

4 Environmental risk analysis

4.1 Methodology

A qualitative environmental risk assessment was undertaken for the proposed modification, using two variables; namely:

- the potential severity or consequences of the environmental impact; and
- the likelihood that impact will increase from current approved levels.

The variables were evaluated assuming that reasonable and feasible mitigation measures would be in place. The following definitions were applied.

- Severity or consequences of impact:
 - **Minor:** Near-source confined and promptly reversible impact on-site with little or no off-site impact expected.
 - **Medium:** Near source confined and short-term reversible impact on-site with little, promptly reversible, off-site impact.
 - **Serious:** Near-source confined and medium-term recovery impact on-site with near-source and short-term reversible off-site impact.
 - **Major:** Impact that is unconfined and requiring long-term recovery, leaving residual damage on-site with near-source confined and medium-term recovery of off-site impacts.
 - **Catastrophic:** Impact that is widespread and requiring long-term recover, leaving major residual damage on-site with off-site impact that is unconfined and requiring long-term recovery and leaving residual damage.
- Likelihood of increased impact:
 - **Rare:** Impact that is unlikely to occur during the lifetime of the project.
 - **Unlikely:** Impact that is unlikely to occur during the lifetime of the project.
 - **Possible:** Impact that may occur during the lifetime of the project.
 - **Likely:** Impact that may occur frequently during the lifetime of the project.
 - **Almost certain:** Recurring event during the lifetime of the project.

Table 4.1 below shows the risk matrix used to identify environmental risks associated with the proposed modification. In each case, a score of 1 to 5 is given for the consequence and likelihood of increased impact and the scores are added to determine the environmental risk rating. There are four classes of environmental risk utilised in this assessment, as indicated below.

- **Low:** Risks that are below the risk acceptance threshold, within current development consent limits and do not require active management. Certain risks would require additional monitoring.

- **Moderate:** Risks that lie on the risk acceptance threshold and require active monitoring. The implementation of additional measures could be used to reduce the risk further.
- **High:** Risks that exceed the risk acceptance threshold and require proactive monitoring. Includes risk for which proactive actions have been taken, but further risk reduction is impractical.
- **Critical:** Risks that significantly exceed the risk acceptance threshold and need urgent and immediate action.

Table 4.1 Environmental risk assessment matrix

		Consequence				
		1 Minor	2 Medium	3 Serious	4 Major	5 Catastrophic
Likelihood of increased impact	5 Almost certain	6 (Moderate)	7 (High)	8 (Critical)	9 (Critical)	10 (Critical)
	4 Likely	5 (Moderate)	6 (High)	7 (High)	8 (Critical)	9 (Critical)
	3 Possible	4 (Low)	5 (Moderate)	6 (High)	7 (Critical)	8 (Critical)
	2 Unlikely	3 (Low)	4 (Low)	5 (Moderate)	6 (High)	7 (Critical)
	1 Rare	2 (Low)	3 (Low)	4 (Moderate)	5 (High)	6 (High)

4.2 Risk ratings

The results of the risk assessment for the proposed modification are provided in Table 4.2. The risk ratings were derived by considering the proposed extension and how it would affect the environmental attributes listed in the table in terms of the likelihood and consequences of its increased impacts on those attributes compared to the currently approved operations.

Table 4.2 Environmental risk rating

Environmental attribute	Consequence	Likelihood	Rating
Ecology			
Potential impact upon threatened flora and vegetation communities	2	3	5 (Moderate)
Potential impact on threatened fauna	2	3	5 (Moderate)
Potential impact on habitat for native species	2	3	5 (Moderate)
Cumulative ecological impacts	2	2	4 (Low)
Aboriginal cultural heritage			
Potential impact on Aboriginal artefacts	2	2	4 (Low)
Potential impact on cultural heritage	2	2	4 (Low)
Noise and vibration			
Potential impact on residences	2	3	5 (Moderate)
Potential vibration impacts on buildings and structures	1	2	3 (Low)

Table 4.2 Environmental risk rating

Environmental attribute	Consequence	Likelihood	Rating
Cumulative noise impacts	2	3	5 (Moderate)
Air quality			
Potential impact on residences	2	3	5 (Moderate)
Cumulative air quality impacts	2	3	5 (Moderate)
Visual amenity			
Potential impact on surrounding receptors	2	2	4 (Low)
Potential impact on nature of surrounding area	1	1	2 (Low)
Groundwater			
Potential impacts on hard rock aquifers	1	1	2 (Low)
Potential impacts on the Hunter alluvium	1	1	2 (Low)
Surface water			
Potential impacts on the Hunter River – water supply	1	1	2 (Low)
Potential impact on local hydrological flows	1	1	2 (Low)
Potential impact on downstream users	1	1	2 (Low)
Traffic and transport			
No changes are proposed	1	1	2 (Low)
Increases in traffic volumes	1	1	2 (Low)
Soils and land capability			
Increase in erosion potential	1	2	3 (Low)
Agriculture			
Potential impact on agricultural resources and enterprises	1	1	2 (Low)
Greenhouse gas			
Potential impacts through increases in greenhouse gas emissions	1	1	2 (Low)
Social amenity			
Amenity impacts on residents	2	2	4 (Low)
Potential disruption to the local community	1	1	2 (Low)
Historic heritage			
Potential impact on historic heritage	1	1	2 (Low)

As shown in Table 4.2, majority of environmental risks from the proposed modification were considered low, with ecology, noise and air quality considered a moderate risk.

Environmental assessments of these moderate risk environmental aspects have been undertaken using relevant available information from the EA lodged for the Warkworth Extension Project (EMM, 2010). New information has been incorporated into the assessments where required due to state government policy changes or updates to the baseline information and operational conditions since the lodgement of the EA.

Rehabilitation is described in chapters 2, 5 and 10.

Where appropriate, management and monitoring measures are proposed in the subsequent chapters to prevent and/or mitigate the potential for adverse impacts to the attributes identified in Table 4.2.

