CHAPTER

07

Sustainability

Inland Rail is a subsidiary of
Australian Rail Track Corporation

INLAND RAIL

Contents

Tables

7. Sustainability

7.1 Scope of chapter

This chapter provides a summary of the sustainability considerations in relation to the design, construction and operation of the Inland Rail—Border to Gowrie project (the Project). This chapter was publicly notified between 23 January 2021 and 4 May 2021 following the submission of the draft Environmental Impact Statement (EIS) to the Coordinator-General. In January 2022, the Coordinator-General issued an additional information request to Australian Rail Track Corporation (ARTC). This chapter has been updated in accordance with the additional information request from the Coordinator-General. This includes:

- The description of policies, standards and guidelines relevant to sustainability in the context of the Project (Section 7.2)
- The detail of the proposed Sustainability Management Plan requirements and sustainability within the context of the wider Inland Rail Program, and how this has been considered during the development of the revised reference design for the Project (Sections 7.4 and 7.5)
- The description of the sustainability initiatives that will guide the detailed design, construction and operation stages of the Project (Section 7.6).

The revised reference design captures the key design inputs required for the revised draft EIS and provides the basis on which impact assessment has been undertaken. It will also inform the development of each stage of the Project.

7.2 Legislation, policies, standards and guidelines

The legislation, policies and guidelines outlined in Table 7-1 have been used to guide the implementation of sustainability initiatives during the revised reference design process, in considering the whole-of-life of the Project. Table 7-1 should be read in conjunction with the regulatory context presented in the Project's environmental impact assessments. Environmental impact assessments have been undertaken for technical aspects such as air quality, ecology, hydrology, visual impact and cultural heritage, which also interface with the preservation of natural, social and built environment considered in this chapter. Chapter 8 through to Chapter 22 of the revised draft EIS detail the impact assessment of each of the technical aspects and proposed mitigations for the Project.

Full discussion on legislation of relevance to the Project is presented in Chapter 3: Legislation and Project Approvals Process.

TABLE 7-1 REGULATORY CONTEXT

Legislation, policy or guideline	Relevance to the Project
Commonwealth legislation	
Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	Promotes ecologically sustainable development (ESD) through the conservation and ecologically sustainable use of natural resources.
National Greenhouse and Energy Reporting Act 2007 (Cth)	Outlines the approach to providing data and reporting in relation to greenhouse gas (GHG) emissions, and energy consumption and production.
Climate Change Act 2022 (Cth)	Sets out Australia's GHG emissions reduction targets, and aims to advance an effective and progressive response to the urgent threat of climate change drawing on the best available scientific knowledge.
State legislation	
Environmental Protection Act 1994 (Qld) (EP Act)	Aims to protect the environment while allowing for ecologically sustainable development.
Planning Act 2016 (Qld) (Planning Act)	Establishes an efficient, effective, transparent, integrated, coordinated and accountable system of land us e planning, development assessment and related matters that facilitates the achievement of ecological sustainability in Queensland.
Planning frameworks, strategies and statutory guidelines	
National Strategy for Ecologically Sustainable Development (NSESD) (Ecologically Sustainable Development Steering Committee, 1992)	Sets out the broad strategic and policy framework under which governments will cooperatively make decisions and take actions to pursue ESD in Australia.

Legislation, policy or guideline	Relevance to the Project
United Nations 2030 Agenda for Sustainable Development (United Nations, 2015a)	The 2030 Agenda for Sustainable Development is made up of the 17 Sustainable Development Goals and provides a roadmap for global development efforts to 2030 and beyond. Each of the 193 signatory countries has committed to producing a Voluntary National Review at least twice over the lifetime of the 2030 Agenda.
United Nations Framework Convention on Climate Change, including the Paris Agreement (United Nations, 2015b)	Australia is a party to the Paris Agreement which was adopted on 12 December 2015 and entered into force on 4 November 2016. On 16 June 2022, the Australian Government lodged a new Nationally Determined Contribution, setting an ambitious 2030 target to reduce GHG emissions by 43 per cent below 2005 levels, putting us on track to achieve net zero emissions by 2050. On 8 September 2022, Australia passed the *Climate Change Act 2022* (Cth), which has enshrined these reduction targets into law.
Sustainable Procurement Guide: An environmental focus for Commonwealth entities (Department of Climate Change, Energy, the Environment and Water, 2024a)	Provides the steps for embedding environmental sustainability within all Australian Government procurements. The Guide also serves to support implementation of the *Environmentally Sustainable Procurement Policy and Reporting Framework* (Department of Climate Change, Energy, the Environment and Water, 2024b)
Infrastructure Sustainability Rating tool (Infrastructure Sustainability Council)	Inland Rail will adopt the IS Rating tool or equivalent tool for guiding sustainability for all projects within the Inland Rail Program.
Queensland Climate Adaptation Strategy (Q-CAS) (Department of Environment and Heritage Protection, 2017b) and *Climate Risk Management Guideline for Queensland Government Departments* (Queensland Government and Griffith University, 2024)	Provides guidance on the context for consideration of climate change mitigation and adaptation approaches in Queensland.
Crime Prevention Through Environmental Design (CPTED) (Queensland Government, 2021a)	The fundamental idea of CPTED is to use knowledge and creativity to design built environments in ways that lessen or prevent the incidence of such crime.
Inland Rail policies	
Inland Rail Industry Participation Policy 2021	Sets the priorities and direction for sustainable procurement in the context of Inland Rail (Appendix C: Corporate Policies).
Inland Rail Environment and Sustainability Policy (ARTC, 2023a)	Sets the priorities and direction for implementing sustainability initiatives during the planning, design, construction and operation stages of Inland Rail (Appendix C: Corporate Policies).

7.3 Definition of ecologically sustainable development

The pursuit of sustainable development has gained momentum since the release of *Our Common Future*, commonly referred to as the Brundtland Report (World Commission on Environment and Development, 1987). In the Australian context, the definition of sustainable development is based on the information contained in the Brundtland Report, as well as the NSESD (Council of Australian Governments, 1992), which provides the following definition:

> *'…using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.*

The Project, being part of the Inland Rail Program, meets the intent of the guiding principles for the NSESD, as shown in Table 7-2.

TABLE 7-2 GUIDING PRINCIPLES OF THE NATIONAL STRATEGY FOR ECOLOGICALLY SUSTAINABLE DEVELOPMENT AND RELEVANCE TO THE PROJECT

Guiding principle	Project response
Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equity considerations	▸ Multi-criteria analysis (MCA) has been used as the decision-making process to assess potential economic, environmental, social and equity considerations consistently for the Project during revised reference design development. ▸ Value engineering provides the key to achieving return on investment. The concepts of ESD and energy efficiency have been incorporated into each major decision, from Project inception, through concept planning, design, construction, operation and decommissioning, thereby offering the opportunity to demonstrate whole-of-life benefits for the Project.

Guiding principle	Project response
Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation	▸ The revised draft EIS and revised reference design have been developed with input from field studies, scientific modelling, and results of technical assessments across all engineering, planning and environmental disciplines. The precautionary principle underpins the majority of the relevant environmental legislative context for the Project, which exercises caution in circumstances where a lack in scientific certainty exists
The global dimension of environmental impacts of actions and policies should be recognised and considered	▸ As discussed in Chapter 2: Project Rationale, Inland Rail will provide a long-haul freight solution that is time- and cost-competitive compared to road freight. Consequently, Inland Rail will replace some of the long-haul road freight task, resulting in reduced road congestion and fewer vehicular carbon emissions. ▸ It is estimated that transportation of freight on Inland Rail will use one-third of the fuel compared to transportation of the same volume of freight via the existing road route (ARTC, 2015c). ▸ GHG emissions during the construction stage (in total) were estimated in 2020 to be in the order of 474,300 tonnes of carbon dioxide equivalent, including emissions generated by land-use change. The largest contributors to GHG emissions during the construction stage are earthworks activity (approximately 45 per cent) and land-use change (approximately 25 per cent). ▸ Emissions resulting from the operation and maintenance of the rail asset calculated over a lifecycle of 100 years are estimated to be in the order of 20,700 tonnes of carbon dioxide equivalent annually. The largest contributors to GHG emissions for operation and maintenance averaged over the 100-year lifecycle of the asset are earthworks activities, including diesel use for corridor, level crossing, and other maintenance activities, (approximately 69 per cent) and weekly track inspections (approximately 20 per cent). ▸ ARTC supports Australia's commitment to net zero emissions by 2050 and the United Nations call for countries to step up their efforts to achieve the 2030 Sustainable Development Goals (SDG). ARTC recognises that as a socially responsible business it must play its part and has increased focus on Environmental, Social and Governance activities. As the national rail network manager and a vital part of the nation's transport supply chain, ARTC primarily contributes to SDG 9 Industry, Innovation and Infrastructure. ▸ ARTC's Environmental, Social, and Governance ambition is to develop a modal shift to rail for a sustainable future, recognising the many social, environmental and economic benefits of rail as a transport mode. This is supported by building ARTC's five strategic priorities: skilled and diverse workforce; network safety and resilience; social responsibility; environmental benefits; and growing new markets. ARTC's focus on Environmental, Social, and Governance will increase ARTC's contribution to SDGs, including SDG11 Sustainable Cities and Communities, SDG10 Reducing Inequalities, SDG8 Decent Work and Economic Growth and SDG13 Climate Action.
The need to develop a strong, growing and diversified economy that can enhance the capacity for environmental protection should be recognised	▸ The addition of a major asset such as the Inland Rail Program will even the playing field between road and rail. This will enhance the competition between the two modes in Australia, thus driving innovation and efficiency in each competing sector (ARTC, 2015c). ▸ Other strategic benefits include the expansion and enhancement of the national standard-gauge rail network, the removal of a large portion of expensive future road freight, and the greater regional economic development, particularly along the Inland Rail corridor. ▸ It will better link producers, farmers and businesses to national and global markets. Almost 70 per cent of freight carried on Inland Rail will be household goods and groceries produced in Australia and consumed in its major cities. ▸ It is estimated that transportation of freight on Inland Rail will use one-third of the fuel compared to transportation of the same volume of freight via the existing road route (ARTC, 2015c), reducing the use of fossil fuels.
The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised	▸ One of the most important benefits outlined in this chapter is that Inland Rail would improve the productivity and efficiency of the Australian economy, by providing a 'backbone link' in the eastern Australian rail and road network (ARTC, 2015c).

Guiding principle	Project response
Cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms	▸ Results from the Commonwealth Scientific Industrial Research Organisation (CSIRO) Supply Chain Mapping Project found that existing road-based supply chains could save an average of $80.77 per payload tonne when shifted to Inland Rail for Melbourne–Brisbane inter-capital freight, and would also 'significantly improve' rail connections between eastern Australian regional areas and the east coast ports (CSIRO, 2022). ▸ The trickle-down effect of this is lower prices for consumers, which, in turn, reduces the cost of living, a key component of most quality-of-life metrics.
Decisions and actions should provide for broad community involvement on issues that affect them	▸ ARTC is committed to engaging with local communities along the proposed Project alignment openly and in a collaborative manner. ARTC operates in accordance with the International Association for Public Participation (IAP2) Core Values. Inland Rail has three main engagement goals to ensure the building of positive relationships, to obtain support for the Project and enable the successful delivery of Inland Rail within each community. These are to build trust, build credibility, and build visibility. ▸ The Project Engagement Implementation Plan is a practical summary of how engagement activities are, and will be, carried out on the Project, and the statutory requirements that underpin these outcomes. The Engagement Implementation Plan is regularly updated to reflect the Project development stages. The Project Engagement Implementation Plan supports preparation of the revised draft EIS through the communication of findings and gathering of input at key milestones. The outcomes of engagement, and a summary of how these outcomes have been addressed, is provided in Chapter 6: Stakeholder Engagement and Appendix E: Consultation Report. In summary, the engagement program has involved: ▸ regular communication with the community through community consultative committee meetings ▸ meetings with directly affected landowners ▸ liaison with Traditional Owner groups ▸ liaison with State and Australian Government departments ▸ State government EIS forum ▸ local council EIS forums ▸ Australian Government meetings ▸ Queensland State Government meetings ▸ New South Wales State Government meetings ▸ Toowoomba Regional Council fortnightly technical working group meetings ▸ Goondiwindi Regional Council meetings with officers and councillors ▸ meetings with local business and industry ▸ meetings with peak bodies, community and environmental groups (numerous in the region and Australia-wide) ▸ meetings with government, local councils and Chambers of Commerce for the Social Impact Assessment ▸ meetings with elected representatives ▸ presentations at industry forums. ▸ As part of the EIS process ARTC has actively engaged via face-to-face meetings, phone call and email exchanges with a wide range of stakeholders associated with the Project. For further details on consultation undertaken relevant to the Project refer Chapter 6: Stakeholder Engagement. ▸ A Community and Stakeholder Engagement Management Sub-plan will be finalised as part of the Project's Social Impact Management Plan (Chapter 24: Draft Outline EMP). The Community and Stakeholder Engagement Management Sub-Plan will describe how the Project will communicate and engage with community members and other stakeholders throughout the Project's detailed design, pre-construction and early works and construction works stages. It will include a monitoring and reporting framework and describes how stakeholder inputs will be incorporated in ongoing development and implementation of SIMP measures. The sub-plan will guide the development of the Community and Stakeholder Engagement Management Plan (CSEMP) for the Project construction stage.

7.4 ARTC policy and commitments

ARTC has developed an *Inland Rail Environment and Sustainability Policy* (ARTC, 2023a), which is provided in Appendix C: Corporate Policies.

The sustainability commitments embedded into the *Inland Rail Environment and Sustainability Policy* guide the Project's approach to sustainability and are supported by identified targets for Inland Rail projects as part of the Program-wide Sustainability Strategy. The *Inland Rail Environment and Sustainability Policy* will inform the Sustainability Management Plan that will be prepared by the contractor for the Project (Section 7.5.1) and will guide the identification of Project-specific initiatives. The sustainability commitments for Inland Rail and their application to the Project are summarised in Table 7-3.

TABLE 7-3 INLAND RAIL SUSTAINABILITY COMMITMENTS AND APPLICATION TO THE PROJECT

ARTC commitments	Application to the Project

No Harm:
▸ ARTC's goal is that no-one is harmed at work, on ARTC's network, or as a result of Inland Rail activities
	▸ Development and implementation of a community wellbeing plan to provide a framework for cooperation with key stakeholders to implement mitigation measures addressing impacts on quality of life as the result of Project impacts on amenity, character, cohesion or connectivity (Chapter 17: Social).
	▸ Consultation with Queensland Police Service, Queensland Ambulance Service, and Queensland Fire and Emergency Service during the detailed design stage to provide these agencies with an understanding of the scope and size of the Project, and potential flash points, to ensure appropriate emergency vehicle access is provided across the rail corridor (Chapter 6: Stakeholder Engagement).
	▸ ARTC commitment to attend Local Disaster Management Group and District Management Group meetings during construction (Chapter 6: Stakeholder Engagement).
	▸ CPTED: Incorporate measures in the detailed design, construction and operation stages that reduce the likelihood of damage and injury to people and property, and the impact these issues have on local communities. during construction and operation.
	  ▸ Example 1: Providing legible temporary traffic diversions during construction and lighting to meet CPTED guidance
	  ▸ Example 2: Designated active and passive crossings to be provided to prevent unauthorised passage into and across the rail corridor.

Engage early and meaningfully with stakeholders, including Indigenous organisations, communities, industry and government: ▸ Build effective working relationships and a shared understanding of the Program and solutions	▸ Development and implementation of a Community and Stakeholder Engagement Plan that ensures due consideration of all Project-related opportunities and concerns, and maintains productive relationships and communication between ARTC Inland Rail, the contractor, landowners, Traditional Owners and all levels of government (Chapter 6: Stakeholder Engagement. ▸ Heritage: Recognise the role that engagement with the Indigenous and non-Indigenous community has in the identification of heritage items and values, and investigate the opportunity to interpret heritage to promote local heritage values (Chapter 6: Stakeholder Engagement).
Promote long-term economic benefits within regional communities: ▸ Create opportunities for development of skilled local and Indigenous workers ▸ Support local and Indigenous businesses to ensure they are prepared for and provided with opportunities to participate ▸ Enable Inland Rail to be a catalyst for complementary private-sector investment	▸ Procurement: Encourage sustainability throughout the value chain for goods and services used to build and operate Inland Rail. ▸ Community and stakeholder engagement: Encourage, plan, implement and monitor stakeholder and community engagement. ▸ Local business: Implementation of an Indigenous participation plan (Chapter 17: Social). ▸ Local business: Implementation of Inland Rail Skills Academy: **inlandrail.artc.com.au/inland-rail-skills-academy-fact-sheet/.** ▸ Workforce: Local resident and Indigenous workforce targets will be established by ARTC and implemented by the contractor. ▸ Local business: ARTC has a commitment to local content in its supply chain. ▸ Implement the Social Impact Management Plan specifically relating to workforce management, accommodation, and local business and industry content (Chapter 17: Social). ▸ ARTC has developed an Australian Industry Participation Plan and will work with various service providers, consultants and contractors to implement the plan.

ARTC commitments	Application to the Project
Protect the environment by minimising the environmental footprint: ▸ Apply principles of avoid, minimise, and offset to manage impacts to receiving environments and ecological values ▸ Reduce GHG emissions and minimise waste ▸ Minimise water use ▸ Continually investigate opportunities to improve environmental values and prevent pollution ▸ Obtain and comply with all environmental approvals and compliance obligations	▸ Environment: Seek opportunities to reduce the environmental footprint of the Project. ▸ Waste: Seek opportunities to minimise waste generation and to reuse or recycle materials. ▸ Energy and carbon: Seek opportunities to reduce the carbon footprint of the Project by considering construction and operational GHG emissions. ▸ Water: Seek opportunities to reduce the total amount of water used on the Project and to identify sources of water that reduce the demand on potable water supplies. ▸ Resources and embodied energy: Seek opportunities to reduce the environmental impacts of materials used during the construction and operation stages of the Project by minimising material use through the design, and improving the service life of materials.
Future-proof Inland Rail to be efficient and effective in the long term: ▸ Design for climate change resilience ▸ Incorporate future demand requirements and corridor uses in the current design	▸ ARTC will incorporate carbon reduction and climate variability and opportunities in the final design to reduce the risks to Inland Rail, and to adjacent local land, infrastructure and assets associated with a future climate. This will be achieved by undertaking a Climate Change Risk Assessment (CCRA) of which the methodology will be guided to align with the requirements of: ▸ *AS5334-2013 Climate change adaptation for settlements and infrastructure – a risk-based approach* (Standards Australia, 2013) ▸ *AS/NZS ISO 31000-2009 Risk management – principles and guidelines* (Standards Australia and Standards New Zealand, 2009) ▸ *ARTC Risk Management Framework* (ARTC, 2017a)*, Risk Management Procedure* (ARTC, 2024a) and *Project Risk Management* (ARTC, 2023c) ▸ *Australian Rainfall and Runoff: A Guide to Flood Estimation* (Ball, et. al., 2019) ▸ Future-proofing: Consider the future demand requirements to reduce the potential for impacts to the natural and social environment associated with future upgrades to meet increased demand for freight rail.
Base decisions on balanced consideration of technical, economic, environmental and social elements: ▸ Adopt a consistent approach across the Program	▸ ARTC has a process for conducting options assessment via MCA in support of strategic decision-making within the Inland Rail Program. ▸ The option assessment process is used to support decision-making across a range of Project and design decisions. The MCA considers technical viability, safety assessment, operational approach, constructability and schedule, environmental, community, property, heritage, and approvals and stakeholder risk.
Regularly review, audit and report sustainability processes and outcomes: ▸ Challenge the way ARTC has operated previously ▸ Ensure ARTC is doing what was said would be done	▸ Leadership: Demonstrate sustainability leadership across the delivery of Inland Rail and at the Project level. ▸ Management and governance: Recognise the importance of monitoring and reviewing progress to identify opportunities for continuous improvement. ▸ Benefits identification: Identify the benefits of the Project early so that the promised benefits can be assessed and reviewed during operation. ▸ Inland Rail has publicly reported on its sustainability outcomes through the publication of an Annual Report since 2018 and will continue to do so. Refer to the link below for Annual Reports produced to date: ▸ **inlandrail.artc.com.au/building-inland-rail/sustainability.**
Drive culture of continuous improvement: ▸ Seek to improve, collaborate and add value throughout delivery ▸ Continually improve the Environmental Management System to enhance environmental performance	▸ Management and governance: Encourage improvement in the delivery of the Project and on the promises made to stakeholders and the community. ▸ Stakeholder participation: Continue to consult with community and stakeholder groups to identify opportunities for improving Project outcomes. ▸ Innovation: Review the outcomes of the way things are done to find new and better ways of achieving the desired outcomes.

7.5 Sustainability management and measures

7.5.1 Sustainability Management Plan

A Sustainability Management Plan will be developed to guide the design and construction of the Project.

The Plan will:

- Demonstrate leadership and commitment to sustainability
- Set targets for safety, local employment, materials, waste, procurement, GHG emissions, and climate resilience in line with the Inland Rail objectives and targets
- Establish the roles, responsibilities and resourcing requirements for embedding sustainability throughout the design, procurement, construction and operation of the Project. It is anticipated that local employment and business targets will be developed and negotiated through the competitive tendering/bidding process for construction contracts.
- Document the process for identification, assessment and implementation of sustainability initiatives and opportunities, particularly those associated with the efficient use of energy, water and transport
- Document the process for managing the assessment, monitoring and review of sustainability in accordance with an IS Rating tool or equivalent tool
- Outline the documentation and reporting requirements necessary to demonstrate how sustainability has been incorporated into the Project during design, construction and operation.

Prior to the commencement of operations, the sustainability elements incorporated into the Project will be independently verified by the Infrastructure Sustainability Council.

7.5.2 Sustainability in reference design

During the development of the revised reference design, frameworks were used to guide the design development in order to assist in the identification of sustainability initiatives. These reference frameworks, and the identified sustainability initiatives, are outlined in Table 7-4.

TABLE 7-4 REVISED REFERENCE DESIGN FRAMEWORK FOR SUSTAINABILITY INITIATIVES

Topic	Sustainability initiatives
Making informed decisions	Preparation of a Sustainability Management Plan that will guide the design development and environmental approval process for the Project to provide sustainability outcomes that support the *Inland Rail Environment and Sustainability Policy* (ARTC, 2023a).
	Use of a Safety-in-Design process that provides a comprehensive framework to avoid or minimise risk and enhance safety.
	Use of MCA that considers environmental, social and economic impacts to evaluate alignment options (Chapter 2: Project Rationale).
	Development of a constructability assessment that identifies methods and activities from start to finish during the construction stage to inform how the Project could be built.
	Implementation of a value management process that highlights potential opportunities for defining, maximising and achieving efficiencies.
	Implementation and use of a Consultation Manager System to record stakeholder feedback for all stages of the Project (Chapter 6: Stakeholder Engagement).
Future-proofing	The horizontal and vertical alignment of the Project has considered future asset requirements, including ultimate corridor considerations, to minimise the potential for premature decommissioning of the infrastructure and future disruption or impacts to the environment and landowners. In particular, the following were considered: ▸ Structures designed to accommodate 30 tonne axle load (TAL) ▸ Track structure and formation designed to suit 30 TAL ▸ Connections to existing brownfield operating rail corridors via turnout connections to Inland Rail.
	The design has endeavoured not to prevent opportunities for adjacent land use or business to access the Inland Rail corridor in the future (Chapter 5: Project Description and Chapter 8: Land Use and Tenure).

Topic	Sustainability initiatives

Climate response	The Project has been designed to achieve the Basis of Design for Inland Rail (Chapter 5: Project Description), which includes:
	▸ 50-year design life for formation and embankment performance
	▸ Track drainage designed to ensure that the potential for performance of the formation and track is unlikely to be affected by water
	▸ Earthworks designed to ensure that the rail formation is not over-topped during a 1% annual exceedance probability (AEP) flood event
	▸ Embankment cross-section design that can sustain flood levels up to the 1% AEP flood event with 300 millimetre (mm) freeboard to formation level:
	  ▸ Freeboard or level of redundancy exists between formation level and 'top of rail' (the point of overtopping), is approximately 750 mm. At any given point along the alignment there is a difference in level of at least 1,050 mm between current day 1% AEP peak flood levels and the 'top of rail'. The available freeboard applies to regional flooding in floodplains as well as local runoff in small catchments.
	  ▸ The increase in flood level associated with the 1% AEP climate change flood event along the alignment is typically an order of 200 to 500 mm, with upper limits of 1 m (representative concentration pathway 8.5 emissions scenario, the 2090 time horizon, an increase in rainfall of approximately 20 per cent). It is therefore anticipated that a small number of locations under the climate change scenario may become inundated; however, the 'top of rail' will remain above 1% AEP climate change flood event levels.
	▸ Bridges designed to withstand flood events up to and including 0.05% AEP (2,000-year event).

	ARTC has developed the Program CCRA Framework, which incorporates climate modelling, carbon reduction and climate variability opportunities. The CCRA framework, used in conjunction with the ARTC's CCRA Register, provides a foundation for how each Project contractor should undertake a CCRA and assign adaptation actions. The CCRA register provides an agreed list of climate hazards, a pre-determined list of impact descriptions, and assessment of likelihood and consequence for both the 2030 and 2090 time horizons (derived from the representative concentration pathway 8.5 emissions scenario). The CCRA register also provides identified adaptation measures and categories of potential additional measures. The purpose of this CCRA framework and CCRA register is to provide a baseline, which then must be adapted to the specific context of each project across the 2030 and 2090 time horizons. Design documents have been informed by the modelling considerations and impacts outlined within the Project-specific CCRA.
	Incorporation of climate change in modelling has been used to inform design of drainage and waterways including: ▸ Climate change has been assessed in accordance with *Australian Rainfall and Runoff Guidelines* (Ball, et. al., 2019) requirements, with the representative concentration pathway 8.5 (2090 horizon) scenario adopted giving an increase in rainfall intensity of 18.7 per cent across the catchment areas. The predicted impacts resulting from changes in peak water levels under the 1% AEP event with climate change are generally similar to those seen under the 1% AEP event.
	Consideration and implementation of treatment and adaptation options associated with the direct and indirect impacts of climate change and natural hazards (e.g. wildfires, landslides) to reduce risks to sensitive receivers, emergency services, adjoining properties, local communities and the potential for service disruption (Chapter 21: Hazard and Risk).
	Design of mitigation measures applied to manage runoff and flooding to sensitive receivers (Chapter 14: Flooding and Geomorphology).
	Consideration of risks that have the potential impact of flooding sensitive receptors and impeding emergency access/egress for extreme events rarer than a 1% AEP event, to minimise unexpected or unacceptable impacts (Chapter 14: Flooding and Geomorphology).
	Consideration of long-duration flood events (i.e. three-day inundation) on infrastructure components including embankments (Chapter 14: Flooding and Geomorphology).
	Implementation of changes to horizontal and vertical alignment of the infrastructure to accommodate proposed bridges, such as across the Condamine River floodplain, where four bridges have been incorporated into the design with a combined length of 6 kilometres to minimise hydrological impacts to adjoining properties (Chapter 14: Flooding and Geomorphology).
	The revised reference design includes the option to modify the existing Yelarbon flood levee to increase the flood immunity for the township of Yelarbon with the addition of the Project. This solution has been discussed with Goondiwindi Regional Council and agreed in principle as an acceptable design solution.

7.5.3 Project-specific sustainability initiatives

The Project has embraced the three main aspects of sustainability: consideration of the economic, environmental and social impacts and opportunities. The sustainability initiatives that have been identified, documented and implemented during the revised reference design process in accordance with these principles, are identified in Table 7-5 under the themes of:

- Advancing local, regional and national economies
- Environmental protection
- Respect for people, communities and valued places.

TABLE 7-5 SUSTAINABILITY INITIATIVES IN REVISED REFERENCE DESIGN

Theme	Topic	Sustainability initiatives
Advancing local, regional and national economies	Supporting local businesses and Indigenous businesses	Adherence to the *Inland Rail Industry Participation Policy 2021* (ARTC, 2021) to ensure that supply opportunities are available to local business (Appendix C: Corporate Policies).
		Engagement has commenced with local businesses and service providers to identify opportunities for participation in construction of the Project (Chapter 17: Social).
		ARTC's Business Development Manager has engaged with local business to identify opportunities to develop and promote local business use of Inland Rail once operational (Chapter 6: Stakeholder Engagement).
		Local material sourcing strategies have been considered, including identifying opportunities for the use of local material sources, quarries and concrete suppliers (Chapter 17: Social).
		A commitment by ARTC to develop a clear and efficient process for people to seek information about employment opportunities and to register their interest in Inland Rail (Chapter 6: Stakeholder Engagement).
		Work has commenced with local communities and government stakeholders to identify education and training pathways, and employment opportunities for local residents during and post construction (Chapter 17: Social).
Environmental protection	Biodiversity conservation	The Project has considered the re-use of previously disturbed land, including existing rail corridors and non-productive land, to minimise impacts to agricultural land and native vegetation (Chapter 8: Land Use and Tenure).
		The Project has been positioned to align with roads and property boundaries, where possible, to reduce impacts to habitat, fauna passage and remnant vegetation (Chapter 2: Project Rationale and Chapter 11: Flora and Fauna).
		Where culverts are planned to be replaced or constructed, the opportunity for dry fauna passage is not precluded. This is in addition to fish passage considerations (Chapter 11: Flora and Fauna).
		The design has identified and implemented measures to maintain connectivity for fauna, including the use of fencing and dedicated crossings associated with the three main terrestrial biodiversity corridors (Whetstone State Forest, Bringalily State Forest and between Pittsworth and Southbrook) as well as fish passages (Appendix P: Fauna Connectivity Strategy).
		The design has been developed to minimise impacts to watercourses, riparian vegetation and in-stream flora and habitats including: ▸ Adopting a crossing structure hierarchy (e.g. bridges preferred to culverts), as applicable and relevant to local conditions and constructability ▸ Aiming to avoid, then minimise, the extent of watercourse diversions or realignments ▸ Avoiding potential discharges/impacts to hydrology associated with wetlands, including surface flows ▸ Considering water quality design matters in response to impacts identified through the revised draft EIS (Chapter 14: Flooding and Geomorphology).

Theme	Topic	Sustainability initiatives

	Efficient use of resources and minimisation of carbon footprint	The design has considered and contributed to meeting the Inland Rail Program-wide carbon reduction target of 15 per cent (using the accredited IS rating tool) in both the construction and operation stages of the Project (Chapter 12: Air Quality):
		▸ For construction, this has included measures such as:
		  ▸ maintain construction equipment and vehicles to ensure engine efficiency, minimising fuel use and resulting emissions
		  ▸ procure energy efficient construction equipment, when appropriate
		  ▸ minimise waste from construction by procuring prefabricated products, where possible
		  ▸ use low energy intensity materials instead of high energy intensity building materials, where possible
		  ▸ reduce third-party emissions by sourcing imported materials from local areas, minimising travel distances
		  ▸ reduce travel distances and fuel consumption onsite by planning construction haul roads and staging of related activities efficiently
		  ▸ require construction contractors to minimise the idling time of plant and equipment as much as possible, and switch engines off when not in use
		  ▸ minimise the extent of vegetation cleared during construction to the clearing limits required
		  ▸ recycle any waste produced, where feasible.
		▸ For operation, this has included measures such as:
		  ▸ commit to investigating opportunities for reducing fuel consumption, for example through the use of electric vehicles
		  ▸ maintain support vehicles and equipment to ensure engine efficiency, minimising fuel use and resulting emissions
		  ▸ plan and stage maintenance activities considering efficiency and fuel consumption
		  ▸ commit to investigating opportunities to reduce GHG emissions through the use of renewable energy
		  ▸ regular auditing of operational performance with a view to progressively improving efficiency and reducing emissions through reduced fuel consumptions (e.g. reduced train idling time at crossing loops, etc.)
		  ▸ periodic energy audits with a view to progressively improving energy efficiency
		  ▸ commitment to monitor, audit and report on GHG emissions from relevant significant activities and emission sources, and the success of abatement measures
		  ▸ commitment to develop a GHG emissions reduction plan, which may include the above commitments, and a process for regularly reviewing new technologies to identify opportunities to further reduce emissions and energy use, consistent with best practice environmental management.

Theme	Topic	Sustainability initiatives
		The design has considered and implemented measures to reduce and re-use waste. This has included (Chapter 22: Waste and Resource Management and Appendix AB: Earthworks Strategy and Draft Soil Management Plan): ▸ Re-use of local sources of aggregate and treatment of dispersive and reactive materials to improve mass haul ▸ Re-use of material excavated below the rail embankment for less critical parts of infrastructure ▸ Re-use of excavated material as a stabilised structural fill ▸ Optimising the number, width and depth of earthworks cuts to avoid the generation of material that would be considered surplus, and otherwise treated as waste, to Project requirements ▸ The viability of re-using existing track ballast as high-quality general fill or structural fill to minimise the import of rock armour ▸ The use of onsite materials through re-use of spoil to minimise the disposal and transportation of materials. Preliminary ways to treat or ameliorate materials that would normally be considered waste have been identified ▸ The horizontal and vertical design have been refined within the confines of the Project footprint to minimise the quantity of offsite fill required ▸ The Project has been aligned to avoid, where possible, steep terrain and topographical constraints to minimise earthworks and provide for more efficient track geometry and grade ▸ Optimising the shape and size of batters to encourage cut-and-fill balancing.
		The Project has been positioned to align with existing roads and property boundaries, where possible, to reduce impacts, minimise severance and loss of productive agricultural land (Chapter 8: Land Use and Tenure).
		Existing brownfield operating rail environments (South Western and Millmerran Branch Lines) have been used, where possible, to minimise land-take impacts.
		Initial discussions have been held with the Department of Agriculture and Fisheries to identify opportunities for State forest timber salvage to supply local timber mills prior to commencement of rail construction.
		Erosion and sediment control, and scour protection, have been provided for in the permanent and temporary Project footprint to minimise the potential for soil loss during the construction and operation stages (Chapter 9: Land Resources).
Respect for people, communities and valued places	Being a good neighbour	The Project has been co-located with existing transport corridors as much as possible, including being positioned within the existing South Western Line and Millmerran Branch Line rail corridors, to avoid introducing a new linear infrastructure corridor in proximity to receptors that are potentially sensitive to noise and vibration (Chapter 16: Noise and Vibration).
		Crossing loops at Yelarbon, Inglewood, Kooroongarra, Yandilla and Broxburn have been positioned to avoid, where possible, the exposure of sensitive receptors to noise and vibration and emissions from idling trains (Chapter 12: Air Quality and Chapter 16: Noise and Vibration).
		Consultation with directly impacted landowners has been undertaken to ensure that a satisfactory level of access between adjoining lots is maintained, and to identify actions that will minimise or offset changes to connectivity or changes to water flows that affect their properties (Chapter 6: Stakeholder Engagement).
		The Project footprint has been restricted to that required for safe construction and operation of the rail network to maintain the rural character of the area.
		Vegetation clearing and land disturbance has been minimised to that required for safe construction and operation of the rail network to maintain the rural character of the area (Chapter 11: Flora and Fauna).
		The use of landscape treatments on embankments has been evaluated to soften their visual impact (Chapter 10: Landscape and Visual Impact Assessment).

Theme	Topic	Sustainability initiatives
	Respecting heritage and culture values	Engagement with Registered Aboriginal Parties (RAPs) has been undertaken, resulting in the establishment of Cultural Heritage Management Plans (CHMPs) for the Project, formulating ARTC's commitments to fulfilling its duty of care under the *Aboriginal and Cultural Heritage Act* (Qld) in a manner that is endorsed by the relevant parties (Chapter 19: Cultural Heritage).
		Permanent and temporary infrastructure and ancillary activities have been located to minimise impacts to locations of cultural heritage value (Chapter 19: Cultural Heritage).
		Alignment selection has sought to reduce the proximity of the Project to non-Indigenous cultural heritage (Chapter 2: Project Rationale and Chapter 19: Cultural Heritage).
	Building relationships	Community and stakeholder feedback has been incorporated into decision making for the Project, including design, impact mitigation and construction planning (e.g. the Condamine River floodplain crossing solution) (Chapter 6: Stakeholder Engagement).
	Community safety, health and wellbeing	Road and rail interfaces for public roads have been optimised to minimise safety risks, be considerate of wait times and maintain a high level of local accessibility (Chapter 20: Traffic, Transport and Access).
		Directly impacted landowners have been consulted to identify specific measures that will reduce impacts on lot management, connectivity or amenity, including consideration of the level of existing lighting, noise levels, flooding and geomorphology, and visual amenity within the Project impact assessment area, and the location and design of the Project, to reduce impacts (Chapter 6: Stakeholder Engagement).
		Stock route connectivity has been maintained, acknowledging their importance to local graziers for stock movement and as a source of/pathway to food and water.
		Watercourse crossing structures (including culverts and bridges) have been designed to minimise the need for ongoing maintenance and risk of blockage (Chapter 14: Flooding and Geomorphology).
		Crossing loops have been positioned to avoid emissions to sensitive receptors, where possible.
		The rail corridor has been positioned to minimise impacts to licensed groundwater bores.
		Temporary construction facilities (e.g. laydown areas) have been positioned to avoid sensitive receptors to noise, where practically possible (Chapter 16: Noise and Vibration).
		Sensitive receptors to potential noise, air quality and vibration impacts have been considered during permanent alignment selection for rail and road infrastructure (Chapter 12: Air Quality and Chapter 16: Noise and Vibration).
		Future controls have been incorporated into the revised reference design through the Safety-in-Design process to address key safety risks throughout the Project life cycle (Chapter 21: Hazard and Risk).

7.6 Future sustainability opportunities

A summary of future sustainability opportunities for the Project is provided in Table 7-6. These opportunities were identified during the reference design stage but require further investigation during the detailed design, construction and/or operational stages.

The future sustainability opportunities identified in Table 7-6 will be investigated and implemented as appropriate.

TABLE 7-6 SUSTAINABILITY OPPORTUNITIES FOR FUTURE STAGES OF THE PROJECT

Theme	Area	Sustainability opportunities
Governance	Sustainability leadership	▸ Create a culture within ARTC where implementation of sustainability initiatives is inherent in all business activities ▸ Commit to operating as a responsible and attractive employer ▸ Maintain a high level of safety and security through the development of management systems.
	Monitoring and evaluating performance	▸ Maintain dialogue with supply-chain stakeholders ▸ Report transparently about environmental performance ▸ Include performance requirements for the contractor to report against sustainability targets on a monthly basis.
	Making informed decisions	▸ Build an Environmental Management System for Inland Rail that collects sustainability data from individual projects, in line with IS Rating Scheme credit requirements, in a consistent and reliable format ▸ Create a robust sustainability reporting framework that supports decision making.

	Future proofing	▸ Embed the principles of sustainability and environmental benefits into rail asset management programs including:
		  ▸ resource consumption (energy, water, fuel, chemicals)
		  ▸ equipment efficiency
		  ▸ procurement of environmentally friendly and socially friendly materials and suppliers
		  ▸ triple bottom-line reporting into asset risk analysis, including potential for environmental damage, negative social impacts and regulatory compliance issues from asset failures
		  ▸ review of sustainability impacts from asset disposal.

	Encouraging innovation	▸ Apply precautionary approaches to environmental challenges and support initiatives, projects and new technologies for further improved environmental performance ▸ The Inland Rail Program has the potential to act as a catalyst for market-driven investments in the freight and complementary industries. ARTC will assess opportunities to support such developments as they arise. ▸ Partnering with key material providers (e.g. providers of rails and sleepers) to pursue innovation opportunities.
	Learning from experiences/ continuous improvement	▸ Establish a Program-wide sustainability network to enable the sharing of lessons learnt between projects and with the broader industry ▸ Identify environmental risks and processes across the Inland Rail Program and support new ways of acting to reduce these ▸ Provide access to training on environmental improvement and requirements and provide awareness and visibility initiatives across ARTC.

Theme	Area	Sustainability opportunities
Advancing local, regional and national economies	Supporting local and Indigenous businesses	▸ Include specific details on opportunities and targets for local and Indigenous business participation in the Project's implementation plan for the *Inland Rail Industry Participation Policy 2021*. It is anticipated that local employment and business targets will be developed and negotiated through the competitive tendering/bidding process for construction contracts.

	Job creation and skills development	▸ Work with government agencies to assist the local workforce to adjust to construction employment opportunities through:
		  ▸ workforce upskilling
		  ▸ engagement of small business
		  ▸ liaison with education and training providers
		  ▸ development of procurement and tendering processes for local business and suppliers.
		▸ Focus on local impacts and communities through consultation and opportunity planning
		▸ Consider skills development and training partnerships with training providers to continue skills development beyond the life of the Project
		▸ Continue engaging with communities, representative organisations and service providers to develop new local businesses.

	Stimulating sustainable procurement	▸ Engage with suppliers and contractors to ensure they recognise and understand their role in supporting ARTC's sustainable objectives ▸ Select products and services that have lower environmental impacts across their life cycle compared with competing products and services, in the context of whole-of-life value for money ▸ Foster a viable market for sustainable products and services by supporting businesses and industry groups that demonstrate innovation in sustainability ▸ Support suppliers who are socially responsible and adopt ethical practices.

Respect for people, communities and valued places	Building relationships	▸ Implement a wide range of communication and consultation strategies throughout the Project's construction to ensure information about the Project is accessible to all interested stakeholders, and to support adaptive management of social and environmental impacts
		▸ Establish a Community Reference Group, as per the Social Impact Management Plan (Chapter 17: Social and Appendix X: Social Impact Assessment) to ensure a representative selection of the community. The Community Reference Group will:
		  ▸ provide a channel to inform communities about the construction and operational stages of the Project
		  ▸ enable feedback to ARTC about construction plans and programs, and mitigation and enhancement measures
		  ▸ enable Community Reference Group members to participate in monitoring the effectiveness of social and environmental management measures
		  ▸ implement communication mechanisms that will be maintained by ARTC throughout the detailed design, pre-construction and construction stages.

	Community safety, health and wellbeing	▸ Move freight competitively by rail, taking long-haul truck traffic off roads reducing GHG emissions
		▸ Explore the use of closed-circuit television monitoring systems that address rail trespass and road vehicle incursions, specifically targeting:
		  ▸ fire detection and response
		  ▸ remote monitoring of tracks and unattended or secure locations
		  ▸ video surveillance and analysis
		  ▸ train schedule monitoring
		  ▸ track maintenance and detection of damage or obstructions
		  ▸ railway crossing management and detection of objects on the line
		  ▸ detection and recognition of over speeding
		  ▸ detection of objects protruding from moving trains.
		▸ Possible re-use of work sites, laydown areas and haul roads associated with projects being pursued within the region or neighbouring regions
		▸ Implementation of health and community wellbeing actions from the Social Impact Management Plan (Chapter 17: Social and Appendix X: Social Impact Assessment).

Theme	Area	Sustainability opportunities
Environmental protection	Biodiversity conservation/ ecological integrity	▸ Investigate opportunities to engage and support local wildlife groups during construction to preserve fauna impacted by the Project ▸ Investigate opportunities to work with local land-care groups to implement a program of supplementary planting of habitat corridors ▸ During detailed design, continuing to refine and optimise alignment design to minimise the corridor footprint on environmentally sensitive areas ▸ Adopt waterway design principles to promote natural flow through culverts and 'wet areas' ▸ Use endemic species in site restoration that retard weed spread and require minimal maintenance, wherever practically possible.

	Using resources efficiently	▸ Explore opportunities for the delivery and haulage of materials via the existing rail networks
		▸ Promote the selection of fuel/energy efficient plant and equipment used during construction. During detailed design:
		  ▸ identify opportunities to change batter slopes and save earthworks where not adversely impacting bulk earthworks or material re-use
		  ▸ review vertical alignment to determine potential earthworks volumes and culvert design savings
		  ▸ assess culverts with low afflux at rail property boundary to achieve potential culvert optimisation
		  ▸ identify potential earthworks savings by reverting from reinforced concrete pipe to reinforced concrete box culvert to reduce cover requirements.
		▸ Investigate the refinement of earthworks and substructure quantities through:
		  ▸ assessment of technically feasible options for reuse of unsuitable and non-conforming material
		  ▸ the use of geogrids and stabilisation to reduce the volume of subgrade treatment
		  ▸ the use of low embankments providing the opportunity to omit rock protection (subject to hydraulic assessment).
		▸ During construction, investigate the use of:
		  ▸ light detection and radar (LiDAR) aerial surveying for accurate knowledge and control of cut and fill requirements
		  ▸ pre-fabricated solutions for structures
		  ▸ mobile crushing plants and materials handling
		  ▸ positioning of pre-casting and manufacturing locations to reduce transport footprint.
		▸ Investigate the opportunity to balance the use of materials across Project boundaries, including exchanging surplus fill, aggregates, pipe work and common-use materials between projects
		▸ Investigate the use of pre-fabricated Project components throughout the construction life cycle.

	Preventing pollution and minimising carbon footprint	▸ Consider the use of solar power systems, including stand-alone systems, for the provision of power at site offices, accommodation camps and for permanent infrastructure associated with signalling ▸ Investigate the implementation of signalling control systems that automatically adjust control and speed profiles so that trains arrive at their target destinations on time, while minimising energy consumption ▸ Invest in practical methods to address waste minimisation, energy and water-saving technologies and practices during construction, operation and maintenance.

7.7 Conclusion

Through the revised reference design process, ARTC has addressed climate change risk reduction concerns and identified opportunities for sustainability initiatives, including travel distance, selection of building materials and renewable energy opportunities. ARTC will incorporate climate modelling, carbon reduction and climate variability opportunities in the final design to reduce the potential risks to Inland Rail and to adjacent local land, infrastructure and assets associated with future climate scenarios.

The Project has embraced the three main aspects of sustainability, namely consideration of the economic, environmental and social impacts and opportunities. The sustainability initiatives fall broadly under the themes of:

- Advancing local, regional and national economies
- Environmental protection
- Respect for people, communities and valued places.

Sustainability initiatives to be explored and adopted by the Project have been identified during technical investigations and stakeholder engagement undertaken for the Inland Rail Program and the Project. These initiatives will be investigated further during detailed design and, where feasible, implemented during construction and operation activities. The implementation of these sustainability measures will contribute to the Inland Rail sustainability objectives.