CHAPTER 24

Conclusion

CALVERT TO KAGARU ENVIRONMENTAL IMPACT STATEMENT

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

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24.1 Overview

This draft Environmental Impact Statement (EIS) has assessed the potential environmental, social, and economic impacts and benefits from construction and operation of the Calvert to Kagaru Project (the Project), part of the Inland Rail Program (Inland Rail).

The Project was declared a 'coordinated project for which an EIS is required' by the Queensland Coordinator-General on 16 June 2017 under Section 26(1)(a) of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act). On 21 June 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 2017/7944 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 *Environment Protection and Biodiversity Conservation Act 1999* (Cth). It addresses the *Terms of Reference for an Environmental Impact Statement: Inland Rail—Calvert to Kagaru Project*, dated December 2017 and provides analysis and assessment of potential environmental and socio-economic impacts from the Project.

24.2 Project description

The construction and (where applicable) operation of the following has been assessed in this draft EIS:

- Approximately 53 kilometres of single-track, dual-gauge rail line with four crossing loops, initially constructed for 1,800 metre long, double-stacked trains, and designed so as not to preclude the future extension of some crossing loops to accommodate 3,600 metre trains
- A 1,015 metre tunnel through the Teviot Range and bridges to accommodate the topography and to cross waterways and other infrastructure
- Tie-ins to the existing West Moreton Railway Line and to the existing operational Sydney to Brisbane Interstate railway line at the Project boundaries
- Allowance for a future connection to the Ebenezer Industrial Area at Willowbank
- Construction of associated rail infrastructure, including maintenance sidings and signalling infrastructure to support the Advanced Train Management System
- Rail crossings, including level crossings, grade separations and road overbridges, occupational and private crossings, fauna crossing structures, signage, and fencing
- Significant embankments and cuttings along the length of the alignment
- Ancillary works, including road and public utility crossings and realignment (excluding enabling works)
- Construction worksites, laydown areas and access roads
- The estimated capital expenditure for construction of the Project is approximately $648 million.[1]

The Project is located within the Ipswich City Council, Logan City Council and Scenic Rim Regional Council local government areas in South East Queensland. It will generally be located within the Southern Freight Rail Corridor (SFRC), which was gazetted in November 2010 as future railway land under the *Transport Infrastructure Act 1994* (Qld).

1. Estimated total Project capital expenditure is incurred during construction and is to the nearest $100 million. Capital expenditure used in economic modelling for the Project is included in Appendix S: Economic Impact Assessment Technical Report.

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 Calvert to Kagaru Project will be fully realised when considered with the benefits of the full Melbourne to Brisbane alignment.

Key benefits specific to the Project include:

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

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 and 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 E: Proponents Commitments.

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

24.5 Community and stakeholder consultation

The assessment methodologies adopted for the purpose of this draft EIS have been presented to, and discussed with, relevant regulatory agencies. 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 is necessary to understand constraints, values, and impacts.

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

- Raise awareness about the Project, including the need for the Project, its benefits and the process undertaken to develop the design and draft EIS
- Verify the appropriateness of assessment methodologies adopted for the draft EIS
- Provide stakeholders with opportunities to inform investigations being undertaken for the design and draft 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 draft EIS
- Understand stakeholder and community issues and, where possible, address any issues raised. Stakeholder and community feedback and comments received from the consultation process have informed the preparation of the draft EIS including:
  - Identifying community values and local conditions in proximity to the Project
  - Assessing potential benefits and impacts of the Project's construction and operation
  - Identifying management 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 consultation process was also structured to allow input from:

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

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

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 F: 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 provides a concise summary of the key findings of the EIS including potential impacts, benefits, and opportunities, along with design responses and proposed mitigation measures.

TABLE 24.1 KEY IMPACTS AND MITIGATION MEASURES

Environmental aspect	Impacts, opportunities, and mitigation measures

Land use and tenure (refer Chapter 8)	The Project has been designed to follow the SFRC (gazetted as future railway land) as much as possible. Where required, refinement of the Project alignment outside the Southern Freight Rail Corridor has aimed to avoid, then minimise, further impacts to land uses.
	Key findings
	▸ Potential impacts on land use and tenure include:
	  ▸ Changes in tenure and loss of property
	  ▸ Disruption to land subject to native title claims
	  ▸ Temporary and permanent changes in land use, including the loss of agricultural land and disruption to agricultural practices
	  ▸ Impacts to accessibility, including impacts on the road network and to private property access
	  ▸ Disruption, relocation and modification to services and utilities.
	▸ The Project is also likely to result in a number of land use benefits or opportunities, including supporting future industries, improving access to and from regional markets, and acting as a catalyst for development in the area.
	Proposed mitigation measures
	▸ 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.
	▸ Where feasible, detailed design and construction planning aims to minimise alteration to the surrounding road and transport network and maintain legal property accesses.
	▸ Develop and implement a Reinstatement and Rehabilitation Plan for areas within the disturbance footprint that do not form part of the permanent works.
	▸ Develop and implement a Landscape and Rehabilitation Management Plan to define progressive and post-construction installation of the Project landscape design, and establishment, maintenance, monitoring and completion criteria.

Land resources (refer Chapter 9)	The land resources study area broadly consists of three distinct topographical areas: the western lowlands, the central ranges (Teviot Range), and the Beaudesert Basin. The landscape reflects the underlying geology with a central anticline, forming rugged sandstone hills, and flanking synclines containing coal, sedimentary and igneous rocks that form gently undulating lowlands. The lowlands are traversed by numerous ephemeral and perennial watercourses that have given rise to several wide floodplains. Five distinct soil types occur in the land resources study area: vertosols, sodosols, dermosols, chromosols and rudosols. Sodosols, chromosols and dermosols are the most susceptible to dispersion and have the potential for severe erosion along hillsides. No acid sulfate soils were found. In addition, there is a medium-to-high potential hazard of salinity.
	Key findings
	▸ Potential impacts to land resources include:
	  ▸ Permanent change to landform and topography, influencing the ability to retain and move water within soil catchment systems
	  ▸ Loss of soil-related natural resources including agricultural areas
	  ▸ Unexpectedly encountering acid sulfate soils or acid rock
	  ▸ Degrading soil resources through invasive flora and fauna
	  ▸ Increased salinity causing water table salting, irrigation water salting and erosion scalding
	  ▸ Disturbance of existing contaminated land
	  ▸ Creation of new contaminated land resulting from Project activities.

Environmental aspect	Impacts, opportunities, and mitigation measures
Land resources (refer Chapter 9) (continued)	▸ Residual impacts are of the Project on land resources are anticipated to be low, except for changes to landform and topography, loss of soil resources and the potential for disturbance of existing contaminated land. **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 detailed design to characterise soil and ground conditions across the disturbance footprint. ▸ Develop and implement: ▸ Contaminated Land Management Strategy ▸ Erosion and Sediment Control Plan ▸ Construction Environmental Management Plan (CEMP) ▸ Construction Spoil Management Plan ▸ Reinstatement and Rehabilitation Plan.
Landscape and visual amenity (refer Chapter 10)	The landscape between Calvert and Kagaru is highly varied, comprising intensive irrigated agriculture, dry croplands and pastures interspersed with a network of rivers and creeks, set against the distinctive backdrop of forested hills created by the Teviot and Little Liverpool Ranges. Visual impacts of the Project will typically be contained by the presence of vegetation, including along creek lines, and localised undulations in landform. However, there are elevated and panoramic views over the alignment from the Forested Uplands, particularly from walking trails around Flinders Peak. Elsewhere, there are fairly open views across the rural landscape from the network of local roads and highways, including the Cunningham Highway, Rosewood–Laidley Road and Ipswich–Boonah Road. **Key findings** ▸ Landscape and visual impacts of the Project relate to the removal of vegetation, the raising of embankments and creation of new rail bridges. ▸ Ten landscape character types were identified within the landscape and visual impact assessment study area, of which eight are potentially affected by the Project. A significant impact will be on Forested Uplands due to extensive cut-and-fill and tunneling within the forested landscapes of the Teviot Range, south of Flinders Peak. **Proposed mitigation measures** ▸ Proposed mitigation measures include landscape design, and implementation of the Reinstatement and Rehabilitation Plan and the Landscape and Rehabilitation Management Plan.
Flora and fauna (refer Chapter 11)	The ecology study area includes habitat for one 'threatened ecological community' and 35 threatened species listed under the provisions of the EPBC Act and the *Nature Conservation Act 1992 Act*. A number of endangered, of concern, and least concern regional ecosystems are also within the ecology study area and are protected under the *Vegetation Management Act 1999* (Qld). Sixty-two sensitive environmental receptors were identified within the ecology study area. These receptors varied from broad-scale receptors such as protected areas and bioregional corridors, down to finer species-scale receptors, including threatened ecological communities and conservation-significant flora and fauna species. These receptors were grouped into 'high', 'moderate' and 'low' sensitivity categories based on factors such as conservation status, exposure to threatening processes, resilience, and representation in the broader landscape. Proposed mitigation measures for the Project were identified to reduce the significance of the potential impacts on the sensitive environmental receptors. Following the application of the mitigation hierarchy (i.e. avoid, minimise, mitigate), which included a range of measures and management plans, the residual impacts to the identified sensitive environmental receptors were generally reduced. However, some project activities may have cumulative, irreversible, or permanent impacts on some sensitive environmental receptors, even with environmental management measures. For example, additional mitigation measures are not likely to significantly reduce impacts associated with the loss of vegetation as a result of clearing or removal, resulting in residual impacts.

Environmental aspect	Impacts, opportunities, and mitigation measures

Flora and fauna (refer Chapter 11) (continued)	**Key findings**
	▸ 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):
	  – Threatened ecological community: Swamp Tea-tree (*Melaleuca irbyana*) Forest of South East Queensland threatened ecological community
	  – Flora: Lloyd's Olive (*Notelaea lloydii*)
	  – Fauna: Spotted-tail Quoll (*Dasyurus maculatus maculatus*), Australian Painted Snipe (*Rostratula australis*), Collared Delma (*Delma torquata*), Swift Parrot (*Lathamus discolor*); Red Goshawk (*Erythrotriorchis radiatus*); Brush-tailed Rock-wallaby (*Petrogale penicillata*), Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*)
	  ▸ Prescribed matters for the State of Queensland:
	  – 'Endangered' or 'of concern' regional ecosystems
	  – Regulated vegetation (Category B (other than grassland) within a defined distance from the defining banks of a relevant watercourse or relevant drainage feature)
	  – Remnant vegetation intersection with a *Vegetation Management Act 1999* wetland
	  – Essential habitat
	  – Connectivity areas
	  – Protected wildlife habitat for: Bailey's Cypress Pine (*Callitris baileyi*), Slender Milkvine (*Marsdenia coronata*), Swamp Tea-tree (*Melaleuca irbyana*), Glossy-black Cockatoo (*Calyptorhynchus lathami*), and Powerful Owl (*Ninox strenua*).
	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.
	▸ Provisions of offsets for the MNES with significant residual impacts will be required under the EPBC Act Offsets Policy. For matters of state environmental significance, impacts to prescribed matters that are considered to constitute significant residual impacts will need to be offset consistent with the *Environmental Offsets Act 2014* (Qld). The EIS includes ARTC's Environmental Offset Strategy—Qld.
	▸ Refine fauna passage locations and associated rehabilitation areas in the design to maintain infrastructure permeability, particularly at the six key locations identified as part of the EIS assessment process to maintain and/or re-establish habitat connectivity.
	▸ Landscape design establishes the requirements for rehabilitation of disturbed areas for habitat re-creation, landscaping and stabilisation, including for riparian zones and informs the development of the Reinstatement and Rehabilitation Plan and the Landscape and Rehabilitation Management Plan.
	▸ Develop and implement the CEMP.
	▸ Develop and implement the Reinstatement and Rehabilitation Plan and the Landscape and Rehabilitation Management Plan.
	▸ Develop a Post-construction MNES Monitoring Plan in consultation with relevant stakeholders. The Post-construction MNES Monitoring Plan will define for the threatened ecological community or other matters of national environmental significance: habitat location, reference condition, assessment framework, infrastructure elements (e.g. erosion and sediment control devices, fauna crossing structures), corrective actions, completion criteria and monitoring timeframes.

Environmental aspect	Impacts, opportunities, and mitigation measures
Air quality (refer Chapter 12)	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 'low risk' of human health impacts from the construction of the Project, but a 'medium risk' of impacts from dust deposits. By implementing the proposed mitigation measures, the impacts to air quality from both dust deposits and human health will not be significant. ▸ 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. The assessment of the operational phase assumed that a number of the operational management measures that are already required by the QR West Moreton System (required by the *South West Supply Chain (QR West Moreton System) Coal Dust Management Plan*), will apply to the Project, when used for coal transport. For example, 'veneering' of coal wagons is currently required on the QR West Moreton System. Veneering involves applying a biodegradable, non-toxic binding agent onto the surface of loaded coal wagons, which forms a crust over the coal that minimises coal dust lifting off in transit. ▸ Assessments show that during the operation phase, compliance for all pollutants is predicted for all traffic-volume scenarios, if veneering is used. Without veneering, the annual objectives are predicted to be exceeded. Therefore, it is expected that veneering will be required. No other mitigation measures are proposed. ▸ The potential for the operational phase of the Project to impact tank water quality was also specifically investigated. Investigation of dust emissions showed the *Australian Drinking Water Guidelines* will be met by a significant margin at all receptors. **Proposed mitigation measures** ▸ Develop and implement the CEMP. ▸ Prior to commencement of operational activities involving coal transport, engagement will be undertaken with existing stakeholders and members of the South West Supply Chain with regards to coal dust management and monitoring practices.
Surface water and hydrology (refer Chapter 13)	The Project is located within the Bremer River and Logan River catchments, and the alignment crosses a number of watercourses including Western Creek, Bremer River, Warrill Creek, Purga Creek, Sandy Creek, an un-named tributary of Purga Creek, and Teviot Brook. **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. ▸ 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. **Proposed mitigation measures** ▸ Key measures associated with the management of surface water quality impacts include developing and implementing the CEMP, an Erosion and Sediment Control Plan, the Reinstatement and Rehabilitation Plan and a construction water quality monitoring program. ▸ 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)	The water table is typically a subdued version of the topography, with the depth to groundwater increasing under topographic highs (e.g. the Teviot Range) and is shallower in lower-lying reaches such as close to surface water drainage lines. Stock watering, drinking water and aquatic ecosystems were identified as the groundwater environmental values of relevance to the groundwater study area. The groundwater assessment for the Project included a desktop review, geotechnical and hydrogeological site investigations, assessment of potential short- and long-term impacts and an assessment of the significance of these impacts. Modelling assessed potential groundwater ingress and drawdowns associated with a free-draining (unlined) Teviot Range Tunnel, portals, and cuts. A desktop survey of registered groundwater bores identified 65 groundwater bores (43 'existing' and 22 'abandoned') within 1 kilometre either side of the proposed alignment. **Key findings** ▸ Key impacts on groundwater include: ▸▸ Loss of, or damage to, registered bores ▸▸ Changes to groundwater level and flowpaths from embankment loading ▸▸ Reduced groundwater levels due to seepage into cuttings and Teviot Range Tunnel ▸▸ Changes to groundwater quality from spills and uncontrolled releases, or from acid rock drainage ▸▸ Subsidence/consolidation due to groundwater extraction, dewatering or loading ▸▸ Vegetation removal and surface alteration affecting recharge/discharge and increasing associated salinity risks. **Proposed mitigation measures** ▸ Undertake additional investigations and assessment of potential drainage/dewatering impacts associated with the tunnel through the Teviot 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. ▸ Review the proposed groundwater monitoring network to ensure locations are accessible during pre-construction, construction, commissioning and operation of the Project. Continue collection of baseline groundwater monitoring data (levels and quality) to confirm seasonal variation and inform detailed design and the development of the final Groundwater Monitoring and Management Plan. Include monitoring at any additional bores identified during the development of the Groundwater Monitoring and Management Plan to establish a comprehensive monitoring regime prior to construction and operation. ▸ Undertake a groundwater bore survey and engage with relevant landholders to confirm the location of existing bores, identification/confirmation of new monitoring bore locations, and procure access agreements to existing registered groundwater bores included in the Groundwater Monitoring and Management Plan. ▸ Confirm sources for construction water requirements via consultation with relevant stakeholders (including landholders) prior to construction. ▸ Develop and implement the CEMP. The assessment concluded that after mitigation measures are implemented, the residual significance for the majority of potential impacts identified is expected to be low. A moderate residual significance remains for the potential for construction to alter or reduce groundwater levels or introduce contaminants.

Environmental aspect	Impacts, opportunities, and mitigation measures

Noise and vibration (refer Chapter 15)	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 781 sensitive receptors
	  ▸ Construction vibration criteria is expected to be exceeded at 71 sensitive receptors during non-standard hours
	  ▸ Construction traffic on eighteen roads in the study area is predicted to exceed the established noise criteria
	  ▸ There are no predicted exceedances of ground-borne noise or vibration from tunnel construction at any sensitive receptors.
	▸ Blasting charge masses are not known at this stage. Therefore, maximum allowable instantaneous charge masses have been provided at indicative distances from sensitive receptors.
	▸ Based on the construction noise assessment and proposed mitigation, construction noise impacts at 45 per cent of receptors are not predicted to be feasibly mitigated to below the appropriate criterion by physical attenuation alone. This includes the consideration of the worst case construction works scenarios during non-standard work hours. However, these residual impacts present will be temporary and will stop when construction finishes. Managing residual impacts will be undertaken in consultation with the affected landholders.
	Operation
	▸ 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.
	▸ Noise levels have been predicted to be up to 14 dBA above the assessment criteria and trigger a review of noise mitigation measures at 59 sensitive receptors at Project opening (2026) and an additional six sensitive receptors for the design year (2040).
	Proposed mitigation measures
	Construction
	▸ During detailed design, review and update the construction noise and vibration assessment to reflect the final location of construction sites, construction activities and construction scheduling to inform the development of the Construction Environmental Management Plan'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.

Environmental aspect	Impacts, opportunities, and mitigation measures
Noise and vibration (refer Chapter 15) (continued)	**Operation** ▸ During detailed design, review and update the operational road traffic noise to reflect/inform the detailed design, including incorporation of potential noise treatments. ▸ 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.

Social (refer Chapter 16)	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 include directly affected and nearby landholders, Traditional Owners, 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, level crossings and other Project infrastructure
	  ▸ Periodic traffic delays at level crossings during operations, potentially delaying emergency service vehicles en-route to an emergency.
	▸ At a regional level, potential impacts identified include:
	  ▸ If multiple infrastructure projects are constructed at the same time, there may be a significant draw on trades and construction labour
	  ▸ Demand for local health and emergency services is likely to increase during the construction phase
	  ▸ Introducing a freight rail line between Calvert and Kagaru may increase the risk of road–rail accidents, although it is considered the Project will have an overall positive impact on road safety
	  ▸ Use of the Boonah to Ipswich Trail and its connectivity with the Flinders Peak Conservation Park may be disrupted.
	▸ In contrast, the local community will benefit from construction and operation of the Project. The Project will generate employment for up to 620 people over the construction period. This employment is expected to contribute to financial and housing security, self and family care and social connections. Training opportunities will also be provided for people who are disadvantaged in the current labour market, including young people and Indigenous people. Local businesses will have the opportunity to supply the Project with fuels, equipment, quarried material, and services including fencing, electrical installation, rehabilitation and landscaping, maintenance, and trade services.
	Social Impact Management Plan
	▸ A Social Impact Management Plan has been developed to address social impacts, invest in local communities and offset impacts on distributional equity. The Social Impact Management Plan 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.

Environmental aspect	Impacts, opportunities, and mitigation measures
Economics (refer Chapter 17)	The economic impact assessment undertaken for the draft EIS established and examined the existing economic environment and local context to form the basis to measure the economic impacts. It identified and assessed potential economic benefits and impacts on affected local and regional communities and businesses. It also assessed the economic significance of the Project on the regional, state, and national economies through computable general equilibrium modelling (CGE) and evaluated the potential cumulative impacts on local and regional economies resulting from the construction and operation of related projects, including adjacent Inland Rail projects. It is noted that the economic impact assessment was largely completed before the economic shock associated with the 2020 Q2 market conditions. In particular, the baseline representation of the economy does not account for the 2020 Q2 market conditions. **Key findings** ▸ The Project will support regional and local economic development. ▸ The Project is expected to provide a total (2019 present value terms) of $166.22 million 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 Greater Brisbane region. Using recent labour market trends and projected construction sector activity, 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 $355 million higher than the baseline level. ▸ Under a slack labour market scenario, the Project is also expected to deliver an additional 482 direct and indirect jobs per year over the construction period, over and above the 620 jobs created over the construction period. **Mitigation measures** ▸ Implement the Social Impact Management Plan, particularly the Local Business and Industry Action Plan.
Cultural heritage (refer Chapter 18)	Cultural Heritage Management Plans (CLH017009) have been developed and approved under the *Aboriginal Cultural Heritage Act 2003*. Searches of the Department of Aboriginal and Torres Strait Islander Partnerships database indicates there are 45 reported Aboriginal cultural heritage sites within 1 km of the cultural heritage study area. The majority of these sites consist of stone artefacts—either isolated finds or clustered in scatters—followed by landscape features, resource areas and grinding grooves. An assessment of non-Indigenous heritage values and impacts was also undertaken using a combination of register searches and historical and archival research. The assessment identified 13 Areas of Interest within the cultural heritage study area, including five registered local heritage places, which were inspected and assessed against the relevant criteria. Ten of the 13 Areas of Interest were assessed as having local heritage significance, meaning that they have '*aesthetic, historic, scientific, or social value for past, present or future generations*'. These Areas of Interest were mostly related to local pastoral and dairying industries and include yards, huts, creameries, and dwellings. Seven places were identified as being at risk of direct impacts, with the other six places identified at risk of indirect impact. The assessment found that, with appropriate mitigation measures, the Project impacts could be reduced to neutral or slight for identified sites. **Key findings** ▸ Impacts and/or risks associated with Indigenous heritage will be managed in accordance with the Cultural Heritage Management Plans (CLH017009). ▸ Direct impacts to non-indigenous places are most likely to occur during site preparation as a part of the construction phase. ▸ Indirect impacts may occur during any phase of the Project, when construction, operation, or decommissioning activities result in excessive dust, noise, or vibration that damages heritage structures.

Environmental aspect	Impacts, opportunities, and mitigation measures
Cultural heritage (refer Chapter 18) (continued)	**Mitigation measures** ▸ Comply with the approved Cultural Heritage Management Plans (CLH017009). ▸ Provide opportunities for ARTC staff and contractors to learn about the Aboriginal cultural heritage and non-Indigenous heritage associated with delivery of the Inland Rail Program. ▸ Clearing extents avoid impacts to previously undisturbed areas as far as practicable. ▸ 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. ▸ Develop and implement the CEMP.
Traffic, transport and access (refer Chapter 19)	The traffic impact assessment assessed the construction and operation phases of the Project. **Key findings** Key impacts during construction include: ▸ Three State-controlled roads that interface with the proposed alignment and four State-controlled roads within the traffic, transport and access study area are expected to have construction traffic exceed 5 per cent of the background traffic. ▸ Thirty-seven 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 that are in excess of 10 per cent of the background traffic during the construction phase and the Project may potentially cause a minor change in the level of service for some road sections during each year of construction. ▸ One cycle route between Warwick Road between Cunningham Highway and Saleyards Road is expected to experience construction traffic in excess of 5 per cent of the background traffic. ▸ One road (Warwick Road) along a public transport route is expected to have construction traffic exceed 5 per cent of background traffic. ▸ However, it is not expected that the Project will generate any need to upgrade the local road network for such a short duration of impact, but adequate traffic and road use management strategies and mitigation measures will be required. **Mitigation measures** ▸ A Traffic Management Plan and a Road Use Management Plan will be developed and implemented as part of the CEMP.

Environmental aspect	Impacts, opportunities, and mitigation measures

Hazard and risk (refer Chapter 20)	Natural, Project-related, and dangerous goods risks and hazards have been 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 conditions, 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 or rocks or soil; natural events exacerbated by climatic conditions; and impacts of the Project on greenhouse gas emissions
	  ▸ Project hazards: employee fatigue and/or heat stress; rail accidents caused by increased rail movements; increased use of road vehicles for the Project; increased number of interfaces between live trains and road users including pedestrians and land users; construction and use of the Teviot Range Tunnel; interaction with existing services underground and overhead; health and environmental impacts from contaminated land (construction); and interference with emergency access
	  ▸ Dangerous goods and hazardous chemicals: the transport of dangerous goods freight during operations; and the potential use of explosives for construction (particularly the Teviot Range Tunnel).
	Mitigation measures
	▸ An Incident Management Plan will be developed to detail procures and resources with which emergencies will be responded to and managed.
	▸ ARTC's existing Emergency Management Procedure will continue to be implemented.
	▸ The CEMP will be developed and implemented.

Waste and resource management (refer Chapter 21)	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 V: Spoil Management Strategy. **Key findings** ▸ The construction phase of the Project will generate the majority of waste through vegetation clearing, topsoil stripping, excavation, and the demolition of existing structures. Municipal solid waste will be generated by activities at construction locations and on multiple work fronts. ▸ The Project design calculates that 5,859,671 m^3 of cut material will be produced during construction, primarily from surface works. A calculated 4,237,167 m^3 of this cut material is estimated to be suitable for immediate re-use as general earth fill, as per ARTC's Earthworks Material Specification. A calculated excess of 1,622,504 m^3 of spoil will be managed or treated with the potential for re-use. In line with the Project's spoil management hierarchy, the EIS has assumed a worst-case scenario, that spoil is unable to be repurposed in other parts of the Inland Rail Program and will be transported by road to waste receiving facilities. This scenario is unlikely to occur and re-use within the Inland Rail Program will be pursued as the highest and best use of spoil material arising from the Project. ▸ With the exception of spoil, 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 close to the Project.

Environmental aspect	Impacts, opportunities, and mitigation measures
Waste and resource management (refer Chapter 21) (continued)	**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 V: 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 detailed 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)	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 nine projects that have the potential to contribute to cumulative impacts. The cumulative impact assessment relies on publicly available information, and depending on the level of information available, conservative assumptions about a project's impact have been adopted (e.g. area of vegetation to be cleared). **Key findings** ▸ Potential cumulative impacts on environmental aspects are considered of low significance, except the potential cumulative impacts on the following environmental aspects: landscape and visual amenity; flora and fauna; cultural heritage; waste and resource management; skilled labour supply; and traffic and transport. ▸ Potential cumulative impacts associated with the loss of biodiversity and cultural heritage aspects within the respective areas of interest are common to all projects in the cumulative impact assessment; therefore, these impacts are cumulative by nature. Similarly, projects in the landscape and visual amenity cumulative impact assessment are likely to exacerbate impacts from the Project through combined, successive, and sequential views of adjoining projects. ▸ The potential cumulative impacts associated with spoil disposal when considering the Inland Rail projects in isolation is recognised as being greater than low significance. It is, however, expected that in the detailed design and execution phases, the adjacent Inland Rail projects will have significant opportunities to coordinate spoil management and reduce the volumes required to be disposed outside project areas. ▸ The expansion in construction activity and employment within the region, with a subsequent increase in temporary and non-resident population, has the potential to increase demand for a range of local infrastructure and services, including housing, health care, 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 combined delivery approach for the Gowrie to Helidon, Helidon to Calvert and Calvert to Kagaru Projects provides opportunities to coordinate the management of cumulative impacts generated as a result of construction traffic movements, workforce requirements, spoil management and reuse, and identification and protection of environmental offsets.

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.
- The Draft Outline Environmental Management Plan includes discipline-specific sub-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; waste and resource management. Social and economic matters are addressed under the Social Impact Management Plan.

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

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 part of a continuous rail freight route between Melbourne and Brisbane. The Inland Rail service offering will be competitive with road freight (i.e. a Melbourne to Brisbane transit time of less than 24 hours, with a reliability of 98 per cent), and will better connect regional farms with domestic and international export markets.

The Project is consistent with the objectives of the 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 Business Case* (ARTC, 2015a) and Australian Government expectations.

The 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.

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

The delivery of the Project will provide a safe and sustainable solution to Australia's freight challenge, while seeking to minimise adverse environmental, social, and economic impacts. The 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 E: Proponent Commitments.