APPENDIX

G

Sustainability in design

NARROMINE TO NARRABRI ENVIRONMENTAL IMPACT STATEMENT

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

APPENDIX G Sustainability in design

Sustainability initiatives that have been implemented prior to, or during the feasibility design phase are summarised in Table G.1. The initiatives have been mapped to specific Infrastructure Sustainability credits. This will support formal verification against Version 1.2 of the ISCA rating scheme, which is expected to occur towards the end of the detailed design phase.

Table G.1 Sustainability in design measures implemented during the feasibility design phase

THEME	TOPIC	SUSTAINABILITY IN DESIGN MEASURES	APPLICABLE IS CREDITS
Governance	Making informed decisions	Use of a Program-wide multicriteria assessment which considers environmental, social and local economic impacts to evaluate preferred alignment for greenfield sections.	Man-7
	Future proofing	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.	Lan-4
	Climate response	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 rainfall events including the one in two thousand and one in ten thousand events.	Cli-1
	Climate response	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 the rainfall intensity. ▸ Where new track is to be constructed in greenfield areas, track crossing and longitudinal drainage shall have capacity to convey the 1% annual exceedance probability without over topping formation. ▸ Where enhancement or upgrading 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% annual exceedance probability.	Cli-1, Cli-2, Lan-4
	Climate response	Considers and implemented adaptation options associated with the direct and indirect impacts of climate change and natural disaster events to reduce the potential for service disruption.	Cli-1, Cli-2

THEME	TOPIC	SUSTAINABILITY IN DESIGN MEASURES	APPLICABLE IS CREDITS
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.	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.	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. Consideration of landscaping and habitat rehabilitation measures. 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.	Lan-1 Eco-1, Eco-2, Urb-1 Eco-2
	Efficient use of resources Minimising carbon footprint	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
	Efficient use of resources	Optimisation of road and rail interfaces, considering bridge lengths and crossing angles Consideration of decommissioning.	Mat-1, Hea-2 Was-3
	Efficient use of resources	Cut and fill balancing and minimisation of transport requirements for import/disposal of spoil are considered as part of the design process. Maximisation of the use of on-site cut during construction, including refinements to horizontal and vertical alignments. This will reduce the quantity of off-site fill required. Consideration of fill batter geometry to encourage cut and fill balancing. Earthworks materials assessment including: Topsoil stripping, unsuitable materials, material reuse, bulking factors, ease of excavation and mass haul has been undertaken to reduce the net import of materials, export of waste and reduced transportation distances. Optimisation of formation designs to consider environment, use of local materials, reduced maintenance and ease of construction.	Mat-1, Lan-2 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

THEME	TOPIC	SUSTAINABILITY IN DESIGN MEASURES	APPLICABLE IS CREDITS
		Waste reduction has been considered in the following ways during the feasibility design phase: ▸ The cut and fill balance and minimisation of transport requirements for import/disposal of spoil. ▸ Maximisation of the use of on-site cut during construction, including refinements to horizontal and vertical alignments. This will reduce the quantity of off-site fill required. ▸ Reduce the volume of off-site 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. ▸ Bridges and waterway crossings are designed to minimise impacts to bed, banks and environmental flows. ▸ Consideration of flooding impacts on formation design. ▸ Consideration of long duration flood events (ie 3-day duration) on embankments.	Was-1, Was-2, Was-3, Mat-1, Ene-1 Lan-4 Mat-1 Lan-4
	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 developed to minimise impacts to waterways, riparian vegetation and in-stream flora and habitats. This includes the: ▸ adoption of a crossing structure hierarchy (eg 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. Avoidance of discharges/impacts to hydrology associated with wetlands, including surface flows. Consideration of water quality design matters in response to impacts identified during EIS.	Eco-1, Eco-2, Dis-1 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 during EIS.	Her-1, Her-2
	Building relationships	Consideration of regional and 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

THEME	TOPIC	SUSTAINABILITY IN DESIGN MEASURES	APPLICABLE IS CREDITS
	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. ▸ Horizontal and vertical refinements to optimise creek crossings and to provide flood immunity. ▸ Establishment of flood resilience requirements including greenfield designs providing 1% Annual Exceedance Probability event without overtopping formation, including allowance for free boarding.	Lan-4
		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
		Consideration of air quality design matters in response to impacts identified during EIS.	Dis-4
		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
		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.	Urb-1, Hea-2, Dis-5
		Engagement with stakeholders, including directly affected landholders and provision of materials through the proposal's website.	Sta-1, Sta-2, Sta-3, Sta-4, Hea-1

Future sustainability opportunities at program and project level

A summary of future sustainability opportunities for the proposal are summarised in Table G.2. These opportunities were identified during the feasibility design phase but require further investigation during the detailed design, construction and/or operation phases.

Table G.2 Sustainability opportunities that may be implemented during 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 Minimising carbon footprint	Explore opportunities for haulage and delivery via the rail network. Explore opportunities for upgrading haul road classification to allow much more efficient movement, and to leave as a legacy. Investigate design specifications and treatment methodologies to optimise the re-use of onsite or nearby material. Investigate opportunities for alternative design of bridges (such as pre-cast slabs and direct fixing of rails) to reduce material consumption and reduce maintenance requirements. Investigate opportunities for using low impact materials during for construction.	Mat-1, Ene-1 Mat-1, Ene-1, Inn-1
		Possible re-use of water bores which are no longer required by bore owners. Where there is benefit to the local community, the potential for retaining facilities installed for construction (eg bores and sedimentation basins) would be investigated and negotiated in consultation with relevant stakeholders (eg local councils). Any legislative approvals associated with retention and ongoing use of these facilities would be the responsibility of the party who takes ownership.	Mat-1
		Possible re-use of recycled water plant and surplus water supply from landowners, including reuse of grey water on site for specific purposes.	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