

Appendix D Environmental Risk Assessment

Outlined below is the methodology that was employed to undertake the Environmental Risk Assessment to identify potential environmental impacts (construction and operation) associated with the project.

Methodology

(i) Determine Environmental Aspects

Environmental aspects are any element of the Proposal's activities, products or services that may interact with the environment.

Any environmental aspects which may have already been identified earlier by means such as incident and "near miss" investigations, housekeeping inspections, Take Two, JSA's or departmental audits (e.g. OH&S committees) were considered. For new aspects, the team brainstormed out issues that relate to the Proposal, taking into account the subject's assets, activities, products and services. This was done as simple statements with little debate to allow maximum flow of thought.

From a facility perspective, the team considered normal operating conditions, shutdown and start-up conditions, as well as reasonably foreseeable alarming events or emergency situations.

Note: A significant environmental aspect is an environmental aspect that has, or can have, a significant environmental impact.

(ii) Determine Environmental Impacts

An environmental impact is any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

The consequences and impacts that may credibly arise from the identified aspects were listed down.

(iii) Potential Consequence

Focussing on the identified environmental impacts, the potential consequence of each impact was considered under the following four broad categories:

- The effect or impact on people (safety);
- The effect or impact on the environment and licensing requirements;
- The effect or impact on the plant or business, usually in dollars; and
- The effect or impact on reputation, due to stakeholder outrage.

The consequence rankings were established using criteria for each of the elements (refer to **Table 1**).

Table 1: Consequence Ranking Scores

Low (1)	Minor (2)	Moderate (3)	Major (4)	Critical (5)
Injury and Disease (includes workers and community)				SAFETY
Minor injury. No medical treatment Eg, cuts, bruises, no measurable physical effects.	Significant injury. Medically Treated Injuries from which recovery is likely. Eg, burns, broken bones, severe bruises, cuts.	Serious Injury. Moderate permanent effects from injury or exposure. Eg, serious burns, serious internal and/or head injuries, gassings that require hospitalisation.	Single fatality and/or, Severe permanent injury, paralysis, brain damage, life threatening exposure to a health risk	A Multiple fatality and/or, Significant irreversible exposure to a health risk that effects greater than 10 people
Environmental effects				ENVIRONMENT
Low Pollution. No detectable effect to animals or community on or off-site. Transient event, less than 8 hours. Emission or discharges as a result of being outside normal operating procedures.	Minor Pollution. Detectable effects on plants, animals or community including noise, odour, fall-out and discoloration to water. Expected recovery time is less than 1 week.	Moderate Pollution. Multiple fatality of a species or damage to a habitat. An expected recovery of less than 1 year. Limited to areas within and adjacent to the perimeter of operations. Loss of 1 member of an endangered species.	Major Release. Multiple fatality of a species or damage to a habitat. Potential for recovery between 1 to 10 years. Not limited to areas within and adjacent to the perimeter of operations. High proportion of an endangered species lost and left not viable.	Extreme Event. Multiple fatality of many species or damage to a habitat with a potential for recovery greater than 10 years. Endangered species local population and habitat destroyed.
Social / cultural heritage				
Low-level social or cultural impacts. Low-level repairable damage to commonplace structures.	Minor medium-term social impacts on local population. Minor damage to structures or items of significance. Minor infringement of cultural heritage. Mostly repairable.	Ongoing social issues. Permanent damage to structures or items of cultural significance, or significant infringement on cultural heritage / sacred locations.	On-going serious social issues. Significant damage to structures or items of cultural significance, or significant infringement and disregard of cultural heritage.	Very serious widespread social impacts. Irreparable damage to highly valued structures, items or locations of cultural significance. Highly offensive infringements of cultural heritage.

Operational impact		PLANT / BUSINESS (\$)		
Easily addressed or rectified by immediate corrective action. No loss of production. No damage to equipment.	Minor or superficial damage to equipment and/or facility. Minor loss of or impact on production.	Moderate damage to equipment and/or facility. Significant loss of or impact on production.	Major damage to facility requiring significant corrective or preventative action. Serious loss of production.	Future operations at site seriously affected. Urgent corrective or remedial action required. Major loss of production.
Financial / Marketing / Customers				
Can be easily absorbed through normal activity.	Consequences can be absorbed, but management effort is required to minimise impact. Minor delivery delays	Significant event, which can be managed under Special circumstances. Some customers seek alternative supply for short term.	Major event, with prioritised and focused management will be endured. Some customers lost to alternative supply.	Extreme event with potential to lead to failure of most objectives or collapse of part of business. Key customers lost to alternative supply.
Legal				
Low-level legal issue. Technical non-compliance. Prosecution unlikely.	Minor legal issues. Non-compliances to regulations. Minor prosecution, eg., on the spot fine.	Serious regulatory breach with expected prosecution and/or moderate fine. Civil action possible.	Major regulatory breach with investigation and prosecution, and potential major fine. Major civil action possible.	Investigation by authority with significant prosecution and fines. Very serious civil action, including class actions.
Total Business Cost Impact				
< \$25k	\$25k - \$250k	\$250k - \$2.5m	\$2.5m - \$25m	> \$25m
Community / government / media / reputation				OUTRAGE
Public concern restricted to local complaints. Ongoing scrutiny / attention from regulator. Individual concern. No discernable impact on reputation.	Minor, ongoing local public or media attention and complaints. Significant hardship from regulator. Reputation is impacted with a small number of people.	Heightened concern by local community/media and local NGOs. Significant difficulties in gaining approvals. Reputation impacted with some stakeholders.	Adverse national media / public / NGO attention. Licence to operate suspended. Unable to gain approval. Reputation impacted with significant number of key stakeholders.	Serious public or media outcry (international coverage). Damaging NGO campaign. Licence to operate threatened. Reputation impacted with majority of key stakeholders.

(iv) Determine Likelihood

The likelihood of the scenario occurring leading to the potential consequence/impact level assessed above was then considered (Table 2).

Table 2: Likelihood (frequency) ranking scores

Description	Rating Factor
Almost Certain Event expected to occur in most circumstances	5
Likely Event will probably occur in most circumstances.	4
Possible Event should occur at some time.	3
Unlikely Event could occur at some time.	2
Rare Event may occur, but only under exceptional circumstances.	1

(v) Assign Risk

The combination of the consequence rating and the likelihood rating was then used to determine the current risk of the activity to the environment (Table 3).

$$\text{Risk (R)} = \text{Consequence (C)} + \text{Likelihood (L)}$$

Table 3: Risk ranking matrix

Consequence → Likelihood ↓	Low (1)	Minor (2)	Moderate (3)	Major (4)	Critical (5)
Almost certain (5)	High (6)	High (7)	Extreme (8)	Extreme (9)	Extreme (10)
Likely (4)	Moderate (5)	High (6)	High (7)	Extreme (8)	Extreme (9)
Possible (3)	Low (4)	Moderate (5)	High (6)	Extreme (7)	Extreme (8)
Unlikely (2)	Low (3)	Low (4)	Moderate (5)	High (6)	Extreme (7)
Rare (1)	Low (2)	Low (3)	Moderate (4)	High (5)	High (6)

(vi) Changes/Control Measures

Once the current risk had been determined, existing and proposed controls and actions were then applied in order to reduce and manage the potential risk giving us the post upgrade risk (residual risk). It was noted that it may be necessary to use a combination of controls to reduce the risk to a tolerable level. The controls focus on either of the consequences or likelihood, though most preventative controls focus on likelihood reduction, whilst most response controls focus on containing the consequence or impact. A hierarchy of control measures to eliminate or minimise the risk was followed in the priority order noted below:

- Elimination
- Substitution
- Isolation
- Engineering controls
- Administrative controls
- Use of personal protective equipment

(vii) Is the risk tolerable?

Once having assessed the post upgrade risk, it was determined whether that risk is tolerable. The environmental impacts which were identified as having an “extreme” post upgrade risk (i.e. a significant risk that may exist following the application of safeguards or control measures), are considered to be key issues.

Environmental Impact	Environmental Management Requirement
Extreme	Activity is assessed to present a high risk of environmental harm Activity specific mitigation measures in addition to industry best practice environmental management requirements may apply Considered as a Key Assessment Issue– Refer Chapter 8
High	Activity is assessed to present a medium risk of environmental harm Industry best practice environmental management requirements and/or some specific additional controls may apply
Moderate	Activity is assessed to present a low risk of environmental harm. Industry best practice environmental management requirements apply
Low	Activity is assessed to present very low risk of environmental harm. Standard Operating Procedures are sufficient to control potential impacts.

^{*}NB: In all cases where the identified risk contravenes statutory regulations, policy and /or standards, the risk will be reduced.