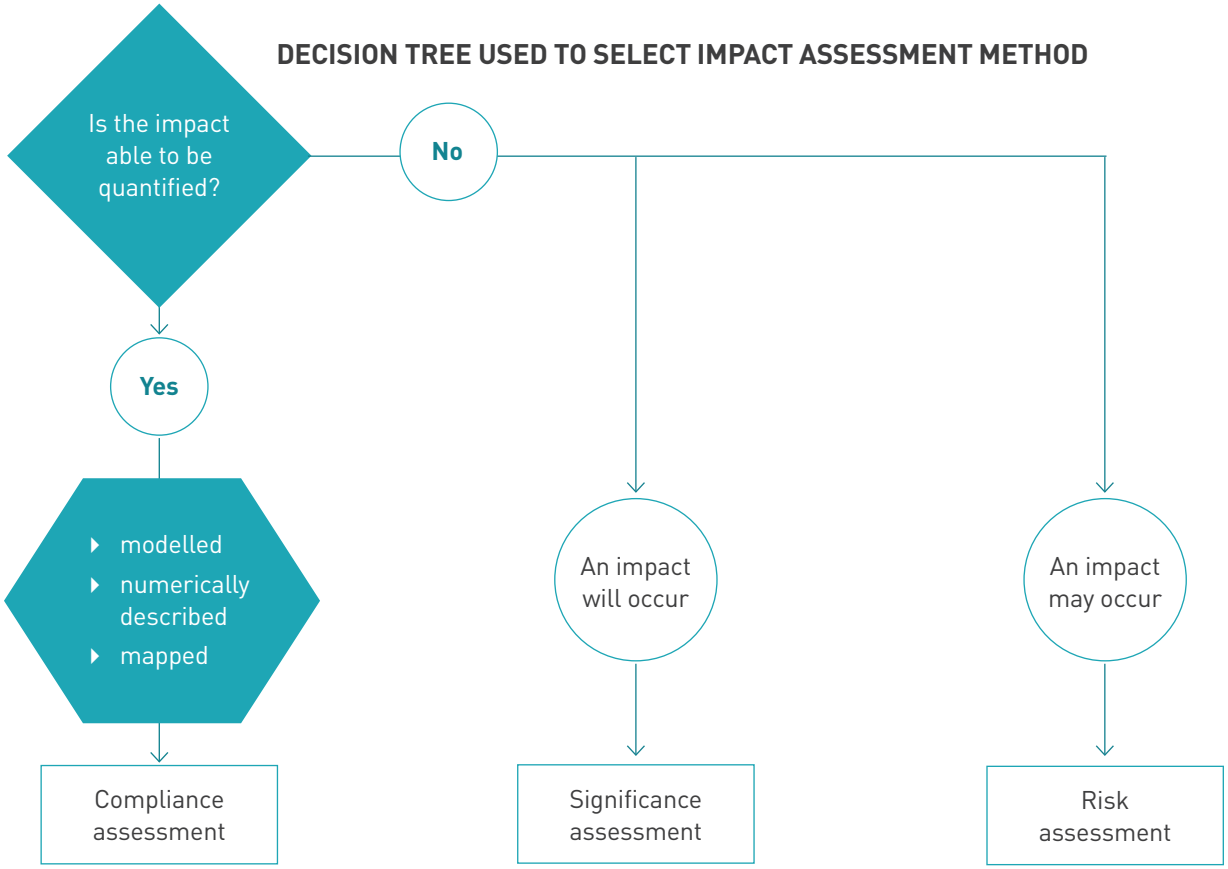
Project-specific matters:

- land resources
- transport and access
- hazard and risk
- waste management.

The risk assessment method was applied to project-specific matters that might be impacted by the Project, where impacts could not be quantified. This includes unknown or unpredictable impacts. Potential impacts are assessed in terms of how likely they are to occur, and the consequences if they do occur.

Likelihood and consequence criteria are consistent with the Australian and New Zealand standard for risk management. Risk assessments have been documented in tabular form in the relevant EIS chapters.

DECISION TREE USED TO SELECT IMPACT ASSESSMENT METHOD



Significance assessment

Type: Qualitative

Relevance: Used where an impact will occur to assess the sensitivity or the vulnerability of the environmental value to the impact

Project-specific matters:

- landscape and visual amenity
- flora and fauna
- air quality (construction phase)
- surface water
- groundwater
- social
- Indigenous cultural heritage
- non-Indigenous cultural heritage.

The significance assessment method was applied to environmental aspects that will be impacted by the Project, and impacts cannot be quantified. The significance of a potential impact is assessed in terms of the sensitivity or vulnerability of the project-specific matter, and the magnitude of the potential impact. Significance assessments have been documented in tabular form in the relevant EIS chapters.

Cumulative assessment

This EIS also includes a cumulative impact assessment. The cumulative impact assessment considers the combined effects of the Project, and relevant existing and proposed developments on project-specific matters. The cumulative impact assessment method is described separately in **Chapter 21: Cumulative Impacts.**

Mitigation and management measures

Mitigation and management measures are designed to protect project-specific matters and sensitive receptors, achieve established environmental performance objectives, and enhance positive impacts as a result of the Project. Initial and additional mitigation and management measures have been incorporated into the compliance, risk and significance assessment methodologies.

Initial mitigation measures are the controls incorporated into the planning and reference design phases of the Project to avoid or minimise potential impacts.

Additional mitigation and management measures are proposed to further avoid or minimise impacts through future Project phases including detailed design, pre-construction, construction and operation.

In some instances, such as ecology, significant residual impacts are anticipated after the application of additional mitigation and management measures. In these cases, the need for environmental offsets to compensate for significant adverse residual impacts has been assessed.

Mitigation and management measures (initial and additional) have been documented in tabular form in the relevant EIS chapters.

Outline Environmental Management Plan

The purpose of the Outline Environmental Management Plan is to identify the project-specific matters potentially affected by the Project and to establish a framework for continuous management, monitoring, reporting and training. It provides a consolidation of mitigation and management across all aspects assessed in the EIS. The Outline Environmental Management Plan has been prepared to establish the minimum requirements of environmental management plans for future phases of the Project. Further information can be found in **Chapter 22: Outline Environmental Management Plan.**

Gore Highway near the township of Pittsworth

Stakeholder engagement

Stakeholders and members of the community have helped to shape the scope of this EIS with local knowledge by highlighting issues, identifying potential impacts and recognising benefits of the Project.

Community information stand at the Goondiwindi Show

This chapter the outlines the community engagement process and how the outcomes were addressed in the EIS.

An engagement program was undertaken to inform stakeholders, including the broader community, about the Border to Gowrie Project and the EIS process, seek stakeholder involvement in the development of the design and EIS, and report on how this input was considered.

Stakeholders identified for the Border to Gowrie Project included:

- Australian, Queensland and New South Wales state and local government officers and elected representatives
- potentially affected landowners
- local businesses
- industry bodies
- environmental and community groups
- Traditional Owners and Indigenous groups
- utility/engineering infrastructure asset owners
- education and training providers
- media
- nearby communities.

Want to know more?

See the following Environmental Impact Statement chapter:

- **Appendix C: Stakeholder Engagement Plan**

Since 2015, there has been a wide range of consultation undertaken for the Inland Rail Program and the Border to Gowrie Project.

Early engagement with key stakeholders was carried out from January 2016 to September 2016. This included workshops with local councils, government agencies and industry bodies, as well as meetings with landowners and information sessions for the broader community.

In October 2016, the Australian Government determined four possible Inland Rail corridor options between Yelarbon and Gowrie would be assessed independently through a like-for-like comparison.

The then Department of Infrastructure, Regional Development and Cities (DIRDC) established the Yelarbon to Gowrie Project Reference Group (PRG), to provide local community input into the review.

In September 2017, the Australian Government announced the Border to Gowrie study area and in late 2017 ARTC carried out extensive community engagement to inform landowners and the broader community of the study area. This included letters to landowners in the study area, a community update newsletter, and a series of 14 community information meetings held across seven locations. ARTC also established two community consultative committees for the Project area: the Inner Darling Downs Community Consultative Committee and the Southern Downs Community Consultative Committee.

In March 2018, the Queensland Coordinator-General declared the Project a 'coordinated project' and, in May 2018, the draft Terms of Reference for the EIS were released for public comment. To support this, ARTC carried out broad engagement to inform people of the EIS process and how they could make a submission on the draft Terms of Reference. This included letters to landowners in the study area and seven community information sessions. On 16 November 2018, the Coordinator-General released the final Terms of Reference for the Project.

From September 2018 to November 2020, ARTC delivered broad engagement with key stakeholders, landowners and the community regarding the development of the reference design and EIS.

This engagement centred around the following elements:

- proposed Project footprint
- alignment development
- hydrology modelling and the preliminary Condamine floodplain solution
- road/rail interface (public roads)
- social impact assessment.
- proposed crossing loop locations
- noise modelling
- potential groundwater impacts
- field investigations and cultural heritage surveys.

Engagement activities and communication tools:

- letters
- phone calls
- meetings with directly impacted landowners
- community consultative committees
- workshops with key stakeholders
- community information sessions
- factsheets
- a community survey
- regular electronic newsletters
- printed newsletters
- print and social media advertising
- website.

Community input received since 2015, particularly the detailed information received since September 2018, has been considered throughout the design development.

The team's engagement with stakeholder groups has meant government agencies, stakeholders, communities and landowners have regular opportunities to engage with the Project.

Sustainability

ARTC is aiming to establish a new sustainability benchmark for economic, environmental and social performance for its operations and the rail industry more widely.

This chapter outlines ARTC's commitment to social, environmental and economic sustainability to deliver the best possible outcomes for communities and the natural environment.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 6: Sustainability**

Border Bridge over the Macintyre River, Goondiwindi

At a glance

Potential opportunities

In building a sustainable Inland Rail, the Project provides opportunities to:

- maximise resource efficiency
- enhance local economic activity
- mitigate potential environmental and social impacts.

By providing long-haul freight that is time and cost competitive compared to road freight, Inland Rail will result in reduced road congestion and fewer vehicular carbon emissions. It is estimated that transporting freight on Inland Rail will use one-third of the fuel compared to transporting the same volume via existing roads.

A broad range of sustainability initiatives have been identified and incorporated in the reference design.

Design initiatives seek opportunities to:

- reduce the project disturbance
- minimise waste generation and encourage reuse/recycling
- reduce the carbon footprint
- reduce water demands
- improve the service life of materials
- consider potential impacts of climate change and natural hazards
- support local business
- maximise job opportunities
- develop skills and training partnerships.

ARTC's sustainability commitments for the Project include:

- no harm
- engage early and meaningfully with stakeholders, including Indigenous organisations, communities, industry and government
- promote long-term economic benefits with regional communities
- protect the environment by minimising the environmental footprint
- future-proof Inland Rail to be efficient and effective in the long term
- base decisions on balanced consideration of technical, economic, environmental and social issues
- regularly review and audit processes and performance
- drive a culture of continuous improvement.

A Sustainability Management Plan will be developed to set targets, demonstrate a commitment to sustainability, establish roles and responsibilities for embedding sustainability into the Projects, document processes to implement sustainability initiatives and opportunities, and document reporting requirements and review under the Infrastructure Sustainability scheme.

Sustainability initiatives will contribute towards achieving an Infrastructure Sustainability Rating Scheme for the Project, which is administered by the Infrastructure Sustainability Council of Australia. The Project s contribution will also form part of the Inland Rail Program's target of achieving an 'Excellent' rating.

Land use and tenure

Beneficial impacts include opportunities to support the agricultural industry, improving access to and from regional markets and acting as a catalyst for development in the area.

Berghofer Road, behind Toowoomba Wellcamp Airport

This chapter assesses the Project's compatibility with, and potential impacts on, land use and tenure.

Approximately one third of the Project length will involve upgrade, enhancement or construction of new track coincident with existing rail corridor. The balance of the Project has been co-located with existing road infrastructure or will be established on land that, by and large, has been subject to previous disturbance for agricultural purposes.

The Project traverses through, or near, the townships of Yelarbon, Inglewood, Millmerran, Pampas, Brookstead, Pittsworth, Southbrook, Athol, Gowrie Mountain and Kingsthorpe.

Notable land uses include the Kildonan Key Resource Area, Whetstone State Forest, Bringalily State Forest, Commodore Mine, Toowoomba Wellcamp Airport and several intensive animal production operations including cattle feedlots, poultry farms and piggeries.

The tenure of land within the permanent footprint is predominantly freehold, where new (greenfield) rail corridor is required for the Project, and leasehold, where using the existing South Western Line and Millmerran Branch Line rail corridors.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 7: Land Use and Tenure**
- **Appendix F: Impacted Properties**

Inland Rail has been specifically incorporated into state planning and its design aligns with the land use intent and planning principles applicable to the southern Darling Downs. The Project is consistent with the *State Planning Policy, Darling Downs Regional Plan 2013 and Shaping SEQ 2017.*

The Project is generally consistent with the intent of relevant state and regional land use planning and policy for the impact assessment area. The Border to Gowrie Project aligns with the Queensland Government's regional planning, which identifies a long-term aspiration of a modal shift towards freight rail infrastructure.

The reference design is co-located with existing rail and road infrastructure (including the existing South Western Line and Millmerran Branch Line rail corridors) where possible, and traverses along (or as close as possible) to property boundaries to reduce potential fragmentation and sterilisation of land.

Of the 440 properties within the permanent footprint, 58 are within the existing South Western Line and Millmerran Branch Line rail corridors.

The reference design has been developed to avoid impacts to the current operational footprint of the Commodore Mine, and avoid or minimise impacts to potential expansions to the operational footprint in the future. The reference design also avoids intensive livestock operations, where possible, and ensures double-stacked trains will not extend vertically into the obstacle limitation surface at the Toowoomba Wellcamp Airport.

At a glance

Key impacts

- tenure changes and loss of property
- land use changes including loss and disruption to agricultural practices
- impacts on accessibility
- disruption or relocation to services and utilities.
- beneficial impacts, including supporting the agricultural industry, improving access to and from regional markets and acting as a catalyst for development in the area.

Mitigation measures

- property acquisitions and compensation
- individual property treatments developed in consultation with landowners including:
  - adjustments to fencing, access, farm infrastructure
  - relocation of impacted structures, crossing points and access to water supply.
- consultation with key stakeholders to ensure continued usability of existing stock routes
- consultation with resource interest holders
- grade separations, level crossings and road diversions to ensure access to surrounding road networks.

Land surrounding the Project is used for:

- livestock grazing
- cropping and irrigated cropping
- production forestry
- transport
- communication.

Kingsthorpe Tilgonda Road, Kingsthorpe, facing south

Land resources

Impacts to land resources have been considered in the design of the Project and will be managed through adherence to the Environmental Management Plan.

Channel bars in the Macintyre River

This chapter evaluates the existing environment, identifies and assesses the risks of disturbing and excavating the land and disposing of soil, to determine appropriate mitigation measures during construction and operation.

The assessment of land resources considered topography, geology and soils, which included contaminated land, important agricultural areas (IAA) and other soil properties. The existing environment for the Project was investigated through desktop assessment of existing publicly available datasets and literature. This was supplemented by numerous field sampling and laboratory analysis of soil for salinity, sodicity, dispersivity and cracking clays.

The impact assessment area one kilometre either side of the rail alignment features two distinct areas of elevation along flat to undulating terrain, and passes through the floodplains of the Border Rivers and Condamine-Balonne catchments. The Project has been aligned to avoid steep slopes, where possible, and therefore negate the risk of landslide.

Planning has been undertaken to avoid highly productive agricultural land wherever possible. The permanent footprint will traverse less than 0.1 per cent of Class A and 0.5 per cent of Class B agricultural land within Goondiwindi local government area. The permanent footprint will traverse 0.2 per cent of Class A and Class B agricultural land within Toowoomba local government area.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 8: Land Resources**
- **Chapter 22: Outline Environmental Management Plan**

Sandstone boulders, Millwood

Sixteen properties outside the existing rail corridors are subject to current environmentally-relevant activities or hold a mining lease. Of these, three properties are listed on the environmental management register for landfill (Pittsworth waste facility), Zimms Corner service station (outside the two kilometre study area) and Commodore Mine.

Potentially contaminated sites, including the existing rail corridor, that will be disturbed will require specific management controls. These controls will be developed by a suitably qualified person to identify, document and manage contamination in these locations. In some instances, further environmental investigations may be warranted. Depending on the type and levels of contamination encountered, contaminated material may be reused for construction activities within the rail corridor, such as encapsulation within a zoned embankment.

Most potential impacts to land resources through Project activities are expected to have a 'low' residual risk rating. Permanent alteration to landform and topography remains a 'medium' risk due to the potential for loss of soil resources through erosion and disturbance of existing contaminated land during the construction phase of the Project.

All potential impacts to land resources will be managed through adherence to the outline Environmental Management Plan (see **Chapter 22: Outline Environmental Management Plan**).

Highest point of elevation = between Mount Mallard and Mount Watson

Lowest point of elevation = Macintyre River

Broad classification of soil types in the Project study area:

- vertosols
- sodosols
- dermosols
- chromosols
- kandosols
- lithosols.

At a glance

Key impacts

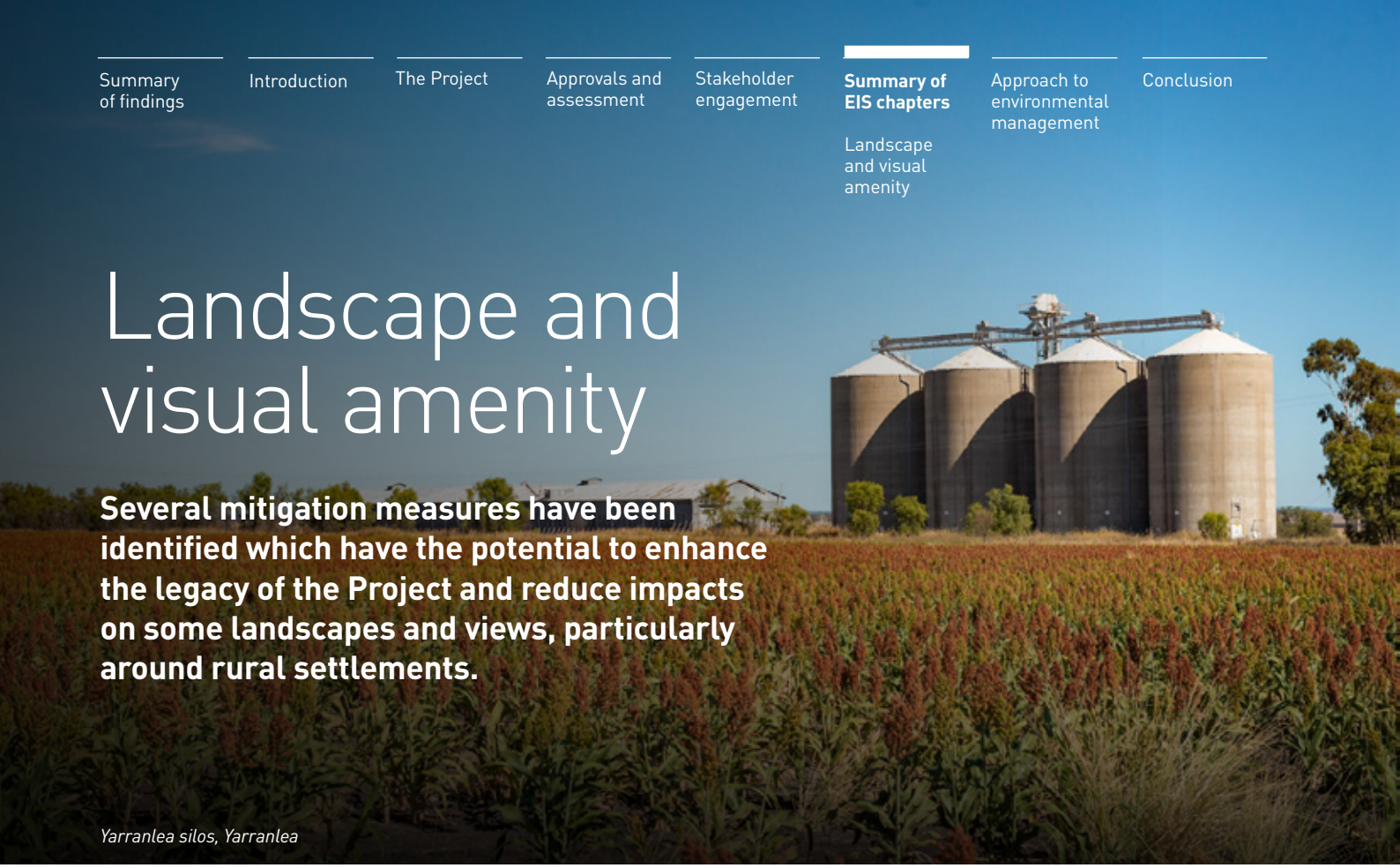
- permanently changing landform and/or topography
- loss of soil resources on farming and other economically valuable land
- reduced production value of soils
- loss of soils due to erosion
- soil stability
- modification of soil conservation plans
- degradation of soils resources through invasive flora
- exposing potential acid sulfate soils and acid rock to oxygen during excavation and earthworks
- secondary salinity through vegetation removal or change in overland flow
- disturbing existing contaminated land
- creation of contaminated land.

Mitigation measures

- slope batter optimisation
- minimising and managing the quantity of spoil generated during earthworks
- using field data to inform structure designs, rail formation, soil treatment and management
- avoiding disturbance to the existing flow regime where bridges are proposed at major waterway crossings
- development and implementation of erosion control measures
- rehabilitation
- implementation of storage, transport and handling procedures for the management of contaminated material.

Landscape and visual amenity

Several mitigation measures have been identified which have the potential to enhance the legacy of the Project and reduce impacts on some landscapes and views, particularly around rural settlements.



Yarranlea silos, Yarranlea

This chapter assesses the existing environment and potential landscape and visual impacts of the Project, as well as proposed mitigation measures.

Assessment approach

The landscape between Kurumbul (near the NSW/Queensland border) and Gowrie Junction is typically a sparsely settled rural landscape characterised by generally flat irrigated and non-irrigated croplands and undulating pastures.

It is interspersed with a network of watercourses associated with the Dumaresq, Macintyre and Condamine rivers and set against a backdrop of forested low hills and isolated volcanic peaks. Historically, freight rail has existed within the impact assessment area, and there is a legacy of modern and heritage rail infrastructure throughout the area.

The number of visual receptors varies greatly across the impact assessment area. Key areas with high numbers of properties whose outlook will change include Kingsthorpe, Gowrie Mountain, Southbrook, Pittsworth, Brookstead, Pampas and Yelarbon, as well as numerous rural living areas.

Visual impacts are often contained by the presence of vegetation and landform. However, there are localised elevated areas affording views over a wider area, including three scenic lookouts located at Mount Basalt Reserve, Commodore Peak picnic area and Mount Kingsthorpe summit.

> The Project area, for the most part, is a highly modified landscape as a result of historical clearing practices for agriculture and grazing, the establishment of linear infrastructure (railways, highways and power lines) and other development activity, such as Commodore Mine and Toowoomba Wellcamp Airport.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 9: Landscape and Visual Amenity**
- **Appendix I: Landscape and Visual Amenity Technical Report**

Twenty-two representative viewpoints were used to assess the potential landscape and visual impacts of the Project on a range of 'visual audiences', including:

- local residents and workers in towns and rural settlements (including Yelarbon, Inglewood, Millmerran, Pampas, Brookstead, Pittsworth, Southbrook, Athol, Gowrie Mountain and Kingsthorpe)
- local residents and workers on rural and acreage properties within the impact assessment area
- travellers on main and local roads
- tourists on roads including users of 'scenic drives' and visitors staying in tourist accommodation within the impact assessment area
- tourists on the 'Westlander' train
- recreational users of the landscape, particularly using walking trails within national parks (Wondul Range National Park), state forests (such as Whetstone State Forest) and other nature reserves.

The selected viewpoints are discussed further in **Appendix I: Landscape and Visual Amenity Technical Report.**

Lighting impacts of up to a 'moderate' level of effect were identified for the construction and operation phases. The University of Southern Queensland Mount Kent Observatory is located approximately 21 kilometres south east from the Project (closest Project point is Southbrook), beyond the extent of the impact assessment area.

At a glance

Key impacts

- introduction of rail infrastructure into relatively intact rural and natural settings
- removal of vegetation
- provision of new infrastructure elements including embankments, deep cuts, viaducts and new road and rail bridges.

Mitigation measures

- avoiding impacts on protected landscape areas such as the Wondul Range National Park
- minimising impacts on state forests such as Whetstone State Forest
- avoiding direct impacts on areas of regional landscape significance.

Wondul Range National Park

Lighting provision for realignment of existing roads will generally be in accordance with current arrangements unless additional lighting requirements are identified in consultation with asset owners.

One third of the Project is co-located with existing road and rail infrastructure to minimise the Project disturbance footprint.

The design avoids significant settlements to the greatest extent possible to assist in minimising visual impacts. This includes at Inglewood, Millmerran and Pittsworth. At Yelarbon, Pampas and Brookstead, the alignment is within or adjacent to the existing rail corridor which runs through these settlements.

The requirement for additional specific mitigation to manage landscape and visual impacts is limited and constrained by practical and operational factors. Specific mitigation opportunities have been identified to enhance the outcome for affected local visual receptors, particularly around several rural settlements including Yelarbon, Brookstead and Pittsworth. These opportunities have potential to enhance the legacy of the Project and would reduce the residual impact of the Project on some landscapes and views.

Cunningham Highway, Yelarbon, looking south west towards Goondiwindi (current)

Cunningham Highway, Yelarbon, looking south west towards Goondiwindi (design)

Ware Street, Brookstead, looking north east from Brookstead State School (current)

Ware Street, Brookstead, looking north east from Brookstead State School (design)

The Gore Highway, Pampas, looking south east near the Brose Lane intersection (current)

The Gore Highway, Pampas, looking south east near the Brose Lane intersection (design)

Pittsworth Felton Road, Pittsworth, looking north west towards Oakey-Pittsworth Road and the Gore Highway (current)

Pittsworth Felton Road, Pittsworth, looking north west towards Oakey-Pittsworth Road and the Gore Highway (design)

The Gore Highway, near Pittsworth

Linora Drive, Gowrie Mountain, looking north west towards the Warrego Highway (current)

Linora Drive, Gowrie Mountain, looking north west towards the Warrego Highway (design)

Flora and fauna

Detailed studies were undertaken to understand flora and fauna and identify and minimise potential impacts.

Koala

This chapter describes the terrestrial and aquatic ecology of the impact assessment area and design considerations to minimise impacts to flora and fauna

Assessment approach

The Project is situated within the Brigalow Belt South bioregion, which has experienced a long history of human disturbance as a result of agricultural practices and resource development. Consequently, most remaining areas of vegetation are fragmented.

The ecological assessment framework provides the approach to identifying the Project's environmental constraints and potential impacts.

Eighty-nine ecological receptors were identified within the impact assessment area.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 10: Flora and Fauna**
- **Appendix J: Terrestrial Ecology Technical Report**
- **Appendix K: Aquatic Ecology Technical Report**
- **Appendix L: Matters of National Environmental Significance Technical Report**
- **Appendix M: Preliminary Fauna Movement Provision and Fencing Strategy**
- **Appendix N: Environmental Offset Strategy (Qld)**

The impact assessment area contains:

- 15 matters of national environment significance
- 12 matters of state environmental significance
- protected areas (Whetstone State Forest and Bringalily State Forest)
- high value regrowth vegetation.

At a glance

Key impacts

It has been established through assessment that the construction and operation of the Project has the potential to impact on ecological receptors through:

- loss of habitat and degraded habitat due to vegetation clearing and removal
- injury or mortality to fauna
- reduced biological viability of the soil to support plant growth
- displacement of species due to invasive weeds and pests
- reduced connectivity of biodiversity corridors and habitat fragmentation
- edge and barrier effects
- noise, dust and light impacts
- increased litter and waste
- aquatic degradation
- erosion and sedimentation
- potential contamination of habitats
- flooding.

Mitigation measures

- restricting vegetation clearing to minimum requirements
- maintaining habitat connectivity by locating fauna crossing opportunities
- bridges and culvert structures:
  - minimising impacts to the bed, banks and environmental flows of watercourses
  - maintaining existing flow paths and flood flow distributions
  - bridge and culvert structures designed to avoid increases in peak water levels, velocities and duration of inundation.
- preliminary fauna movement provision and fencing strategy
- biodiversity management sub-plan to address:
  - methods of sequencing protected plant surveys
  - pre-clearance fauna surveys
  - staging of works
  - animal handling protocols
  - plant and habitat relocation for Brigalow Belt reptiles.
- detailed ecological surveys of the Project footprint to refine quantification of impacts and revise offset requirements
- biosecurity management sub-plan for weed and pest fauna controls.

Flora and fauna-sensitive design

Greenfield sections of the Project have been designed to minimise impacts to remnant vegetation and the number of watercourses crossed. Clearing of remnant vegetation will be restricted to the minimum required for the safe construction, operation and maintenance of the rail corridor. This includes minimising disturbance to sensitive areas such as:

- habitat for critically endangered and vulnerable flora and fauna species
- critically endangered threatened ecological communities
- riparian vegetation
- steep slopes
- along riverbanks.

Fauna crossing opportunities for species such as koala, Condamine earless dragon and southern greater glider have been co-located with waterway crossings and other cross-drainage structures to maintain habitat connectivity across the rail corridor. Where possible, these align with regional, state and locally significant fauna movement corridors or areas of important fauna habitat.

Additional fauna movement and fencing opportunities will be assessed and, where appropriate, developed during the detailed design phase.

The Project incorporates bridge and culvert structures to maintain existing flow paths and flood flow distributions. This includes the Condamine River floodplain where six bridges have been incorporated into the design with a combined length of six kilometres.

Bridge and culvert structures have been located and sized to avoid increases in peak water levels, velocities and duration of inundation.

The Project has been developed to minimise impacts to watercourses, riparian vegetation and in-stream flora and habitats. Bridges are preferred over culverts to maintain connectivity for 'matters of national environmental significance', such as Murray Cod.

A comprehensive list of flora and fauna species recorded within the impact assessment area, as well as a likelihood of assessment for conservation significant species is provided in **Appendix J: Terrestrial Ecology Technical Report** and **Appendix K: Aquatic Ecology Technical Report.**

Proposed grade separation at Biddeston Southbrook Road and Bushy Lane diversion, Southbrook

Air quality

All air quality impacts associated with the construction and operation of Inland Rail are assessed and managed in line with relevant air quality legislation and guidelines.

This chapter describes the potential impacts on air quality arising from the Project and outlines proposed mitigation measures.

Assessment approach

The Project may temporarily impact the air quality of nearby sensitive receptors including residences, schools and hospitals during construction and operations.

A detailed description of each pollutant can be found in **Appendix O: Air Quality Technical Report.**

To determine potential impacts to the existing environment, several air quality impact assessments were undertaken, including:

- establishment of background air quality and existing emission sources
- construction phase impacts
- operational phase impacts
- proposed mitigation measures.

Background air quality was established using PM_{10} (particles with a diameter of 10 micrometres or less) and $PM_{2.5}$ (particles with a diameter of 2.5 micrometres or less) monitoring data collected at an air quality monitoring station established for Inland Rail at the northern end of the Project.

What is a sensitive receptor?

People in the community who may be impacted by noise, air or visual impacts are called 'sensitive receptors'.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 11: Air Quality**
- **Appendix O: Air Quality Technical Report**

Air quality (construction)

Potential dust impacts during construction on sensitive receptors were determined through a qualitative significance assessment. The results of the air quality risk assessment for construction activities, without mitigation, posed a 'low' risk of human health impacts, and a 'medium' risk of dust soiling.

To improve the understanding of background air quality in the area local to the mine, an air-quality monitoring station has been installed at a residential dwelling on Millmerran–Inglewood Road, Millmerran. Monitoring data from this location will improve understanding of ambient air quality and emissions from the mine and will be used to guide the detailed design and finalisation of the construction approach for the Project.

Air quality (operation)

Modelling of freight trains travelling along the track was undertaken to assess the degree to which the Project complies with specified air quality goals at resident locations. All potential significant sources of air emissions identified for the operational phase of the Project were included in the model. Where possible, the results were used to optimise the design and assess the effectiveness of mitigation measures.

The air quality objectives used for the assessment are prescribed to protect health and wellbeing, and the aesthetic environment. This includes avoiding nuisance. The predicted cumulative concentrations and deposition levels for the pollutants assessed are below the adopted objectives. The operation of Inland Rail is not expected to create significant adverse impacts to environmental values.

Investigation into the deposition of dust emissions at sensitive receptor water tank locations showed that predicted pollutant water concentrations would be significantly lower than Australian Drinking Water Guidelines.

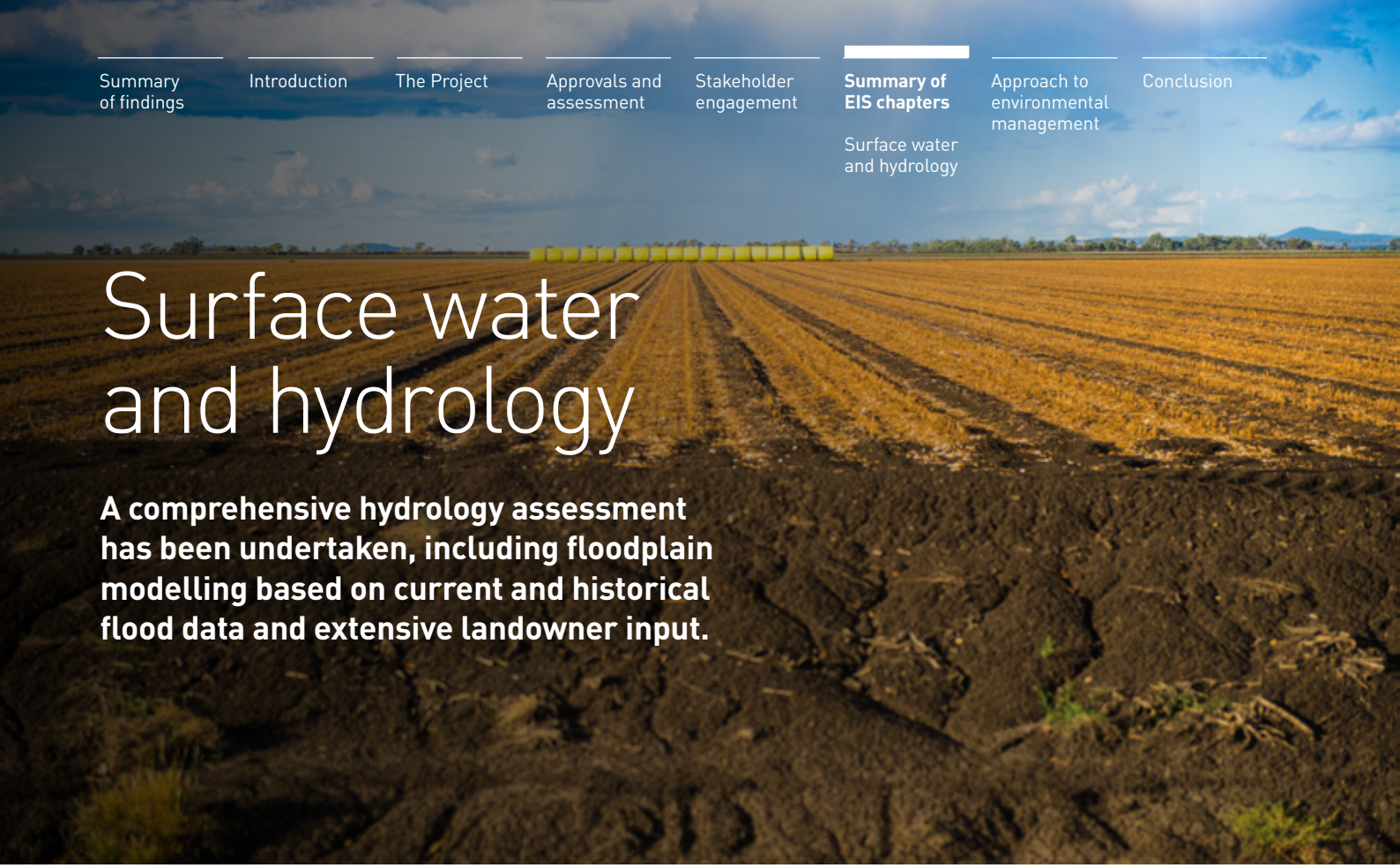
At a glance

Key impacts

- dust or emissions from earthworks and construction activities
- gas from diesel combustion of train exhausts
- dust from cargo and movement of train wagons on the tracks
- dust or emissions from operational maintenance activities.

Mitigation measures

- the horizontal and vertical alignment has been established to optimise the earthworks required and achieve as close to a net balance as possible
- the development of the reference design considered air quality in the context of fuel storage locations, earthworks, haulage routes, existing transport corridors, gradients, clearing and laydown area
- use of construction traffic routes that provide the shortest journey time
- correctly operating and maintaining vehicles and equipment
- implementing mitigation measures during operations to ensure operators adhere to regulatory standards and best practice.



Surface water and hydrology

A comprehensive hydrology assessment has been undertaken, including floodplain modelling based on current and historical flood data and extensive landowner input.

This chapter includes a description of the surface water quality impact assessment, and the hydrology and flooding impact assessment.

Managing surface water impacts

Surface water quality was identified through desktop study and field water quality samples.

Water quality across the impact assessment area was typically considered 'average-poor' with typical patterns of alkaline pH, high electrical conductivity, elevated concentrations of suspended sediment, nutrients and instances of diminished dissolved oxygen concentrations.

Bridge structures are included in the design to minimise disturbance of aquatic habitats in the following watercourses:

- Macintyre River
- Macintyre Brook
- Pariagara Creek
- Cattle Tree Creek
- Native Dog Creek
- Bringalily Creek
- Nicol Creek
- Back Creek
- Grasstree Creek
- Condamine River South Branch
- Condamine River Main Branch #1 and #2
- Condamine River North Branch
- Westbrook Creek
- Dry Creek.

The impact assessment has identified that with design considerations and mitigation measures in place, the risk of impact from construction (including pre-construction) and operation phase activities is 'low'. It is not expected the Project will result in significant residual impacts on surface water quality.

Full details of the surface water quality assessment are provided in **Appendix P: Surface Water Quality Technical Report**.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 12: Surface Water and Hydrology**
- **Appendix P: Surface Water Quality Technical Report**
- **Appendix Q1: Hydrology and Flooding Technical Report Volume I**
- **Appendix Q2: Hydrology and Flooding Technical Report Volume II**

Hydrology and flooding

The Project is located within the Condamine-Balonne Rivers catchment and the Queensland section of the Border Rivers catchment.

Key waterways

- Gowrie Creek
- Condamine River
- Macintyre Brook
- Macintyre River.

Other significant creek crossings include Pariagara Creek, Cattle Creek, Native Dog Creek, Bringalily Creek, Nicol Creek, Back Creek and Westbrook Creek.

Detailed hydrologic and hydraulic assessments have been undertaken due to the catchment sizes and substantial floodplain flows associated with each of these watercourses.

Several flood events were modelled including 20%, 10%, 5%, 2%, 1%, 1 in 2,000, 1 in 10,000 annual exceedance probability (AEP) and probable maximum flood (PMF) events to determine the current flooding depths, durations and flow velocities, and potential impacts caused by the Project.

The Project has been designed to achieve a 1% AEP flood immunity while minimising unacceptable impacts on the existing flooding and drainage regime. Bridge and culvert structures have been 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.

Flood impact parameters the reference design was measured against include:

- change in peak water levels
- change in duration of inundation (floodwater timeframes)
- flood flow distribution (changes in natural flow patterns and changes to flood flow distribution across the floodplain areas)
- velocities
- extreme event risk management (impacts of events larger than the design criteria)
- sensitivity testing (climate change impacts and blockages).

The hydrologic and flooding assessment undertaken has demonstrated the Project is predicted to result in impacts on the existing flooding regime that generally comply with the flood impact objectives.

At a glance

Key impacts

- potential increase in rubbish and debris
- altered water quality, chemistry and hydrology
- introduction of contaminants
- increased salinity
- erosion and sedimentation.

Mitigation measures

- minimising the Project s temporary construction footprint
- designing bridges and waterway crossings to minimise impacts to beds, banks and environmental flows
- developing the reference design to avoid the need to permanently divert watercourses
- incorporating cross-drainage structures and sediment basins in the reference design.

Crossing the Condamine

The Project alignment crosses the Condamine River floodplain between Millmerran and Brookstead. The floodplain is formed by three main river branches including the Condamine River North Branch, the main Condamine River and a southern branch known as Grasstree Creek.

The development of the Condamine floodplain crossing solution was an early deliverable for the Project. Since the release of the proposed solution in late 2018, consultation with landowners and key stakeholders has continued to update the flood model and design of the crossing solution.

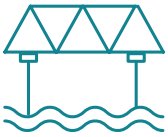
The flood model has been expanded to incorporate additional local flow paths, in particular within the Back Creek catchment, and has also been validated against the 2013 flood event.

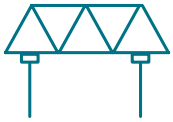
Further sensitivity testing on the model has also been undertaken to determine how inflows from local creeks may impact water levels and velocities in a 1% AEP flood event in order to gain more robust results based on local knowledge.

Additional data from the Warwick and Cecil Weir stream gauges, as well as anecdotal data of historic flood events prior to 1921, to improve the flood frequency analysis has also been included. These updates have allowed improved understanding of flooding behaviour in the Condamine floodplain but have not resulted in significant changes to the overall model or required considerable updates to the crossing design.

Assessment of the proposed Condamine floodplain crossing solution using the updated flood model indicates that in a 1% AEP event, the solution is likely to change flood behaviour at 23 private properties that already experience some degree of flooding. This includes changes in peak water levels of 10-50 millimetres at six houses.

The reference design includes:

6 
BRIDGES

6 
KILOMETRES TOTAL BRIDGE LENGTH

500 
APPROXIMATELY 500 CULVERTS (900 MILLIMETRES – 2.1 METRES in diameter)

Proposed Condamine River floodplain crossing

Inland Rail community consultation stand

Community consultation

Comprehensive consultation has been undertaken to provide the community with detailed information and certainty around flood modelling and the Project design. Consultation with stakeholders, including landowners, was undertaken at key stages including validation of the performance of the modelling in replicating experienced historical flood events and presentation of the design outcomes and impacts on properties and infrastructure.

In future stages, ARTC will continue to work with:

- landowners concerned with hydrology and flooding throughout the detailed design, construction and operation phases of the Project
- directly impacted landowners affected by the alignment throughout the detailed design, construction and operation phases of the Project
- local councils, state government agencies and local flood specialists throughout the detailed design, construction and operation phases of the Project.

Full details of the hydrology and flooding assessment are provided in **Appendices Q1 and Q2: Hydrology and Flooding Technical Report Volumes I and II.**

Independent International Panel of Experts for Flood Studies in Queensland

The Australian and Queensland governments established an Independent International Panel of Experts for Flood Studies to provide advice to government on the flood models and structural designs developed by ARTC for Inland Rail in Queensland. As an advisory body to government, the panel is independent of ARTC regarding the development, public consultation and approvals for the Inland Rail EIS process. Relevant submissions received from public exhibition of the draft EIS will be provided to the panel for consideration as part of its review.

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

Groundwater

Most groundwater impacts will be temporary and related to the construction phase of the Project. Impacts to groundwater resources are manageable with the application of mitigation measures and monitoring programs.

Gowrie Creek crossing on Leeson Road, Gowrie

Groundwater models were used to evaluate potential drawdown.

Assessment approach and findings

The Project has identified three main aquifer systems that supply groundwater to the region.

The first, Cainozoic, is the recent geological era and is characterised by shallow alluvial systems along river valleys (Border and Condamine rivers) and volcanic basalt aquifers in the eastern portion.

The second is the formation of volcanic rocks of the Tertiary age which constitutes the Main Range and extends west towards the Darling Downs. Geology is characterised by fractured basalt aquifers in the eastern portion.

The third, Walloon Coal Measures, are a series of volcanolithic sandstones, coal, mudstones and siltstones extending over wide areas of the Surat Basin and the Clarence-Moreton Basin in south western Queensland.

The majority of the Project area is underlain by the Great Artesian Basin, Australia's largest groundwater basin.

Local-scale groundwater models were developed to evaluate potential drawdown. Five indicative cuts along the Project alignment were identified as best representing the local geographical conditions and potential impacts on groundwater resources.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 13: Groundwater**
- **Appendix R: Groundwater Technical Report**

Groundwater is water found in between rock, soil and sediment under the land's surface.

Simulations indicated that:

- seepage is concentrated at the bottom of the cuts, on both sides of infill material
- initial inflow of seepage will be higher than the average rate predicted for steady-state scenarios and will then plateau
- seepage values are considered to be 'low' based on an average of site-specific data
- temporary increases in seepage may be observed in cuts with sandy soil or weathered sandstone following rainfall events
- seepage of groundwater from bedrock is anticipated to be 'low' except where enhanced by weathering of fractures.

Drawdown is only expected to occur at three of the five modelled locations. The maximum extent of drawdown is predicted to range from 15 metres to 80 metres from the centre of the Project alignment.

Further investigations will be undertaken targeting specific locations, such as bridge abutments and significant cuts and fill sites.

Registered bores

There are 30 registered bores within the Project footprint. These bores, and unregistered bores that also occur within the Project footprint, are likely to be decommissioned for the progression of the Project.

Where drawdown impacts are anticipated in registered bores that would not otherwise be decommissioned, engagement will be undertaken with each licensed user to agree on an appropriate mitigation approach (e.g. monitoring with bore-specific impact thresholds for intervention and 'make good' agreements).

The use of groundwater to supplement the construction demand for the Project may be considered if private owners of registered bores wish to sell to, or trade with, ARTC under private agreement in accordance with approved licences.

A *Groundwater Management and Monitoring Plan* will be developed to provide an ongoing assessment of impacts during construction.

Bores in the construction impact zone will be decommissioned in consultation with landowners and in accordance with the *Minimum Construction Requirements for Water Bores in Australia – Edition 3* (Feb 2012).

At a glance

Key impacts

- loss or damage to existing landowner bores
- temporary groundwater level reduction
- disturbing shallow groundwater flows due to voids created by deep cuttings
- reduced permeability which may modify flow direction of shallow groundwater
- lower permeability, altered groundwater flow patterns and reduction in groundwater resources during bridge and piling work
- subsidence/settlement of compressible substrates and possible damage to adjacent structures
- contamination/reduction of groundwater quality due to unintended spills and leaks of oils, fuels, lubricants and other chemicals, water mixtures and emulsions related to washdown areas, and upward seepage of salty groundwater from deeper aquifers.

Mitigation measures

- using geotechnical and groundwater field data to inform the design of rail structures
- complying with Australian Standards for bridge design and railway structures
- considering alternative seepage control measures
- avoiding steep terrain and topographical constraints for more efficient track geometry and grade
- conducting baseline groundwater sampling for collection of baseline water quality, durability and salinity parameters.

Noise and vibration

Studies have been undertaken to assess the potential impacts of noise and vibration during construction and operation within the Project area.

This chapter addresses the impacts of noise and vibration from the construction and operation of the Project.

Assessment approach

Sensitive receptors

Noise and vibration studies have been carried out to identify 'sensitive receptors' (i.e. people in the community who are most likely to be impacted by heightened noise activity), and plans have been put in place to help lessen these impacts.

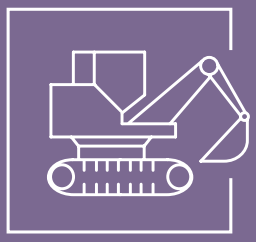
Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 14: Noise and Vibration**
- **Appendix S: Construction Noise and Vibration and Operational Road Traffic Noise Technical Report**
- **Appendix T: Operational Railway Noise and Vibration Technical Report**

Examples of sensitive noise receptors

- residential dwellings
- hospitals
- places of worship
- schools
- childcare centres
- open space – passive use (e.g. parkland, bush reserves)
- open space – active use (e.g. sports field, golf courses)



At a glance – Construction

Key impacts

- airborne noise as a result of operation of machinery and equipment
- ground-borne vibration as a result of vibratory roller or piling
- noise and vibration as a result of blasting at a few locations within the Project footprint
- road traffic noise.

Mitigation measures

A Construction Noise and Vibration sub-plan will provide guidelines on:

- effective community consultation
- training construction site workers
- using temporary noise barriers
- monitoring noise and vibration outputs
- selecting and maintaining appropriate equipment
- scheduling work during less sensitive time periods
- respite periods
- construction traffic management
- situating equipment and plant in less noise sensitive locations.

Where blasting impacts are expected to exceed the Project blasting performance criteria, mitigation measures will be included in the Blast Management Plan to avoid, then minimise, potential impacts.

At a glance – Operation

Key impacts

- road traffic noise
- airborne noise (rail)
- ground-borne noise (rail).

Mitigation measures

- noise walls or barriers will only be considered at Yelarbon, Brookstead and Pittsworth, where the mitigation can effectively control noise at groups of sensitive land uses and receptor buildings and where noise level reductions, generally in the order of five decibels (dB(A)) or more, are required at sensitive receptors
- in circumstances where rail corridor mitigation is not found to be feasible and all other mitigation options are exhausted, property controls will be investigated and implemented. The implementation of architectural treatments and other measures to private property would likely be subject to the agreement of commercial and legal terms between ARTC and the property owner.

Construction

Baseline noise measurements were taken to establish construction noise criteria. Monitoring results were typical of noise levels experienced in rural environments, with low background levels dominated by environmental sounds such as bird and insect activity.

Reasonable worst-case construction scenarios were assessed for each of the main construction activities.

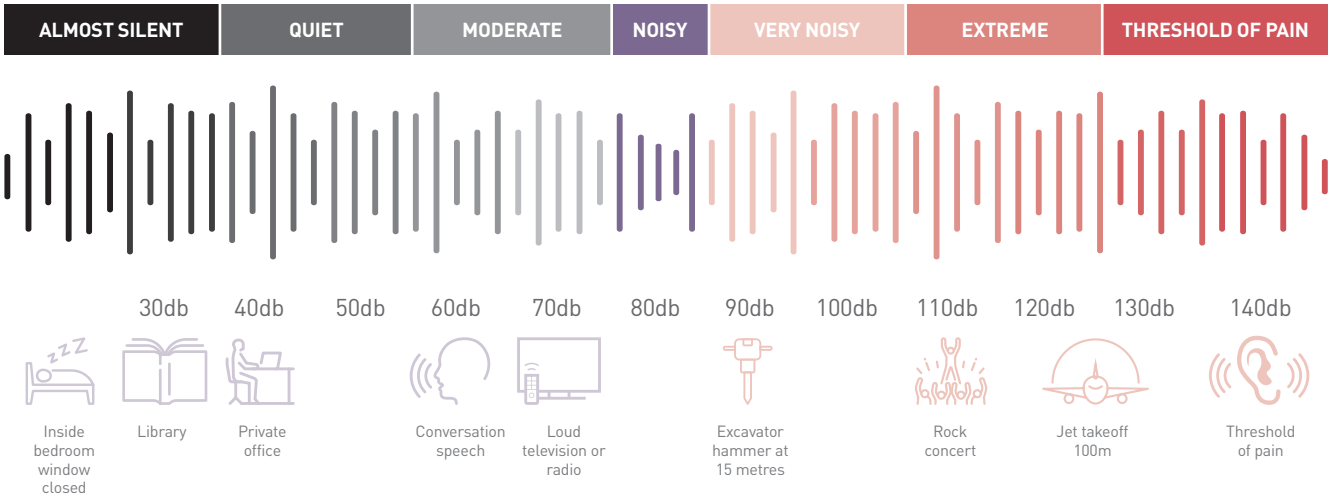
The assessment indicates exceedances against both the lower and upper external noise limits within the noise and vibration assessment area.

This assessment is representative of the worst case 15-minute period of construction activity while construction equipment is at the nearest location to each sensitive receptor location (distances will vary between plant and sensitive receptors).

Particularly noisy activities, such as piling, are likely to occur for a portion of the overall construction period. For works that move along the rail alignment, rather than works located at a construction compound, noise exposure at each receptor will reduce due to increased distances as works progress.

NOISE LEVEL COMPARISONS

People's perception of noise is strongly influenced by their environment.
A noise level that is perceived as loud in one situation may appear quiet in another.



Operation

ARTC is implementing consistent criteria for the assessment and management of operational railway noise across the Inland Rail Program to ensure the potential noise-related impacts to public health, amenity and disturbance are managed the same, regardless of which state the sensitive land uses are located in.

ARTC has elected to assess and manage railway noise on the entire Project, applying the noise criteria for new railways.

Social

A Social Impact Assessment was undertaken to identify how the Project may affect local and regional communities.

This chapter explores the social benefits, opportunities and impacts that were discovered as part of the Project Social Impact Assessment (SIA).

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 15: Social**
- **Appendix U: Social Impact Assessment Report**

At a glance

Key impacts

- cultural landscapes and local character
- property acquisition and property severance on the use and amenity of properties
- farm management
- flood patterns on homes, farms and agricultural land
- rural amenity
- connectivity within and between properties, on the road network, and with respect to level crossings
- decrease in property values
- groundwater access for farms and businesses
- community well-being as a result of noise, vibration and air quality
- construction traffic leading to safety issues
- Project-related stress on mental health.

Mitigation measures

- partnering with service providers for access to employment and training
- establishment of non-resident workforce accommodation at Yelarbon, Inglewood and Turallin to minimise the potential for stress on local housing supply for residents and visitors
- working closely with directly affected property owners and landowners
- working with local businesses to maximise their capacity to participate in the Project supply chain
- partnerships with Toowoomba Regional Council, Goondiwindi Regional Council and local community organisations to maintain access to social services
- a mental health partnership to support residents experiencing stress and anxiety
- working with communities to manage impacts during construction and achieve positive long-term social outcomes through a community reference group.

The SIA assesses the type, level and significance of the Project's social impacts (both negative and positive) throughout the Project lifecycle and informs how ARTC will manage identified social impacts while enhancing the social benefits.

The engagement process involved a broad range of stakeholders and included community information sessions throughout the impact assessment area and the Southern Darling Downs Community Consultative Committee (CCC) and Inner Darling Downs CCC meetings.

Additional SIA-specific stakeholder engagement included a community survey, workshops, meetings and interviews. Stakeholders who were engaged included directly affected and nearby landowners, Traditional Owners, government agencies, businesses, and community, environmental and economic groups.

Social benefits and opportunities

The SIA found the Project would result in social benefits, primarily in relation to employment, training and business supply opportunities for residents.

Social benefits include:

- employment opportunities during construction
- increased trade and supply opportunities for local businesses through workers at the non-resident workforce accommodation
- direct permanent employment for about 15 people when the railway is operational
- indirect employment as the result of the Project facilitating economic development
- potential training and career pathways for young people, Indigenous people and job seekers in the area
- opportunities for local, regional and Indigenous businesses (including construction, transport or logistics businesses) to participate in the construction supply chain
- potential to improve the agricultural industry's access to freight transportation and stimulate business and industry development, including at the Toowoomba Enterprise Hub.

The SIA includes a Social Impact Management Plan (SIMP). Measures intended to enhance Project benefits and opportunities are provided in the following sub-plans:

- community and stakeholder engagement
- workforce management
- housing and accommodation
- health and community wellbeing
- local business and industry content.

A monitoring strategy is in place to report on the delivery and effectiveness of the SIMP along with agreements with the Department of Education, Queensland Health, Queensland Police Service, Queensland Ambulance Services and the Queensland Fire and Emergency Services regarding changes to facility access or service demands.

The following policies, plans and programs are also in place to further promote social benefits and mitigate impacts to the community:

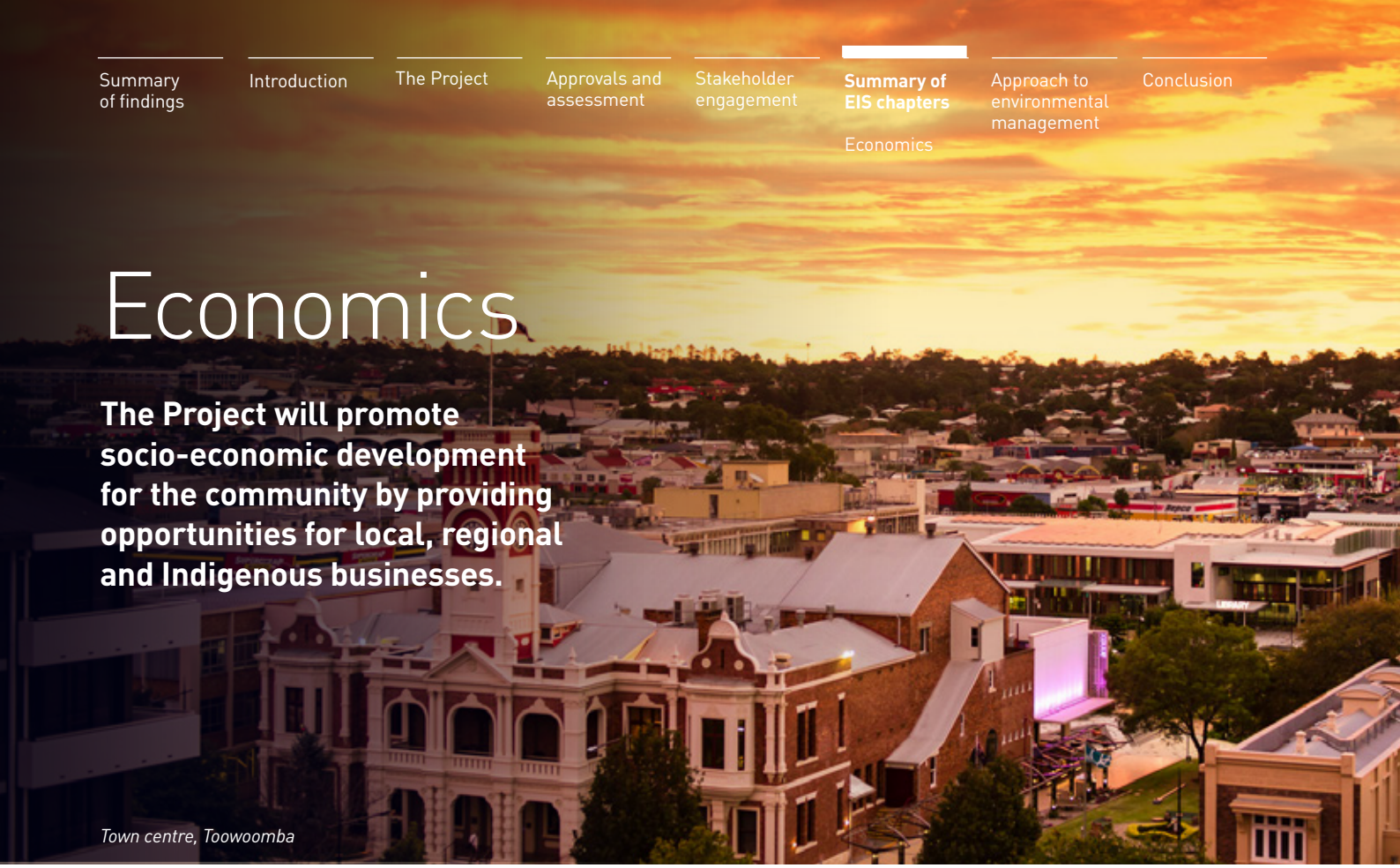
- Inland Rail Sustainable Procurement Policy
- Australian Industry Participation Plan
- Indigenous Participation Plan
- Inland Rail Skills Academy
- Inland Rail Community Sponsorships and Donations program.

Inland Rail Community Sponsorships and Donations program recipients, Goondiwindi Men's Shed

Inland Rail Community Sponsorships and Donations program recipients, Yelarbon Recreation Grounds

Economics

The Project will promote socio-economic development for the community by providing opportunities for local, regional and Indigenous businesses.



Town centre, Toowoomba

This chapter explores the economic impact on the region through direct and indirect business and employment opportunities arising from Project construction and operation.

Assessment approach

Specifically, this assessment:

- establishes the existing economic environment and local context to understand the local economic context and form the basis to measure the economic impacts
- identifies potential economic benefits and impacts on affected local and regional communities and businesses
- assesses the projected economic benefits of the Project, including the basis for their estimation through a detailed economic benefits assessment. The outcomes of the proposed the Project link-specific analysis will be contextualised against the *Inland Rail Program Business Case* (2015)
- assesses the economic significance of the Project on the regional, state and national economies
- evaluates the potential cumulative impacts on local and regional economies resulting from the construction and operation of related projects, including adjacent Inland Rail project links.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 16: Economics**
- **Appendix V: Economic Impact Assessment**

At a glance

Key impacts

- direct employment
- workforce accommodation
- changes to property and housing
- positive impacts to employment in other industries such as hospitality, transport and logistics
- indirect employment
- freight benefits
- costs savings from reduced potential for vehicle incidents
- reduced environmental costs due to reduction in air pollution and greenhouse gas emissions
- reduced long-haul traffic movements
- low scale of total loss of agricultural land
- disruption to farm management
- changes in accessibility or connectivity to land
- acquisition of land using for agriculture
- stock and product movement
- hydrology and periodic inundation
- improvements in supply chain efficiency.

Mitigation measures

- a Workforce Management Plan
- develop cooperative strategies with landowners to address potential impacts on property operations, access and infrastructure prior to construction occurring alternative measures for stock access to watering points are to be finalised with the landowner and implemented
- promote the business registration process on ARTC's website
- development and implementation of an Australian Industry Plan focusing on opportunities for involvement by local business in construction and operation of the Project that involves:
  - identifying businesses within 125 kilometres of the Project with potential capacity to supply the construction phase
  - engagement with local businesses to identify opportunities to develop and promote local business participation.
- engagement with Department of Employment, Small Business and Training and the Department of State Development, Tourism and Innovation to develop business capacity building strategies.
- continue to engage with Toowoomba and Surat Basin Enterprise, chambers of commerce and local business groups/associations
- consider providing the local content report to the Australian Industry and Skills Committee when developed
- implementation of ARTC's Sustainable Procurement Policy
- Indigenous participation and local participation included as key elements of construction tender assessments
- ARTC will work with government stakeholders and local and Indigenous businesses to:
  - build businesses capacity to participate in the Project s supply chain through business development, mentoring and pre-qualification projects
  - support Indigenous businesses to ensure they are prepared for and provided with opportunities to participate
  - link training and development programs with other projects and local industries to provide the greatest regional benefit.

Community benefits

The Project will promote regional economic growth across the Darling Downs–Maranoa region.

Secondary service and supply industries such as retail and hospitality will benefit from the Project development, including opportunities within the three proposed accommodation camps at Millmerran, Inglewood and Yelarbon. The expansion in construction activity is also likely to support temporary flow-on demand and additional spending by the construction workforce in the local community.

By providing efficient transport access to intrastate and interstate markets, the Project may also act as a catalyst for further private sector investment in the area, particularly for freight and logistics operations, and may stimulate business and industry development at the Toowoomba Enterprise Hub by promoting greater international export opportunities via Toowoomba Wellcamp Airport.

> The Project will promote regional economic growth across the Darling Downs–Maranoa region.

Jobs

A 'slack' labour market scenario will characterise labour market conditions during the construction phase of the Project. Under this scenario, real Gross Regional Product is projected to be $229 million higher than the baseline level and an additional 1,025 jobs (direct and indirect) per year over the construction period are expected to be delivered.

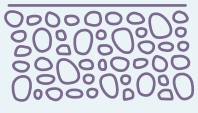
Local business and industry

The Project alignment has been designed to minimise impacts to local business and industry, however disruptions to the tourism and agriculture sectors may occur.

As a critical link of the broader Inland Rail Program, the Project offers opportunities to support the local agricultural industry by driving savings in freight costs and improving market access. Despite these benefits, the productive capacity of the local agricultural industry may be negatively impacted by the loss of agricultural land (through disturbance, acquisition or sterilisation), disruption to farm management, and changes in accessibility or connectivity to land. ARTC will work with individual landowners to develop suitable management solutions based on individual farm management practices to mitigate and manage these impacts.

Tourism may be impacted by changes to the amenity of, or connectivity to, local attractions. ARTC will work with tourism associations so impacts on tourism values are reduced wherever possible.

Primary businesses will benefit from the construction and operation of the Project by supplying resources, materials and services such as:



borrow and ballast materials

fencing and electrical installation

instrumentation

landscaping

cleaning and maintenance of construction and accommodation facilities

Economic benefits assessment

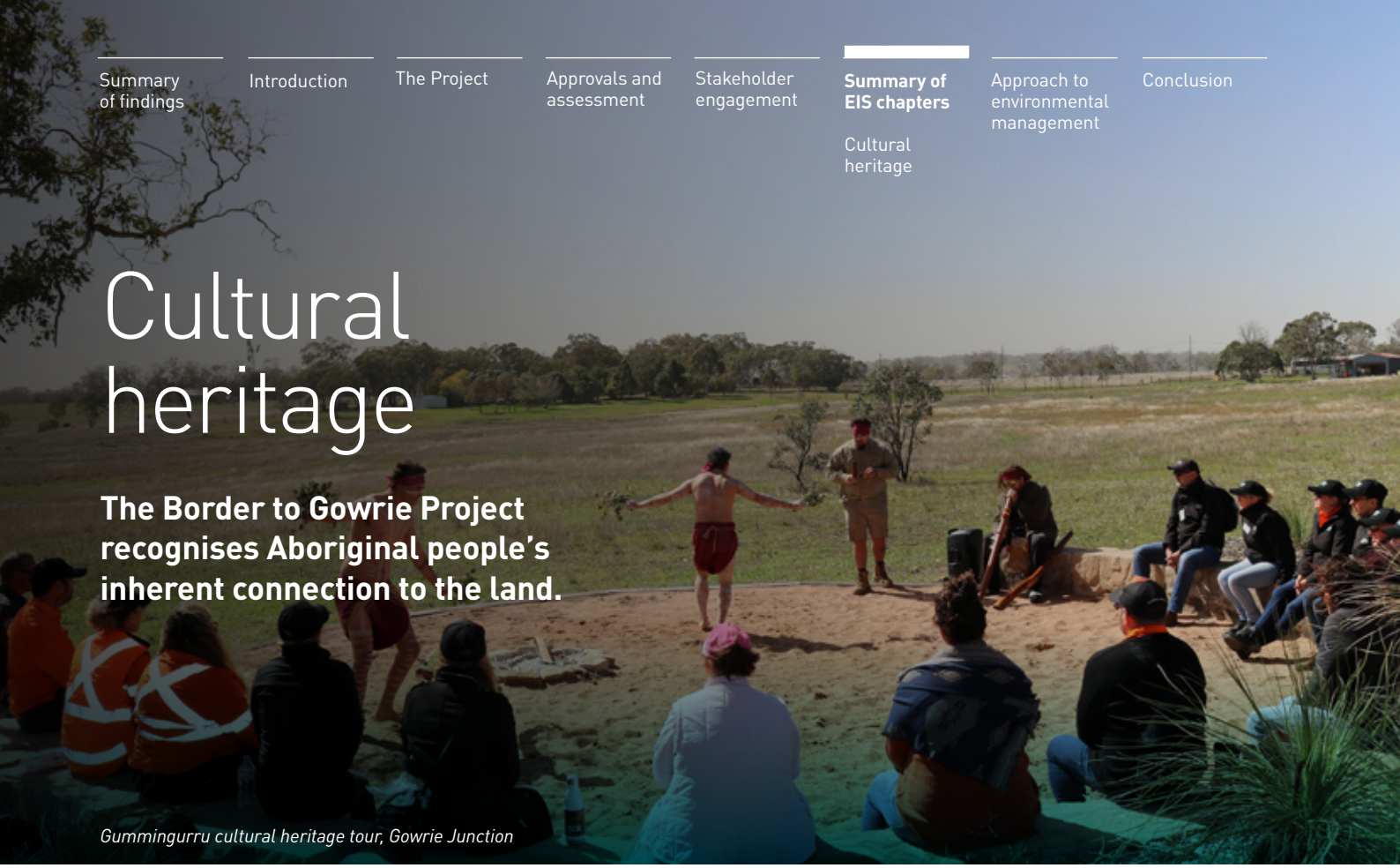
$674.36 million in incremental benefits at a seven per cent discount rate (2019 present value terms) resulting from improvements in freight productivity, reliability and availability.

Lower prices for consumers, as a result of lower inter-capital freight costs, has the potential to reduce costs of living for households.

There is also potential to promote good planning and stimulate the regional economy by providing improved freight transport to business and industry precincts, and intermodal terminals.

Cultural heritage

The Border to Gowrie Project recognises Aboriginal people's inherent connection to the land.



Gummingurru cultural heritage tour, Gowrie Junction

This chapter addresses the Indigenous and non-Indigenous cultural heritage values of the Project, provides a significance assessment and proposes a methodology for mitigating potential impacts.

Indigenous cultural heritage

ARTC has developed Cultural Heritage Management Plans (CHMPs) in consultation with the Bigambul People, Western Wakka Wakka People and endorsed Aboriginal parties for the Project area which have been approved by the Chief Executive of the Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP).

The CHMPs establish methods for investigating Indigenous cultural heritage that may be impacted by the Project. This includes implementing detailed surveys over the Project footprint to identify any significant Aboriginal objects or significant Aboriginal areas, or to find evidence of Aboriginal occupation of an area of archaeological or historic significance and manage these accordingly.

The location of pre-construction works, construction activities and permanent Project components will, where possible, be positioned to avoid any known restricted area identified through cultural heritage assessment.

ARTC will engage with the relevant Aboriginal party to develop an approach to avoiding, or otherwise managing, works in proximity to the restricted area.

Where ARTC considers it to be impractical to change the location of Project activities to avoid a known restricted area, the appropriate management measures established in the CHMPs will be implemented.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 17: Cultural Heritage**
- **Appendix W: Non-Indigenous Cultural Heritage Survey Report**

Non-Indigenous cultural heritage

An assessment of non-Indigenous heritage values and impacts was undertaken by appropriately qualified heritage specialists using a combination of registers, searches, and historical and archival research.

The assessment of heritage significance was undertaken against standard criteria as defined in the *Queensland Heritage Act 1992* (QH Act).

The QH Act prescribes eight criteria that may be used to measure the heritage value of a place and determine its significance. Only one of these criteria need to be fulfilled for it to be considered of heritage significance:

- historical
- rarity
- research
- representativeness
- aesthetic
- creative/technical
- social and associational.

Following inspection, it was determined that 14 of the Areas of Interest (AOI) are of local heritage significance and one is of state heritage significance.

Likely impacts to each AOI were identified based on proximity to the Project. Direct impacts are those that may result in the demolition or substantial alteration of a building or the disturbance of an archaeological site.

Direct impacts to cultural heritage places or sites are most likely to occur during site preparation as a part of the construction phase. At this time, clearing and stripping activities may require the demolition of heritage structures and the disturbance of archaeological sites.

A Cultural Heritage Management sub-plan will detail mitigation and management measures to be implemented during construction in relation to cultural heritage. The sub-plan will be separate to the CHMPs for the Project and will relate to all heritage aspects of importance to all stakeholders.

At a glance

Key impacts

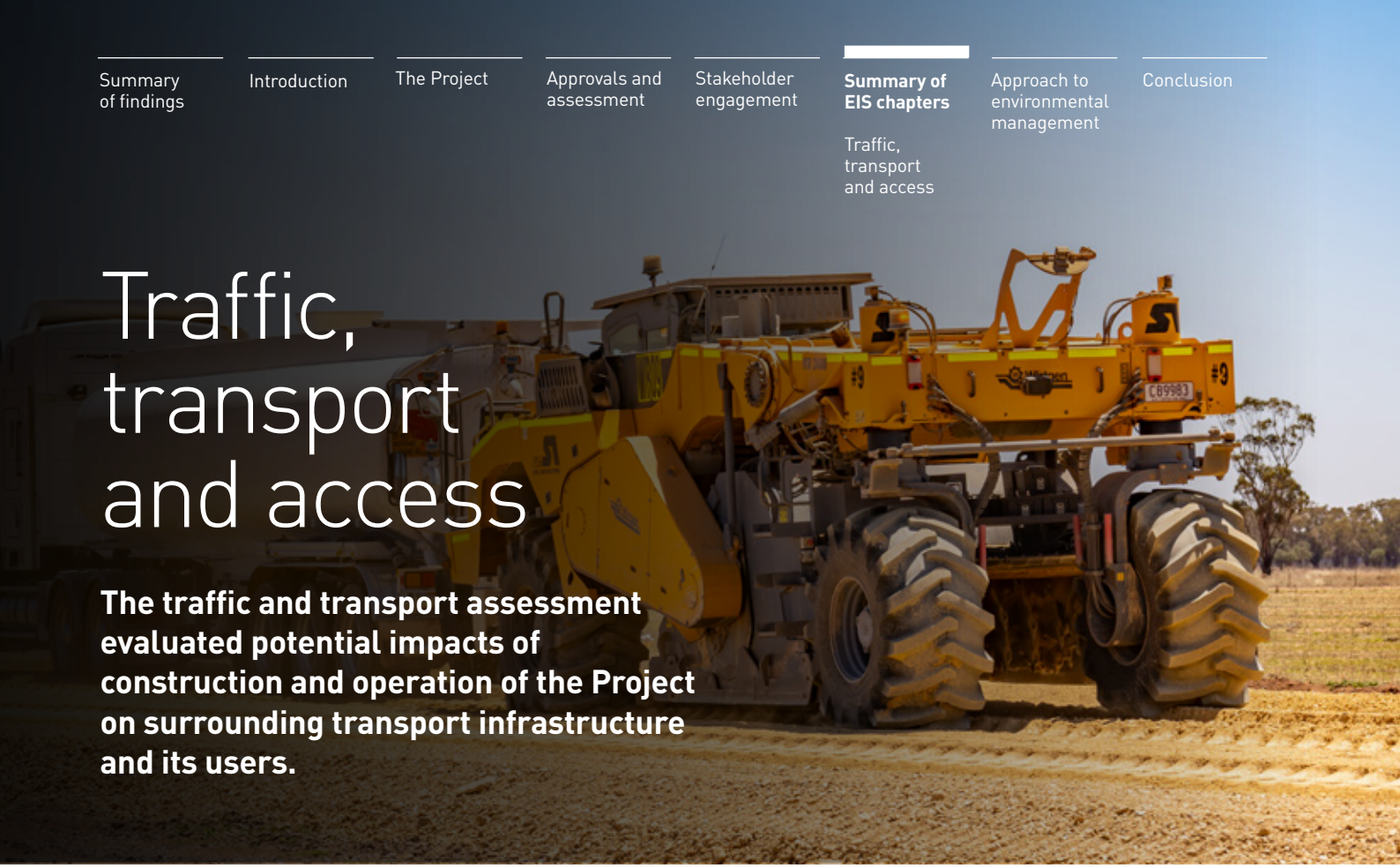
- impacts and risks associated with Indigenous cultural heritage
- direct impacts to non-Indigenous places occurring during site preparation
- indirect impacts during construction, operation, or decommissioning activities resulting in excessive dust, noise or vibration damaging heritage structures.

Mitigation measures

- approved Cultural Heritage Management Plans
- clearing extents will avoid previously undisturbed areas as far as possible
- ARTC staff and contractors to learn about Aboriginal cultural heritage and non-Indigenous heritage in the area
- where possible, Project works will avoid direct and indirect impacts (e.g. vibration) to identified items, sites and areas of Aboriginal heritage significance and historic and natural heritage significance.

CHMPs with relevant Traditional Owners have been agreed and will establish the process to undertake cultural heritage surveys for the Project footprint.

Traffic, transport and access



The traffic and transport assessment evaluated potential impacts of construction and operation of the Project on surrounding transport infrastructure and its users.

This chapter addresses the assessments and management plans in place to evaluate and mitigate the impacts of the Project on surrounding roads and road users.

Key findings

The assessment examined the potential traffic and pavement impacts from the movement of materials, workforce and equipment on the surrounding road network. This found:

- the reference design interfaces with seven state-controlled roads in nine locations
- 69 local government roads are expected to experience construction traffic exceeding five per cent of background traffic, however the impact to many of these roads is expected to be minimal as the high percentage of construction traffic is a function of low existing traffic volumes
- 17 cycle routes may be impacted by construction traffic
- 11 public transport services have been identified with routes that are proposed to be used, in part, by construction traffic. None of the 11 public transport routes traverse, or are in proximity to, the Project footprint
- 184 existing school bus services share elements of proposed Project construction routes. 11 of these bus services have upgraded or new road-rail interfaces included in the reference design. These services may experience longer journey times due to temporary traffic control measures, temporary or permanent road realignments and wait times at level crossings
- 11 existing long-distance coach services share elements of proposed construction routes for the Project. However, the impacts on these long-distance coach services are expected to be minimal due to the low frequency of the services
- the reference design for the Project interfaces with the state stock route network in 12 locations
- rail operational traffic volumes are likely to be negligible with no envisaged impact to operational conditions of the surrounding road networks.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 17: Cultural Heritage**
- **Appendix W: Non-Indigenous Cultural Heritage Survey Report**

ARTC has consulted with Toowoomba Regional Council, Goondiwindi Regional Council, Department of Transport and Main Roads and Queensland Fire and Emergency Services through the impact assessment and design development process. As a result, the reference design for the Project has, in all instances, maintained connectivity across the Project footprint for public roads.

The design also provides maintained access to private and state land.

This will be provided through:

- the provision of a crossing point of the rail alignment in the location of the existing access, or
- the provision of continued means of access via an alternative location with interconnectivity provided.

This assessment concluded road network and access safety are expected to have a 'medium' residual risk rating following the implementation of all mitigation measures. This level of residual risk is largely attributed to the external human factors that contribute to road network and access safety that cannot be completely controlled by measures implemented by the Project. All other assessed risks have a residual risk rating of 'low'.

The design also provides maintained access to private and state land which will be provided through:

- the provision of a crossing point of the rail alignment in the location of the existing access, or
- the provision of continued means of access via an alternative location with interconnectivity provided.

At a glance

Key impacts

- construction traffic on local government roads
- cycle routes may be impacted by construction traffic
- bus and coach services and the stock route network share proposed construction traffic routes.

Mitigation measures

- safety assessment of detailed design, proposed construction traffic routes and level crossings
- a Traffic Management sub-plan will be prepared to consider:
  - construction routes
  - seasonality of stock routes
  - areas of significant pedestrian and cyclist activity
  - standard hours of work and deliveries
  - school zones
  - bus service operators
  - employee transport
  - employee parking.
- a Road Use Management Plan will support works to the existing road network and identify appropriate strategies for the use of state-controlled roads and local government roads
- traffic management for construction sites, laydown areas and workforce accommodation will be negotiated and approved by the Department of Transport and Main Roads
- detailed pavement impact assessment.

Proposed grade separation at Chamberlain Road, Gowrie Mountain

The reference design has been developed in parallel with the draft EIS to avoid the occurrence of impacts to transport infrastructure and traffic. Where avoidance has not been possible, design development has sought to minimise the likelihood and/or consequence of these impacts, as far as possible. Where potential impacts to traffic and transport have not been fully avoided or mitigated through the reference design, additional mitigation measures have been nominated for implementation in future phases of the Project.

Hazard and risk

Hazards and risks may be associated with the design, pre-construction, construction and operation phases of the Project.

This chapter addresses potential impacts to people, property and the environment relating to hazardous natural events, Project-related hazards and hazardous substances.

Mitigation measures

The Project reference design has adopted the following mitigation measures and controls.

Flooding

- 50-year design life for formation and embankment performance
- track drainage ensures the performance of the formation and track is not affected by water
- earthworks designed to ensure the rail formation is not over-topped during a flood event
- embankment cross section can sustain flood levels
- bridges are designed to withstand major flood events.

The Project uses the existing South Western Line and Millmerran Branch Line rail corridors as much as possible to avoid adding new infrastructure to the floodplains.

A climate change assessment has been incorporated into the design of cross drainage structures in the event of increased rainfall intensity in accordance with the Australian Rainfall and Runoff Guidelines.

Rail incidents

The rail alignment has been designed to minimise the likelihood of rail incidents for the types of trains projected to use the Inland Rail network.

This has been achieved by adhering to the minimum design requirements, which are:

- a design speed of 115 kilometres per hour
- maximum grade of 1:80, with 1:100 the target
- maximum curve radius of 800 metres, with 1,200 metre target
- initial train lengths of 1,800 metres, with potential to increase train lengths up to 3,600 metres.

The reference design includes mixed gauge turnouts at locations where the Project interfaces with existing rail networks or infrastructure, to enable Queensland Rail rollingstock to join and exit the Inland Rail network.

Want to know more?

See the following Environmental Impact Statement chapters:

Chapter 19: Hazard and Risk

Road-rail interfaces

Where possible, grade separated crossings of existing roads have been adopted instead of level crossings. The specific design treatment at each road-rail interface has been selected based on a combination of factors, including topography, road classification, rail and road geometry, and community and stakeholder feedback.

Where grade separation has not been feasible, the design has been developed in accordance with ARTC's Engineering Code of Practice.

Utilities

Subsurface utility investigations confirmed the presence, location and orientation of utilities within the Project footprint.

Minimum design requirements have been established to avoid utility strikes. Consultation with owners of assets located in the Project footprint has commenced. Asset owners include APA Group, Energex, Millmerran Operation Co., Queensland Urban Utilities, Powerlink, Santos, Optus/Uecomm, National Broadband Network and TPG.

Infrastructure

The rail alignment has been positioned to avoid areas of previous workings or planned future workings associated with Commodore Mine.

The rail alignment is approximately one kilometre from the northern end of the runway for the Toowoomba Wellcamp Airport. The Project has been positioned to ensure that double-stacked freight trains will not extend vertically into the obstacle limitation surface for this airport.

> ARTC's risk management policies and procedures will effectively reduce most of the risks associated with the Project to a 'low' to 'medium' level.

Bridges

Track design on rail bridges is in accordance with ARTC's Engineering Code of Practice which requires ballast kerb profiles on bridges achieve sufficient height to maintain the ballast for the anticipated operational train speed. Adherence to this code of practice reduces the likelihood of ballast being lost from rail bridge structures.

Anti-throw screens have been incorporated into the design of road bridges to reduce the likelihood of objects being thrown off road bridges onto the rail track and no public pedestrian access is provided on road-over-rail bridges.

Freight dangerous goods

The rail alignment has been designed to minimise the likelihood of rail incidents for the types of trains projected to use the Inland Rail network.

A Hazardous Materials Management sub-plan will be prepared and implemented to identify the materials and chemicals required to be stored and used in support of construction, specify how dangerous goods and hazardous materials and chemicals will be handled, stored and transported, describe the response procedures in the event of an incident, and establish the waste storage and disposal procedures for hazardous materials and chemicals and dangerous goods.

Workplace risks

Occupational hazards will be managed in compliance with the *Work Health and Safety Act 2011* (WHS Act) and *Work Health and Safety Regulation 2011*, engineering standards and guidelines, and the procedures and work instructions that form part of ARTC's Safety Management System.

At a glance

Natural hazards

- bushfire, flooding, storms, cyclones and landslides
- wildlife, biosecurity
- climate change.

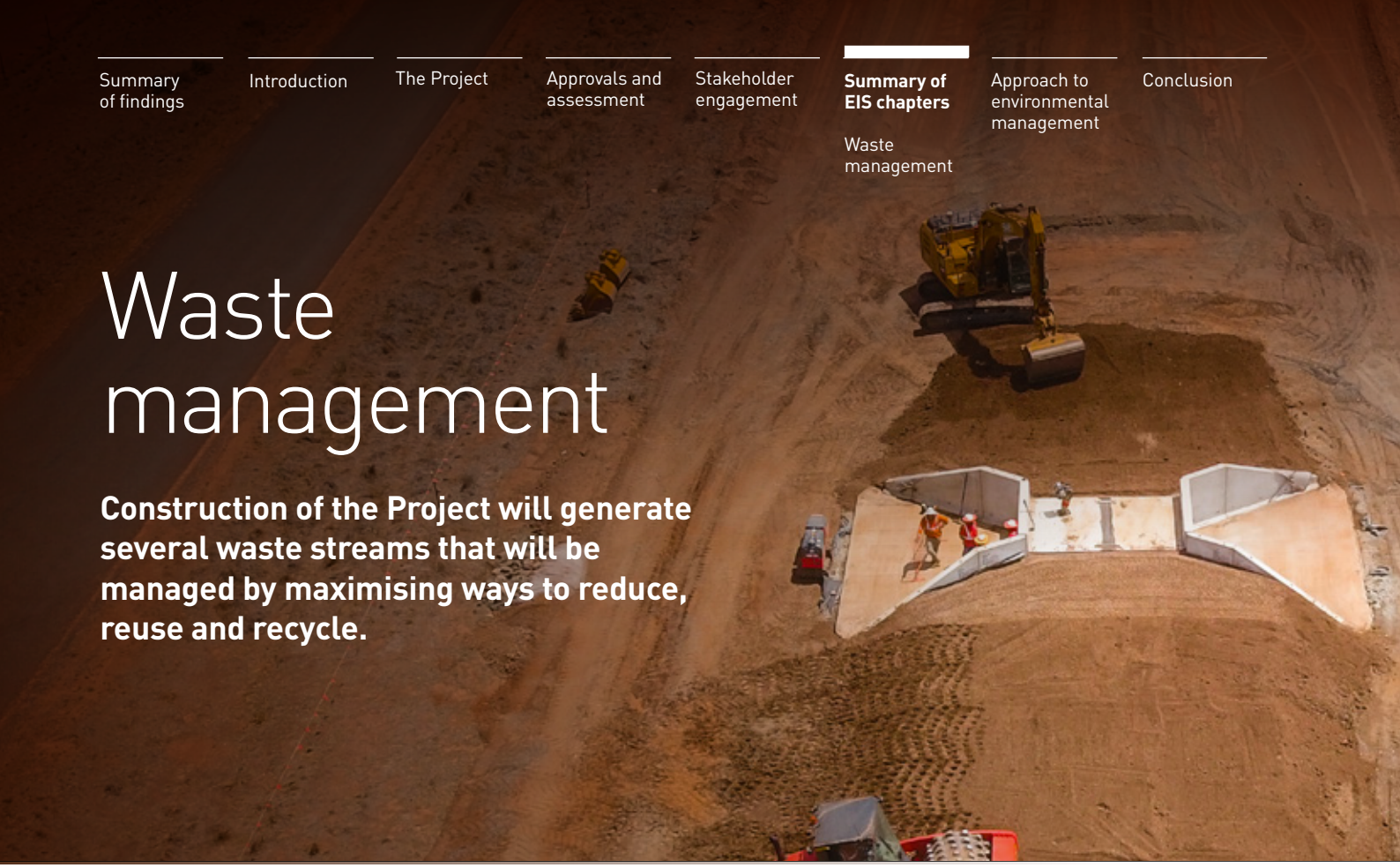
Project hazards

- health
  - fatigue and stress
  - asbestos, respirable silica and other airborne contaminants
  - noise and vibration
  - contaminated land
- accidents
  - road infrastructure
  - private access and stock routes
  - rail infrastructure
- safety
  - infrastructure and services
  - unexploded ordnance
  - bridges
  - emergency access
  - abandoned mines.

Dangerous goods and hazardous substances

- construction and operation maintenance chemicals
- freight transportation of dangerous goods
- explosives used in proximity to the Project.

The development of railway infrastructure has hazards and risks that must be managed throughout the lifecycle of the Project.



Waste management

Construction of the Project will generate several waste streams that will be managed by maximising ways to reduce, reuse and recycle.

This chapter addresses how waste will be managed across the Project life cycle.

Key findings

During construction, waste will be generated by:

- vegetation clearing, stripping topsoil, excavations
- demolition of existing structures
- operation of laydowns, site compounds and non-resident workforce accommodation.

The proximity of waste management facilities to the Project has been considered based on a commonly adopted haul route distance of 50 kilometres for bulk waste and 15 kilometres for municipal waste collected in domestic collection vehicles. Waste streams like municipal solid waste from workforce accommodation will be disposed of within appropriately licensed facilities.

The ability of facilities to receive waste generated by the Project has been determined based on initial consultation with operators, a review of environmental authority licencing under the *Environmental Protection Act 1994* (EP Act), and consideration of the Project's contribution to the regional waste management network.

Feedback from consultation with Toowoomba Regional Council and Goondiwindi Regional Council indicates the identified facilities located at Toowoomba, Millmerran, Goondiwindi and Yelarbon that are owned and/or managed by these councils are expected to have sufficient combined capacity to accept waste materials generated by the Project.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 20: Waste Management**
- **Appendix Y: Spoil Management Strategy**

It is anticipated only minor quantities of waste will be generated during normal operation as a result of maintenance of rail infrastructure.

With the implementation of effective waste management and resource recovery control measures, waste and resource recovery activities associated with the Project are not anticipated to pose a significant risk to the environment or public health.

The management of waste activities associated with the Project will be underpinned by the *2018 National Waste Policy and Waste Reduction and Recycling Act 2011 (Qld)* (WRR Act) waste and resource management hierarchy.

Waste types generated during Project construction include:


domestic


commercial


industrial


general


green


recyclables


regulated

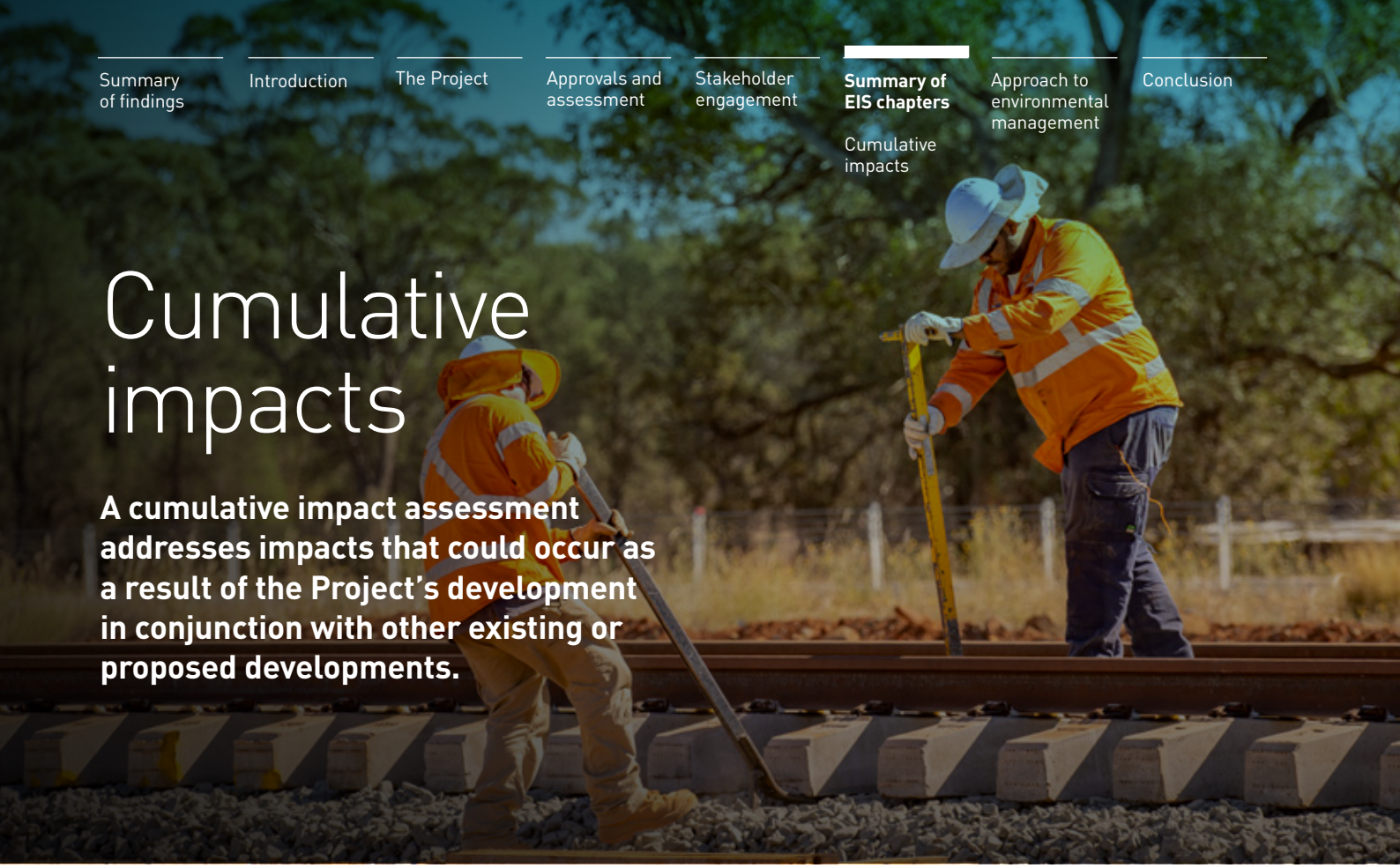
At a glance

Key impacts

- waste disposal additional to current levels, resulting in increased consumption of airspace and reduction of community access to waste facilities
- uncontrolled release of waste from the improper storage or failure of management systems resulting in contamination of receiving environments (i.e. land, surface water and air)
- increase in vermin, insects and pests from the inappropriate storage and handling of putrescible wastes
- reduced visual amenity of land uses adjacent to the Project
- increased transportation of waste materials on and off site, resulting in increased emissions
- decreased amenity of land uses adjacent to the Project from the generation of dust and road deterioration
- risks to health and safety of site personnel, through the release of pollutants from the poor management of regulated wastes.

Mitigation measures

- waste targets (or waste reduction targets) to be achieved for the Project, in accordance with the WRR Act
- general protocols and performance objectives for keeping the work site clean and tidy
- processes for documenting waste volumes, types and how these will be compared to waste targets
- confirmation of waste streams and estimated volumes
- temporary waste storage areas and disposal locations on and off site
- confirmed waste disposal criteria for disposal sites, in accordance with the environmental authority conditions for operational facilities
- methods for identifying asbestos containing materials and other hazardous materials
- requirements for waste segregation (e.g. green waste, construction and demolition waste, general waste, regulated waste and recyclables) in accordance with the EP Act
- requirements for secure temporary storage, collection frequency and disposal/recycling requirements, in accordance with the EP Act
- procedures and reporting/documentation requirements for ensuring waste transporters and receivers are appropriately licenced according to the type of waste, in accordance with the EP Act.



Cumulative impacts

A cumulative impact assessment addresses impacts that could occur as a result of the Project's development in conjunction with other existing or proposed developments.

This chapter addresses potential outcomes arising from the Project in combination with other existing or planned projects.

Assessment approach

When numerous projects occur within proximity to each other they can cause cumulative impacts.

Cumulative impacts can occur at a local, regional or national level, be positive or negative, accumulate over time, exacerbate the intensity, scale, frequency or duration of impacts in isolation, or in combination with other existing or planned projects.

ARTC has considered potential cumulative impacts associated with the Project in the EIS.

The assessment considers projects that:

- have been approved but where construction has not commenced
- have commenced construction but have potential for overlap in construction activities with the Project
- have been completed subsequent to issuance of the Terms of Reference for the Project
- are operational developments that have future plans for expansion
- are currently being assessed as 'coordinated projects for which an EIS is required' under the SDPWO Act.

The cumulative impact assessment area is defined as the spatial area of influence, determined by each environmental and social issue assessed in the EIS. The assessment draws on the findings of **Chapters 7 to 20** of the EIS, and impact assessments of projects within the areas of influence.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 21: Cumulative Impacts**

Projects included in the cumulative impact assessment are either currently being assessed under the EP Act, have been declared a 'coordinated project' by the Coordinator-General under the SDPWO Act, use resources located within the region (including materials, groundwater, road networks or workforces) the same as those to be used by the Project, or could potentially compound residual impacts the Project may have on natural, built or social aspects.

Where cumulative impacts have been identified for the North Star to Border Project and the Gowrie to Helidon Project of the Inland Rail Program, network-wide mitigation measures will be implemented. These will be consistent with the Inland Rail Environment and Sustainability Policy and environmental management plan for the Project.

Where cumulative impacts have been identified with other projects outside the Inland Rail Program, individual proponents will be invited to participate in the community reference group established for Inland Rail. This will provide opportunities to verify the cumulative impact assessment and, if necessary, identify further mitigation measures which can be implemented by ARTC within its area of control.

At a glance

Potential cumulative impacts

- land resources – loss of soil resources
- landscape and visual amenity – construction impacts
- flora and fauna – loss of biodiversity
- surface water – impacts from vegetation clearing
- noise and vibration – increased noise levels
- non-Indigenous heritage – loss of cultural heritage sites
- traffic, transport and access – increased traffic volumes
- hazard and risk – hazardous materials and dangerous goods
- social impacts – social character, housing availability and affordability, business, employment opportunities and regional development, access to skilled labour.

The assessment considers projects that:

- have been approved but where construction has not commenced
- have commenced construction but have potential for overlap in construction activities with the Project
- have been completed subsequent to issuance of the Terms of Reference for the Project
- are operational developments that have future plans for expansion
- are currently being assessed as 'coordinated projects for which an EIS is required' under the SDPWO Act.

Approach to environmental management

Environmental management measures developed during reference design and EIS development will be updated and refined for implementation during detailed design, pre-construction, construction and operation of the Project.

This chapter provides an environmental management framework for detailed design, pre-construction, construction and operation of the Border to Gowrie Project. It establishes the process for the preparation and implementation of the construction environmental management plan and operations.

The Outline Environmental Management Plan (EMP) includes the following sub-plans:

- land resources
- landscape and visual amenity
- flora and fauna
- air quality
- surface water
- groundwater
- noise and vibration
- cultural heritage
- traffic, transport and access
- hazard and risk
- waste and resource management.

Want to know more?

See the following Environmental Impact Statement chapters:

- **Chapter 22: Outline Environmental Management Plan**

The Outline EMP:

- provides a framework to ensure that reasonable environmental and social outcomes are achieved for the detailed design, pre-construction and construction phases of the Project using outcomes derived from the EIS
- informs the preparation and implementation of the Construction Environmental Management Plan and the Operation Environmental Management Plan
- describes the key elements and the environmental management framework for the Project
- outlines monitoring, reporting, auditing, review and documentation requirements
- details processes for dealing with a non-compliance, including corrective actions
- includes requirements for training and awareness, community and stakeholder engagement
- outlines the complaints management and response process.

Each member of the Project delivery team has a 'general environmental duty' under Section 319 of the EP Act, and must not carry out any activities that cause, or are likely to cause, unauthorised environmental harm, unless all reasonable and practical measures are taken to prevent or minimise harm.

The roles that will support environmental management for the Project include:

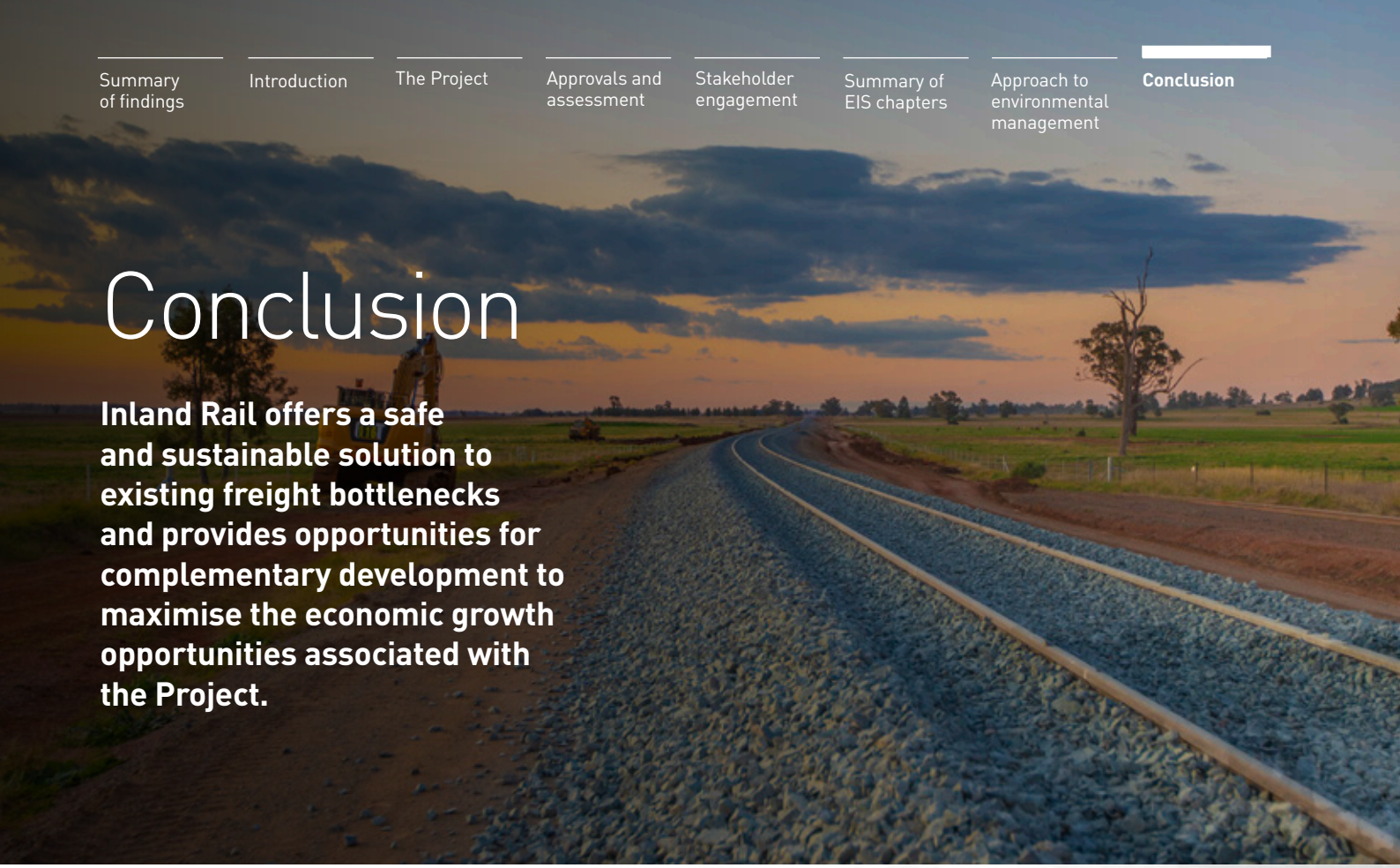
- ARTC corporate
- Principal contractor
- Coordinator-General
- ARTC construction environmental monitor
- ARTC construction community relations monitor
- Construction community reference group
- ARTC operations.

Environmental outcomes are mandatory and must be achieved. The environmental outcomes are derived from statutory requirements or other relevant criteria and are reflected in the criteria adopted in the draft EIS.

Performance criteria are measurable objectives or indicators of the environmental outcome. Environmental outcomes are deemed to be achieved if the performance criteria are met. If the performance criteria are not met, mitigation measures must be implemented to achieve the environmental outcomes.

Mitigation measures are directed at achieving the environmental outcomes. The proposed mitigation measures have been identified through the EIS process, recognising that additional or different mitigation measures may be applied in order to achieve the environmental outcome. Additional mitigation measures may be developed in consultation with directly affected persons and relevant stakeholders.

Monitoring and reporting requirements demonstrate that environmental outcomes are achieved.



Conclusion

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.

The Border to Gowrie Project and the wider Inland Rail Program provide significant opportunities to deliver long-term, substantial economic benefits for Australia's future. The delivery of the Project will provide a safe and sustainable solution to Australia's freight challenge while minimising adverse environmental, social and economic impacts.

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 producers with international export markets. Should this Project not proceed, future generations could experience worsening safety and environmental impacts due to continued growth in road transport between Melbourne and Brisbane.

During Project development, environmental investigations and stakeholder consultation were carried out to identify potential impacts and avoid them to the greatest extent possible. Where it was identified that impacts could not be avoided, mitigation and management measures are to be implemented and biodiversity offsets will be provisioned.

The avoidance, mitigation and management strategies provided in each of the impact assessment sections in this EIS were developed to address both the potential impacts and the effects of cumulative impacts. Overall, the EIS found the benefits provided a strong justification for the Project to proceed and, while potential impacts have been identified, proposed mitigation measures will minimise these impacts.

The Project is consistent with the objectives of the EPBC Act, 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* (Department of Transport and Main Roads, 2019a), the Inland Rail Business Case (ARTC, 2015a) and Australian transport planning requirements.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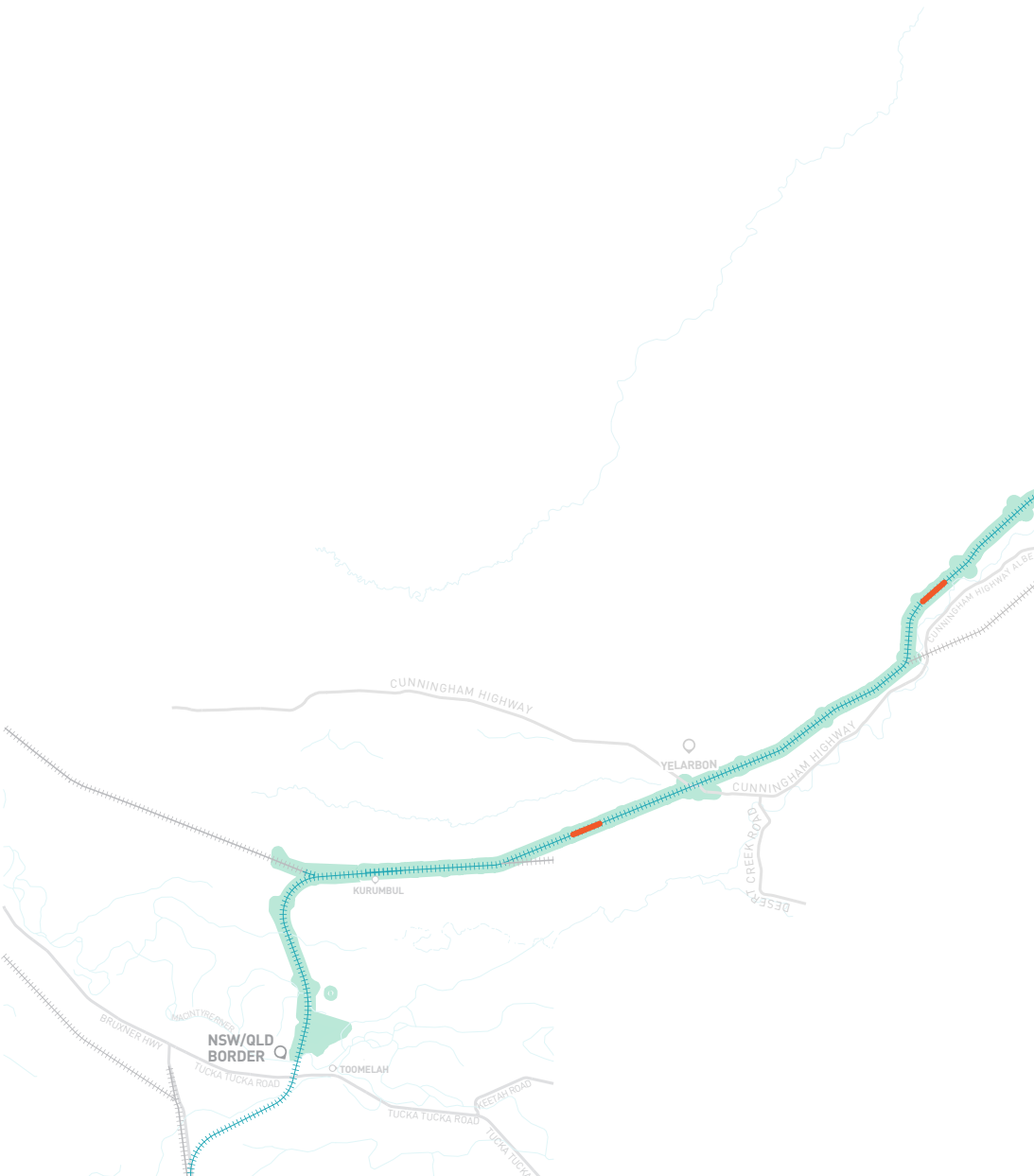
CUNNINGHAM HIGHWAY
YELARBON
CUNNINGHAM HIGHWAY
KURUMBUL
DESERT CREEK ROAD
BRUXNER HWY
NSW/QLD
BORDER
TOOMELAH
TUCKA TUCKA ROAD
CHEETAH ROAD
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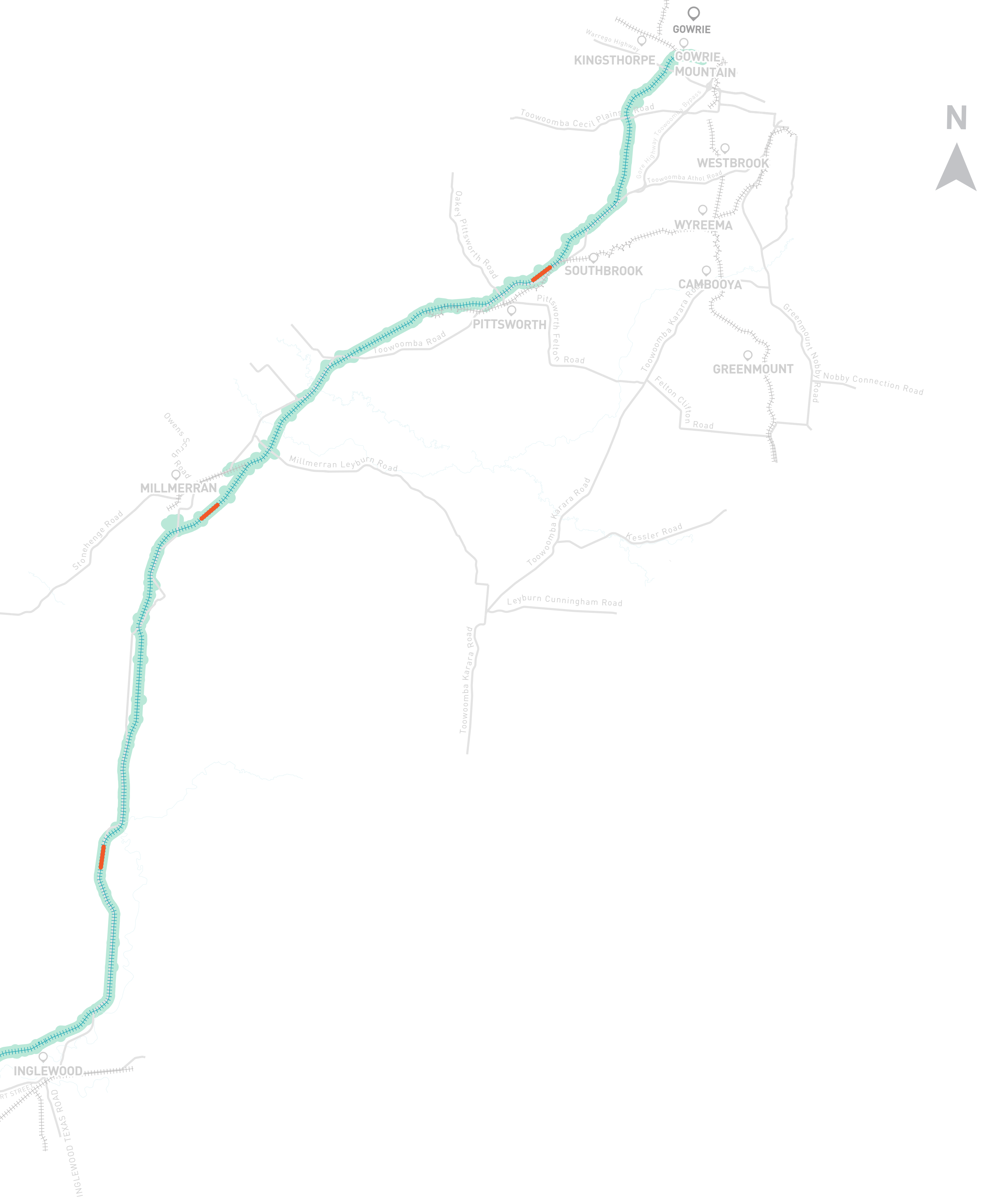
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CAMBOOYA
Oakey Pittsworth Road
PITTSWORTH
Pittsworth Felton Road
Toowoomba Road
GREENMOUNT
Greenmount Nobby Road
Nobby Connection Road
Toowoomba Karara Road
Felton Clifton Road
Owens Scrub Road
Millmerran Leyburn Road
MILLMERRAN
Stonehenge Road
Kessler Road
Leyburn Cunningham Road
INGLEWOOD
INGLEWOOD TEXAS ROAD

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