CHAPTER 18

Sustainability

NORTH STAR TO NSW/QUEENSLAND BORDER ENVIRONMENTAL IMPACT STATEMENT

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

Contents

Figures

Tables

18. Sustainability

18.1 Scope of chapter

This chapter provides a summary of the sustainability considerations in relation to the construction and operation of the North Star to NSW/Queensland Border (NS2B) project (the proposal), including:

- Describing the legislation, policies, standards and guidelines relevant to sustainability in the context of the proposal (Section 18.3)
- Defining Australian Rail Track Corporation's (ARTC) approach to sustainability within the context of the wider Inland Rail program, and how this has been considered during the prefeasibility design of the proposal (Section 18.4)
- Assesses the sustainability performance of the proposal based on the reference design (outcomes of the feasibility design phase) and the environmental assessment undertaken as part of the EIS and recommends a target an Infrastructure Sustainability (IS) rating for the proposal (Section 18.7)
- Details the proposed Sustainability Management Plan requirements and identified sustainability initiatives that will guide the detailed design, construction and operation of the proposal (Section 18.6).

This chapter summarises the sustainability objectives, targets and commitments for the proposal, utilising the IS Rating Tool.

18.2 Secretary's Environmental Assessment Requirements

This chapter addresses the Secretary's Environmental Assessment Requirements Sustainability Council of Australia (SEARs) requirements for sustainability presented in Table 18.1.

TABLE 18.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS COMPLIANCE

	Task 21: Sustainability
Desired performance outcome	The proposal reduces the NSW Government's operating costs and ensures the effective and efficient use of resources. Conservation of natural resources is maximised.
Current guidelines	*NSW Sustainable Design Guidelines Version 4.0* (Transport for New South Wales, 2017) Infrastructure Sustainability Rating Scheme v1.2 (IS Rating Scheme) relating to energy and carbon for large infrastructure proposals, Infrastructure Sustainability Council of Australia (ISCA) NSW Infrastructure Skills Legacy Programs' training and employment targets (Department of Industry, 2017)

SEARs requirement	EIS section
Item 21.1 The Proponent must assess the sustainability of the proposal in accordance with the Infrastructure Sustainability Council of Australia (ISCA) *Infrastructure Sustainability Rating Tool* and recommend an appropriate target rating for the proposal, including targets and strategies to improve Government efficiency in use of water, energy and transport.	Section 18.5.3 discusses how sustainability has been addressed during the feasibility design phase of the proposal. Section 18.3 details legislation, policies, standards and guidelines relevant to sustainability in the context of the proposal. Section 18.6 details the sustainability performance of the proposal, based on the concept design, and the environmental assessments undertaken as part of the EIS is assessed. This section also recommends a target rating for the proposal. Section 18.6.4 addresses future sustainability initiatives, particularly associated with the efficient use of energy, water and transport.

18.3 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'.*

This definition is included in Section 516A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cth), which requires Australian Government organisations to report on how they '*accord with and advance the principles of ecologically sustainable development*'.

The IS Rating Scheme was established in 2012 by ISCA. 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 18.2 have been used to guide the implementation of sustainability initiatives during the proposal's feasibility design phase.

Table 18.2 should be read in conjunction with the regulatory context of technical disciplines such as ecology, hydrology, visual impact assessment and cultural heritage, which also interface with the preservation of natural, social and built environments considered in this chapter.

TABLE 18.2 SUMMARY OF LEGISLATIVE, POLICIES, STRATEGIES AND GUIDELINES

Legislation, policy, strategy or guideline	Relevance to the proposal
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Cth)	The EPBC Act promotes ecological sustainable development 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 emissions and energy consumption and production.
Australian Standard AS5334:2013 *Climate change adaptation for settlements and infrastructure: A risk-based approach* (AS5334:2013) (Standards Australia, 2013)	This standard guides how climate change risks should be assessed, as well as the development of effective adaptation measures.
Sustainable Procurement Guide (Department of Environment and Energy, 2018)	This guide sets the priorities and direction for sustainable procurement for Australian Government agencies and organisations.
United Nations Framework Convention on Climate Change (including Paris Agreement on climate change) (United Nations, 2016)	This framework outlines the Australian Government's commitments to international action on climate change.
Infrastructure Sustainability Planning Guidelines (ISCA, 2016)	The guidelines detail how the IS Rating Scheme may be applied to the planning phase of infrastructure projects, which occurs prior to the detailed design phase.
Infrastructure Sustainability Scorecard Version 1.2 (November 2018 update) (ISCA, 2018)	The proposal is pursuing an 'excellent' rating against version 1.2 of the IS Rating Scheme.
State (NSW)	
Environmental Planning and Assessment Act 1979 (EP&A Act) (NSW)	The EP&A Act encourages ecologically sustainable development.
NSW Infrastructure Skills Legacy Program	The program sets training and employment targets for contributing to local economic and social advancement.
NSW Climate Change Policy Framework (Office of Environment and Heritage (OEH), 2016)	The framework for minimising carbon emissions through design.
Inland Rail Environment and Sustainability Policy (ARTC, 2018a)	The policy sets the priorities and direction for implementing sustainability initiatives during the planning, design and operation phases of Inland Rail.
Inland Rail Sustainable Procurement Policy (ARTC, 2018b)	The policy sets the priorities and direction for sustainable procurement in the context of Inland Rail.
NSW Sustainable Design Guidelines Version 4.0 (Transport for New South Wales (TfNSW), 2017)	The guidelines establish guidance on integrating sustainability into transport proposals in NSW.
NSW Waste Avoidance and Resource Recovery Strategy 2014–21 (Environment Protection Authority (EPA), 2014)	The strategy sets out the NSW Government's position in relation to waste avoidance, diversion from landfill, reuse and recycling.
NSW Government Resource Efficiency Policy (OEH, 2014)	The policy provides guidance on how to maximise resource efficiency during the proposal lifecycle.

18.4 Approach to sustainability on Inland Rail

As discussed in Chapter 2: Strategic Context, Inland Rail will provide a long-haul freight solution that is time- and cost-competitive when compared to road freight. Consequently, Inland Rail will replace some of the long-haul road freight tasks, resulting in reduced road congestion and fewer vehicular carbon emissions. It is estimated that transportation of freight on Inland Rail is expected to use one third of the fuel when compared to transportation of the same volume of freight via the existing road route (ARTC, 2015a).

In recognition of the role the Inland Rail Program has in demonstrating sustainability leadership, ARTC has developed an Environment and Sustainability Policy (ARTC, 2018a). The sustainability commitment from the policy are summarised in Table 18.3.

TABLE 18.3 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.	▸ Health and community wellbeing—In accordance with the 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 measures in design, construction and operation that reduce the likelihood of damage and injury to people and property and the impact these have on local communities, and investigating the opportunity for designing temporary construction diversions and lighting to meet *Crime Prevention through Environmental Design* guidance (NSW Police Force, 2020).
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.	▸ Community and stakeholder engagement—encouraging, planning, implementing and monitoring stakeholder and community engagement in accordance with the SIMP and the Community and Stakeholder Engagement Action Plan. ▸ Heritage—recognising the role that engagement with the Aboriginal and non-Aboriginal community has in the identification of heritage items and values.
Promote long-term economic benefits within regional communities: ▸ Create lasting 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—encouraging sustainability throughout the value chain for goods and services used to build and operate Inland Rail. ▸ Community and stakeholder engagement—encouraging, planning, implementing and monitoring stakeholder and community engagement. ▸ Heritage—recognising the role that engagement with the Aboriginal and non-Aboriginal community has in the identification of heritage items and values and investigating the opportunity to interpret heritage to promote local heritage values. ▸ Community health and wellbeing—identification of opportunities to support local economic benefits to local, regional and Aboriginal communities. ▸ Implement the SIMP and supporting action plans specifically relating to workforce management, housing and accommodation and local business and industry content. ▸ ARTC has developed a Local Industry Participation Plan and will work with its various service providers, consultants and contractors in its implementation.

Sustainability commitments	Relationship with Infrastructure sustainability credits
Protect the environment by minimising the environmental footprint: ▸ Apply the principles of avoid, minimise, offset to manage impacts to receiving environments and ecological values ▸ Reduce greenhouse gas emissions and minimise waste ▸ Minimise water use ▸ Continually investigate opportunities to improve environmental values and prevent pollution ▸ Obtain and comply with all relevant environmental approvals and compliance obligations.	▸ Environment—seeking opportunities to reduce the environmental footprint of the proposal. ▸ Waste—seeking opportunities to minimise waste generation and to reuse or recycle materials. ▸ Energy and carbon—seeking opportunities to reduce the carbon footprint of the proposal through considering construction and operational greenhouse emissions. ▸ 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 supplies. ▸ Resources and embodied energy—seeking opportunities to reduce the environmental impacts of materials used during construction and operation of the proposal through encouraging dematerialisation of the design and improving the service life of the 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 current design.	▸ Climate change—considering climate change impacts and opportunities to reduce the risks to Inland Rail associated with a future climate. ▸ Future proofing—considering 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 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.	▸ Leadership—demonstrating sustainability leadership across the delivery of the Inland Rail Program and at the proposal level. ▸ Management and governance—recognising the importance of monitoring and review of progress to identify opportunities for continuous improvement. ▸ Benefits identification—early identification of the benefits the proposal will bring, so that the promised benefits can be assessed and reviewed during operation.
Drive a culture of continuous improvement: ▸ Seek to improve, collaborate and value add throughout delivery ▸ Continually improve our Environmental Management System (EMS) to enhance environmental performance.	▸ Management and governance—encouraging improvement in the delivery of the proposal 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—reviewing the outcomes from the way things are done to find new and better ways of achieving the desired outcomes.

18.5 Methodology

The proposal has assessed the consideration and implementation of sustainability using the framework that underpins the IS Rating Scheme. A description of the proposal is available in Chapter 6: The Proposal and Chapter 7: Construction of the Proposal. The scheme, which considers whole of life impacts and benefits, has historically been used for the assessment of sustainability performance at the end of design and again prior to the commencement of operation of the asset. 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 stimulate the culture of continuous improvement.

18.5.1 Infrastructure Sustainability Council of Australia rating framework

The IS Rating Scheme is made up of 44 credits grouped into categories under the following six themes:

- Management and governance
- Using resources
- Emissions, pollution and waste
- Ecology
- People and place
- Innovation.

The proposal'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 18.4. An excellent rating indicates that the proposal is achieving Australian best practice in terms of sustainability.

TABLE 18.4 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 rating scheme (version 2.0). The proposal has not been assessed against version 2.0; rather, it has been assessed against version 1.2. This is in accordance with guidance provided by the ISCA. Opportunities for the proposal to pilot some of the new credits associated with version 2.0 of the rating scheme have been identified in Section 18.6.4.

18.5.2 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 feasibility design phase) as defined by ISCA. An IS version 1.2 rating 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 18.1. Applying the IS Rating Scheme in this way will not preclude future assessment of the proposal against the scheme.

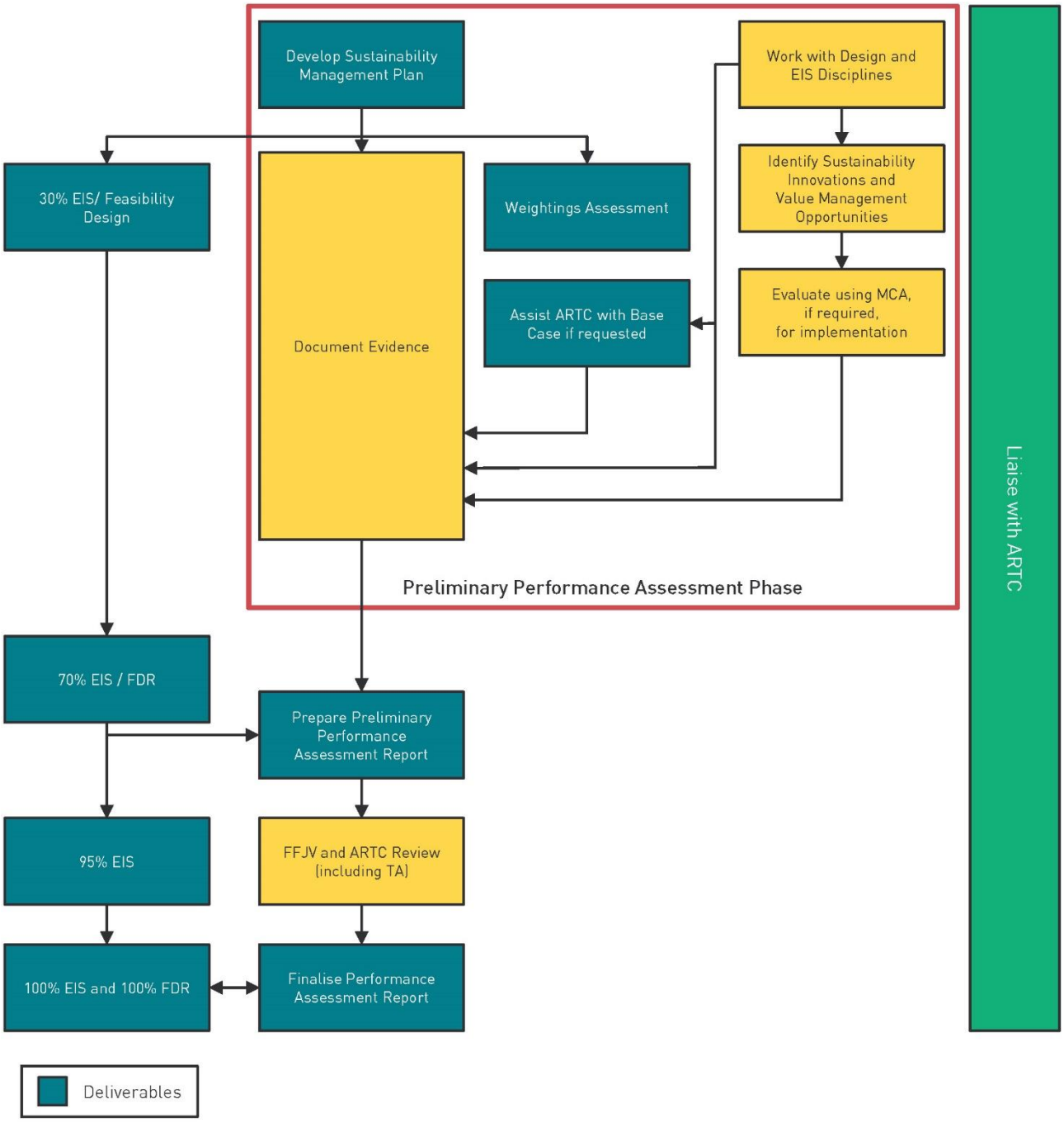

FIGURE 18.1 ADOPTION OF THE IS RATING SCHEME DURING THE PLANNING PHASE

18.5.3 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, which is expected to inform the weightings assessment that is submitted for verification as part of the formal IS rating process.

18.5.3.1 Approach to undertaking the preliminary weightings assessment

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

- Stakeholder workshop
- Project/asset team representing stakeholder views
- Individual assessor.

A variant of the project/asset team approach was used to undertake the preliminary weightings assessment for the proposal—a workshop was held with key stakeholders, followed by an online survey. The online survey asked a range of construction, operation and contextual questions based on questions contained in version 1.2 of the IS scorecard (released on 24 April 2018). Questions covered included:

- Capital and annual operational/maintenance expenditure
- Longest design life for project infrastructure (or, where existing infrastructure exists, the remaining design life)
- Construction, operation and maintenance activities that are energy, water or material intensive, or are likely to involve night works
- Presence and/or proximity to natural hazards (flooding, bushfires, droughts, cyclones), sensitive receivers, environmentally sensitive and/or contaminated land, and Aboriginal and historical heritage (including heritage that is not listed on formal registers)
- Stakeholder and community interest in the project, and potential community interaction with construction sites.

18.5.3.2 Previous studies relating to sustainability

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

- North Star to NSW/Queensland Border Project *Phase 1 Continuity Alignment Report* (WSP Parsons Brinckerhoff, 2017)
- North Star to NSW/Queensland Border Project *Phase 2 Preparatory Alignment Assessment Report* (ARTC, 2017)
- North Star to NSW/QLD Border Project *Study Area Selection Report* (ARTC, 2018c).

These studies include the outcomes of stakeholder consultation activities occurring between April 2016 and May 2018. 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 studies noted above and key issues were used as evidence to support the preliminary weightings assessment for the proposal.

18.5.4 Base case proposal

Four of the IS credits in the Energy and Carbon, Water and Materials category assess the performance of the proposal relative to a 'base case' (i.e. business-as-usual design, construction and operational methodologies). The base case that has been adopted for the proposal is the design that is presented in this EIS.

18.5.5 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 across the life of the asset as shown in Figure 18.2.

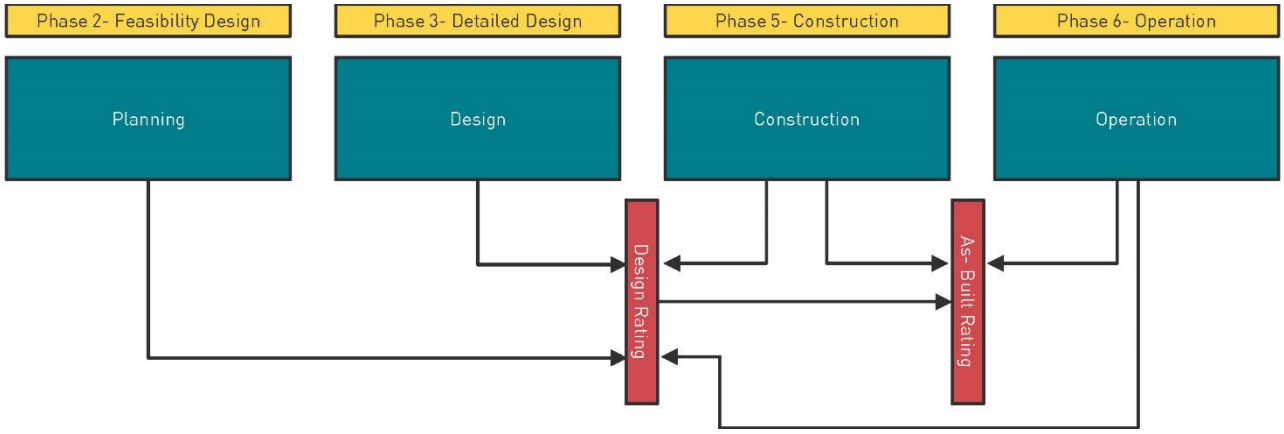

FIGURE 18.2 APPLICABILITY OF INFRASTRUCTURE SUSTAINABILITY VERSION 1.2 RATINGS TO DIFFERENT PROPOSAL PHASES

It draws on evidence and opportunities from the proposal's feasibility design phase, considering the likelihood that outcomes from the feasibility design phase will be carried forward to the detailed design phase, when a formal IS rating will be pursued. This approach to undertaking the preliminary performance assessment is illustrated in Figure 18.1.

The intent of the preliminary performance assessment is to:

- Document evidence to show how sustainability initiatives have been embedded into the feasibility 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 greenhouse gas 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 in order 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 detailed design phase.

The preliminary performance assessment draws on evidence from the:

- ARTC *Environment and Sustainability Policy*
- Inland Rail Program *Environmental Management Plan*
- ARTC and Inland Rail guidance documents, including the basis of design
- Mitigation measures proposed as part of this EIS
- The current processes, practices and methodologies associated with the delivery of critical state-significant infrastructure in NSW.

18.6 Sustainability management and measures

A preliminary performance assessment has been undertaken for the proposal against version 1.2 of the IS Rating Scheme, which demonstrates that achievement of at least an 'excellent' level of performance is achievable for the proposal. This assessment was based on the documentation and review of work undertaken during the planning phase of the proposal, including the incorporation of sustainability measures as part of the design development and the mitigations identified in this EIS.

The proposal has also considered the feasibility stage key activities as outlined in the *NSW Sustainable Design Guidelines Version 4.0* (TfNSW, 2017), which has informed the sustainability requirements and targets, as well as the assessment of value management and sustainability initiatives. The following compulsory requirements have been considered as part of the sustainability assessment:

- Operational energy, related to energy consumed by the ARTC in operating the asset, and the adoption of energy efficient equipment
- Climate change risk as discussed in Chapter 19: Climate Change and Risk Adaptation
- Biodiversity offsets as discussed in Chapter 11: Biodiversity
- Urban design applicable to the proposal context, as discussed in Chapter 21: Landscape and Visual Impact Assessment
- Innovation and legacy items as discussed in Sections 18.6.4 and 18.5.5 respectively
- Waste management, including reuse of spoil as discussed in Chapter 25: Waste and Resource Management
- Water demand during construction is discussed in Chapter 7: Construction of the Proposal and operation as discussed in Section 18.6.1, including consideration of water-efficient equipment and processes
- Sustainable procurement reflected in the *Inland Rail Environment and Sustainability Policy* (Section 18.6.6) (ARTC, 2018a) and Chapter 23: Social-Economic Impact Assessment.

The proposal also considered the NSW Skills and Legacy Program targets, which have been discussed as part of Chapter 23: Socio-Economic Impact Assessment and Appendix O: Social Impact Assessment Technical Report.

A sustainability strategy, as discussed in Section 18.6.1, will also be prepared by the proposal for the design and construction phases, which will set specific targets against credits within the IS Rating Scheme and consider the *NSW Sustainable Design Guidelines Version 4.0* (ARTC, 2018a). Further investigation of sustainability opportunities, including those identified in Section 18.6.4, are expected to be pursued during design development.

18.6.1 Sustainability Strategy

A sustainability strategy will be developed by the design and construction contractors, which will guide the proposal's sustainability commitments, including the achievement of an 'excellent' rating against version 1.2 of the IS Rating Scheme. The aim of the strategy will be to:

- Demonstrate sustainability leadership and commitments to sustainability
- Set targets for safety, local employment, materials and waste, procurement, ecological connectivity, greenhouse gas emissions and climate change resilience, in line with the Inland Rail sustainability 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 identification, assessment and implementing sustainability initiatives and opportunities, particularly those associated with the efficient use of energy, water and transport
- Document the process 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.

18.6.2 Sustainability in design

Sustainability initiatives through the progression of feasibility design have been identified and captured in Table 18.6. A summary of these measures, which have been implemented as part of the proposal as presented in this EIS, are in Table 18.5. 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 feasibility design, and may be suitable for consideration as part of the detailed design, construction or operation, these opportunities are presented in Section 18.6.4.

18.6.3 Initiatives implemented during the feasibility design

Sustainability initiatives that have been implemented prior to, or during the feasibility design phase have been summarised in Table 18.5. The initiatives have been mapped to specific IS credits and *NSW Sustainable Design Guidelines v4.0* (ARTC, 2018a). This mapping will support formal verification against version 1.2 of the IS Rating Scheme, which is expected to occur towards the end of the detailed design phase.

TABLE 18.5 SUSTAINABILITY IN DESIGN MEASURES IMPLEMENTED DURING THE FEASIBILITY DESIGN PHASE

Discipline	Sustainability in design measures	IS Credit	NSW Sustainable Design Guidelines
Alignment	The proposal has been developed to minimise environmental and social impacts. In preparation for the feasibility design phase, a multi-criteria assessment 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: ▸ Its reduced chance of impacting on environmentally sensitive sites and remnant vegetation ▸ Being located further away from sensitive receivers in terms of noise, vibration and visual amenity impacts. As a result, Option D1 was carried forward to the feasibility design phase.	Man–7, Eco–1, Eco–2, Dis–2, Dis–3.	
	Optimisation of road and rail interfaces, considering bridge lengths and crossing angles.	Mat–1, Hea–2	Operational energy
	Additional mitigation measures were applied to the design to protect environmentally and socially sensitive sites within the greenfield alignment.	Eco–1, Sta–3, Her–1, Dis–1, Dis–2, Dis–3, Dis–4 and Dis–5	
	Alignment considers the reuse of previously disturbed land, thereby avoiding agricultural and native vegetation. Where possible, the alignment has been situated within the existing non-operational Boggabilla rail corridor, to avoid impacting greenfield sites.	Lan–1	
	A multi-criteria assessment was used to identify the preferred greenfield alignment of the Proposal. The preferred alignment (referred to as P2.5—West Eukabilla Road and East Whalan Creek) improved the multi-criteria assessment score by 0.625. Alignment P2.5 will: ▸ Reduce the length of track through cultivated Lot 8/SP146067 by 350 m. ▸ The Whalan Creek crossing is closer to the Macintyre River bridge; there is the potential for lower waterway impacts due to the proximity of bridge structures.	Man–7	
Design	During the feasibility design phase, the number of bridges proposed decreased from 16 to 11.	Mat–1, Ene–1, Eco–1	Construction greenhouse gas (GHG) emissions
Climate change	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, 2014) ▸ Assessment of impacts associated with the 1% Annual Exceedance Probability (AEP) to determine the sensitivity of the design to potential changes in rainfall intensity ▸ Where new track is to be constructed in greenfield areas, track crossing and longitudinal drainage will have capacity to convey the 1% AEP without overtopping the formation	Cli–1, Cli–2, Lan–4	Climate change risk

Discipline	Sustainability in design measures	IS Credit	NSW Sustainable Design Guidelines
	▸ Where enhancement or upgrades to existing track is to be undertaken, no worsening of the existing track flood immunity will occur ▸ Adoption of afflux design limits of 0.01 m for building floor envelope and neighbouring infrastructure unless agreed otherwise with affected stakeholders for the 1% AEP.		
Constructability	Assumptions associated with construction methodology for use in the Base Case and preliminary performance assessment were documented to assist with the future preparation of the Base Case proposal.	Ene–1, Mat–1, Wat–1, Wat–2	Construction GHG emissions Operational energy Construction water
	Consideration of design features that reduce impacts or provide opportunities to reuse or recycle materials as part of the decommissioning of the asset at end of life.	Was–3	
Materials	Minimisation of transport requirements for fill and spoil are considered as part of the design process: ▸ Maximisation of the design to reduce total fill requirements without impacting on flood resilience, including refinements to horizontal and vertical alignments ▸ Locally sourced materials during construction ▸ Earthworks materials assessment, including topsoil stripping, unsuitable materials, material reuse, bulking factors, excavatability and mass haul has been undertaken to reduce the net import of materials, export of waste and reduced transportation distances.	Mat-1, Lan-2, Ene-1	Construction GHG emissions Beneficial spoil reuse
	Local material sourcing strategies, including the use of existing borrow pits and use of local material sources, quarries and concrete suppliers.	Mat–1, Was-3	Construction GHG emissions Beneficial spoil reuse
	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	Construction GHG emissions Beneficial spoil reuse
	Consideration of topsoil stripping and preservation for re-use within the proposal and/or local area.	Lan–2	Beneficial spoil reuse
Waste	Waste reduction has been considered in the following ways during the feasibility design phase: ▸ 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	

Discipline	Sustainability in design measures	IS Credit	NSW Sustainable Design Guidelines
Surface water and groundwater	Minimise adverse impacts to receiving water quality during construction and operation.	Dis–1	
	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 been 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.	Eco–1, Eco–2, Dis–1	
	Avoidance of discharges/impacts to hydrology associated with wetlands, including surface flows. Consideration of water-quality design matters in response to impacts identified during the EIS.	Dis–1	
Flooding	Design mitigation measures applied to manage runoff and flooding. As a result, the proposal will not cause a net increase in flood risk. 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 freeboarding.	Lan–4	
	Bridges and waterway crossings are designed to minimise impacts to bed, banks and environmental flows.	Lan–4	
	Consideration of flooding impacts on formation design.	Lan–4	
	Consideration of long-duration flood events on embankments.	Lan–4	
Noise and vibration	Changes to the track alignment, resulting in reduced operational noise and vibration impacts to sensitive receivers.	Dis–2, Dis–3	
	Consideration of impacts on sensitive receptors and identification of management and mitigation measures to minimise impacts.	Dis–2, Dis–3	
Ecology	Consideration of landscaping and habitat rehabilitation measures.	Eco-1, Eco-2, Urb-1	Vegetation offsets
	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	Vegetation offsets
Air quality	Consideration of air-quality design matters in response to impacts identified during the EIS.	Dis–4	

Discipline	Sustainability in design measures	IS Credit	NSW Sustainable Design Guidelines
Lighting	Consideration of the level of existing lighting within the area and the orientation, design and timing of proposed lighting around curfews to reduce impacts on the sensitive receivers.	Dis–5	
Contamination	Assessment of potential to disturb contaminated sites assessed and impacts on the availability of locally sourced materials considered.	Lan–3	
Social impact	Consideration of regional and local government 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, and opportunities for skill development.	Hea–1	
Heritage	Consideration of heritage (Aboriginal and historical) matters in response to impacts identified during the EIS.	Her–1, Her–2	
Urban design	Consideration of crime prevention, light pollution and urban design aspects of the IS Rating Scheme in the landscape and visual amenity assessment.	Urb–1, Hea–2, Dis–5	Urban design
Consultation	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	
	Consideration and engagement for provision of suitable alignment crossings by affected landowners such as: ▸ Livestock underpass crossings ▸ Light vehicle and agricultural plant crossings ▸ Provision of level crossings for legal access.	Sta–1, Sta–2	
	Consideration and engagement for allowance for travelling stock reserve and provision of travelling stock reserve crossings.	Sta–1, Sta–2	

18.6.4 Future sustainability opportunities

A summary of future sustainability opportunities for the proposal are summarised in Table 18.6. These opportunities were identified during the feasibility design phase but require further investigation during the detailed design, construction and/or operation phases.

TABLE 18.6 SUSTAINABILITY OPPORTUNITIES THAT MAY BE IMPLEMENTED DURING FUTURE PHASES OF THE PROPOSAL

Discipline	Sustainability opportunity	IS	NSW Sustainable Design Guidelines
Governance	Possible re-use of worksites and haul roads and/or water bores associated with projects being within the region or neighbouring regions.	Mat–1, Ene–1, Lan–1, Wat–1, Wat–2	Construction GHG emissions Construction water
Materials	Explore opportunities for haulage and delivery via the rail network.	Mat-1, Ene-1	Construction GHG emissions
	Investigate design specifications and treatment methodologies to optimise the re-use of onsite or nearby material.	Mat–1, Ene–1, Inn–1	Construction GHG emissions Beneficial spoil reuse Innovation
	Investigate design options to increase the batter slope gradients in order to reduce general fill quantities and the earthworks footprints.	Mat–1, Ene–1	Construction GHG emissions

Discipline	Sustainability opportunity	IS	NSW Sustainable Design Guidelines
Land requirements	Possible re-use of worksites and haul roads and/or water bores associated with projects being pursued within the region or neighbouring regions.	Lan–1, Mat–1	Construction GHG emissions Construction water
	Use of isolated parcels of land created by the rail alignment for construction and maintenance laydown areas.	Lan–1	
Water	Possible re-use of water bores that are no longer required by bore owners.	Mat–1	Construction water
	Possible re-use of recycled water plant and surplus water supply from landowners.	Wat–1, Mat–1	Construction water
Energy	Use of stand-alone solar power systems for provision of power at the site offices.	Ene–2	Construction GHG emissions
	Use of stand-alone power systems for provision of power associated with signalling works.	Ene–2	Operational Energy
Urban Design and Visual Amenity	Community artwork: Opportunity for ARTC to work with Grain Corp to provide artwork to the grain silo at North Star as an extension of Grain Corp's existing silo art trail.	Urb–1	Urban Design
	North Star Park Upgrades: Opportunity for ARTC to work with local government and community to upgrade existing park facilities at North Star (in conjunction with Narrabri to North Star Inland Rail project) and provide viewing area of rail and grain silo.	Urb–1 (Hea–1)	Urban Design
	North Star Sports and Recreation Ground Upgrades: Opportunity for ARTC to work with local government and community to upgrade sports and recreation facilities at North Star (in conjunction with Narrabri to North Star Inland Rail project) following closure of the construction camp proposed in this vicinity.	Urb–1 (Hea–1)	Urban Design
	Interpretation: Opportunity for ARTC to work with local government and community to provide interpretation and viewing opportunities associated with old and new rail infrastructure.	Urb–1 (Her–1)	Urban Design
	Urban design branding: Opportunity for ARTC to create legacy branding of new rail infrastructure, such as date stamps, that will enhance its potential as a future heritage element.	Urb–1 (Her–1)	Urban Design

18.6.5 Broad-scale sustainability opportunities

Several sustainability opportunities that are applicable to the wider Inland Rail Program have been identified, including:

- 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 Inland Rail 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, which 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.

18.6.6 Skills and legacy

As part of the Inland Rail *Environment and Sustainability Policy* (ARTC, 2018a), ARTC has committed to the promotion of economic benefits within 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, state and local governments to develop strategies to appropriately manage the likely draw of labour during the construction phase of the proposal.

18.7 Conclusions

Sustainability is an important consideration for the proposal, especially with regard to maximising resource efficiency, enhancing local economic activity, and mitigating potential environmental and social impacts. During the feasibility design phase of the proposal, a broad range of sustainability initiatives were identified and implemented and these have been used to assess the anticipated sustainability performance of the proposal, which is expected to achieve the equivalent of an 'excellent' level of performance against version 1.2 of the Infrastructure Sustainability framework.