

Appendix E

Environmental Risk Assessment

Appendix E

Environmental Risk Assessment

An environmental risk assessment has been undertaken in accordance with the principles of the Australian and New Zealand standard *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines*. Identification of the consequence and likelihood, and risk matrix used to establish the risk outcome, are detailed below in Table E-1, Table E-2, and Table E-3.

Table E-1: Consequence rating method

Consequence rating	Criteria
Catastrophic	- Long-term or irreversible, large-scale environmental, social, or economic impacts. - Extended and substantial disruptions or impacts on stakeholder(s).
Severe	- Long-term, potentially irreversible environmental, social, or economic impacts. - Severe or long-term disruptions or impacts on stakeholder(s).
Major	- Medium-term, potentially irreversible environmental, social, or economic impacts. - Major disruptions or impacts on stakeholder(s).
Moderate	- Medium-term, reversible, or well-contained environmental, social, or economic impacts. - Moderate disruptions or impacts on stakeholder(s).
Minor	- Short-term, reversible, or minor impacts within environmental regulatory limits and within site boundaries. - Minor or short-term impacts on stakeholder(s).
Insignificant	- No appreciable or noticeable environmental, social, or economic impacts. - Negligible impacts on stakeholder(s).

Table E-2: Likelihood rating method

Likelihood rating	Criteria
Almost certain	Expected to occur frequently during project activity time.
Likely	Expected to occur occasionally during project activity time.
Possible	More likely to occur than not occur during project activity time.
Unlikely	More likely to not occur than occur during project activity time.
Rare	Not likely or expected to occur during project activity time.
Almost unprecedented	Not expected to occur during project activity time.

Table E-3: Risk matrix

Likelihood	Consequence					
	Catastrophic	Severe	Major	Moderate	Minor	Insignificant
Almost certain	Very high	Very high	Very high	High	High	Medium
Likely	Very high	Very high	High	High	Medium	Medium
Possible	Very high	High	High	Medium	Medium	Low
Unlikely	High	High	Medium	Medium	Low	Low
Rare	High	Medium	Medium	Low	Low	Low
Almost unprecedented	Medium	Medium	Low	Low	Low	Low

Table E-4 presents a preliminary environmental risk assessment considering the potential impacts of the project at the pre-mitigation measures being implemented for the project.

Table E-4: Environmental risk assessment

Potential risk	Initial risk rating (unmitigated)			Residual risk rating (mitigated)		
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating
Biodiversity						
Removal of planted vegetation due to project activities during construction and/or operation	Insignificant	Almost unprecedented	Low	Insignificant	Almost unprecedented	Low
Disturbance or loss of habitat due to project activities during construction and/or operation	Moderate	Almost unprecedented	Low	Moderate	Almost unprecedented	Low
Light, noise, or vibration disturbance to fauna due to project activities during construction and/or operation	Minor	Almost unprecedented	Low	Minor	Almost unprecedented	Low
Aboriginal heritage						
Disturbance of land with Aboriginal heritage due to project activities during construction and/or operation	Moderate	Almost unprecedented	Low	Moderate	Almost unprecedented	Low
Heritage (non-Aboriginal)						
Direct impacts on heritage listed items, such as damage due to the movement of vehicles and machinery, during construction period. Heritage items are inclusive of nine State listed heritage items and three local heritage items.	Moderate	Rare	Low	Moderate	Rare	Low
Indirect impacts on heritage listed sites, including visual impacts, or impacts to setting and landscape, due to construction activities	Moderate	Rare	Low	Moderate	Rare	Low
Transport, traffic, and access - construction						
Temporary impacts on roads, parking, or pedestrian and cycling access, due to construction activities	Moderate	Possible	Medium	Moderate	Rare	Low
Temporary worsening of traffic conditions due to construction activities	Moderate	Unlikely	Medium	Moderate	Rare	Low
Temporary impacts on the timing and reliability of public transport services due to construction activities	Minor	Unlikely	Low	Minor	Unlikely	Low
Temporary impacts on road safety for vehicles, pedestrians, and cyclists due to construction activities	Major	Unlikely	Medium	Major	Almost unprecedented	Low
Transport, traffic, and access - operation						
Ongoing or permanent traffic impacts due to operational and/or maintenance activities, such as movement of project vehicles	Moderate	Almost unprecedented	Low	Moderate	Almost unprecedented	Low
Ongoing or permanent changes to parking, pedestrian and cycling routes, or traffic network due to operational and/or maintenance activities	Major	Almost unprecedented	Low	Major	Almost unprecedented	Low

Potential risk	Initial risk rating (unmitigated)			Residual risk rating (mitigated)		
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating
Surface water, groundwater, and flooding - construction						
Temporary water quality impacts due to ground disturbance activities such as earthworks and excavation during construction	Moderate	Unlikely	Medium	Moderate	Rare	Low
Temporary water quality impacts due to spill of fuels, chemicals, or other contaminants during construction	Moderate	Possible	Medium	Moderate	Rare	Low
Impacts on groundwater flow and recharge due to ground disturbance activities during construction	Moderate	Unlikely	Medium	Moderate	Rare	Low
Surface water, groundwater, and flooding - operation						
Reoccurring, ongoing, or permanent impacts on surface water hydrology due to operation, such as increasing runoff rates	Moderate	Unlikely	Medium	Insignificant	Rare	Low
Generation and discharge of sediment-containing stormwater runoff during operation	Minor	Possible	Medium	Insignificant	Rare	Low
Soils and contamination						
Impacts on soils including erosion, sediment transfer, or local soil quality changes due to construction and/or operational activities	Minor	Possible	Medium	Minor	Unlikely	Low
Contamination due to leaks or spills of fuel, chemicals, wastewater, or mobilisation of pre-existing contaminants during construction and/or operation	Minor	Possible	Medium	Minor	Unlikely	Low
Noise and vibration - construction						
Temporary airborne noise impacts to sensitive receivers due to construction activities	Moderate			Moderate		
Temporary airborne noise impacts to sensitive receivers due to vehicle movement during construction period	Moderate			Moderate		
Temporary vibration impacts adversely affecting human comfort, or causing structural damage, due to construction activities	Moderate			Moderate		
Noise and vibration - operation						
Ongoing airborne noise impacts due to operational activities	Major			Major		
Sleep disturbance due to operational activities	Major			Major		
Hazards and risks - construction						
Health, safety, or environmental impacts due to the spill of hazardous materials such as diesel, refrigerants, or transformer oil, during construction period	Moderate	Unlikely	Medium	Moderate	Rare	Low

Potential risk	Initial risk rating (unmitigated)			Residual risk rating (mitigated)		
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating
Occurrence of natural hazards, such as flooding or bushfire activity, during construction period	Moderate	Rare	Low	Moderate	Rare	Low
Hazards and risks - operation						
Health, safety, or environmental impacts due to the occurrence of a thermal event triggered by faults such as coolant loss, overcharging, or external damage, during operation	Moderate	Unlikely	Medium	Moderate	Rare	Low
Health, safety, or environmental impacts caused by the release of toxic or flammable gases due to battery fire or HVAC failure during operation	Moderate	Unlikely	Medium	Moderate	Rare	Low
Health, safety, and environmental impacts due electrical fault, fire, or oil release, caused by transformer failure	Moderate	Unlikely	Medium	Moderate	Rare	Low
Occurrence of natural hazards, such as flooding or bushfire activity, during operation	Moderate	Rare	Low	Moderate	Rare	Low
Air quality - construction						
Local air quality impacts due to particulate emissions during construction	Minor	Unlikely	Low	Minor	Unlikely	Low
Local air quality impacts due to combustion of fuel and/or operation of machinery during construction	Minor	Unlikely	Low	Minor	Unlikely	Low
Air quality - operation						
Air quality impacts due to particulate or gaseous emissions during operation	Minor	Rare	Low	Minor	Rare	Low
Socioeconomic - construction						
Temporary changes to local amenity including noise, dust, vibration, and visual changes during construction period	Moderate	Unlikely	Medium	Moderate	Rare	Low
Temporary impacts on parking and road access due to increased traffic during construction period	Moderate	Unlikely	Medium	Moderate	Rare	Low
Temporary impacts on resident access to employment and services, and business visibility impacts due to construction activities	Moderate	Unlikely	Medium	Moderate	Rare	Low
Socioeconomic – operation						
Ongoing or permanent changes to amenity and social infrastructure due to operational activities	Moderate	Unlikely	Medium	Moderate	Rare	Low
Ongoing or permanent impacts on community values and lifestyle, and reduction of access to services, employment, and businesses, due to operational activities	Minor	Unlikely	Low	Minor	Rare	Low

Potential risk	Initial risk rating (unmitigated)			Residual risk rating (mitigated)		
	Consequence	Likelihood	Risk rating	Consequence	Likelihood	Risk rating
Ongoing or permanent impacts on parking and road access due to operational activities	Moderate	Unlikely	Medium	Moderate	Rare	Low
Visual amenity						
Temporary impacts on visual amenity during construction	Minor	Almost certain	High	Insignificant	Almost certain	Medium
Ongoing or permanent impacts on visual amenity during operation	Minor	Almost certain	High	Insignificant	Almost certain	Medium
Waste management						
Impacts to health or environment due to excess production, or improper management, of waste during construction and/or operation	Moderate	Unlikely	Medium	Moderate	Rare	Low
Land use and property						
Direct land use impacts within the project area, including the relocation of existing utilities such as stormwater drains, fire hydrant services, and security cameras, during construction and/or operation	Minor	Unlikely	Low	Minor	Unlikely	Low
Direct land use impacts outside the project area, including the relocation of existing utilities such as stormwater drains, fire hydrant services, and security cameras, during construction and/or operation	Minor	Rare	Low	Minor	Rare	Low
Cumulative impacts						
Cumulative impacts in conjunction with surrounding projects during construction including cumulative traffic, noise, hazards and risks, and social impacts	Moderate	Unlikely	Medium	Moderate	Rare	Low
Cumulative impacts in conjunction with surrounding projects during operation including cumulative traffic, noise, hazards and risks, and social impacts	Moderate	Unlikely	Medium	Moderate	Rare	Low