



Australian Government



**Sydney Metro –
Western Sydney Airport**

Chapter 26

Environmental risk analysis

Table of Contents

26	Environmental risk analysis	26-1
26.1	Purpose	26-1
26.2	Project context	26-1
26.3	Methodology	26-1
	26.3.1 Preliminary environmental risk analysis	26-3
	26.3.2 Environmental Impact Statement environmental risk analysis	26-3
26.4	Environmental risk analysis summary	26-4
	26.4.1 Preliminary environmental risk analysis	26-4
	26.4.2 Environmental Impact Statement environmental risk analysis	26-5
26.5	Conclusion and next steps	26-6

List of tables

Table 26-1	Environmental risk analysis consequence definitions	26-2
Table 26-2	Environmental risk analysis likelihood definitions	26-3
Table 26-3	Risk matrix	26-3
Table 26-4	Summary of updated risks for each phase of the project	26-5
Table 26-5	Summary for residual risks for each phase of the project	26-6

List of figures

Figure 26-1	Flowchart of environmental risk process	26-2
Figure 26-2	Comparison of updated risk to residual risk	26-6

26 Environmental risk analysis

This chapter provides a summary of the environmental risk analysis undertaken for the project, identifying the potential environmental and community risks and issues assessed as part of the Environmental Impact Statement.

The full results of the Environmental Impact Statement environmental risk analysis is provided in Appendix I (Environmental risk analysis results).

26.1 Purpose

The purpose of the Environmental Impact Statement environmental risk analysis is to build upon preliminary environmental risk analysis in the Sydney Metro – Western Sydney Airport Scoping Report 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 Planning Secretary's Environmental Assessment Requirements (SEARs) to enable appropriate assessment
- consider environmental impacts based on additional detailed investigations and greater project definition, when compared to the preliminary environmental risk analysis
- 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 project. Activity and site-specific impacts are detailed within each chapter of this Environmental Impact Statement.

26.2 Project context

The environmental risk analysis has been prepared based on the project as described in Chapter 7 (Project description – operation) and Chapter 8 (Project description – construction).

The investigation area includes a number of different environments including urban areas, semi-rural areas and Western Sydney International. While the environmental risk analysis aims to identify a 'worst case' scenario, risk levels will vary based on the environmental context and impact type.

As the project would be located in a rapidly developing area of Western Sydney and amid the development of Western Sydney International (resulting in a major transformation of the airport environment associated with ongoing airport construction), the land use character and urban form within the investigation area is likely to change considerably over time compared to the existing environment.

The project would result in a number of benefits for Western Sydney and the broader Sydney region. These benefits are captured in the environmental risk analysis for context, however these benefits do not change overall risk ratings.

26.3 Methodology

The environmental risk analysis was undertaken as a staged assessment of the environmental risks associated with the project. Figure 26-1 provides an overview of the process undertaken for the environmental risk analysis.

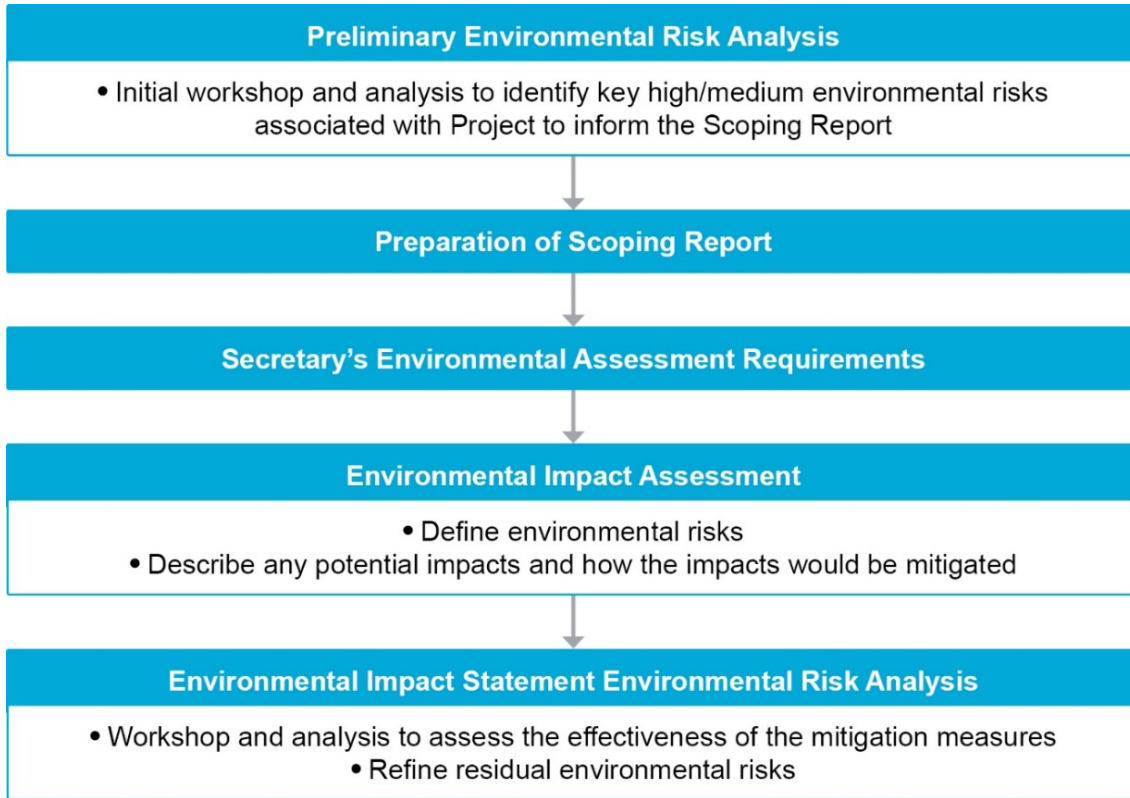


Figure 26-1 Flowchart of environmental risk process

The environmental risk analysis was undertaken in accordance with the principles of the Australian and New Zealand standard *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines*. The environmental risk analysis involved the identification of the consequence and likelihood of impacts to determine the risk of a given action or impact. The definitions of the consequences used are provided in Table 26-1 and the definitions of likelihood are provided in Table 26-2. Table 26-3 shows the risk matrix, combining the consequence and likelihood to establish the risk outcome.

Table 26-1 Environmental risk analysis consequence definitions

Topic	Key issues raised
Catastrophic	<ul style="list-style-type: none"> • Long-term (greater than 12 months) and irreversible large-scale environmental, social or economic impacts • Extended substantial disruptions and impacts on stakeholder(s) or customers.
Severe	<ul style="list-style-type: none"> • Long-term (6 to 12 months) and potentially irreversible impacts • Extensive remediation required • Severe disruptions or long-term impacts on stakeholder(s) or customers.
Major	<ul style="list-style-type: none"> • Medium-term (between 3 and 6 months) and potentially irreversible impacts • Considerable remediation required • Major impacts or disruptions on stakeholder(s) or customers.
Moderate	<ul style="list-style-type: none"> • Medium-term (between 1 and 3 months), reversible and/or well-contained impacts • Minor remedial actions required • Moderate impacts or disruptions on stakeholder(s) or customers.
Minor	<ul style="list-style-type: none"> • Short-term (less than 1 month), reversible or minor impacts that are within environmental regulatory limits and within site boundaries • Minor or short-term impacts on stakeholder(s) or customers.
Insignificant	<ul style="list-style-type: none"> • No appreciable or noticeable changes to the environment • Negligible impact on environment, stakeholder(s) or customers.

Table 26-2 Environmental risk analysis likelihood definitions

Topic	Key issues raised	Probability
Almost certain	Expected to occur frequently during time of activity or project (10 or more times per year)	>90%
Likely	Expected to occur occasionally during time of activity or project (1 to 10 times per year)	75-90%
Possible	More likely to occur than not occur during time of activity or project (once per year)	50-75%
Unlikely	More likely not to occur than occur during time of activity or project (once every 1 to 10 years)	25-50%
Rare	Not expected to occur during the time of activity or project (once every 10 to 100 years)	10-25%
Almost unprecedented	Not expected to ever occur during time of activity or project (less than once every 100 years)	<10%

Table 26-3 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

26.3.1 Preliminary environmental risk analysis

A preliminary risk workshop and analysis was undertaken to identify and rank environmental risks associated with the construction and operation of the project to inform the preparation of the Scoping Report.

Industry standard mitigation practices were considered in determining the risk ratings. Project-specific mitigation measures were not applied.

Due to the preliminary nature of the assessment, specific environmental risks were grouped together into broader environmental issues. These were assigned an overall worst case risk rating to categorise project issues as ‘key’ or ‘other’ issues in the Scoping Report to inform the request for SEARs. The outcome of that preliminary environmental risk analysis is detailed in Section 7.4 of the Scoping Report.

26.3.2 Environmental Impact Statement environmental risk analysis

The preliminary environmental risk analysis in the Scoping Report was used as the starting point for the Environmental Impact Statement environmental risk analysis. The Environmental Impact Statement environmental risk analysis consisted of two main steps:

1. Updated environmental risk analysis which involved:
 - a. consideration of the findings of the environmental impact assessments for the project
 - b. splitting the grouped environmental issues into specific environmental risks
 - c. identification of the need for project-specific mitigation measures and performance outcomes
2. Residual environmental risk analysis following the application of project-specific mitigation measures and performance outcomes.

Consistent with the approach of the preliminary environmental risk analysis, the initial environmental risk analysis prepared for the Environmental Impact Statement considered risks with the application of standard mitigation measures only. As part of this environmental risk analysis, a risk rating was assigned to each of the individual risks for each environmental aspect to provide further detail and inform project-specific mitigation measures and performance outcomes.

Project-specific mitigation measures and performance outcomes were then developed (as presented in Chapter 27 (Synthesis)) based on the outcome of the updated environmental risk analysis and the environmental impact assessments for key environmental issues. Project-specific mitigation measures and performance outcomes aim to address specific high-risk aspects and reduce potential risk.

The residual risk represents the final risk of impact to the environment for the project following the application of project-specific mitigation measures and performance outcomes.

The outcome of the Environmental Impact Statement environmental risk analysis is summarised in 26.4.2 and complete environmental risk analysis tables have been provided in Appendix I (Environmental risk analysis results).

26.4 Environmental risk analysis summary

26.4.1 Preliminary environmental risk analysis

The preliminary environmental risk analysis undertaken as part of the Scoping Report identified 18 environmental aspects that could potentially cause environmental harm associated with project construction and operation. An assessment of cumulative risk was also undertaken. Of these, 14 were categorised as high or very high and were recommended for further investigation.

The preliminary environmental risk analysis identified the following key issues to be further investigated as part of the Environmental Impact Statement:

- construction impacts:
 - traffic and transport
 - noise and vibration
 - biodiversity
 - non-Aboriginal heritage
 - Aboriginal heritage
 - land use and property
 - social and economic
 - flooding, hydrology and water quality
 - landscape and visual impact
 - cumulative construction impacts
- operational impacts:
 - land use and property
 - social and economic
 - landscape and visual impact
 - cumulative operational impacts.

26.4.2 Environmental Impact Statement environmental risk analysis

Updated environmental risk analysis

The updated environmental risk analysis identified a total of 90 risks (across 16 broader environmental aspects) with the potential to cause environmental harm (refer to Appendix I (Environmental risk analysis results)). Of these risks, 44 (across 10 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 project-specific mitigation measures and performance outcomes.

Table 26-4 provides a summary of updated risks for each overall environmental aspect associated with each project phase.

Table 26-4 Summary of updated risks for each phase of the project

Risk	Project phase	
	Construction	Operation
Low	<ul style="list-style-type: none"> resource management hazard and risk 	<ul style="list-style-type: none"> biodiversity Aboriginal heritage contamination and soils resource management air quality hazard and risk
Medium	<ul style="list-style-type: none"> groundwater and geology contamination and soils sustainability, climate change and greenhouse gas air quality 	<ul style="list-style-type: none"> groundwater and geology non-Aboriginal heritage sustainability, climate change and greenhouse gas
High	<ul style="list-style-type: none"> Aboriginal heritage flooding, hydrology and water quality land use and property landscape and visual 	<ul style="list-style-type: none"> traffic and transport noise and vibration flooding, hydrology and water quality social and economic land use and property landscape and visual cumulative impacts
Very high	<ul style="list-style-type: none"> traffic and transport noise and vibration biodiversity non-Aboriginal heritage social and economic cumulative impacts 	<ul style="list-style-type: none"> nil

Residual environmental risk analysis

Following consideration of project-specific mitigation measures and performance outcomes, the residual environmental risk was rated. Of the 44 risks with an overall rating of high or very high in the updated environmental risk analysis, only six remained following mitigation (i.e. the residual risk rating) (refer to Appendix I (Environmental risk analysis results)).

Table 26-5 provides a summary of the residual risks for each overall environmental aspect associated with each project phase.

Table 26-5 Summary for residual risks for each phase of the project

Risk	Project phase	
	Construction	Operation
Low	<ul style="list-style-type: none"> groundwater and geology contamination and soils sustainability, climate change and greenhouse gas resource management air quality hazard and risk 	<ul style="list-style-type: none"> biodiversity non-Aboriginal heritage Aboriginal heritage groundwater and geology contamination and soils sustainability, climate change and greenhouse gas resource management air quality hazard and risk
Medium	<ul style="list-style-type: none"> Aboriginal heritage flooding, hydrology and water quality landscape and visual 	<ul style="list-style-type: none"> traffic and transport noise and vibration flooding, hydrology and water quality social and economic land use and property landscape and visual cumulative impacts
High	<ul style="list-style-type: none"> traffic and transport noise and vibration biodiversity land use and property social and economic cumulative impacts 	<ul style="list-style-type: none"> nil

Figure 26-2 illustrates the decrease in risk items following consideration of project-specific mitigation measures and performance outcomes.

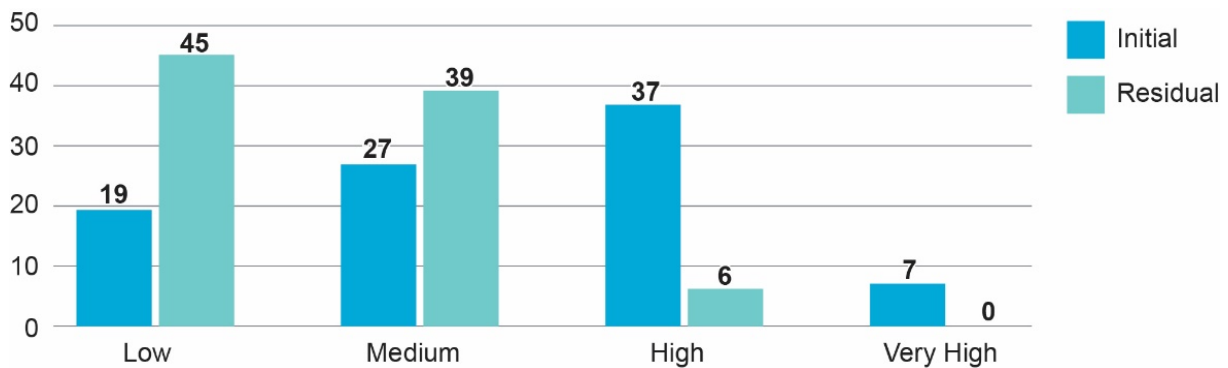


Figure 26-2 Comparison of updated risk to residual risk

26.5 Conclusion and next steps

The environmental risk analysis has identified that the following actions and risks would have a high residual risk after consideration of the project-specific mitigation measures and performance outcomes identified in this Environmental Impact Statement:

- temporary impacts to roads, parking, pedestrian and cycling access or worsening of road network performance due to construction vehicles, road closures or lane closures
- temporary localised airborne noise impacts to sensitive receivers from construction works during and outside of standard construction hours

- impacts (including clearing) on endangered populations, threatened species and threatened ecological communities including riparian and aquatic habitats during construction
- land use and property impacts associated with acquisition or temporary leasing of properties
- social and economic impacts associated with property acquisition
- cumulative impacts from the construction of multiple projects (including the construction of Western Sydney International and future M12 Motorway), including construction fatigue.

It is expected that these risks would be subject to further investigation to identify any further potential mitigation measures, or further on-site management during construction and operation.

The level of assessment carried out for these actions or risks has determined the likely extent of impacts and recommended mitigation to ensure that the risks would be appropriately managed.