Chapter 24

Environmental risk analysis

24 Environmental risk analysis

This chapter provides a summary of the environmental risk analysis carried out for the proposal, identifying the potential environmental and community risks and issues assessed as part of this Environmental Impact Statement. The full results of the Environmental Impact Statement environmental risk analysis are provided in Appendix F (Environmental risk analysis results).

24.1 Purpose

The purpose of the Environmental Impact Statement environmental risk analysis is to:

- Identify the potential environmental and community risks and issues considered as part of this Environmental Impact Statement
- Identify any issues not included in the Secretary's Environmental Assessment Requirements to enable appropriate assessment
- Consider environmental impacts based on additional detailed investigations and greater definition of the proposal, when compared to the preliminary environmental risk analysis presented within the *Sydney Metro West Scoping Report – Major civil construction work between The Bays and Sydney CBD* (Sydney Metro, 2021)
- Identify the residual environmental impacts after the implementation of the mitigation measures and performance outcomes described in this Environmental Impact Statement. This provides early identification of high residual impacts to allow a focus on these areas during the refinement of the design and the development of construction methodologies.

This environmental risk analysis is intended to identify broad environmental risks associated with the proposal. Activity and site-specific impacts are detailed within each chapter of this Environmental Impact Statement.

24.2 Environmental risk analysis methodology

The environmental risk analysis was carried out in accordance with the principles of the *Australian and New Zealand standard AS/NZS ISO 31000:2018 Risk Management – Guidelines*. This involved identifying foreseeable risks of this proposal and understanding the implications that could occur from each risk, that is, the potential impact. The risk of each potential impact was evaluated by identifying the consequence of the potential impact and the likelihood of each impact occurring.

The first step in the risk analysis involved evaluating the consequence of an identified potential impact, which requires making professional judgements about the possible results of an impact if it occurs. The definitions of the consequence levels used are provided in Table 24-1. This is followed by identifying the likelihood of the potential impact occurring with the definitions of likelihood provided in Table 24-2. The consequence level and likelihood are combined to identify the level of risk of the potential impact, as shown in the risk matrix in Table 24-3.

Table 24-1 Consequence definitions

Consequence level	Definition
Catastrophic	• Long-term (greater than 12 months) and irreversible large-scale environmental impact with loss of valued ecosystems • Extended substantial disruptions and impacts to stakeholder(s) or customers
Severe	• Long-term (6 to 12 months), long-term environmental impairment in neighbouring or valued ecosystems. Extensive remediation required • Severe disruptions or long-term impacts to stakeholder(s) or customers
Major	• Medium-term (between 3 and 6 months), impacts external ecosystem and considerable remediation is required • Major impacts or disruptions to stakeholder(s) or customers
Moderate	• Medium-term (between 1 and 3 months), short-term and/or well-contained environmental effects. Minor remedial actions probably required • Moderate impacts or disruptions to stakeholder(s) or customers

Consequence level	Definition
Minor	• Short-term (less than 1 month), change from normal conditions within environmental regulatory limits and environmental effects are within site boundaries • Minor or short-term impacts to stakeholder(s) or customers
Insignificant	• No noticeable or visible changes to environment and/or highly localised event • Negligible impact to environment, stakeholder(s) or customers

Table 24-2 Likelihood definitions

Likelihood	Definition	Probability
Almost certain	Expected to occur frequently during time of activity or project (10 or more times every year)	>90%
Very likely	Expected to occur occasionally during time of activity or project (1 to 10 times every year)	75% to 90%
Likely	More likely to occur than not occur during time of activity or project (once each year)	50% to 75%
Unlikely	More likely not to occur than occur during time of activity or project (once every 1 to 10 years)	25% to 50%
Very unlikely	Not expected to occur during the time of activity or project (once every 10 to 100 years)	10% to 25%
Almost unprecedented	Not expected to ever occur during time of activity or project (less than once every 100 years)	<10%

Table 24-3 Risk matrix

Likelihood	Definition					
	Insignificant	**Minor**	**Moderate**	**Major**	**Severe**	**Catastrophic**
Almost certain	Medium	High	High	Very high	Very high	Very high
Very likely	Medium	Medium	High	High	Very high	Very high
Likely	Low	Medium	Medium	High	High	Very high
Unlikely	Low	Low	Medium	Medium	High	High
Very unlikely	Low	Low	Low	Medium	Medium	High
Almost unprecedented	Low	Low	Low	Low	Medium	Medium

24.3 Environmental risk analysis summary

The environmental risk analysis for this proposal is documented in Appendix F (Environmental risk analysis results). Further details regarding the existing environment and potential impacts associated with each environmental issue are provided for this proposal in Chapter 6 to 22.

The environmental risk analysis identified a total of 59 risks across 18 broader environmental aspects. Of these risks, 20 (across seven broader environmental aspects) were considered to have a high to very high initial risk rating, considering the implementation of standard mitigation measures, and required further investigation and the implementation of mitigation measures and performance outcomes specific to the proposal.

Table 24-4 provides a summary of risks for each overall environmental aspect.

Table 24-4 Summary of risks prior to mitigation measures specific to the proposal

Risk rating	Risk
Low	• Biodiversity • Hazards
Medium	• Aboriginal heritage • Property and land use • Social impacts • Groundwater and ground movement • Soils and surface water quality • Hydrology and flooding • Air quality • Spoil, waste management and resource use • Sustainability, climate change and greenhouse gas
High	• Construction transport and traffic • Non-Aboriginal heritage • Business impacts • Contamination
Very high	• Construction noise and vibration • Landscape and visual amenity • Cumulative impacts

Following consideration of mitigation measures and performance outcomes specific to the proposal, the environmental risk analysis was updated. Of the 20 risks with an overall rating of high or very high in the updated environmental risk analysis, only three remain (across two broader environmental aspects) as high following mitigation (i.e. the residual risk rating) (refer to Appendix F (Environmental risk analysis results)). No very high ratings remain.

Table 24-5 Summary of residual risks

Risk rating	Risk
Low	• Aboriginal heritage • Property and land use • Groundwater and ground movement • Hydrology and flooding • Biodiversity • Air quality • Spoil, waste management and resource use • Hazards • Sustainability, climate change and greenhouse gas
Medium	• Construction transport and traffic • Non-Aboriginal heritage • Landscape and visual amenity • Business impacts • Social impacts • Soils and surface water quality • Contamination
High	• Construction noise and vibration • Cumulative impacts
Very high	• No risks identified

Figure 24-1 illustrates the decrease in risk items following consideration of mitigation measures and performance outcomes specific to the proposal.

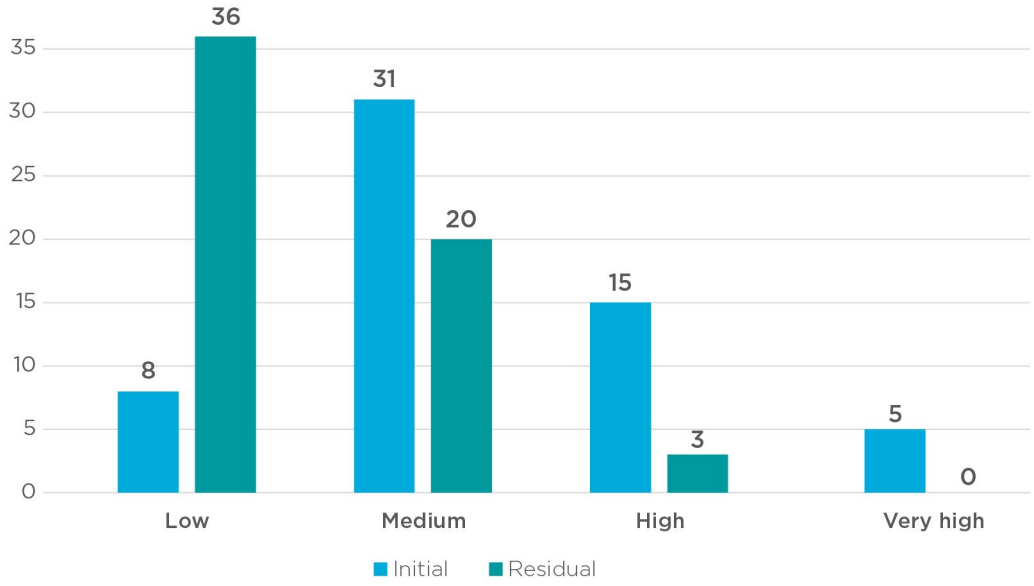

Figure 24-1 Comparison of updated risk to residual risk

24.4 Conclusions and next steps

The environmental risk analysis has identified that the following issues would have a high residual risk after implementation of the mitigation measures proposed in this Environmental Impact Statement:

- Potential temporary exceedances of airborne noise management levels from tunnelling and surface construction sites during standard construction hours impacting sensitive receivers
- Potential temporary exceedances of airborne noise management levels from tunnelling and surface construction sites outside standard construction hours impacting sensitive receivers
- Potential temporary cumulative construction impacts, including potential construction fatigue with other major projects.

This suggests that an increased focus would be required on these aspects throughout construction of the proposal to reduce these risks further to meet an acceptable risk level. In particular, Sydney Metro has developed an Overarching Community Communications Strategy (Appendix B), and a Construction Noise and Vibration Standard (Appendix E) to guide consultation and manage the noise and vibration related impacts.

Opportunities to reduce or manage construction fatigue are identified through continued coordination and engagement with proponents for other concurrent or consecutive construction projects. Ongoing community and stakeholder engagement would also be carried out so that potential cumulative impacts are better understood and reduced where possible.

The assessment carried out for issues that would have a medium residual risk has determined the likely extent of impacts can be suitably managed with the implementation of recommended feasible and reasonable mitigation measures. The implementation of the Construction Environmental Management Framework (Appendix C) would help to further reduce these potential impacts.

Issues that have a low residual risk can be adequately managed through detailed design and construction, and by the implementation of standard management measures so that all necessary environmental criteria and guidelines would be achieved.