

CHAPTER 23

Sustainability

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

ARTC

INLAND
RAIL 
An Australian Government Initiative

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23 Sustainability

This chapter provides the sustainability assessment undertaken for the Narrabri to North Star (N2NS) Phase 2—Moree to Camurra North project (the proposal). It describes the overall approach to sustainability, and the specific objectives and initiatives that would be incorporated into the proposal's design, construction and operation.

The Secretary's Environmental Assessment Requirements (SEARs) relevant to climate change and sustainability are listed in Table 23-1. A full copy of the SEARs is provided in Appendix A: Secretary's Environmental Assessment Requirements.

TABLE 23-1: SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS FOR SUSTAINABILITY

Key issue	Requirement	Where addressed
11. Climate change and sustainability	1 Sustainability of the project in accordance with the Infrastructure Sustainability Council of Australia (ISCA) <i>Infrastructure Sustainability Rating Tool</i> and recommend an appropriate target rating for the project.	Sections 23.1 23.3, 23.3.1 and 23.3.2
	2 Sustainability of the project against the current guidelines including targets and strategies to improve Government efficiency in use of water, energy and transport.	Section 23.1 Section 23.4.4

23.1 Assessment approach

Sustainability is an important consideration for the proposal, especially regarding maximising resource efficiency, enhancing local economic activity, and mitigating potential environmental and social impacts— especially for climate change resilience.

The opportunities that freight rail provides to reduce the environmental and social impacts associated with promoting economic advancement, by connecting the producers of agricultural and industrial goods to their markets, is at the heart of the Inland Rail Program. Inland Rail will provide a long-haul freight solution that is time- and cost-competitive compared to road freight (refer Chapter 5: Need for the Inland Rail Program and the strategic context of the proposal). It is anticipated that Inland Rail would replace some of the long-haul road freight task, resulting in reduced road congestion. Fewer vehicular emissions are also expected with Inland Rail compared to transportation of the same volume of freight via the road route.

The *Inland Rail Sustainability Strategy* (ARTC, 2019) and *Environment and Sustainability Policy* (ARTC, 2018a) outline sustainability objectives, targets and commitments for the entire Inland Rail Program, including the proposal. This includes the implementation of a sustainability management plan, and the pursuit of an 'Excellent' rating against version 1.2 of the Infrastructure Sustainability (IS) Rating Scheme for Detailed Design and As-Built (construction) phases (the Infrastructure Sustainability Council of Australia's (ISCA), 2018a).

A broad range of sustainability initiatives were identified and incorporated into the proposal during the development of the design to contribute to the pursuit of an 'Excellent' rating. These initiatives are presented in detail in section 23.4.3. An 'Excellent' rating indicates that the proposal would achieve Australian best practice in terms of sustainability.

Table 23-2 demonstrates how the sustainability objectives, targets and commitments from the *Inland Rail Sustainability Strategy* and ARTC's *Environment and Sustainability Policy* relate to the proposal.

TABLE 23-2: INLAND RAIL SUSTAINABILITY COMMITMENTS AND THE APPLICATION OF THESE ON THE PROPOSAL

Sustainability commitments	Relationship with infrastructure sustainability credits
No harm: our goal is that no-one is harmed at work or on our network.	- Community health and wellbeing—In accordance with the Inland Rail Social Impact Management Plan (SIMP), the Health and Community Wellbeing Action Plan discusses creating a safe environment, developing programs and initiatives to improve safety outcomes to local communities, and ensuring ongoing engagement. - Crime prevention through environmental design— incorporating crime prevention measures in the design, construction and operation, which will reduce potential impacts on local communities. This also includes investigating the opportunity for designing temporary construction diversions and lighting to meet guidelines laid out in <i>Crime Prevention through Environmental Design guidance</i> (NSW Police Force, 2020).

Sustainability commitments

Relationship with infrastructure sustainability credits

Engage early and meaningfully with stakeholders, including Indigenous organisations, communities, industry and government: ▶ build effective working relationships and a shared understanding of the Inland Rail Program.	▶ Stakeholder and community engagement credits—encouraging, planning, implementing and monitoring stakeholder and community engagement with Inland Rail. ▶ Heritage credits—recognising the role that the Indigenous and non-Indigenous community has in identifying heritage items and values, and consulting with cultural heritage stakeholders.
Promote long-term economic benefits within regional communities: ▶ create opportunities for development of skilled local and Indigenous workers ▶ support local and Indigenous businesses; ensure they are provided with opportunities to participate ▶ enable Inland Rail to be a catalyst for complementary private sector investment.	▶ Procurement credits—encouraging sustainability throughout the value chain for goods and services used to build and operate Inland Rail. ▶ Stakeholder and community engagement credits—encouraging, planning, implementing and monitoring stakeholder and community engagement with Inland Rail. ▶ Heritage credits—recognising the role that the Indigenous and non-Indigenous community has in identifying heritage items and values and investigating the opportunities to interpret heritage to promote local heritage values. ▶ Community health and wellbeing—identifying opportunities to contribute to local communities. ▶ Implement the Social Impact Management Plan (SIMP) and supporting action plans specifically relating to workforce management, housing and accommodation, and local business and industry content. ▶ ARTC has developed an Australian Industry Participation Plan and will work with its various service providers, consultants and contractors in its implementation.
Protect the environment by mitigating potential impacts: ▶ apply the principles of avoid, minimise, offset to manage potential impacts to receiving environments and ecological values ▶ minimise greenhouse gas (GHG) emissions, waste generation and water consumption ▶ continually investigate opportunities to improve environmental values and prevent pollution ▶ obtain and comply with all relevant environmental approvals and compliance obligations.	▶ Ecology; and discharge to air, land and water credits—seek opportunities to reduce the environmental footprint of the proposal and identify opportunities to enhance environmental values. ▶ Energy and carbon—identifying opportunities to reduce the carbon footprint of the proposal. ▶ Water—seeking opportunities to reduce the total amount of water used on the proposal and to identify sources of water that reduce the demand on potable water sources. ▶ Materials—identifying opportunities to reduce the material impact of the proposal; dematerialisation of the design; improving the service life of selected materials.
Future-proof Inland Rail so it is efficient and effective in the long term: ▶ design for climate change resilience ▶ incorporate the future demand requirements and corridor uses in the current design.	▶ Climate change risk assessment—identifying potential climate change impacts and implementing adaptation and resilience measures. ▶ Adaptation measures—considering future demand requirements and corridor uses in the current design. ▶ Designing for efficient use of materials and energy for the life of the asset.
Base decisions on a balanced consideration of technical, economic, environmental and social issues: ▶ adopt a consistent approach across the Program.	▶ Decision making—consistently considering the environmental, social, local economic and technical impacts during decision making and ensure such considerations are built into the decision-making process.
Regularly review and audit processes and performance: ▶ challenge the way we have always done things ▶ ensure we are doing what we said we would do.	▶ Management and governance credits—recognising the importance of sustainability commitments; regularly reviewing progress against sustainability commitments; encouraging culture of continuous improvement through stakeholder and community engagement. This includes the early detection of benefits the proposal will bring so that the promised benefits can be assessed and reviewed during operation. ▶ Innovation—identifying new and improved methods of achieving sustainability commitments.

Sustainability commitments	Relationship with infrastructure sustainability credits
Drive a culture of continuous improvement: ▶ seek to improve, collaborate and value add throughout delivery ▶ continually improve our environmental management system to enhance environmental performance.	▶ Management and governance—monitoring and evaluating performance; implementing lessons learnt from within and outside the proposal. ▶ Stakeholder and community engagement credits—continue to consult with community and stakeholder groups to identify opportunities for improving the proposal outcomes. ▶ Innovation—identifying new and improved methods of achieving sustainability commitments.

23.2 Legislation, policies, standards and guidelines

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 Brundtland Report, as well as the *National Strategy for Ecologically Sustainable Development* (Council of Australian Governments, 1992). The definition of sustainable development is:

‘...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.’
Environmental Protection and Biodiversity Conservation Act, 1999 (Cth) (EPBC Act)

This definition is included in Section 516A of the EPBC Act, which requires Commonwealth organisations to report on how they ‘*accord with and advance the principles of ecologically sustainable development*’.

The IS Rating Scheme was established in 2012. It provides a clear framework for embedding sustainability into the planning, design, construction and operation phases of infrastructure projects. In addition to the IS Rating Scheme, the legislation, policies and guidelines outlined in Table 23-3 have been used to guide the implementation of sustainability initiatives during the design phases undertaken to date. Table 23-3 should be read in conjunction with the regulatory context of technical disciplines such as ecology, hydrology, visual impact assessment and cultural heritage.

TABLE 23-3: LEGISLATIVE, POLICY AND GUIDELINE CONTEXT

Legislation, policy or guideline	Relevance to the proposal
<i>Inland Rail Environment and Sustainability Policy</i> (ARTC, 2018a)	Sets the priorities and direction for implementing sustainability initiatives during the planning, design and operation phases of Inland Rail.
<i>Inland Rail Sustainable Procurement Policy</i> (ARTC, 2018b)	Sets the priorities and direction for sustainable procurement in the context of Inland Rail.
<i>Inland Rail Sustainability Strategy</i> (ARTC, 2019)	Sets out the delivery model for sustainability in the context of Inland Rail. It includes targets that are aligned with the <i>Inland Rail Environment and Sustainability Policy</i> .
<i>NSW Sustainable Design Guidelines Version 4.0</i> (Transport for NSW (TfNSW), 2017)	Framework for integrating sustainability into transport projects in NSW.
<i>Infrastructure Sustainability Scorecard Version 1.2, April 2018 update</i> (Infrastructure Sustainability Council of Australia (ISCA), 2018a)	The proposal is pursuing an ‘Excellent’ rating against version 1.2 of the IS Rating Scheme.
<i>Infrastructure Sustainability Planning Guidelines</i> (ISCA, 2016)	Details how the IS Rating Scheme may be applied to the planning phase of infrastructure projects, which occurs prior to the detailed design phase.
<i>Infrastructure Sustainability Technical Manual (Version 1.2)</i> (ISCA, 2018b)	The IS rating scheme provides a comprehensive rating system for evaluating sustainability performance of infrastructure projects. IS evaluates the sustainability performance against the benchmarks set out within the IS rating scheme in this Technical Manual and the IS Scorecard.
<i>Environmental Planning and Assessment Act 1979</i> (NSW) (EP&A Act)	One of the Act’s objects is ‘to facilitate ecologically sustainable development [ESD] by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment’. Environmental assessment under the Act must take ESD into account.
<i>NSW Infrastructure Skills Legacy Program’s training and employment targets</i> (NSW Department of Industry (DoI), no date)	Sets targets for contributing to local economic and social advancement.

Legislation, policy or guideline	Relevance to the proposal
<i>NSW Climate Change Policy Framework</i> (NSW Office of Environment and Heritage (OEH), 2016)	Framework for minimising carbon emissions through design.
<i>National Greenhouse and Energy Reporting Act 2007</i> (Cth) (NGER Act)	The NGER Act introduced the <i>Emissions and Energy Reporting Scheme</i> (EERS), which outlines the approach to monitoring and reporting GHG emissions, including a standard set of factors used to determine GHG footprints for liquid fuels and electricity.
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) (EPBC Act)	Provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the EPBC Act as matters of national environmental significance (MNES).
<i>NSW Waste Avoidance and Resource Recovery Strategy 2014–21</i> (NSW Environment Protection Authority (EPA), 2014)	Sets out the NSW Government's position in relation to waste avoidance, diversion from landfill, reuse and recycling.
<i>NSW Government Resource Efficiency Policy</i> (OEH, 2019)	Provides guidance on how to maximise resource efficiency during the proposal's lifecycle.
<i>United Nations Framework Convention on Climate Change</i> including <i>Paris Agreement on climate change</i>	Outlines the Australian Government's commitments to international action on climate change.
<i>Australian Standard AS5334:2013 Climate change adaptation for settlements and infrastructure: A risk-based approach</i> (Standards Australia, 2013)	Guides how climate change risks should be assessed, as well as the development of effective adaptation measures.
<i>Sustainable Procurement Guide</i> (Australian Government, 2013)	Sets the priorities and direction for sustainable procurement for Australian Government agencies and organisations.
<i>Guide for sustainable procurement of services</i> (Eco-Buy Limited, 2013)	Sets the priorities and direction for sustainable procurement for Australian Government agencies and organisations.

23.3 Methodology

Sustainability has been assessed for the proposal using the framework that underpins the IS Rating Scheme. The scheme, which considers whole-of-life impacts and benefits, has historically been used for the assessment of sustainability performance throughout the design and construction phases, and is evaluated by ISCA at the end of each of these stages. By adopting the IS rating framework during the planning phase, it has enabled the assessment of anticipated performance against defined benchmarks considering governance, environmental, social and local economic aspects. This will assist with the monitoring and reviewing of performance during delivery and to stimulate the culture of continuous improvement.

23.3.1 Infrastructure Sustainability rating framework

The IS Rating Scheme (administered by ISCA) is made up of 44 credits grouped into six themes:

- 1 management and governance
- 2 using resources
- 3 emissions to air, land and water
- 4 ecology
- 5 people and place
- 6 innovation.

Table 23-4 outlines the themes, categories and credits that make up the IS Rating Scheme.

TABLE 23-4: IS RATING SCHEME FRAMEWORK

Theme	Categories	Credit abbreviation	Credit name
Management & governance	Management systems	Man-1	Sustainability leadership and commitment
		Man-2	Risk and opportunity management
		Man-3	Organisational structure, and roles and responsibilities
		Man-4	Inspection and auditing
		Man-5	Reporting and review
		Man-6	Knowledge sharing
		Man-7	Decision making
	Procurement and purchasing	Pro-1	Commitment to sustainable procurement
		Pro-2	Identification of suppliers
		Pro-3	Supplier evaluation and contract award*
		Pro-4	Managing supplier performance*
	Climate change adaption	Cli-1	Climate change risk assessment
		Cli-2	Adaptation measures
Using resources	Energy and carbon	Ene-1	Energy and carbon monitoring and reduction
		Ene-2	Use of renewables
	Water	Wat-1	Water use monitoring and reduction
		Wat-2	Replace potable water
	Materials	Mat-1	Materials lifecycle impact measurement and reduction
		Mat-2	Environmentally labelled products and supply chains*
Emissions pollution & waste	Discharges to air, land and water	Dis-1	Receiving water quality
		Dis-2	Noise
		Dis-3	Vibration
		Dis-4	Air quality
		Dis-5	Light pollution
	Land	Lan-1	Previous land use
		Lan-2	Conservation of onsite resources
		Lan-3	Contamination and remediation
		Lan-4	Flood design
	Waste	Was-1	Waste management
		Was-2	Diversification from landfill*
		Was-3	Deconstruction/disassembly/adaptability
Ecology	Ecology	Eco-1	Ecological value
		Eco-2	Habitat connectivity
People and places	Community health, wellbeing and safety	Hea-1	Community health and wellbeing
		Hea-2	Crime prevention
	Heritage	Her-1	Heritage assessment and management
		Her-2	Monitoring of heritage*
	Stakeholder participation	Sta-1	Stakeholder engagement strategy
		Sta-2	Level of engagement
		Sta-3	Effective communication
		Sta-4	Addressing community concerns
	Urban and landscape design	Urb-1	Urban design
		Urb-2	Implementation*
Innovation	Innovation	Inn-1	Innovation strategies and technologies

A project's rating depends on how well it performs against defined benchmarks set for each credit. The proposal is pursuing a rating of 'Excellent', corresponding to a score of 50 to 74, as shown in Table 23-5.

TABLE 23-5: INFRASTRUCTURE SUSTAINABILITY RATING LEVELS

Score	Rating level
<25	Not eligible for a certified rating
25 to 49	Commended
50 to 74	Excellent
75 to 110	Leading

In July 2018, ISCA released a new version of the IS Rating Scheme (version 2.0); however, the proposal has been assessed against version 1.2, in accordance with guidance provided by ISCA. Opportunities for the proposal to pilot some of the new credits associated with version 2.0 of the IS Rating Scheme have been identified in section 23.4.4 of this chapter.

23.3.2 Adoption of the Infrastructure Sustainability Council of Australia rating scheme during the planning phase

The proposal is currently in the planning phase (i.e. EIS and reference design phase) as defined by ISCA. An IS rating (v1.2) cannot be formally verified during the planning phase; formal verification against version 1.2 of the IS Rating Scheme is expected to occur towards the end of the detailed design phase.

The method of applying the IS Rating Scheme during the planning phase is represented schematically in Figure 23-1. Applying the IS Rating Scheme in this way will enable formal verification to occur towards the end of the detailed design phase.

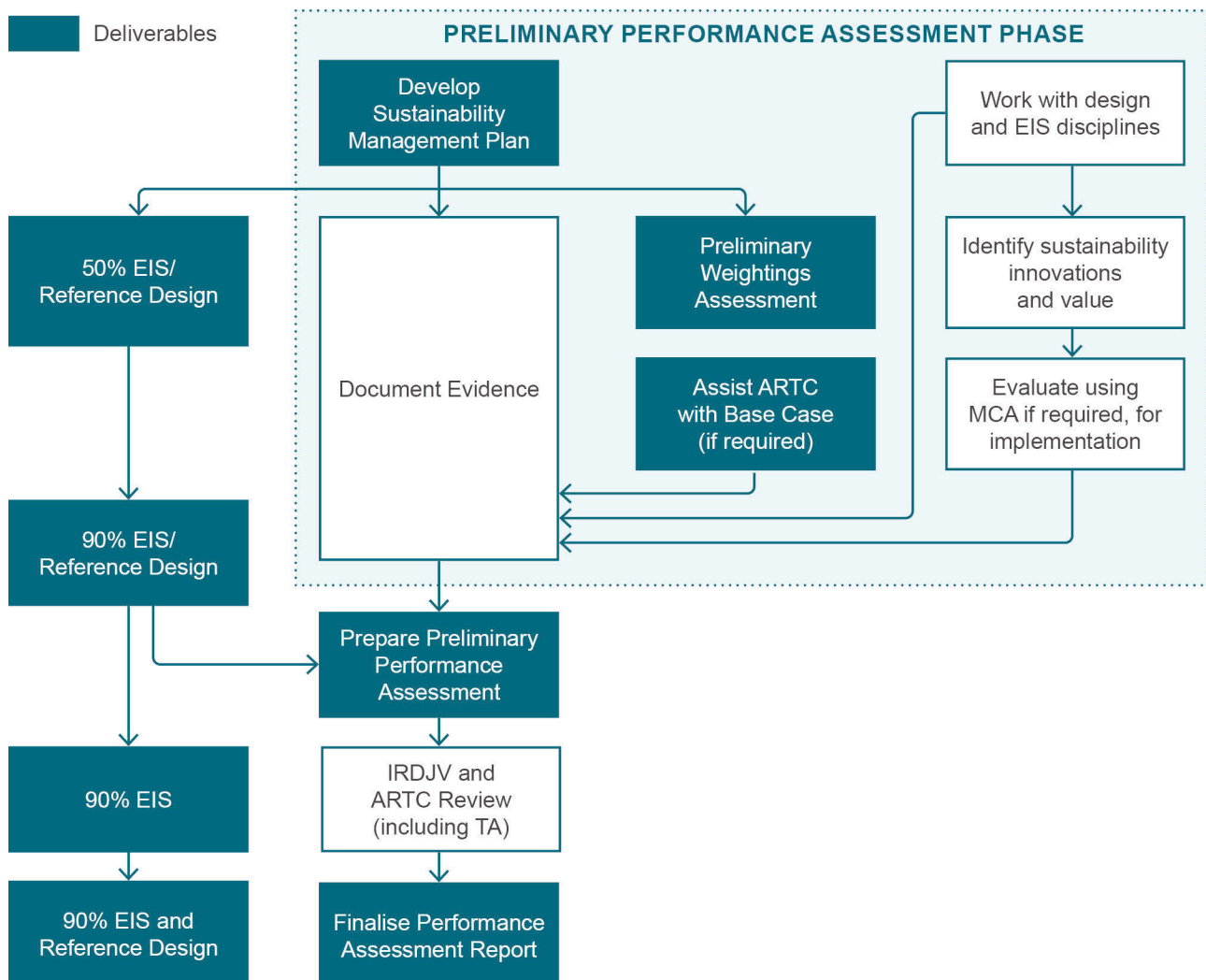


FIGURE 23-1: INFRASTRUCTURE SUSTAINABILITY COUNCIL OF AUSTRALIA IS RATING SCHEME PROCESS

23.3.3 Preliminary weightings assessment

Version 1.2 of the IS Rating Scheme allows projects to adjust the materiality (i.e. weighting) of certain credits depending on the local/regional context. The process of adjusting the materiality of certain credits is known as a weightings assessment. A preliminary weightings assessment has been completed for the proposal. The intent is that the preliminary weightings assessment will be compiled by the design and construction contractor and verified by ISCA once the detailed design phase commences.

The preliminary weightings assessment found the following categories to have the most relevance:

- ▶ ecology
- ▶ discharges to air, land and water
- ▶ management systems
- ▶ energy and carbon
- ▶ water.

23.3.4 Approach to undertaking the preliminary weightings assessment

The Infrastructure Sustainability Technical Manual (ISCA, 2018b) presents three different approaches for undertaking the preliminary weightings assessment:

- ▶ stakeholder workshop
- ▶ proposal/asset team representing stakeholder views
- ▶ individual assessor.

For the preliminary weightings assessment, the design team and ARTC reviewed the most relevant sustainability issues based on the proposal and baseline information collected for the environmental assessments.

23.3.5 Previous studies relating to sustainability

The following studies detail how the proposed alignment has been developed in response to engineering, environmental and community engagement activities:

- ▶ *Inland Rail Programme: Narrabri to North Star Environmental Impact Assessment* (GHD, 2017).

These studies include the outcomes of stakeholder consultation activities occurring prior to August and November 2020, outlined in Chapter 4: Consultation.

The following key issues relevant to the preliminary weightings assessment were raised during stakeholder consultation activities:

- ▶ flooding
- ▶ stakeholder engagement
- ▶ impacts on the local economic activities (e.g. agriculture)
- ▶ level crossing safety
- ▶ potential impacts concerning wellbeing, noise, vibration and visual amenity
- ▶ impacts to properties, including severance and loss of productive land.

The above studies and key issues were used as evidence to support the preliminary weightings assessment for the proposal.

23.3.6 Preliminary performance assessment

A preliminary performance assessment has been prepared for the proposal. The preliminary performance assessment uses version 1.2 of the IS Rating Scheme to assess the anticipated sustainability performance of the proposal. It draws on evidence and opportunities from the proposal's design phase, considering the likelihood that outcomes from the initial design phase will be carried forward to the detailed design phase, when a formal IS rating will be pursued. The applicability of the IS Version 1.2 rating to different proposal phases is illustrated in Figure 23-2, noting the proposal is currently in the planning phase.

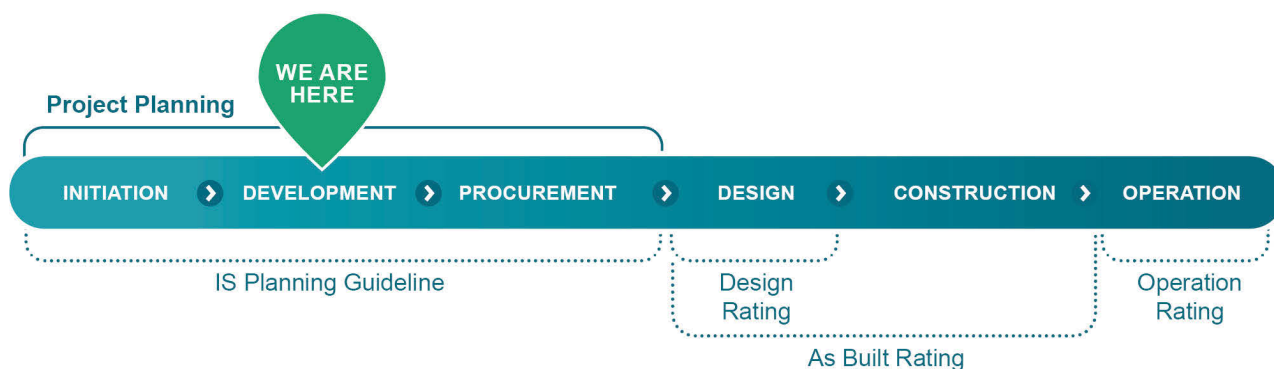


FIGURE 23-2: APPLICABILITY OF INFRASTRUCTURE SUSTAINABILITY VERSION 1.2 RATING TO DIFFERENT PROPOSAL PHASES

The intent of the preliminary performance assessment is to:

- ▶ document evidence to show how sustainability initiatives have been embedded into the current design phase of the proposal, ensuring that initiatives to be carried forward to the detailed design, construction and/or operation phases are also captured
- ▶ document opportunities to minimise energy, water and material consumptions and reduce GHG emissions during construction and operation of the proposal
- ▶ identify cost-effective opportunities for innovation and leading practice during the construction and operation phases
- ▶ document how the design of the proposal has changed to mitigate potential environmental, social and economic impacts, and to improve future resilience
- ▶ inform the IS verification process, which is expected to occur at the end of the detailed design phase.

The preliminary performance assessment draws on evidence from the:

- ▶ *ARTC Environment and Sustainability Policy*
- ▶ *Inland Rail Sustainability Strategy*
- ▶ *Inland Rail Program Environmental Management Plan*
- ▶ ARTC and Inland Rail guidance documents, including the *Basis of Design*
- ▶ the reference design of the proposal
- ▶ mitigation measures proposed as part of this EIS
- ▶ current processes, practices and methodologies associated with the delivery of critical State significant infrastructure (SSI) in NSW.

23.4 Sustainability management and measures

23.4.1 Sustainability management plan

A sustainability management plan would be developed to guide the design, construction and operation of the proposal and would include:

- ▶ demonstrate leadership and commitments to sustainability
- ▶ set reasonable targets for safety, local employment, materials, waste, procurement, ecological connectivity, GHG emissions and climate resilience in line with the Inland Rail objectives and targets
- ▶ establish the roles, responsibilities and resourcing requirements for the embedding of sustainability throughout the design, procurement and construction of the proposal
- ▶ document the process for the identification, assessment and implementation of sustainability initiatives and opportunities, particularly those associated with the efficient use of energy, water and transport
- ▶ document the process to be used to manage the assessment, monitoring and review of sustainability against achieving the requirements of an 'Excellent' level of performance as measured against the requirements of version 1.2 of the IS Rating Scheme
- ▶ outline the documentation and reporting requirements necessary to demonstrate how sustainability has been incorporated into the proposal during design, construction and operation.

Prior to the commencement of operations, the design and construction phase sustainability management plan would be reviewed and updated to focus on operations and maintenance aspects.

23.4.2 Sustainability in design

Sustainability measures that have been identified during the progress of the design are presented in Table 23-6. This table does not include all management measures that form part of discipline-based measures presented elsewhere in this EIS. Where opportunities have been identified but have not been able to be implemented as part of the design, they are presented in section 23.4.4. These measures may be suitable for consideration as part of the detailed design, construction or operation of the proposal.

23.4.3 Initiatives implemented during the EIS design

Sustainability initiatives that have been implemented prior to, or during, the design phases have been summarised in Table 23-6. The initiatives have been developed against specific IS credits. This will support formal verification against version 1.2 of the IS Rating Scheme, which is expected to occur as the design progresses towards a more detailed phase.

TABLE 23-6: SUSTAINABILITY IN DESIGN MEASURES IMPLEMENTED DURING THE REFERENCE DESIGN PHASE

Theme	Topic	Sustainability in design measures	Applicable IS credits
Governance	Making informed decisions	Use of a Program-wide multi-criteria assessment that considers environmental, social and local economic impacts to evaluate preferred alignment for greenfield sections.	Man-7
		The proposed alignment has been developed to minimise environmental and social impacts.	Eco-1, Eco-2, Dis-1, Dis-2, Dis-3
		In preparation for the Reference Design phase, a multi-criteria analysis of the proposed alignment was prepared in May 2017 (WSP Parsons Brinckerhoff, 2017). Six alignments were assessed: Base Case, Option A, Option D, Option E, Option F and Option D1. Option D1 was ranked the highest due to: ▶ reduced chance of impacting on environmentally sensitive sites and remnant vegetation. As a result, option D1 was carried forward to the Reference Design phase.	
		A multi-criteria analysis was used to identify the preferred greenfield alignment. The preferred alignment (referred to as P2.5—West Eukabilla Road and East Whalan Creek) improved the multi-criteria analysis score by 0.625. Alignment P2.5 will:	Man-7

Theme	Topic	Sustainability in design measures	Applicable IS credits
		▶ reduce the requirement to acquire land within 2/SP142352 by approximately 30 hectares (ha). This will be offset by the realignment of Eukabilla Road within the Rainbow Reserve. Making informed decisions also includes engagement with stakeholders and implementing their feedback during all phases of the proposal. In addition, informed decisions include evaluation of design aspects (including constructability and safety).	
	Futureproofing	Consideration of the future asset requirements, including the ultimate corridor considerations, to minimise the potential for premature decommissioning of infrastructure as part of upgrade works, and future disruption to the environment and landowners. For example, structures for future TAL have been incorporated into the design.	Was-3, Mat-1, Ene-1, Wat-1, Cli-2
	Climate response	Wat- Design considers climate and weather events to avoid an increase in flood risk to neighbouring properties and the environment for extreme rainfall and weather events both now and in the future, including extreme 1 in 2,000 and 1 in 10,000 extreme rainfall events.	Lan 4
		▶ Consideration of climate change in modelling used to inform design of drainage and waterways including: ▶ application of the latest Australian Rainfall and Runoff Interim Climate Change Guidelines (Engineers Australia: Water Engineering, 2019) ▶ assessment of impacts associated with the 1% Annual Exceedance Probability (AEP) to determine the sensitivity of the design to potential changes in the rainfall intensity ▶ where new track is to be constructed in greenfield areas, track crossing and longitudinal drainage should have capacity to convey the 1% AEP without overtopping formation ▶ where enhancement or upgrading to existing track is to be undertaken, no worsening of the existing track flood immunity will occur.	Cli-1, Cli-2, Lan-4
		Considers any implemented adaptation options associated with the direct and indirect impacts of climate change and natural disaster events to reduce the potential for service disruption. This includes implementing oversized culverts, consideration of extreme flood events and longer duration events (refer to Chapter 22: Climate change and Technical Paper 4: Hydrology and flooding impact assessment).	Cli-1, Cli-2
Advancing local, regional and national economies	Supporting local and Indigenous businesses	Consideration and preparation, of local material sourcing strategies, including the use of existing borrow pits from previous projects, identifying opportunities for the use of local material sources, quarries and concrete suppliers (refer to Chapter 18: Economics).	Ene-1, Mat-1, Dis-1, Dis-2, Lan-2, Was-3
Environmental protection	Biodiversity conservation	Additional mitigation measures were applied to the design to protect environmentally and socially sensitive sites within the greenfield alignment (refer to Chapter 27: Approach to environmental management).	Eco-1, Sta-3, Her-1
		Alignment considers the reuse of previously disturbed land, thereby avoiding agricultural and native vegetation. Where possible, the alignment has been situated within the existing rail corridor to avoid impacting greenfield sites.	Lan-1
		Consideration of landscaping and habitat rehabilitation measures.	Eco-1, Eco-2, Urb-1

Theme	Topic	Sustainability in design measures	Applicable IS credits
		Fauna crossings to maintain/enhance fauna connectivity for both terrestrial and aquatic species such as: ▶ use of environmental culverts to facilitate fauna crossings ▶ consideration of fish passage requirements.	Eco-2
	Efficient use of resources	During the Reference Design phase, the number of bridges proposed decreased from 16 to 14. This reduced the total bridge length from approximately 2,875 km to 2,032 km, while the total bridge deck area decreased from 11,414 m² to 8,067 m².	Mat-1, Ene-1, Eco-1
		Assumptions associated with construction methodology for use in the Base Case/Preliminary Performance Assessment were documented to assist with the future preparation of the Base Case proposal.	Ene-1, Mat-1, Wat-1
		Optimisation of road and rail interfaces, considering bridge lengths and crossing angles.	Mat-1, Hea-2
		Consideration of decommissioning.	Was-3
		Cut-and-fill balancing and minimisation of transport requirements for import/disposal of spoil are considered as part of the design process (refer to Chapter 21: Waste for the cut-and-fill balancing results): ▶ maximisation of the use of onsite cut during construction, including refinements to horizontal and vertical alignments. This will reduce the quantity of offsite fill required ▶ consideration of fill batter geometry to encourage cut-and-fill balancing ▶ locally sourced materials during construction ▶ sourcing materials with reduced embodied carbon and environmental impact where possible ▶ earthworks materials assessment including: topsoil stripping, unsuitable materials, material reuse, bulking factors, excitability and mass haul has been undertaken to reduce the net import of materials, export of waste and reduced transportation distances.	Mat-1, Lan-2, Was-2
		Optimisation of formation designs to consider environment, use of local materials, reduced maintenance and ease of construction.	Lan-2, Dis-1, Dis-2, Mat-1
		Consideration of topsoil stripping and preservation for re-use within proposal and or local area.	Lan-2
		Waste reduction has been considered in the following ways during the reference design phase: ▶ the cut-and-fill balance and minimisation of transport requirements for import/disposal of spoil ▶ maximisation of the use of onsite cut during construction, including refinements to horizontal and vertical alignments; this will reduce the quantity of offsite fill required ▶ reduce the volume of offsite materials required for construction. This will reduce impacts on local road networks as fewer trucks will be required to transport materials. This will also result in fuel savings and greenhouse gas emission reductions.	Was-1, Was-2, Was-3, Mat-1, Ene-1
		Bridges and waterway crossings are designed to minimise impacts to bed, banks and environmental flows.	Lan-4
		Consideration of flooding impacts on formation design.	Mat-1, Cli-2
		Consideration of long duration flood events (i.e. 3-day duration) on embankments.	Lan-4, Cli-2
		Minimise adverse impacts to receiving water quality during construction and operation.	Dis-1

Theme	Topic	Sustainability in design measures	Applicable IS credits
	Surface water and ground water	Waterway realignment/diversion design to include simulation of natural features. This may include meanders, pools, riffles, shaded and open sections, deep and shallow sections and different types of sub-strata, depending on the pre-disturbance environmental values.	Lan-4, Dis-1, Eco-1
		The design has developed to minimise impacts to waterways, riparian vegetation and in-stream flora and habitats. This includes the: ▶ adoption of a crossing structure hierarchy (e.g. bridges preferred to culverts), as applicable and relevant to local conditions and constructability ▶ aim to avoid, then minimise the extent of waterway diversions or realignments by utilising the existing rail corridor.	Eco-1, Eco-2, Dis-1
Respect for people, communities and valued places	Respecting heritage and culture values	Consideration of heritage (Indigenous and non-Indigenous) matters in response to impacts identified in the EIS, including community heritage values (refer to Chapter 15: Cultural heritage).	Her-1, Her-2
	Building relationships	Consideration of Moree Plains Shire Council plans associated with community health and wellbeing as defined by the IS Rating Scheme, including local economic development and business activities, cultural and community values, opportunities for skill development.	Hea-1
	Community safety, health and wellbeing	Design mitigation measures applied to manage runoff and flooding. As a result, the proposal will not cause a net increase in flood risk. Design mitigation measures include:	Lan-4
		▶ horizontal and vertical refinements to optimise creek crossings and to provide flood immunity ▶ establishment of flood resilience requirements including greenfield designs providing 1% AEP event without overtopping formation, including allowance for free boarding.	
		Consideration of potential impacts to sensitive receivers along the track alignment for operational noise and vibration.	Dis-2, Dis-3
		Changes to the radius of the curves where noise impacts are greater than linear sections.	Dis-2
		Use of continuously welded rail and identification of potential mitigation measures (based on reasonableness and practicality).	Cli-2
		Consideration of impacts on sensitive receivers, and identification of management and mitigation measures to minimise impacts.	Dis-2, Dis-3
		Consideration of air quality design matters in response to impacts identified in the EIS.	Dis-4
		Consideration of the level of existing lighting within the area and the orientation, design and timing of proposed construction-related lighting around curfews to reduce impacts on the sensitive receivers.	Dis-5
		Assessment of potential to disturb contaminated sites assessed and impacts on the availability of locally sourced materials considered.	Lan-3
		Consideration of crime prevention, light pollution and urban design aspects of the IS Rating Scheme in the landscape and visual amenity assessment. Including considerations to level crossings and interfaces with the proposal.	Urb-1, Hea-2, Dis-5
		Engagement with stakeholders, including directly affected landowners and provision of materials through the proposal's website.	Sta-1, Sta-2, Sta-3, Sta-4, Hea-1
		Identification of community priority issues.	Hea-1, Sta-1, Sta-2, Sta-3, Sta-4

23.4.4 Future sustainability opportunities at Program and proposal level

A summary of future sustainability opportunities for the proposal as summarised in Table 23-7. These opportunities were identified during development of the design but require further investigation during the detailed design, construction and/or operation phases.

TABLE 23-7: SUSTAINABILITY OPPORTUNITIES THAT MAY BE IMPLEMENTED DURING THE FUTURE PHASES OF THE PROPOSAL

Theme	Topic	Sustainability in design measures	Applicable IS credits
Governance	Making informed decisions	Possible re-use of works sites and haul roads, and/or water bores associated with projects being pursued within the region or neighbouring regions.	Lan-1, Mat-1
Environmental protection	Efficient use of resources	Explore opportunities for haulage and delivery via the rail network.	Mat-1, Ene-1
	Minimising carbon footprint	Investigate design specifications and treatment methodologies to optimise the re-use of onsite or nearby material.	Mat-1, Ene-1, Inn-1
	Efficient use of resources	Possible re-use of water bores that are no longer required by bore owners.	Mat-1
		Possible re-use of recycled water plant and surplus water supply from landowners.	Wat-1, Mat-1
		Use of stand-alone solar power system for provision of power at the site offices.	Ene-2
		Use of stand-alone power system for provision of power associated with signalling works.	Ene-2
Innovation	Innovation	Incorporation of continuous improvement, sharing knowledge and lessons learnt from the innovations that have been approved on other Inland Rail projects. Identification of innovations during detailed design and construction stage.	Inn-1, Man-6

23.4.5 Broad-scale sustainability opportunities

The wider Inland Rail Program has identified and is implementing several sustainability opportunities that would also be adopted for the proposal. These include:

- ▶ establishment of a Program-wide sustainability network to enable the sharing of lessons learnt between projects and with the broader industry
- ▶ establishment of a Program-wide sustainability supply chain program, building on existing sustainability supply chain initiatives
- ▶ balancing of materials across project boundaries, including the exchanging of surplus fill, aggregates, pipe work and common-use materials between projects
- ▶ use of already constructed sections of the Inland Rail network to assist with the transportation of materials, including rails and sleepers
- ▶ consideration of skills development and training partnerships with registered training organisations and schools that enable apprentices and vocational education and training students to continue skills development beyond the life of the proposal
- ▶ partnering with key material providers (e.g. providers of rails and sleepers) to pursue innovation opportunities, including encouraging the uptake of environmental labelling schemes
- ▶ identify Program-wide mitigation and adaptation strategies, including those associated with the operation phase.

23.4.6 Skills and legacy

As part of the Inland Rail Environment and Sustainability Policy, ARTC has committed to the promotion of economic benefits in regional communities. In line with the NSW Government's Infrastructure Skills Legacy Program targets, ARTC has committed to:

- ▶ providing up-skilling opportunities to apprentices/trainees (subject to regulatory and other restrictions)
- ▶ developing a workforce management plan, including an Indigenous Participation Plan
- ▶ engaging with local businesses and residents to investigate options for flexible working arrangements
- ▶ working with local businesses to secure supply contracts and encourage local economic activity.

Furthermore, ARTC would work with the Australian Government, the NSW State Government, and local governments to develop strategies to appropriately manage the likely draw of labour during the construction phase of the proposal.

23.4.7 Summary of mitigation measures

The measures outlined in Table 23-8 would be implemented to mitigate the potential land use and property impacts for the proposal.

TABLE 23-8: SUMMARY OF MITIGATION MEASURES

Ref	Impact	Mitigation measures	Timing
S-1	Climate response	The design would consider climate and weather events to avoid an increase in flood risk to neighbouring properties and the environment for extreme rainfall and weather events, both now and in the future, including extreme rainfall events such as the 1-in-2000 and 1-in-10000 events.	Detailed design
S-2	Climate response	The design would consider climate change in modelling used to inform design of drainage and waterways including: ▶ application of the latest <i>Australian Rainfall and Runoff Interim Climate Change Guidelines</i> ▶ assessment of impacts associated with the 1% AEP to determine the sensitivity of the design to potential changes in the rainfall intensity ▶ where new track is to be constructed in greenfield areas, track crossing and longitudinal drainage would have capacity to convey the 1% AEP without overtopping formation ▶ where enhancement or upgrading of existing track is to be undertaken, no worsening of the existing track flood immunity would occur.	Detailed design
S-3	Climate response	Design would include mitigations for the potential increase in flood risk arising from any increase in extreme rainfall as a result of climatic change. Adaption strategies, such as installing an early flood warning system to alert ARTC to impending flood risks, locating critical electrical systems (signalling, communications huts, etc.) above potential flood zones, and considering the use of solar and battery devices to ensure uninterrupted operation of signalling and network communication in the event of power failure, would be considered during detailed design.	Detailed design
S-4	Supporting local and Indigenous businesses	Consideration and preparation of local material sourcing strategies would be undertaken, including the use of existing borrow pits from previous projects, identifying opportunities for the use of local material sources, quarries and concrete suppliers (refer to Chapter 18: Economics).	EIS design and detailed design
S-5	Biodiversity conservation	The alignment would maximise the reuse of previously disturbed land, thereby avoiding agricultural land and native vegetation. Where possible, the alignment would be situated within the existing rail corridor to avoid impacting greenfield sites.	Detailed design
S-6	Efficient use of resources	Optimisation of road and rail interfaces, including bridge lengths and crossing angles, would be considered.	Detailed design

Ref	Impact	Mitigation measures	Timing
S-7	Efficient use of resources	Cut-and-fill balancing and minimisation of transport requirements for import/disposal of spoil would be considered as part of the design process (refer to Chapter 21: Waste for the cut-and-fill balancing results): ▶ maximisation of the use of onsite cut during construction, including refinements to horizontal and vertical alignments. This would reduce the quantity of offsite fill required ▶ consideration of fill batter geometry to encourage cut-and-fill balancing ▶ locally sourced materials during construction ▶ sourcing materials with reduced embodied carbon and environmental impact where possible ▶ earthworks materials assessment including: topsoil stripping, unsuitable materials, material reuse, bulking factors, excitability and mass haul has been undertaken to reduce the net import of materials, export of waste and reduced transportation distances.	Detailed design, pre-construction and construction
S-8	Efficient use of resources	Formation design would be optimised to consider the environment, use of local materials, reduced maintenance and ease of construction.	Detailed design
S-9	Efficient use of resources	Topsoil stripping and preservation for re-use within the proposal and or local area would be considered and undertaken where possible.	Detailed design, pre-construction and construction
S-10	Efficient use of resources	Waste reduction would be considered in the following ways: ▶ the cut-and-fill balance and minimisation of transport requirements for import/disposal of spoil ▶ maximisation of the use of onsite cut during construction, including refinements to horizontal and vertical alignments. This would reduce the quantity of offsite fill required ▶ reduce the volume of offsite materials required for construction. This would reduce impacts on local road networks as fewer trucks would be required to transport materials. This would also result in fuel savings and greenhouse gas emission reductions.	Detailed design
S-11	Efficient use of resources	Bridges and waterway crossings would be designed to minimise impacts to bed, banks and environmental flows.	Detailed design
S-12	Surface water and groundwater	The design would minimise impacts to waterways, riparian vegetation and in-stream flora and habitats. This includes: ▶ adoption of a crossing structure hierarchy (e.g. bridges preferred to culverts), as applicable and relevant to local conditions and constructability ▶ aim to avoid, then minimise, the extent of waterway diversions or realignments by utilising the existing rail corridor.	Detailed design
S-13	Respecting heritage and cultural values	Heritage (Indigenous and non-Indigenous) matters would be considered in response to impacts identified in the EIS, including community heritage values (refer to Chapter 15: Cultural heritage).	Detailed design
S-14	Building relationships	Consideration of Moree Plains Shire Council plans associated with community health and wellbeing would be undertaken as defined by the IS rating scheme, including local economic development and business activities, cultural and community values, and opportunities for skill development.	Detailed design
S-15	Community safety, health and wellbeing	Consideration would be given to: ▶ potential impacts to sensitive receivers along the track alignment for operational noise and vibration ▶ optimisation of the radius of the curves where noise impacts are greater ▶ use of continuously welded rail ▶ impacts on sensitive receivers, and identification of noise and flooding management and mitigation measures to minimise impacts ▶ air quality design matters in response to impacts identified in the EIS	Detailed design

Ref	Impact	Mitigation measures	Timing
		▶ level of existing lighting within the area and the orientation, design and timing of proposed construction-related lighting to reduce impacts on the sensitive receivers ▶ assessment of potential to disturb contaminated sites and impacts on the availability of locally sourced materials ▶ crime prevention, light pollution and urban design aspects of the IS rating scheme in the landscape and visual amenity assessment. Including considerations to level crossings and interfaces with the proposal ▶ engagement with stakeholders, including directly affected landowners, and provision of communication materials through the proposal's website ▶ identification of community priority issues.	
S-16	Making informed decisions	The possible re-use of work sites and haul roads within the region or neighbouring regions would be considered.	Construction and post-construction
S-17	Efficient use of resources	Opportunities for haulage and delivery via the rail network would be considered.	Detailed design and construction
S-18	Minimising carbon footprint	Design specifications and treatment methodologies would be investigated to optimise the re-use of onsite or nearby material.	Detailed design, pre-construction, construction and post-construction
S-19	Efficient use of resources	The possible re-use of recycled water and surplus water supply from landowners would be considered.	Detailed design, construction and post construction
S-20	Efficient use of resources	The use of stand-alone solar power system for provision of power at the site offices would be considered.	Detailed design and pre-construction
S-21	Efficient use of resources	The use of stand-alone power system for provision of power associated with signalling works would be considered.	Detailed design