APPENDIX A

Lachlan River Bridge Modification Project

Environmental Risk Assessment

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Digital Engagement Team
Australian Rail Track Corporation
Inland Rail
GPO Box 2462
Brisbane Qld 4001

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Contents

Tables

Appendix A Environmental Risk Assessment

A.1 Purpose

The purpose of this environmental risk assessment is to:

- Describe the potential environmental risks and issues to be considered in this report with input from the Review of Environmental Factors (REF)
- Identify and rank environmental risks based on the risk or significance rating.

A.2 Methodology

The environmental risk analysis was undertaken in accordance with the principles of the Australian and New Zealand standard A*S/NZS ISO 31000:2009 Risk Management—Principles and Guidelines* (Standards Australia, 2009). This involved categorising each of the environmental values by identifying the consequence of the impact and the likelihood of the impact occurring.

For both the risk and significance assessment methods, a pre-mitigation and a post-mitigation scenario was assessed and a risk/significance ranking determined. The initial assessment of potential impact was undertaken on a pre-mitigation scenario. Following the assessment of the level of risk/significance, the application of mitigation measures is then applied to determine a new risk or significance ranking.

The risk assessment and significance assessment are discussed in the following sections.

A.3 Risk assessment

For those environmental values where an impact may occur, a qualitative risk assessment method based on *AS/NZS 31000:2009 Risk Management—Principles and Guidelines* is considered appropriate.

The definitions of the likelihood used are in Table A. 1 and the consequence criteria are in Table A. 2. The resulting risk matrix is in Table A. 3.

TABLE A. 1 DEFINITION OF LIKELIHOOD

Likelihood	Definition	Frequency of occurrence	Percentile
Almost certain	Is expected to occur in most circumstances	Once per month	>90%
Likely	Will probably occur in most circumstances	Between once a month and once a year	60–90%
Possible	Might occur at some time	Between once a year and once in five years	30–60%
Unlikely	Could occur at some time	Between once in 5 years and once in 20 years	10–30%
Rare	May occur in exceptional circumstances	Once in more than 20 years	<10%

TABLE A. 2 CONSEQUENCE CRITERIA

	Consequence				
Risk category	**Not significant**	**Minor**	**Moderate**	**Major**	**Extreme**
Safety—impact to people	No medical treatment required	Lost Time Injury (LTI) results OR medical treatment required	Serious injury occurs	Single fatality occurs	Multiple but localised fatalities occur
Assets—engineering impacts and satisfying objectives	Up to 6 hrs track closure	>6 hrs to 24 hrs track closure	>24 hrs to 48 hrs track closure	>48 hrs to 5 days track closure	>5 days track closure
Financial—total outturn cost impact	Up to 0.05% of program budget (i.e. to $5m in $10b)	>0.05% to 0.5% of program budget (i.e.>$5m to $50m in $10b)	>0.5% to 1.5% of program budget (i.e.>$50m to $150m in $10b)	>1.5% to 5% of program budget (i.e.>$150m to $500m in $10b)	>5% of program budget (i.e.>$500m in $10b)

Risk category	Consequence				
	Not significant	Minor	Moderate	Major	Extreme
	Up to 0.1% of project budget (e.g. to $100k in $100m)	>0.1% to 0.5% of project budget (e.g. >$100k–$500k in $100m)	>0.5% to 2.5% of project budget (e.g. >$500k–$2.5m in $100m)	>2.5% to 10% of project budget (e.g. >$2.5m–$10m in $100m)	>10% of project budget (e.g. >$10m in $100m)
Environment—environment impact, heritage, flora and fauna, archaeology and Aboriginal impacts, pollution and amenity (public)	Contained environmental damage—fully recoverable (no cost or ARTC action required)	Isolated environmental damage—minimal ARTC remediation required	Localised/clustered environmental damage—requiring remediation	Considerable environmental damage—requiring remediation	Widespread, long-term or permanent environmental damage—remediation required
Regulatory—regulatory/legislation exposure, non-compliance and our licence to operate	Minimal or no regulatory involvement	Notice to produce information	Improvement notice or threatened action	Prohibition notice or fines	Prosecution of the company and/or its office holders
Reputation—reputational exposure, customer dissatisfaction, shareholder support, service quality and reliability, public image and stakeholder attitudes.	Isolated event able to be resolved (up to 7 days)	Management intervention required (>7 days to 3 months)	Tactical (business unit/divisional) intervention required (>3 months to 18 months)	Strategic intervention required (>18 months to 3 years)	Corporate loss of shareholder and/or customer support (tangible business impact >3 years)
Schedule—time-based impacts	Influences schedule up to 1% of program-approved schedule period	Influences schedule >1% to 2.5% of program-approved schedule period	Influences schedule >2.5% to 5% of program-approved schedule period	Influences schedule>5% to 10% of program-approved schedule period	Influences schedule >10% of program-approved schedule period
	Influences schedule up to 2% of project-approved schedule period	Influences schedule >2% to 5% of project-approved schedule period	Influences schedule >5% to 10% of project-approved schedule period	Influences schedule >10% to 20% of project-approved schedule period	Influences schedule >20% of project approved-schedule period

TABLE A. 3 RISK ASSESSMENT MATRIX

Likelihood	Consequence				
	Not significant	Minor	Moderate	Major	Extreme
Almost certain	Medium	Medium	High	Very high	Very high
Likely	Low	Medium	High	Very high	Very high
Possible	Low	Low	Medium	High	High
Unlikely	Low	Low	Low	Medium	Medium
Rare	Low	Low	Low	Low	Medium

A.4 Environmental risk analysis

Using the framework described above, the risk assessment for the proposal is in Table A.4.

TABLE A.4 RISK ASSESSMENT

	Pre-mitigated risk				Residual risk		
Potential impact	**Consequence**	**Likelihood**	**Risk**	**Proposed mitigation**	**Consequence**	**Likelihood**	**Risk**
Biodiversity							
Impacts on endangered terrestrial populations, threatened species and threatened ecological communities during construction	Major	Unlikely	Medium	Refer to mitigation in Section 5.3	Moderate	Unlikely	Low
Impacts on endangered aquatic populations, threatened species and threatened ecological communities during construction	Major	Unlikely	Medium	Refer to mitigation in Section 5.3	Moderate	Unlikely	Low
Noise and vibration							
Construction noise impacts on residential receivers	Moderate	Almost certain	High	Refer to mitigation in Section 5.1	Minor	Almost certain	Medium
Potential impacts of vibration	Moderate	Unlikely	Low	Refer to mitigation in Section 5.1	Moderate	Unlikely	Low
Potential impacts from increase in train operation on the rail	Not significant	Likely	Low	Refer to mitigation in Section 5.1	Not significant	Likely	Low
Aboriginal heritage							
Direct impacts on known Aboriginal heritage items	Moderate	Unlikely	Low	Refer to mitigation in Section 5.10.2	Moderate	Rare	Low
Non-Aboriginal heritage							
Impacts on known heritage items	Minor	Almost certain	Medium	Refer to mitigation in Section 5.2	Minor	Almost certain	Medium
Landscape character and visual amenity							
Visual impacts of machinery, site compounds and scaffolding during construction	Minor	Likely	Medium	Refer to mitigation in Section 5.4	Minor	Likely	Medium
Potential amenity impacts to receivers from lighting during construction	Minor	Likely	Medium	Refer to mitigation in Section 5.4	Minor	Possible	Low
Potential impacts due to the slightly altered bridge design and train operations	Minor	Likely	Medium	Refer to mitigation in Section 5.4	Minor	Possible	Low
Surface water							
Impacts to on flood-prone areas during construction	Moderate	Possible	Medium	Refer to mitigation in Section 5.5	Moderate	Rare	Low
Impacts to surface water quality during construction by sedimentation, chemicals and nutrients	Moderate	Likely	High	Refer to mitigation in Section 5.10.3	Moderate	Unlikely	Low

Potential impact	Pre-mitigated risk			Proposed mitigation	Residual risk		
	Consequence	Likelihood	Risk		Consequence	Likelihood	Risk
Waste							
Increased waste generation during construction	Minor	Almost certain	Medium	Refer to mitigation in Section 5.6	Not significant	Likely	Low
Impacts associated with the management of waste	Minor	Almost certain	Medium	Refer to mitigation in Section 5.6	Not significant	Likely	Low
Air quality							
Impacts to local air quality due to the during construction	Minor	Likely	Medium	Refer to mitigation in Section 5.10.4	Minor	Likely	Medium
Land use and property							
Impacts on other infrastructure during construction including utilities and existing rail lines	Minor	Likely	Medium	Refer to mitigation in Section 5.10.5	Minor	Possible	Low
Soil and contamination							
Disturbance of contaminated land	Minor	Possible	Low	Refer to mitigation in Section 5.8.6	Minor	Unlikely	Low
Contamination of land due to leaks and spills	Moderate	Possible	Medium	Refer to mitigation in Section 5.8.6	Moderate	Unlikely	Low
Traffic and access							
Construction vehicle movements with potential impacts to road safety and traffic delays	Moderate	Likely	High	Refer to mitigation in Section 5.7.6	Minor	Likely	Medium
Community and socio-economic							
Amenity impacts on residential receivers during construction	Moderate	Likely	High	Refer to mitigation in Section 5.9	Minor	Likely	Medium
Amenity impacts on residential receivers during operation	Minor	Likely	Medium	Refer to mitigation in Section 5.9	Minor	Likely	Medium
Hazard and risk							
Environmental exposure of lead-based paint	Moderate	Possible	Medium	Refer to mitigation in Section 5.10.6	Moderate	Unlikely	Low
Spill or leak from transport and storage of hazardous substances and dangerous goods during construction	Moderate	Possible	Medium	Refer to mitigation in Section 5.10.6	Moderate	Unlikely	Low
Cumulative impacts							
Cumulative impacts from the construction and operation of multiple projects in the region	Minor	Possible	Low	Refer to mitigation in Section 5.11.6	Moderate	Unlikely	Low