

# Part B

## Environmental assessment

Googong Township water cycle project

Environmental Assessment

**November 2010**



# 6 Environmental risk assessment

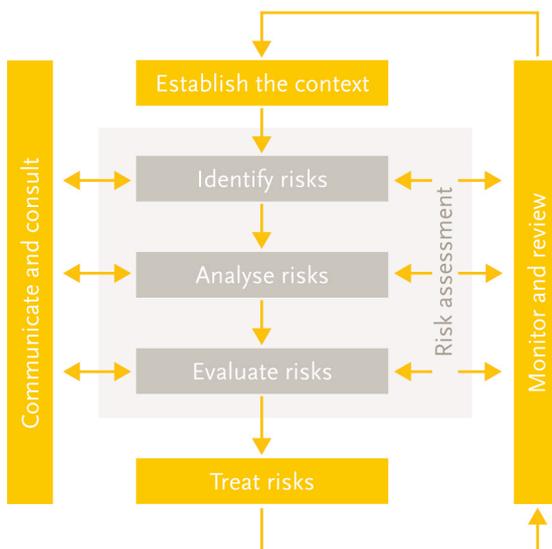
The EA shall include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the EA.

The environmental risk assessment is required as part of the Director-General's Requirements (DGRs), and is considered to be an important step in the environmental impact assessment process. In particular, it is used to guide the scoping of environmental investigations and assessments, guide design, help identify appropriate mitigation measures and management responses, and identify potentially significant residual impacts.

## 6.1 Environmental risk assessment process

The environmental risk assessment has been performed in accordance with the principles of AS/NZS 4360:2004. The process is shown in Figure 6.1 and can be broken into seven components, as outlined in this section.

**Figure 6.1** Risk assessment process



### **6.1.2 Establish the context**

This is the first step in the risk assessment process. It involves defining the basic parameters within which risks must be managed, and sets the scope for the rest of the process. The risk context for this assessment is associated with the potential environmental impacts of the Project. The DGRs outline the key issues that must be addressed in the EA, and these requirements have defined the basic scope for the environmental risk assessment. The risk assessment has focused on the following issues:

- Water quality.
- Hydrology.
- Heritage (Indigenous and non-indigenous).
- Geology and soils/geomorphology.
- Air quality (greenhouse gases, dust and odours).
- Biodiversity.
- Traffic and access.
- Visual amenity and landscape/urban design.
- Noise and vibration.
- Utilities and services.
- Waste.
- Socio-economic.
- Hazards and risk (including human health).

### **6.1.3 Identify risks**

This step involves identifying risks to be managed for the defined issues (refer to Section 6.1.2). The environmental team collaboratively identified potential impacts associated with each of these issues. The identification of each impact was based on the results of the preliminary environmental assessment (PEA) and experience on similar projects.

### **6.1.4 Analyse risks**

This step involves determining the potential level of risk for each of the identified impacts. The environmental team conducted ongoing workshops where each impact was analysed using two descriptors of risk.

The first descriptor of risk defines the consequence level for each potential impact. The definitions for each consequence level are outlined in Table 6.1.

**Table 6.1** Risk assessment consequence definitions

Consequence level	Definition
Extreme	<ul style="list-style-type: none"> <li>• Would result in a major prosecution under relevant environmental legislation.</li> <li>• Would cause long-term and irreversible impacts.</li> </ul>
Major	<ul style="list-style-type: none"> <li>• Would result in a fine or equivalent under relevant environmental legislation.</li> <li>• Would cause medium to long-term, potentially irreversible impacts.</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>• Would result in a medium-term, reversible impact.</li> </ul>
Minor	<ul style="list-style-type: none"> <li>• Would result in a short-term, reversible impact.</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>• Would not result in any perceptible impacts.</li> </ul>

The second descriptor of risk identifies the frequency of activities that may cause the impact and the probability of the impact occurring during that activity. The likelihood level is outlined in Table 6.2.

**Table 6.2** Risk assessment likelihood definitions

Likelihood level	Definition
Almost certain	The impact is expected to occur in most circumstances.
Likely	The impact would probably occur in most circumstances.
Possible	The impact would probably occur at some time.
Unlikely	The impact could occur at some time.
Rare	The impact may only occur in exceptional circumstances.

When both the descriptors of risk have been identified for each potential impact, the level of risk – prior to the implementation of mitigation measures – is determined using the risk matrix in Table 6.3.

**Table 6.3** Risk matrix

		Consequences				
		Negligible	Minor	Moderate	Major	Extreme
Likelihood	Almost certain	Moderate	Significant	High	High	High
	Likely	Moderate	Significant	Significant	High	High
	Possible	Low	Moderate	Significant	Significant	High
	Unlikely	Low	Low	Moderate	Significant	Significant
	Rare	Low	Low	Low	Moderate	Moderate

### 6.1.5 Evaluate risks

This step involves making decisions, based on the outcomes of risk analysis, about which risks need treatment and treatment priorities. Issues that have potentially high-risk impacts include:

- Biodiversity.
- Visual amenity.
- Noise and vibration.

### 6.1.6 Treat risks

This step involves identifying a range of options for treating risks, assessing these options, and preparing and implementing treatment plans.

A range of options for treating risks is documented in the mitigation and management measures and the statement of commitments in this EA.

### 6.1.7 Monitor and review

Ongoing review is essential to ensure the overall assessment process remains relevant.

Factors that may affect the likelihood and consequence of an outcome may change, as may the factors that affect the suitability or cost of the treatment options. It is therefore necessary to repeat the risk management cycle regularly. The environmental team has adopted this approach. It has undertaken ongoing reassessments of environmental risk – the latest workshop was held in July 2010 prior to submission of the EA to the DoP for adequacy review.

### 6.1.8 Communicate and consult

This component involves ongoing consultation with government agencies and relevant stakeholders to address issues that may arise throughout the environmental risk assessment process.

## 6.2 Environmental risk assessment results

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Table 6.4 outlines the results from the environmental risk assessment by displaying the recognised risks and the associated risk rating (before implementation of mitigation and management measures outlined in Chapters 7–14). This risk assessment considers the risk management features that are included in the concept design for the Project (Appendix B).

#### Rating key

-  High
-  Significant
-  Moderate
-  Low

**Table 6.4** Risk assessment results before management and mitigation measures are considered

No	Risk	Phase	Risk rating – before mitigation		
			Likelihood	Consequences	Rating
<b>Water quality</b>					
1	Poor water quality discharges from WRP if treatment design fails, leading to reduced water quality in receiving waters.	Operation	Unlikely	Major	■
2	Failure in treatment system, leading to discharge of poor quality recycled water and consequent reduced receiving water quality (quality related).	Operation	Rare	Major	■
3	Failure in treatment system, leading to overflow and reduced receiving water quality (quantity related).	Operation	Rare	Extreme	■
4	Spills of pollutants (chemicals for operation, eg chlorine, fuels) causing pollution of receiving waters.	Operation	Rare	Extreme	■
5	Impact on quality of groundwater sources due to irrigation.	Operation	Unlikely	Moderate	■
6	Impact on surface water quality due to construction (sediment runoff, chemical spills, etc).	Construction	Likely	Moderate	■
7	Impact on water quality in the Googong Dam catchment.	Construction	Rare	Moderate	■
<b>Hydrology</b>					
1	Changes in flows in receiving waters due to discharges of recycled water within stormwater flows.	Operation	Almost certain	Negligible	■
2	Changes to groundwater flows due to construction activities.	Construction	Unlikely	Minor	■
3	Changed geomorphology of receiving water beds due to recycled water discharges (increased flows).	Operation	Unlikely	Moderate	■
<b>Heritage (Indigenous and non-indigenous)</b>					
1	Direct impacts on known items of significance during construction.	Construction	Almost certain	Minor	■
2	Impacts on unidentified sites that are of heritage or recreational value.	Construction and operation	Rare	Extreme	■
3	Discovery of heritage issues during construction, resulting in delays and possible changes to siting of infrastructure.	Construction	Rare	Extreme	■

No	Risk	Phase	Risk rating – before mitigation		
			Likelihood	Consequences	Rating
<b>Geology and soils/geomorphology</b>					
1	Expansive soils that exist in the area may create stability issues during construction.	Construction.	Unlikely	Moderate	■
2	Increased soil erosion and potential for soil erosion due to disturbance of topsoil and loss of vegetation.	Construction.	Likely	Minor	■
3	Failure to adequately identify contaminated soils results in impacts on surrounding environment once exposed.	Construction.	Unlikely	Major	■
4	Contamination of soils due to irrigation of public areas with recycled water.	Operation.	Unlikely	Major	■
<b>Air quality (greenhouse gases, dust and odour)</b>					
1	Increase in greenhouse gas emissions (from construction vehicles, plant and equipment; and fugitive emissions during operation).	Construction and operation	Almost certain	Negligible	■
2	Loss of greenhouse gas sink from vegetation clearing.	Construction	Unlikely	Minor	■
3	Dust from earthmoving equipment activities, vegetation clearing, wind erosion from stockpiling excavated material, etc.	Construction	Almost certain	Minor	■
4	Odour emissions from WRP, leading to adverse impact on air quality (and amenity).	Operation	Possible	Major	■
5	Odour emissions from malfunctions anywhere in the treatment and distribution system.	Operation	Unlikely	Major	■
<b>Biodiversity</b>					
1	Considerable native vegetation loss and removal of vegetation in communities/EECs.	Construction	Unlikely	Major	■
2	Adverse impacts on threatened species (NSW/Cth)	Construction and operation	Unlikely	Major	■
3	Native flora and fauna habitat loss and fragmentation.	Construction	Unlikely	Major	■
4	Failure to adequately address environmentally sensitive areas in siting infrastructure and/or discharging recycled water.	Construction	Unlikely	Major	■
5	Further migration of weeds (noxious and environmental) within disturbed areas.	Construction and operation	Almost certain	Major	■
6	Wildlife trapped in trenches.	Construction	Possible	Minor	■

No	Risk	Phase	Risk rating – before mitigation		
			Likelihood	Consequences	Rating
7	Increased vehicle/fauna interactions due to more traffic.	Construction	Possible	Major	■
8	Disturbance to native fauna, particularly nocturnal species, due to increased lighting around construction compounds and some night-time construction activities.	Construction	Unlikely	Minor	■
9	Increased active erosion and scouring, and loss of riparian vegetation in creeks due to increased flows.	Operation	Unlikely	Moderate	■
10	Impacts on downstream ecology due to changed hydrology in creeks.	Operation	Unlikely	Moderate	■
11	Changes to water quality (alkalinity, conductivity and turbidity conditions) may create changes in aquatic ecology.	Operation	Possible	Major	■
<b>Traffic and access</b>					
1	Increased traffic generation.	Construction	Almost certain	Minor	■
2	Road diversion and/or temporary closure of roads. Private property access issues.	Construction	Almost certain	Moderate	■
3	Traffic impacts due to necessary deliveries and maintenance.	Operation	Almost certain	Negligible	■
<b>Visual amenity and landscape/urban design</b>					
1	Negative impact on visual amenity due to presence of permanent infrastructure.	Operation	Almost certain	Major	■
2	Negative impacts due to temporary infrastructure.	Operation	Almost certain	Major	■
3	Temporary visual impacts due to construction activities (site compounds, works).	Construction	Almost certain	Minor	■
<b>Noise and vibration</b>					
1	Noise and vibration impacts due to construction near sensitive areas.	Construction	Almost certain	Minor	■
2	Noise and vibration impacts from operation of pumping stations and the WRP.	Operation	Almost certain	Moderate	■

No	Risk	Phase	Risk rating – before mitigation		
			Likelihood	Consequences	Rating
<b>Utilities and services</b>					
1	Negative impacts on other major projects, infrastructure or land use in the area.	Construction and operation	Unlikely	Moderate	■
2	Delays and interruptions to road, rail and other services. .	Construction	Unlikely	Minor	■
3	Impacts on services and utilities that were not properly identified prior to construction (eg power lines and underground cables).	Construction	Unlikely	Minor	■
<b>Waste</b>					
1	Spoil (rock and soil) from trenching and building that may require transport and disposal.	Construction	Almost certain	Negligible	■
2	General waste from construction, as well as waste from construction camps.	Construction	Almost certain	Minor	■
3	Impacts related to the trucking of liquid waste.	Operation	Almost certain	Minor	■
4	Impacts related to biosoild removal.	Operation	Almost certain	Minor	■
<b>Socio-economic</b>					
1	Impacts on recreational use at various nearby sites during construction.	Construction	Rare	Minor	■
2	Impacts on recreational use at various nearby sites during operation.	Operation	Rare	Negligible	■
<b>Hazards and risks (including human health)</b>					
1	Safety hazards and risks during construction (eg interference with services, trench collapse, traffic, bushfire, impact with power lines, personal safety and security).	Construction	Unlikely	Extreme	■
2	Safety hazards and risks during operation.	Operation	Unlikely	Extreme	■
3	Risk to human health via pathways of exposure of recycled water.	Operation	Possible	Major	■
4	Contamination of land or soils due to chemical spills.	Construction and operation	Rare	Major	■

All risks would be addressed to varying degrees by the mitigation and management measures proposed in Chapters 7–14. The focus of these measures is to reduce those risks that are rated as high or significant, as listed in Table 6.4. The residual risk and potential impacts following the implementation of these measures is discussed in Chapter 15 for each of the environmental issues.

### 6.3 Precautionary risks and adaptive management

The assessment of environmental issues presented in Chapters 7–14 also identifies associated precautionary environmental risks.

Precautionary risks are potential impacts that, despite being considered unlikely in the desktop analysis, may arise over time once the Project is operating and the effects of the changed water cycle are known.

Where a precautionary risk has been identified, the parameters of the risk would be monitored. If the monitoring indicates that the actual system performs substantially differently from what has been modelled during the desktop analysis, then adaptive management options would be implemented.

As the Project would be progressively built over a 25-year period, this would allow for management measures to be adaptively implemented throughout the staging. The process used to assess environmental issues is detailed in Figure 6.2.

**Figure 6.2** Environmental assessment process

