CHAPTER 24

Conclusions

GOWRIE TO HELIDON ENVIRONMENTAL IMPACT STATEMENT

IR_1536

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24. Conclusions

24.1 Overview

This draft Environmental Impact Statement (EIS) has considered the potential environmental, social and economic impacts from construction and operation of the Gowrie to Helidon (G2H) section (the Project) of the Inland Rail Program.

The Project was declared a 'coordinated project for which an EIS is required' by the Queensland Coordinator-General on 16 March 2017 under Section 26(1)(a) of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act). On 17 March 2017, the Australian Government Minister for the Environment determined the Project a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The controlling provision for the Project is listed threatened species and communities under sections 18 and 18A of the EPBC Act, as determined in the Referral Reference 2017/7882 for the Project.

The SDPWO Act EIS process has been accredited under the Bilateral Agreement for the assessment of the Project under Section 45 of the EPBC Act.

The EIS has identified and described the environmental values that must be protected under Section 9 of the *Environmental Protection Act 1994* (Qld) (EP Act), the Environmental Protection Regulation 2019 (Qld), environmental protection policies, water resource plans, the *State Planning Policy*, relevant guidelines and the EPBC Act.

This EIS has been prepared in accordance with the requirements of the SDPWO Act and the EPBC Act. It addresses the Terms of Reference (ToR) for an Environmental Impact Statement: Inland Rail—Gowrie to Helion project, dated August 2017 and provides analysis and assessment of potential environmental and socio-economic impacts from the Project.

24.2 Project description

The construction and operation of the following elements were assessed in this draft EIS:

- Approximately 28 kilometres (km) of railway linking Gowrie to Helidon via the Toowoomba Range, consisting of 22.4 km of new railway and 5.6 km of brownfield rail corridor
- Three crossing loops, each a minimum of 2,200 metres (m) in length**,** initially constructed for 1,800 m long, double-stacked trains, and designed to not preclude the future extension of some crossing loops to accommodate 3,600 metre trains
- A 6.24 km long undrained tunnel through the Toowoomba Range
- Tie-in to the existing Queensland Rail (QR) West Moreton System rail corridor at the Project extents and other intermediate locations including InterLinkSQ
- Construction of associated rail infrastructure, including maintenance sidings and signalling infrastructure to support the Advanced Train Management System
- Rail crossings, including, grade separations of existing State-controlled roads and West Moreton System, road-over-rail bridge, occupational and private crossings, fauna crossing structures, signage, and fencing
- Significant embankments and cuttings along the length of the alignment
- Potential noise barriers, fauna crossing structures, instream structures and fish passage design, fauna exclusion fencing, and rehabilitation and landscape treatments
- Ancillary works, including road and public utility crossings and realignment (excluding enabling works)
- Construction worksites, laydown areas, storage, tunnel portal construction areas, including the tunnel-boring machine launching area, an intermediate ventilation shaft development area and access roads
- Estimated capital expenditure for construction of the Project is approximately $1.35 billion including both direct and indirect costs. Indirect costs include items such as design services, contractor overhead and margin, contingency and escalation, together with ARTC Program costs such as management, train control systems, property requirements, insurances and utilities. The total investment figure makes provision for expected Project contingency and risk.

The Project will be generally located within the Gowrie to Grandchester future state transport corridor. The Project design does not preclude the development of a dedicated passenger railway within the Gowrie to Grandchester future state transport corridor at a later date.

The Project overlaps the Toowoomba Regional Council and Lockyer Valley Regional Council local government areas (LGA), with the Project generally avoiding towns and urban areas of Toowoomba, with the exception of Gowrie, although a number of suburbs of Toowoomba overlook the Project.

Construction of the Project is planned to commence in 2022 and is expected to be completed in 2027. The Project will be operational when all 13 sections of the Inland Rail Program are complete, which is estimated to be in 2027. The Project will be managed and maintained by ARTC; however, train services will be provided by a variety of operators. The hours of operation are anticipated to be 24 hours a day, 7 days a week (24/7).

On start of operations, it is anticipated that the Project will be used by an average of 33 services per day, increasing to an average of 47 services per day in 2040 (when the line is at freight capacity). The numbers include the existing traffic on the QR West Moreton System rail corridor. Annual freight tonnages are expected to increase in parallel, from approximately 39 million tonnes per year in 2027 to 59 million tonnes per year in 2040.

Inland Rail will be an open access rail service, meaning ARTC will not run trains directly, but will allow access to the rail line by rail operators.

While the Project is specifically designed for freight trains, it does not preclude the use of the track at a future date by passenger services. The current design, and EIS assessment, accommodates the existing QR narrow-gauge rail line, which runs passenger trains, including the Westlander, on the QR West Moreton System.

The Project design does not consider the construction of a high-speed, dedicated passenger rail line, which was the original intent of the Gowrie to Grandchester future state transport corridor, to be delivered by the Queensland Department of Transport and Main Roads (DTMR). Given that the Project accommodates single dual-gauge track and includes significant infrastructure such as the tunnel and large viaducts, the provision of passenger tracks being co-located along the entire Project length at a future date is unlikely.

24.3 Rationale and benefits

Australia is heavily reliant on efficient and reliable supply chains to provide competitive domestic freight links and gateways for international trade. Inland Rail provides a significant opportunity to change the fundamentals of the freight logistics supply chain in Australia.

At present, there is no continuous inland rail link between Melbourne and Brisbane. Interstate rail freight currently travels between Melbourne and Sydney via Albury, and then between Sydney and Brisbane, generally along the coast. Long transit times are endured since the existing network cannot accommodate highly efficient, long double-stacked trains.

As the existing rail connection between Melbourne and Brisbane is congested and constrained, it cannot currently provide a service that is competitive with road freight. With the forecast growth in freight movements along Australia's east coast over the next 30 years, a continued reliance on road freight transport will result in increasing safety, environmental and community impacts, and the need for significant investment in road freight route upgrades and maintenance. Without a competitive rail freight service offering, and an incentive to invest in rail supply chains, companies will potentially be locked into road-based logistic solutions.

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.

Inland Rail presents a unique opportunity to establish a competitive freight system by providing trunk rail infrastructure that supports a network of intermodal terminals and local sidings to distribute goods at a national, regional, and local level. The Inland Rail service offering is central to the delivery and competitiveness of Inland Rail and reflects the priorities of freight customers, including transit time of 24 hours or less from Melbourne to Brisbane, reliability (on-time delivery), price and availability. The service offering underpins the Inland Rail Business Case, and has informed route selection, design, and assessment of the Project.

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

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

Key benefits specific to the Project include:

- A more direct and efficient route across the Toowoomba Range compared to the existing West Moreton System. The Toowoomba Range section of the West Moreton System has been identified by stakeholders a major constraint to shifting to rail:
  - It takes 1.5 hours to traverse and has only two passing loops, which restricts rail capacity and efficiency
  - The lack of passing loops at other points on either side of the range
  - Train lengths being limited to 650 m by constricted sidings/passing loops and level crossing designs
  - Height restrictions in the tunnels, which restrict the use of 9 feet 6 inches high containers and some non-containerised break bulk cargo, e.g. railway lines or material for the coal seam gas industry
- A dedicated freight line has the potential for faster cycle times, higher axle mass limits and the increased capacity (up to 20 new train paths), which would significantly increase rail competitiveness and the overall efficiency of the bulk and containerised agricultural transport task
- Employment for up to 596 people in construction, including people living in the vicinity of the Project and in nearby LGAs, with indirect employment also likely to be stimulated
- Training opportunities provided by ARTC and the development of career pathways for young people, Indigenous people, and unemployed people, who are disadvantaged in the labour market
- Opportunities for local, regional, and Indigenous businesses to participate in the Project's construction supply chain
- Development of labour force skills and business capacity that will enable future employment and business growth opportunities for businesses in the region
- Opportunities in secondary service and supply industries, such as retail, hospitality, and other support services, for businesses in proximity to the Project.

24.4 Assessment approach

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

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

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

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

24.5 Community and stakeholder consultation

A project of this size and significance requires a far-reaching communication and stakeholder engagement approach to provide opportunities for involvement at all levels.

Furthermore, input from a variety of key stakeholders and community members has been and will continue to be required to understand constraints, values and impacts.

The overarching purpose of the community and stakeholder engagement program is to:

- Raise awareness about the Project, including the need for the Project, its benefits and the process undertaken to develop the design and EIS
- Verify the appropriateness of assessment methodologies adopted for the EIS

- Provide stakeholders with opportunities to inform investigations being undertaken for the design and EIS about local values and issues
- Inform government agencies, stakeholders and the community about the progress of the Project and to seek their input into the development of the design and EIS
- Understand stakeholder and community issues and where possible address any issues raised.

The assessment methodologies adopted for the purpose of this EIS have been presented to, and discussed with, relevant regulatory agencies.

Stakeholder and community feedback and comments received from the consultation process has informed the preparation of the EIS including:

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

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

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

Community and stakeholder consultation will continue throughout the life of the Project.

A Community and Stakeholder Engagement Plan will be developed to guide and monitor future engagement activities, in accordance with the Community and Stakeholder Engagement Action Plan within the Social Impact Management Plan (SIMP). The Community and Stakeholder Engagement Plan will:

- Establish and maintain engagement mechanisms that build relationships between the Proponent and its stakeholders, and enable adaptive management of impacts on amenity, connectivity and community values during construction
- Support adaptive management of impacts on amenity, connectivity and values during construction
- Support mitigation of impacts on amenity, community cohesion and local character through stakeholder engagement and in partnership with community and government stakeholders
- Enable implementation of the measures identified in the SIMP to address:
  - cultural landscapes, land acquisition, amenity and lifestyle, disadvantage and community cohesion, connectivity and pedestrian safety during detailed design
  - amenity and lifestyle, connectivity and sense of place during pre-construction
  - residential amenity, cultural landscapes, connectivity and pedestrian traffic safety, sense of place/ local character during construction.

24.6 Sustainability

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

24.7 Key findings of the EIS

Table 24.1 is a concise summary of the key findings of the EIS including potential impacts, benefits, and opportunities, with design responses and proposed mitigation measures.

TABLE 24.1: KEY FINDINGS OF THE EIS

Environmental aspect	Impacts, opportunities and mitigation measures

Land use and tenure (refer Chapter 8: Land Use and Tenure)	The Project generally follows the existing QR West Moreton System rail corridor and the Gowrie to Grandchester future state transport corridor and in doing so complies with the Queensland Government State Planning Policy (SPP) and state interest relevant to transport infrastructures. Where required, refinement of the Project alignment outside the Gowrie to Grandchester future state transport corridor has aimed to avoid, then minimise, further impacts to land uses.
	Key findings
	▸ 151 land parcels, including 94 within the Toowoomba Regional Council LGA and 57 within Lockyer Valley Regional Council LGA. The majority of the land is freehold, abut also includes state land. The Project also intersects 41 interests including easements, strata parcels and volumetric parcels.
	▸ 82 land parcels are within the Gowrie to Grandchester future state transport corridor, with an additional 10 parcels in the associated West Moreton System rail corridor. As such, a number of the land parcels are owned by the state.
	▸ There are 109 land parcels required for the rail and road infrastructure (i.e. the Project's permanent disturbance footprint), with 21 land parcels entirely within the permanent disturbance footprint. This includes 15 land parcels associated with the existing QR West Moreton System rail corridor and 6 freehold land parcels (2 owned by DTMR at the intermediate ventilation shaft).
	▸ 36 land parcels (including six where surface disturbance is proposed) will require volumetric acquisition as the Project passes beneath each of the land parcels when within the proposed Toowoomba Range Tunnel. Locations where volumetric tenure is required include Gowrie Junction, Cranley, Mount Kynoch and Ballard.
	▸ 12 land parcels are only required for construction.
	▸ Impacted properties will be acquired (freehold) or leased (State land) by the relevant constructing authority, converted to Unallocated State Land and dedicated as 'railway corridor land' under the *Transport Infrastructure Act 1994* (Qld), or in some cases a road under the *Land Act 1994* (Qld). Where the Project requires the permanent acquisition of properties, this will be undertaken in accordance with the requirements of the *Acquisition of Land Act 1967* (Qld) or under the *Land Act 1994* (Qld) for state land.
	▸ Potential impacts on land use and tenure include:
	  ▸ Changes in tenure and loss of property
	  ▸ Disruption to land over which native title claims have been made
	  ▸ Temporary and permanent changes in land use, including the loss of agricultural land and disruption to agricultural practices
	  ▸ Impacts to accessibility, including impacts on the road network and to private property access.
	▸ There are 184 utility interfaces
	  ▸ Disruption, relocation and modification to services and utilities, along with tenure arrangements.
	The Project is also likely to result in a number of land use benefits, including the support of future industries, and improved access to and from regional markets. The Project will also act as a catalyst for development in the area.

Environmental aspect	Impacts, opportunities and mitigation measures
Land use and tenure (refer Chapter 8: Land Use and Tenure) [continued]	**Proposed mitigation measures** ▸ The Proponent will continue to engage with the State of Queensland to protect and acquire the rail corridor and land required to facilitate the Project (e.g. road changes). ▸ Where land is compulsorily acquired by the *Acquisition of Land Act 1967* (Qld), compensation will be able to be claimed by every person with an estate or interest in the land. Compensation will be assessed on an individual basis based on the market value of the land as at the date of resumption. Additional compensation amounts for disturbance caused by the resumption of a property is also payable. ▸ Where only part of a land parcel is acquired, an owner may also claim compensation for the severance caused and for the impact of the Project on the balance land. Where impacts on the balance land cannot be appropriately mitigated and managed to the satisfaction of the landholder, the landholder will be able to receive compensation for the property in its entirety at an independently valued market rate. ▸ Refine the disturbance footprint further during detailed design to that required to safely construct, operate and maintain the Project, and minimise land acquisition, severance and disruption to land use, tenure and transport networks. ▸ Interface arrangements with petroleum resource interest holders and public utility providers will be finalised prior to construction activities commencing. ▸ Where feasible, detailed design and construction planning aims to minimise alteration to the surrounding road and transport network and maintain legal property accesses.
Land resources (refer Chapter 9: Land Resources)	The land resources study area consists of a high variability of soil type, with seven distinct soil types identified as occurring: vertosols, dermosols, ferrosols, hydrosols, chromosols, rudosols and sodosols. No acid sulfate soils (ASS) or acid rick were identified. In addition, there is a medium to high potential hazard of salinity. There is also the potential for unexploded ordnance where the Project traverses the former rifle range. There is one property listed on the Environmental Management Register within the disturbance footprint; however, former and existing rail corridors are generally considered areas where contaminated material may occur. **Key findings** Potential impacts to land resources include: ▸ A permanent change in landform and topography in catchments, influencing their ability to retain and move water ▸ Loss of natural soil resources including Class A and Class B agricultural land, and Important Agricultural Areas ▸ Unexpected encounter of ASS or acid rock ▸ Degrading soil resources through invasive flora and fauna ▸ Increased salinity of the landscape causing water table salting, irrigation water salting and erosion scalding ▸ Disturbance of contaminated land (soil and groundwater) ▸ Project activities leading to the generation of new contaminated land (soil and groundwater). Residual impacts on land resources are anticipated to be low, with the exception of changes to landform and topography, loss of soil resources and disturbance of existing contaminated land during the construction phase of the Project which were found to present a medium residual risk. **Proposed mitigation measures** ▸ Refine the disturbance footprint further during detailed design to that required to safely construct, operate and maintain the Project, and minimise impacts to land resources including potential fragmentation and sterilisation of Class A agricultural land, Class B agricultural land and Important Agricultural Areas. ▸ Undertake further geotechnical and soil surveys during to characterise soil and ground conditions across the Project disturbance footprint, including the Toowoomba Range Tunnel, to inform design of structures, embankments, erosion control, soil treatment, soil reuse, as well as rehabilitation works. ▸ Assess the viability of material to be reused as per the ARTC Earthworks Material Specification and the Earthworks and Material Management Framework, including potential environmental harm from the material and the extent of material that may need treatment.

Environmental aspect	Impacts, opportunities and mitigation measures

Land resources (refer Chapter 9: Land Resources) [continued]	▸ Develop and implement:
	  ▸ Contaminated Land Management Strategy
	  ▸ Erosion and Sediment Control Plans
	  ▸ Construction Environment Management Plan
	  ▸ Construction Spoil Management Plan
	  ▸ Reinstatement and Rehabilitation Plan.
	In the event that hazardous materials are identified, a Contaminated and Hazardous Materials Management Plan will be developed and implemented.

Landscape and visual amenity (refer Chapter 10: Landscape and Visual Amenity)	The landscape between Gowrie and Helidon varies greatly, from low-lying alluvial plains with subtle undulations to densely forested elevated areas associated with the Toowoomba Range which forms part of the Great Dividing Range. Visual impacts are typically contained by the presence of vegetation, including along creek lines, and localised undulations in landform. Visual impacts are also contained through the use of a tunnel for a significant length of the Project. Elevated and panoramic views over the Project are also available from the edge of Toowoomba and the Forested Uplands associated with the Toowoomba Range, including from lookouts and walking trails around Picnic Point and from the Toowoomba Bypass. As part of the Landscape and Visual Impact Assessment (LVIA), 20 representative viewpoints were selected and assessed for both the construction and operation phases of the Project. **Key findings** ▸ Landscape and visual impacts of the Project relate to the removal of vegetation, the raising of embankments and the creation of new rail bridges and viaducts. ▸ Eight landscape character types were identified within the landscape and visual impact assessment study area, of which seven are potentially affected by the Project. A major significance was identified for Forested Uplands, associated with the introduction of highly evident viaduct structures, extensive cut and fill, tunnelling and vegetation clearance within the forested landscapes of the Great Dividing Range east of Toowoomba, that are recognised for their high scenic amenity value. ▸ During construction, the greatest visual impact identified was up to High significance, relating to three viewpoints—Viewpoint 13: Keira Court, Blue Mountain Heights looking southeast; Viewpoint 14: Katoomba Point Lookout, Prince Henry Heights looking north; and Viewpoint 15: Looking northeast from Picnic Point Lookout within Picnic Point Parklands, Rangeville. Other impacts of up to Moderate significance are anticipated at seven other viewpoints. ▸ For visual impacts during operation, seven visual impacts of up to High significance were identified. These are associated with Viewpoint 4: Near 10 Paulsens Road, Gowrie, looking southwest towards Gowrie Junction Road bridge; Viewpoint 5: Near 14 Junction Street, Gowrie, looking east towards western tunnel portal; Viewpoint 13: Looking southeast from Keira Court, Blue Mountain Heights; Viewpoint 14: Looking north from Katoomba Point Lookout on Prince Henry Drive, Prince Henry Heights; Viewpoint 15: Looking northeast from Picnic Point Lookout within Picnic Point Parklands, Rangeville; Viewpoint 17: Warrego Highway near Gittins Road, Postmans Ridge, looking west; and Viewpoint 18: Murphys Creek Road near Toowoomba Bypass, looking north. These impacts relate to elevated views from significant locations over the wider Project and/or viewpoints situated in close proximity to the Project. ▸ Three viewpoints will experience visual impacts of up to High significance during construction and operations: Viewpoint 13: Looking southeast from Keira Court, Blue Mountain Heights; Viewpoint 14: Looking north from Katoomba Point Lookout on Prince Henry Drive, Prince Henry Heights; Viewpoint 15: Looking northeast from Picnic Point Lookout within Picnic Point Parklands, Rangeville. These viewpoints are located on top of the Great Dividing Range overlooking Lockyer Valley, where the Project is predominantly located. ▸ For lighting impacts, the most significant effect during construction is up to Moderate for Viewpoint 8: Looking west from Boundary Street bridge over the Toowoomba Bypass. Further, the greatest impact identified during operation is up to Low significance for 13 viewpoints. **Proposed mitigation measures** ▸ Proposed mitigation measures include landscape design, and implementation of the Reinstatement and Rehabilitation Plan and the Landscape and Rehabilitation Management Plan.

Environmental aspect	Impacts, opportunities and mitigation measures

Flora and fauna (refer Chapter 11: Flora and Fauna)	The Project disturbance footprint is contained within the overall ecology study area (1 km buffer either side of the Project disturbance footprint; encompassing a total area of 7,700.22 ha) and is situated within the South East Queensland (SEQ) and Brigalow Belt bioregions. The Project disturbance footprint intersects a variety of landscapes from the agricultural areas on top of the Toowoomba Plateau to the forested foothills of the Great Diving Range.
	Key findings
	• During the surveys works 274 plant species were identified within the ecology study area during Project EIS field assessments. This included 202 (74 per cent) native species, and 72 (26 per cent) non-native species, including 17 restricted matters under the *Biosecurity Act 2014* (Qld). Of these species one species is listed as threatened under the provisions of the EPBC Act and the *Nature Conservation Act 1992* (Qld) (NC Act), with three other threatened plant species listed under the NC Act:
	  ◦ Brush sophora (*Sophora fraseri*)—'Vulnerable' under the EPBC Act and the NC Act
	  ◦ Finger panic (*Digitaria porrecta*)—'Near threatened' under the NC Act
	  ◦ *Cyperus clarus*—'Vulnerable' under the NC Act
	  ◦ Slender milkvine (*Marsdenia coronata*)—'Vulnerable' under the NC Act.
	• During the surveys works 105 fauna species were detected, including 99 (97 per cent) native species and three (3 per cent) non-native species, one of which is a restricted matter. Recorded species consisted of 75 birds, 21 mammals, eight reptiles and one frog. Only two threatened species were detected though habitat for a number of other species was noted during the field surveys. The threatened species that have been identified from the ecology study area, consist of the following:
	  ◦ Koala (*Phascolarctos cinereus*) Vulnerable under the EPBC Act and the NC Act
	  ◦ Collared delma (*Delma torquata*) Vulnerable under the EPBC Act and the NC Act
	  ◦ Five Special Least Concern species under the NC Act were also detected during the surveys.
	• There is one Threatened Ecological Community (TECs) listed under the EPBC Act confirmed as present within the ecology study area and a further two TECs potentially occurring. No TECs are located within the Project disturbance footprint.
	• A number of 'Endangered', 'Of concern' and 'Least concern' REs are also present within the ecology study area which are protected under the *Vegetation Management Act 1999* (Qld) (VM Act). Other sensitive environmental receptors, including protected areas, HVR vegetation and bioregional corridors (of local, regional and state significant) also occur within the ecology study area.
	• Wetland habitats were depauperate across the ecology study area and were mainly associated with riverine habitat and constructed waterbodies. There is however 13.5 lineal km of watercourse within the footprint, thought the majority are drainage lines under the *Water Act 2000* (Qld) or are not mapped as waterways under the *Fisheries Act 1994* (Qld). With the Project design incorporating viaducts over the floodplains of Oaky Creek, Six Mile Creek and Lockyer Creek, and a bridge over Gowrie Creek.
	• Assessment of sensitive environmental receptors against Commonwealth or state significant impact assessment criteria, indicates that the following species will be subject to significant residual impacts as a result of the Project:
	  ◦ Matters listed under the EPBC Act (matters of national environmental significance) (MNES), noting some of the species are threatened under the NC Act:
	  – Brush sophora (*Sophora fraseri*)
	  – Red goshawk (*Erythrotriorchis radiatus*)
	  – Swift parrot (*Lathamus discolor*)
	  – Australian painted snipe (*Rostratula australis*)
	  – Black-breasted button-quail (*Turnix melanogaster*)
	  – Spotted-tail quoll (*Dasyurus maculatus maculatus*)
	  – Koala (*Phascolarctos cinereus*)
	  – Grey-headed flying-fox (*Pteropus poliocephalus*)
	  – Collared delma (*Delma torquata*).

Environmental aspect	Impacts, opportunities and mitigation measures
Flora and fauna (refer Chapter 11: Flora and Fauna) [continued]	▸ Prescribed matters for the State of Queensland: – 'Endangered' or 'of concern' regional ecosystem (RE) – Regulated vegetation (Category B (other than grassland) within a defined distance from the defining banks of a relevant watercourse or relevant drainage feature – Wildlife habitat and essential habitat under the VM Act – Connectivity areas – Nature Conservation (Koala) Conservation Plan 2017 areas: Koala Habitat Areas – Protected wildlife habitat for the following NC Act listed conservation significant flora and fauna species: – Glossy-black cockatoo (*Calyptorhynchus lathami lathami*) – Powerful owl (*Ninox strenua*) – Bailey's cypress (*Callitris baileyi*) – Finger panic (*Digitaria porrecta*) – Slender milkvine (*Marsdenia coronata*). **Proposed mitigation measures** ▸ Undertake flora and fauna surveys to verify previous surveys and assessments, refine potential offset calculations, inform micro-siting of infrastructure, support secondary approvals and establish baseline conditions against which relevant outcomes of the Reinstatement and Rehabilitation Plan can be compared. ▸ Undertake on-ground assessment of all unmapped watercourses intersected by the Project disturbance footprint to determine their status under the *Water Act 2000* (Qld) to inform detailed design and approval requirements. ▸ Undertake on-ground assessment of all waterways in consultation with DAF to confirm whether they are considered to be a waterway providing for fish passage under the *Fisheries Act 1994* (Qld), and, if so, what colour they should be mapped as. This information will inform design and approval requirement, along with mitigation measures including rehabilitation activities. ▸ The design includes a 6.24 km tunnel and 6.7 km of bridges and viaducts which will assist in maintaining connectivity during construction and operations, when complemented with landscaping, fauna fencing and where applicable fauna furniture. ▸ Landscape design establishes the requirements for rehabilitation of disturbed areas for habitat re-creation, landscaping and stabilisation, including for riparian zones and informs the development of the Reinstatement and Rehabilitation Plan and the Landscape and Rehabilitation Management Plan. Provisions of offsets for the MNES and MSES with significant residual impacts will be required under the EPBC Act, Offsets Policy, and relevant Queensland legislation. For matters of state environmental significance, impacts to prescribed matters that are considered to constitute significant residual impacts will need to be offset consistent with the *Environmental Offsets Act 2014* (Qld). The EIS includes ARTC's Environmental Offset Strategy—Qld.
Air quality (refer Chapter 12: Air Quality)	The construction and operation of the Project has the potential to impact existing air quality. Predicted air emissions from the construction phase of the Project were assessed qualitatively. Dispersion modelling assessed line source emissions—operational emissions from freight trains travelling along the track. **Key findings** ▸ The potential for impacts will depend on the proximity of sensitive receptors. The assessment determined that, without mitigation, there is a potential 'high risk' of human health impacts from the construction of the Project, but a 'medium risk' of impacts from dust deposits. By implementing the proposed mitigation measures, the impacts to air quality from both dust deposits and human health will be reduced to acceptable levels. ▸ In the construction phase of the Project, dust sources will be variable and transitory in nature and the potential for impacts depend on the proximity to sensitive receptors. ▸ Assessments show that during the operation phase, compliance for all pollutants is predicted for all traffic-volume scenarios, with and without, veneering. ▸ The tunnel portals will not significantly contribute to the air emissions around the portal, with the man source being the crossing loops. This is due in part of the design of the tunnel ventilation systems and the requirement to reduced air pollutants to allow trains to operate in the tunnel.

Environmental aspect	Impacts, opportunities and mitigation measures
Air quality (refer Chapter 12: Air Quality) [continued]	▸ The potential for the operational phase of the Project to impact tank water quality was also specifically investigated. Investigation of dust emissions showed the Australian Drinking Water Guidelines (NHMRC, 2018) will be met by a significant margin at all receptors. ▸ Predicted dust deposition levels are also well below the levels that have been shown to impact crops and livestock, and therefore the impact of dust deposition on agricultural uses within the air quality impact assessment study area is not anticipated to be significant. ▸ Odour emissions from agriculture freight are considered unlikely to result in significant impact to neighbouring sensitive receptors due to the frequency and duration of the odour generating event (train pass-by) and the predominantly rural nature of the air quality impact assessment study area. **Proposed mitigation measures** ▸ Mitigation measures for trackout (e.g. water sprays on haul roads) will need to be implemented diligently near urban areas to ensure that emissions are minimised to reduce the risk of impacts.
Surface water and hydrology (refer Chapter 13: Surface Water and Hydrology)	The Project traverses through two sub-catchments of the Lockyer Creek catchment and one sub-catchment of the Condamine River Basins and is expected to cross the floodplain of four major watercourses, being Gowrie Creek, Oaky Creek, Six Mile Creek and Lockyer Creek. **Key findings** ▸ Construction activities may result in increased salinity, debris, contaminants, erosion, and sedimentation within watercourses. In addition, water discharged from the tunnel may also cause changes to water quality. If rehabilitation is inadequate, these impacts are likely to be exacerbated. ▸ Groundwater inflow at the western tunnel portal during operations can be directed to the surrounding environment (i.e. the water quality meets the relevant water quality objectives, noting that the local community relies on groundwater from the main range volcanics for domestic purposes). ▸ The Project may also cause changes to the existing flood regime, such as changes in peak water levels and associated inundation, concentration of flows, redirection of flows, increased velocities leading to localised scour and erosion, and changes to duration of inundation or increased depth of water. ▸ There are no changes in peak water levels on any State-controlled roads for all events up to and including the PMF event. ▸ Under the 1% Annual Exceedance Probability (AEP) existing case, the QR Western Line overtops for a length of approximately 250 m at Gowrie. Under the 1% AEP developed case, event flood waters are retained behind the new rail embankment essentially throttling the flow reaching the Western Line. For the Western Line, there is a very localised increase in peak water levels by up to 200 mm that occurs over a length of approximately 20 m however this section of the QR Western Line remains free from overtopping and flood levels are below the existing formation level. The rest of existing Western Line has improved immunity with the 250 m of rail that was previously overtopped now dry. **Proposed mitigation measures** ▸ Key measures associated with the management of surface water quality impacts include developing and implementing the Construction Environmental Management Plan (CEMP), an Erosion and Sediment Control Plan, the Reinstatement and Rehabilitation Plan and a construction water quality monitoring program. ▸ Construction water will be sourced from the capture and reuse of water from the construction of the tunnel and recycled water pipelines (subject to approval). Water treatment plants will be used to treat groundwater inflow during construction and operations of the tunnel, with the water to be reused or discharged into the surrounding environment, subject to approval conditions and water quality objectives. ▸ The Project has been designed to achieve a 1% Annual Exceedance Probability flood immunity. Bridges and culverts have been designed and located to maintain existing surface water flow paths and flood flow distributions, and to avoid unacceptable increases in peak water levels, flow distribution, velocities and duration of inundation. The predicted impacts on the flood regime generally comply with the Project's flood impact objectives. ▸ Acceptable localised impacts will ultimately be determined during detailed design on a case-by-case basis, in consultation with stakeholders and landholders using the flood impact objectives as a guide.

Environmental aspect	Impacts, opportunities and mitigation measures
Groundwater (refer Chapter 14: Groundwater)	The Project is located in the Clarence Moreton Basin with the geology and hydrogeological regime influenced by the Great Dividing Range, where it is a regional groundwater divide. West of the GDR is associated with the Main Range Volcanics and east of the GDR transitions to the Koukandowie Formation, which is outcropped by Gatton Sandstone. The Toowoomba Range Tunnel intercepts and underlays an aquifer associated with the Main Range Volcanics, and overlays the hard rock Koukandowie Formation and associated aquifer. Groundwater gently decreases to the west of the divide and decreases steeply east down the escarpment towards Helidon. The flow direction of the alluvium aquifer may be represented by the surface water catchment boundaries, which correlates well with the groundwater divide observed. Local groundwater flow in shallow alluvium aquifers is influenced by surface water-groundwater interaction, where there is a hydraulic connection. This is observed along Gowrie Creek, which flows west into the Condamine River Basin and it is expected that groundwater in the shallow Gowrie Creek alluvium has a similar trend. East of the GDR, the Project crosses Rocky Creek, Oaky Creek and Six Mile Creek, which flow east, and feed Lockyer Creek and it is expected that groundwater flow in the shallow alluvium follows the surface water pathways. Sixteen registered bores were identified within the Project disturbance footprint, with fourteen to be decommissioned. **Key findings** ▸ Key impacts on groundwater include: ▸ Loss of, or damage to, registered (and unregistered) bores ▸ Changes to groundwater level and flowpaths from embankment loading ▸ Reduced groundwater levels due to seepage into cuttings ▸ Reduced groundwater levels during the construction and operation of the Toowoomba Range Tunnel, which may impair existing groundwater users access to water ▸ Changes to groundwater quality from spills and uncontrolled releases, or from acid rock drainage. **Proposed mitigation measures** ▸ Undertake additional investigations and assessment of potential drainage/dewatering impacts associated with the tunnel through the Toowoomba Range, portals and deep cut sections to further refine current understanding, inform detailed design, identify potential for impacts to and mitigation measures for groundwater users. This will also inform requirements for monitoring during construction and potentially operation. Where applicable, update the groundwater model. ▸ Undertake a bore survey and, where applicable, a bore assessment to identify all groundwater bores within the Project disturbance footprint and the predicted drawdown extents. These surveys will aim to confirm the purpose of the bores, the bores conditions, groundwater level and quality. ▸ Baseline groundwater-level monitoring is required to confirm groundwater levels at the tunnel and inform additional investigations and modelling. ▸ Undertake ground-truthing of groundwater dependent ecosystems to confirm drawdown and inflow rates to deep cuts that intersect groundwater. A Groundwater Management and Monitoring Program will be developed to provide ongoing assessment of the potential impacts. Groundwater monitoring will be conducted before, during, and after the completion of construction works. The program will set out groundwater sampling locations, frequency of sampling, and the analytical program. Roles and responsibilities will be set out to clearly establish the review and approval process that will be used to evaluate the data collected as part of the monitoring program. The assessment concluded that after mitigation measures are implemented, the residual significance for the majority of potential impacts identified is expected to be low. A moderate residual significance remains for construction impacts of potential contamination, or degradation of groundwater quality, including from spills and uncontrolled releases, water mixtures and emulsions from washdown areas, and wastewater from construction sites.

Environmental aspect	Impacts, opportunities and mitigation measures

Noise and vibration (refer Chapter 15: Noise and Vibration)	Both construction and operational noise and vibration impact assessments have been undertaken for the Project. These assessments included consideration of airborne noise, construction blasting, ground-borne vibration, tunnel construction, ground-borne noise, and construction road traffic noise.
	Key findings
	Construction
	Construction noise has the potential to exceed the established criteria at various sensitive receptors. The potential significance of the impacts can be minimised due to the mobile nature of most of the construction works. The number of sensitive receptors affected at any one time and the duration of the impact depends on the type of works and the progression of works along the alignment.
	▸ Reasonable worst-case construction scenarios have been assessed for each of the main construction activities. The worst-case impacts are noted below:
	  ▸ Construction noise (earthworks) during non-standard work hours is predicted to exceed the criteria at 2,131 sensitive receptors
	  ▸ Construction vibration criteria is expected to be exceeded at up to 175 sensitive receptors during non-standard hours
	  ▸ Construction traffic on five roads is predicted to exceed the established noise criteria
	  ▸ 72 residential receptors are predicted to exceed the non-standard hours ground-bourne noise criterion during tunnel construction
	  ▸ There are no predicted exceedances of ground-borne vibration from tunnel construction at any sensitive receptors
	  ▸ Blasting charge masses are not known at this stage. Therefore, maximum allowable instantaneous charge masses have been provided at indicative distances from sensitive receptors.
	▸ Limiting the Project's construction hours to within the *Transport Noise Management Code of Practice Volume 2: Construction Noise and Vibration* (CoP Vol 2) (DTMR, 2015a) standard hours has the potential to significantly reduce the number of sensitive receptors impacted by the construction of the Project. Restricting works to these hours (which is in line with the planned construction hours) reduces the number of impacted receptors by approximately 40 per cent for drainage works, rail and road civil works, and up to a 65 per cent reduction for site setup/laydown and structures. A much smaller change of 20 per cent is evident for earthworks.
	▸ Based on the construction noise assessment and proposed mitigation, construction noise impacts at 46 per cent of receptors are not predicted to be feasibly mitigated to below the appropriate criterion by physical attenuation alone. This assessment includes the consideration of the worst-case construction works scenarios during non-standard work hours. However, these residual impacts present will be temporary and will stop when construction finishes. Managing residual impacts will be undertaken in consultation with the affected landholders.
	Operation
	▸ With consideration to the existing surrounding environment, it is reasonable to expect that noise from railway operations could be audible even where the adopted noise management are achieved.
	▸ The assessment determined that noise emissions from railway options (rolling stock, crossing loops and level crossings) would achieve the assessment criteria at the majority of sensitive receptors.
	▸ At Project opening in the year 2027 there are 32 sensitive receptors (31 properties assumed to be residential and the Gowrie State School) where the predicted railway noise levels have triggered the investigation of feasible and reasonable noise mitigation measures. Because the majority of train movements are expected at the Project opening, the growth in forecast rail traffic has identified an additional one sensitive receptors triggered the noise mitigation review for the design year of 2040 (total 33 receptors triggering a review of mitigation).
	▸ Of the 32 sensitive receptor triggering mitigation, 19 are associated with the brownfield section at Gowrie Junction and 13 are associated with the greenfield section. The noise criteria were most frequently trigged by the night-time L_{Aeq} rail noise levels, as the number of trains per hour is greater during the night-time and the noise criteria are 5 dBA more stringent than the daytime.

Environmental aspect	Impacts, opportunities and mitigation measures

Noise and vibration (refer Chapter 15: Noise and Vibration) [continued]	▸ The assessment of ground-borne noise and vibration from railway operations, including within the Toowoomba Range Tunnel, determined that predicted levels would achieve the criteria for ground-borne noise and ground-borne vibration at the identified sensitive receptors.
	▸ An assessment of the operational fixed infrastructure noise was carried out and noise levels were predicted to meet the *Environmental Protection (Noise) Policy 2019* (EPP (Noise)) acoustic quality objectives at all sensitive receptors.
	▸ A desktop assessment of road traffic noise impacts from the eight road segments changed by the Project was undertaken. The assessment determined that new roads, Morris Road, Gowrie Junction Road, Paulsens Road and Old Homebush Road will result in exceedances at nearby sensitive receptors of the road traffic noise criteria for proposed new roads.
	Proposed mitigation measures
	Construction
	▸ During detailed design, review and update the construction noise and vibration assessment will reflect the final location of construction sites, construction activities and construction scheduling to inform the development of the CEMP's Noise and Vibration Sub-plan to achieve the performance criteria and inform the Construction Noise and Vibration Management Plans.
	▸ Building condition surveys will be undertaken for vibration-sensitive receptors identified as potentially exposed to vibration impacts from the Project works during the detailed design phase's modelling and assessment.
	▸ Develop and implement the CEMP.
	▸ The management of residual impacts will be undertaken in consultation with the affected landholders.
	Operation
	▸ During detailed design, review and update the operational road traffic noise to reflect/inform the detailed design, including incorporation of potential noise treatments.
	▸ Operational mitigation measures proposed include:
	  ▸ Effective community communication
	  ▸ Attenuation of the tunnel ventilation plan
	  ▸ Architectural treatments
	  ▸ Mitigation of impacts will be undertaken in consultation with affected occupants.
	▸ The operational railway noise and vibration levels will be verified through a program of noise and vibration monitoring when the Project is operational. The monitoring program would be undertaken within the initial six months post-commencement of railway operations (Inland Rail freight train movements) on the Project.
	▸ Investigate feasible and reasonable mitigation measures where monitored noise and/or vibration levels at sensitive receptors are confirmed to be above the adopted criteria.
	▸ Specific measures to mitigate operational road traffic noise may include realignment of these road segments during detailed design and a reduction of speed limits along these segments.

Environmental aspect	Impacts, opportunities and mitigation measures

Social (refer Chapter 16: Social)	The purpose of the social impact assessment was to identify how the Project may affect local and regional communities, and how the proponent and its contractors will work with stakeholders to enable mitigation of negative social impacts and enhancement of Project benefits. Stakeholders who were engaged included directly affected and nearby landholders, traditional custodians, government agencies, businesses, and community, environmental and economic groups.
	Key findings
	Potential social impacts at a local level include:
	▸ Property impacts such as land acquisition and the severance of productive agricultural land
	▸ Community conflict regarding the Project, which may affect community cohesion and family networks
	▸ Amenity impacts due to noise, vibration, dust, changes to the landscape and increased traffic
	▸ Traffic delays during construction of bridges, viaducts, the Toowoomba Range Tunnel and other Project infrastructure
	▸ Periodic traffic delays at rail–road interfaces during construction, potentially delaying traffic including emergency service vehicles enroute to an emergency
	▸ Inconvenience to motorists as a result of the closure of public roads that are not required for network connectivity or property access, in order to accommodate the Project.
	At a regional level, potential impacts identified were:
	▸ If multiple infrastructure projects are constructed at the same time, there may be a significant draw on trades and construction labour
	▸ Demand for local health and emergency is likely to increase during the construction phase
	▸ The construction phase represents an important source of training and career development for young people and Indigenous people
	▸ The coincidence of several major projects' construction phases has potential to strain the capacity of the Project region's construction labour force, with a cumulative increase in numbers of non-local personnel and consequent impacts on rental housing availability
	▸ The Project may change the settlement pattern in the areas designated for rural living at Helidon Spa and Postmans Ridge Road where land is within 250 m of the alignment.
	
	In contrast to the potential adverse impacts, the local community will benefit from construction and operation of the Project. The Project would generate employment for up to 596 people over the construction period. This is expected to contribute to financial and housing security, self and family care and social connections. Training opportunities will also be provided for people who are disadvantaged in the current labour market, including young people and Indigenous people. Local businesses will have the opportunity to supply the Project with fuels and oils, construction materials and services, including fencing, electrical installation, trades services, professional services, rehabilitation and landscaping and earthworks.
	Social Impact Management Plan
	▸ A SIMP has been developed to address social impacts, encourage investment in local communities and offset impacts on distributional equity. The SIMP includes five action plans: Community and Stakeholder Engagement; Workforce Management; Housing and Accommodation; Health and Community Wellbeing; and Local Business and Industry. Each action plan includes objectives and desired outcomes, mitigation measures, and the timing for delivery of these mitigation measures.
	▸ The Proponent will engage with the delivery organisation and stakeholders, as identified in the action plans, to review the measures outlined in the SIMP. This review will inform the delivery organisation's implementation of SIMP commitments and ARTC's social performance program delivery including:
	  ▸ Partnerships and projects to support mitigation and enhancement of benefits
	  ▸ The respective responsibilities of the Proponent and other stakeholders
	  ▸ The program for implementation
	  ▸ SIMP monitoring.

Environmental aspect	Impacts, opportunities and mitigation measures
Economics (refer Chapter 17: Economics)	**Key findings** ▸ The Project will support regional and local economic development. ▸ The Project is expected to provide a total of $81.54 million ($2019 present value terms) in incremental benefits (at a 7 per cent discount rate). These benefits result from improvements in freight productivity, reliability and availability, and benefits to the community from crash reductions, reduced environmental externalities and road decongestion benefits. ▸ The Project will promote regional economic growth across the Toowoomba labour market region. Using recent labour market trends and projected construction sector activity to inform workforce capacity and capability within the local region, it is concluded that it is likely that the labour market conditions that will prevail during the construction phase of the Project will most likely be closer to those characterised by the 'slack' labour market scenario. Under this scenario, over the construction phase, real Gross Regional Product is projected to be $595 million higher than the baseline level. ▸ Under a slack labour market scenario, the Project is also expected to deliver an additional 1,027 jobs (direct and indirect) per year over the construction period. ▸ As part of the Inland Rail Program, the Project has the potential to unlock the construction of ancillary and complementary infrastructure, industrial development and logistics operations within the local area. Specifically, the Project will act as a significant catalyst for development in the planned and existing industrial areas at the Toowoomba Enterprise Hub and Gatton West Industrial Zone. For example, the Project design allows for an interface between the Project, InterLinkSQ and the QR Network at Gowrie. **Proposed mitigation measures** ▸ Implement the SIMP, particularly the Local Business and Industry Action Plan.

Environmental aspect	Impacts, opportunities and mitigation measures
Cultural heritage (refer Chapter 18: Cultural Heritage)	Indigenous cultural heritage ▸ As a requirement of the Indigenous heritage component of the Project ToR, a Cultural Heritage Management Plan (CHMP) was to be developed with the relevant Aboriginal Parties for the disturbance area and be approved by the Chief Executive of the Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP). ▸ This process was undertaken by ARTC in 2018 with the Yuggera Ugarapul People and the Western Wakka Wakka People in accordance with the requirements of Part 7 of the *Aboriginal Cultural Heritage Act 2003* (Qld) (ACH Act), and the Cultural Heritage Management Plan Guidelines (DATSIP, 2005). ▸ The CHMP (CLH017009) has been approved under the ACH Act. Non-indigenous cultural heritage ▸ 17 heritages places relevant to the Project. This included five places of State significance, including the Main Range Railway (601480), which the Project traverses under (~100 m) at Ballard (i.e. the West Moreton System rail corridor) and 11 sites listed as locally significant under the relevant planning scheme, with the Project traversing one of these sites: the Bicentennial National Trail. The landscapes associated with the Great Dividing Range, which the Project passes through, are also listed on the non-statutory Register of National Estate. ▸ The assessment found that, with appropriate measures, the Project impacts are neutral (no impact) for 14 of the registered sites, and slight for the Main Range Railway (601480) and neutral/slight for the Bicentennial National Trail. The Mount Lofty Rifle Range impacts were also considered to be neutral. ▸ 36 Areas of Interest (AOI) within the cultural heritage study area, including the Bicentennial National Trail at Gittins Road, Withcott and a rail bridge on the Main Line at Mount Kynoch, which is part of the Main Range Railway (601480). 30 sites were subject to a visual inspection. ▸ Of the 30 AOI that were inspected, the assessment found that 18 of the AOIs did not possess any historic structures, remains, or areas of archaeological potential. The significance of the remaining 12 AOIs, which possessed a range of heritage values, significance or potential, were assessed in accordance with the *Queensland Heritage Act 1992* (Qld) (QH Act) and DEHP 2013. The assessment determined that six of the AOIs are of local heritage significance (but currently unlisted) meaning that they have 'aesthetic, historic, scientific or social value for past, present or future generations'. The Bicentennial National Trail was also considered to be locally significant. The assessment found that, with appropriate measures, the Project impacts could be reduced to neutral or slight for all six sites. **Proposed mitigation measures** ▸ Provide opportunities for ARTC staff and contractors to learn about the Aboriginal cultural heritage and non-Indigenous heritage associated with the delivery of the Inland Rail Program. ▸ Project works avoids direct and indirect impacts (e.g. vibration) to identified items/sites/areas of Aboriginal heritage significance, historic and natural heritage significance, where practicable. ▸ Building condition surveys will be undertaken at all vibration-sensitive receptors identified during detailed design as being subject to potential vibration impacts, which may include structures of heritage value

Environmental aspect	Impacts, opportunities and mitigation measures
Traffic, transport and access (refer Chapter 19: Traffic, Transport and Access)	The traffic impact assessment assessed the construction and operation phases of the Project. **Key findings** ▸ The Project is co-located with the West Moreton System for 5.6 km and crosses over the Main Line at Helidon. A new road bridge over the Western Line is also proposed at Gowrie, along with a spur line to allow trains to access and exit from Toowoomba. This complies with the State Planning Policy and interest guidelines relevant to transport. ▸ The Project generally aligns with the Gowrie to Grandchester future state transport corridor and does not preclude the construction of a dedicated passenger rail within the corridor in the future, including disrupting potential train stations. This complies with the State Planning Policy and interest guidelines relevant to transport. ▸ Two SCRs will interface with the proposed rail alignment, the Toowoomba Bypass, and Murphys Creek Road. These roads will also cater for the expected construction traffic with analysis indicating that the construction traffic would exceed five per cent of the background traffic ▸ 40 local government roads have been identified that are expected to have construction traffic exceed 5 per cent of the background traffic; however, the impact to many of these roads is expected to be minimal because the high percentage of construction traffic is a function of low existing traffic volumes. ▸ Certain sections will generate construction related traffic volumes in excess of 5 or 10 per cent of the background traffic during the construction phase, which may potentially cause a minor change in the level of service for some road sections during each year of construction. ▸ Local road networks changes are warranted to accommodate the Project including the closure of Morris Road and the realignment of Gowrie Junction Road. The traffic analysis predicts that these changes are not likely to impact connectivity or capacity in the shot and long terms. ▸ The Project will provide a more efficient and direct route through Toowoomba Range, along with interoperability between the QR and ARTC networks, which aligns with a number of planning and transport plans. ▸ The Project also proposes to eliminate an existing public level crossing on the QR network at Gowrie, while no public level crossings are proposed for the Project. To facilitate the closure of the existing crossing Gowrie Junction Road will be realigned, with a new road over rail bridge providing north south connectivity across Gowrie Creek and the new and existing rail corridors. **Proposed mitigation measures** ▸ Ongoing consultation with QR and DTMR to resolve the interface issues such as spacing, connections, integration of the two networks etc. ▸ Continue to engage with DTMR of more detailed Traffic Impact Assessment, Road Pavement Impact Assessment and Safety Audit/Assessment and resultant mitigation measures. ▸ Continue to engage with DTMR, TRC and LVRC to formalise the design and end of life requirements for the impacted local and State-controlled road networks. ▸ A Traffic Management Plan and Road Use Management Plan will be developed and implemented as part of the CEMP in consultation with DTMR, TRC, LVRC and, where applicable, QR.

Environmental aspect	Impacts, opportunities and mitigation measures

Hazard and risk (refer Chapter 20: Hazard and Risk)	Natural, Project-related and dangerous goods risks and hazards were assessed for design and pre-construction, construction and commissioning, and operation, including maintenance. This assessment considered potential impacts to people, property and the environment either initiated or exacerbated by the Project. This assessment also included risks to the Project from external factors such as climate change, subsidence or biosecurity hazards. Findings and outcomes of environmental investigations completed during the development of the EIS were incorporated into the assessment.
	Key findings
	▸ No hazards were identified as having a high residual risk following application of proposed mitigation measures. Potential hazards assessed as having a medium residual risk included:
	  ▸ Natural hazards: bushfire; flooding; severe weather events; landslide, sudden subsidence or movement of rocks or soil; natural events exacerbated by climatic conditions; and impacts of the Project on greenhouse gas emissions
	  ▸ Project hazards: employee fatigue and/or heat stress; rail accidents caused by increased rail movements; increased use of road vehicles for the Project; increased number of interfaces between live trains and road users including pedestrians and land users; construction and use of the Toowoomba Range Tunnel; bridges/viaducts; interaction with existing services underground and overhead; health and environmental impacts from contaminated land (construction) and interference with emergency access
	  ▸ Dangerous goods and hazardous chemicals: the transport of dangerous goods freight during operations; and the potential use of explosives for construction (particularly the Toowoomba Range Tunnel).
	Proposed mitigation measures
	▸ An Incident Management Plan will be developed to detail procedures and resources with which emergencies will be responded to and managed.
	▸ ARTC's existing Emergency Management Procedure will continue to be implemented.
	▸ ARTC's Safety Policy (ARTC, 2020d) and Fatal and Severe Risk Program (ARTC, 2017c) will be fully implemented.

Waste and resource management (refer Chapter 21: Waste and Resource Management)	Project waste management requirements were assessed, including the identification of the applicable regulatory framework, waste management strategies and waste stream composition and quantity. Spoil management is also addressed, including the development of Appendix T: Spoil Management Strategy. **Key findings** ▸ Established waste management facilities in proximity to the Project are located throughout Toowoomba and Lockyer Valley, with the Toowoomba Waste Management Centre identified as the major facility that has the greatest potential to service the Project due to its annual capacity and proximity to the Project. ▸ The construction phase of the Project will generate the majority of waste through vegetation clearing, access track and bulk earthworks as well as tunnel portal development and topsoil stripping. Municipal solid waste will be generated by the Project through activities occurring at construction locations and on multiple work fronts. ▸ The Project is anticipated to generate approximately three million cubic metres of excavated material from tunnelling and earthworks during construction. Approximately 2,100,000 m^3 of the excavated material will be reused within the Project as fill, leaving an excess of approximately a one million cubic metres as spoil. The majority of the excess material, approximately 730,000 m^3, will result from the construction of the tunnel (excluding the portals). The design allows for the storage of excess material (i.e. spoil) from the construction of the tunnel as a stockpile within the proposed rail corridor at the western tunnel portal. ▸ With the exception of spoil, which will arise during construction, no significant waste streams have been identified for the Project. As waste streams are not considered significant, they have been categorised at a broad level and will be managed in accordance with standard industry practice and accommodated within the capacity of existing waste management arrangements that exist in the Project locality.

Environmental aspect	Impacts, opportunities and mitigation measures
Waste and resource management (refer Chapter 21: Waste and Resource Management) [continued]	**Proposed mitigation measures** ▸ Cut and fill balance and minimisation of transport requirements for import/disposal of spoil to be further refined during detailed design by implementing the spoil management hierarchy presented in Appendix T: Spoil Management Strategy. ▸ Establish waste reduction targets for design and construction and undertake a waste reduction review to identify opportunities to meaningfully achieve the waste reduction targets through designed design and construction of the Project. ▸ Establish waste reporting requirements for the pre-construction, construction and commissioning phases of the Project for incorporation into the Waste Management Sub-plan. ▸ Develop and implement a Waste Management Sub-plan as part of the CEMP.
Cumulative impacts (refer Chapter 22: Cumulative Impacts)	The purpose of the cumulative impact assessment is to present clear and concise information on the cumulative impacts of specific environmental aspects that could occur as a result of the Project's development in conjunction with other proposed developments. The cumulative impact assessment for the Project considered up to 15 projects that have the potential to contribute to cumulative impacts. For some environmental aspects such as Social and Traffic, transport and access projects such as the Cross River Rail project were also considered. The cumulative impact assessment relies on publicly available information, and depending on the level of information available, conservative assumptions about a project's impact have been adopted (e.g. area of vegetation to be cleared). **Key findings** ▸ Potential cumulative impacts on environmental aspects were considered of low significance, with the exception of potential cumulative impacts on the following environmental aspects: land resources, landscape and visual amenity, flora and fauna, social, non-Indigenous cultural heritage and traffic, transport and access. ▸ Potential cumulative impacts associated with the loss of biodiversity and cultural heritage aspects within the respective areas of interest are common to all projects in the cumulative impact assessment; therefore, these impacts are cumulative by nature. Similarly, projects in the landscape and visual amenity cumulative impact assessment are likely to exacerbate impacts from the Project through combined, successive, and sequential views of adjoining projects. ▸ The expansion in construction activity and employment within the region, with a subsequent increase in temporary and non-resident population, has the potential to increase demand for a range of local infrastructure and services, including housing, healthcare, childcare, and education. Further, spending on consumer-orientated products by the construction workforce has the potential to benefit local retail businesses by increasing their trading levels. **Mitigation measures** ▸ Each of projects will be required to mitigate and manage potential cumulative impacts to acceptable levels. The proposed delivery approach for the Gowrie to Helidon, Helidon to Calvert and Calvert to Kagaru Projects and, where applicable, other Inland Rail Projects, provides opportunities to coordinate the management of cumulative impacts generated as a result of construction traffic movements, workforce requirements (including accommodation requirements), spoil management and reuse, and strategic identification and provision of environmental offsets (for ecological receptors). These aspects will be considered collectively across these three projects in future delivery stages.

24.8 Approach to environmental management

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

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

- Includes discipline-specific plans, drawing on the outcomes of the environmental assessments documented in the Draft EIS. The Draft Outline Environmental Management Plan establishes the framework for the Outline CEMP and subsequent development of the CEMP. The Draft Outline Environmental Management Plan identifies:
  - Environmental outcomes
  - Performance criteria
  - Proposed mitigation measures
  - Monitoring requirements.

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

Any conditions imposed by the Coordinator-General in the EIS evaluation report or by the Australian Government Minister for the Environment (or their delegate), along with any approval conditions from regulators post-EIS approval will need to be incorporated into future versions of the Outline EMP and the CEMP to ensure that all works are authorised and consistent with those conditions.

ARTC has also executed a CHMP with each of the respect Aboriginal Parties relevant to Project, in accordance with the requirements of Part 7 of the *Aboriginal Cultural Heritage Act 2003* (Qld) and the Cultural Heritage Management Plan Guidelines (Department of Aboriginal Torres Strait Islander Partnerships (DATSIP), 2005), and approved by the Chief Executive of DATSIP in 2018 (CLH017009). The resulting CHMPs (CLH017009) entered into with the Aboriginal Parties will allow for the identification, assessment and management of Aboriginal cultural heritage in the plan area (as defined in the CHMP) throughout all Project delivery phases.

24.9 Concluding statement

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

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

The Project will also provide for a more direct and efficient route across the Toowoomba Range which would benefit existing and future rail operators, benefiting south-west Queensland as well as SEQ, which aligns with a number of state and regional plans for the area.

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* (DTMR, 2019a), the *Inland Rail Programme Business Case* (ARTC, 2015a) and Australian Government expectations.

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

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

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

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

Effective mitigation measures to address potential impacts of the Project are detailed within the EIS. The measures will be further developed, implemented and maintained as the Project progresses through future stages of development.

Implementing recommended mitigation and management measures, and adopting each commitment made, will minimise environmental issues.

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

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