

CHAPTER 6

ASSESSMENT METHODOLOGY



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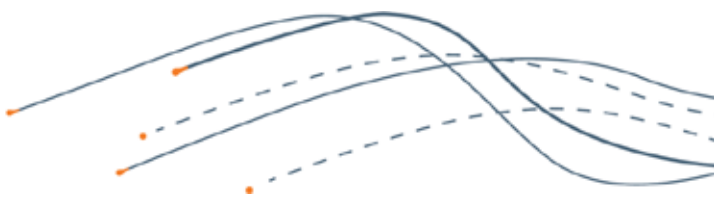
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6 Assessment Methodology

This chapter describes the environmental impact assessment (EIA) methodology that was adopted for the site of the proposed mining lease (the mine site). The required content of a mining proposal is set out in Section 35(1) of the Mining Act and Regulation 30 of the Mining Regulations. The minimum requirements to be included in a mining proposal are described in Ministerial Determination 006 (South Australian Government Gazette 50: 3064-3077, 12 July 2012), made under Regulation 30(3) of the Mining Regulations. These requirements include an assessment of the actual and/or credible potential impact events associated with each phase of the proposed mining activities (construction, operation and post mine closure). The mining proposal must also describe the control and management strategies proposed to reduce adverse environmental impacts.

The EIA for the proposed CEIP mine site has been undertaken in accordance with the Ministerial Determination and considers the adverse and beneficial environmental (biophysical, social and economic) effects associated with the proposed development. It has been undertaken as a two-step process:

1. Impacts which are expected to occur as a result of normal construction and operation of the project (actual impact events) have been considered via an Impact Assessment.
2. Potential threats of adverse effects on the environment (credible potential impact events) as a result of unplanned or unexpected events, or uncertainties in the assessment of impact, have been considered via a Risk Assessment.

In undertaking the EIA, the following definitions have been adopted:

- **Environment:** As defined in Section 6(4) of the Mining Act, environment includes:
 - Land, air, water (including both surface and underground water and sea water), organisms, ecosystems, native fauna and other features or elements of the natural environment
 - Buildings, structures and other forms of infrastructure and cultural artefacts
 - Existing or permissible land use
 - Public health, safety or amenity
 - The geological heritage values of an area
 - The aesthetic or cultural values of an area
- **Environmental Aspect:** Elements of the project that interact with the environment, including land disturbance, discharges to land, atmospheric emissions, releases to water, resource use, waste generation, energy generation and alteration to amenity.
- **Environmental Component:** An element of the environment that may be affected by mining activities.
- **Environmental Impact:** Any change, adverse or beneficial, to environmental, community and economic values which is expected as part of normal operation of the project.
- **Environmental Risk:** Actual or potential threat of adverse effects to environmental, community and economic values arising from unexpected or unplanned events associated with the project. Unexpected or unplanned events include failure of environmental controls, measured impacts being greater than predicted impacts and natural disasters such as bushfire.
- **Environmental Values:** Qualities of the natural and socioeconomic environment that require protection from the effects (both real and potential) of development activities under legislation, government policy or in response to community and stakeholder expectations.

- **As Low as Reasonably Practicable (ALARP):** An impact or risk is considered to be ALARP if the cost of any additional practicable measure to reduce the impact or risk can be shown to be grossly disproportionate to the benefit gained. The criterion is reasonably practicable, not reasonably affordable: justifiable cost and effort is not determined by the budget constraints / viability of a project (NOPSEMA 2014).

6.1 Impact Assessment

The impact assessment process recognises that, even with controls in place, normal or planned construction and operation of the project will result in changes to environmental, community and economic values. The aim of the impact assessment was to identify the residual impacts associated with the CEIP. The steps involved are outlined below.

6.1.1 Define Normal Project Activities and Design Elements

Section 35 of the Mining Act requires the mining proposal to specify 'the mining operations that the applicant proposes to carry out in pursuance of the lease'. This includes the proposed mining methods. Consequently, the first step of the EIA process was to detail the activities that will be undertaken, when they will occur and how they will be executed.

The EIA was based on the preferred project design. This was preceded by a consideration of alternatives to the project and options within the project components against a number of criteria, including environmental. Where practicable, the design sought to eliminate environmental impacts or, where this could not be achieved, minimise impacts. Consideration of options was an iterative process. The project design was refined as a result of the EIA process where it was considered impacts or risks were unacceptable or were not ALARP (see 6.1.9).

6.1.2 Identify Environmental Aspects Associated with Project Activities

Section 35 of the Mining Act also requires a description of the existing environment. Regulation 30(1)(a) notes that any description or assessment relating to the environment may be limited to those aspects of the environment that may reasonably be expected to be affected by the relevant mining operations.

The environmental aspects of the project were identified based on the project description (Chapter 3). This enabled identification of the environmental components that could be impacted by the project, which were then the subject of technical studies to describe the existing environment and the relevant environmental values.

6.1.3 Identify Potential Impact Events

Potential impact events are those events that may result in impact to an environmental value and that may be caused directly or indirectly by the project. Potential impact events were identified:

- From technical studies undertaken for each environmental component
- By relevant stakeholders (community, government, landowners) via consultation (in accordance with Section 35(1)(a)(iv))
- By precedents from other projects

Identification of impact events considered both direct and indirect impacts:

- Direct impacts are those that are a direct consequence of the project, e.g. clearing of vegetation.
- Indirect impacts are those where the project is a substantial cause of a secondary event which has an impact on the environment. An example is groundwater drawdown from mine dewatering impacting on other groundwater users.

Potential impact events were considered for each environmental component and for each phase of the mine (Appendix C). They reflect the ways in which the project might conceivably impact on an environmental value. Identification of impact events did not take account of any design or management controls that may be used to minimise or eliminate an impact.

6.1.4 Describe Source, Pathway, Receptor

Section 35(1)(a)(ii)(A) of the Mining Act requires a mining proposal to include 'an assessment of the environmental impacts of the proposed mining operations'. Consistent with the Ministerial Determination, the assessment used the source, pathway and receptor approach in considering each potential impact event.

- **Source** (or event) is the environmental aspect that may cause an impact, e.g. dust from blasting.
- **Pathway** describes the means or route by which a receptor can be exposed to, or be affected by, an identified source, e.g. wind.
- **Receptor** is a specific environmental value that could come to harm, e.g. surrounding residents.

An impact event will only occur if a source, pathway and receptor are all present. Consistent with the Ministerial Determination, potential impact events were not considered further in the EIA if they were demonstrated to be very low probability or trivial in consequence. Consequently:

- A source was only considered where a contaminant/agent was at a level/magnitude that could reasonably be expected to result in harm to a receptor. For example, radionuclides in ore at the mine site have been assayed and determined to be well below the concentration that would classify this material as a radioactive ore under the *Radiation Protection and Control Act 1982*. As a result, ore from the CEIP is not considered to be a source of radiation.
- A pathway was only considered if it could allow the receptor to be exposed to the contaminant/agent at a level/magnitude that could reasonably be expected to result in harm. For example, while fine dust particles could be transported to Wudinna in certain weather conditions, the concentration of particles in the air would be so diluted that no harm to residents could reasonably be expected.
- A receptor was only considered if it was recognised as having an environmental value. For example, groundwater at the mine site is highly saline and unsuitable for any use other than industrial. For this reason, it was not considered to be a receptor.

This assessment was made prior to consideration of any design or management control measures that are being proposed to remove a source, pathway or receptor.

Where a source, pathway and receptor were all present such that an environmental impact could reasonably be expected to occur, or where knowledge gaps made it uncertain as to whether the source, pathway and receptor were present, an environmental assessment was undertaken to determine the expected impact on a receptor.

6.1.5 Grouping of Impacts

Given the number of impact events, similar impact event were grouped together to assist presentation in the Mining Lease Proposal (MLP). Generally, this reflected events with the same pathway and receptor and within the same phase of mining. Some events were grouped across different mine phases where the impacts were very similar. For example, operation and closure of the integrated waste landform is a combined process so impact events within these two phases were generally not separated.

While impact events were grouped, the impact and risk assessment was undertaken for each individual impact event. This was to ensure detail was not lost that could affect the risk assessment or determination of leading indicator criteria. Grouped impacts were considered in:

- Discussing the impact and risk assessment in the body of the MLP (although, where necessary, reference was still made to individual impacts).
- Setting environmental outcomes and outcome measurement criteria.
- Setting leading indicator criteria where these related to monitoring at the receptor (where leading indicator criteria were targeted at the source or pathway, reference back to individual impact events was needed).

6.1.6 Identify the Measures and Factors that will Limit Impacts

Consistent with Section 35(1)(a)(ii)(B) of the Mining Act, the assessment considered the measures and strategies that are being proposed by Iron Road to manage, limit or remedy impacts. Iron Road adopted a hierarchy of controls applied in the following order:

- Elimination: Redesign the project to eliminate an impact (e.g. use of an integrated waste landform eliminated visual and other impacts that would have come from a rock storage facility adjoining the open pit).
- Minimisation: Redesign the project to minimise an impact (e.g. use of in pit crushing and conveying, instead of a truck and shovel option, to minimise dust impacts).
- Design engineering (physical) controls (e.g. covered conveyers to reduce dust).
- Management system (procedure) controls (e.g. watering of roads to reduce dust).

The assessment also considered natural factors that may limit impacts (e.g. dominant wind direction).

6.1.7 Undertake Studies to Measure the Residual Impact on Environmental, Social and Economic Values

To determine the predicted impact, the studies took into account the identified control measures. Technical studies included baseline surveys, development of conceptual models, development of numerical models, literature reviews and desktop assessment.

6.1.8 Categorise Impact

Regulation 30(1)(b) requires a mining proposal to include a description of the anticipated likelihood and consequences of those impacts after the relevant measures (6.1.6) have been taken. This applies to both the impact and risk assessment. For the impact assessment, the likelihood of an impact is certain, i.e. it is expected to occur as part of the normal operation of the project.

The identified impacts and benefits were categorised as being negligible, low, medium or high. Impact criteria were developed to standardise the assessment and categorisation of impacts for the project (see Table 6-1 and Table 6-2). The EIA has focused on the major issues associated with the project, being those impacts identified as either medium or high. The impacts identified as low or negligible have been addressed only to the extent necessary to demonstrate that they have been considered.

The factors relevant to developing the project impact criteria included legislative criteria, the duration and frequency of the impact, the nature of the affected receiver and the geographic scale of the impact.

Table 6-1 Criteria for Categorising Residual Project Environmental Impacts and Benefits

Category	Impacts		Benefits
	Legislative Criteria Exist	Legislative Criteria Do Not Exist	
Negligible	A negative change below detectable limits.	A negative change below detectable limits. OR No change to environmental value(s) ³ .	A positive change below detectable limits.
Low	Detectable negative change that is within regulatory limits/standards.	A short-term (<3 years) negative change affecting receivers located within the project area ² boundary (local receiver) only. OR A long-term (>3 years) negative change with insignificant but detectable change.	A short-term (<3 years) positive change experienced within the project area ² only. OR A long term (>3 years) positive change with insignificant but detectable change.
Medium	A periodic and/or temporary non-compliance of a regulatory limit/standard ¹ .	A long-term (>3 years) negative change affecting receivers located within the project area ² boundary (local receiver) only. OR A short-term (<3 years) negative change affecting receivers outside of ⁴ the project area ² boundary, but not regionally.	A long-term (>3 years) positive change experienced within the project area ² only. OR A short-term (<3 years) positive change experienced outside of ⁴ the project area ² boundary (local receiver), but not regionally.
High	A regular or consistent non-compliance.	A negative change affecting regional receivers (Eyre Peninsula), state-wide receivers or environmental value(s) ³ .	A positive change experienced by the region (Eyre Peninsula), the state or by environmental value(s) ³ .

- 1 Periodic and temporary impact is defined as a daily exceedance of a specified limit occurring no more than once every two weeks.
- 2 Project area is defined as the land within the proposed mine site boundary.
- 3 Environmental value is an element of the environment that is afforded protection under legislation, including through licensing and permitting (e.g. listed species, native vegetation, groundwater abstraction, level of service for roads).
- 4 Outside of the project area but not regionally considered to be receiving environments within 5 km of the project area to account for the extent of measurable impacts and to capture landowners with property adjacent to the proposed mine site.

Table 6-2 Criteria for Categorising Residual Project Economic / Social Impacts and Benefits

Category	Impacts	Benefits
Negligible	A negative change below detectable limits.	A positive change below detectable limits.
Low	A short-term (<3 years) negative change affecting receivers located within the local study area ¹ only.	A short-term (<3 years) positive change experienced within the local study area only.
Medium	A long-term (>3 years) negative change affecting receivers located within the local study area ¹ only. OR A short-term (<3 years) negative change affecting the regional study area ² or state-wide receivers.	A long-term (>3 years) positive change experienced within the local study area ¹ only. OR A short-term (<3 years) positive change experienced by the regional study area ² or state-wide receivers.
High	A long-term (>3 years) negative change affecting the regional study area ² or state-wide receivers.	A long-term (>3 years) positive change experienced by the regional study area ² or state-wide receivers.

1 The local study area is defined in the economic impact assessment and social impact assessments, Chapters 22 and 23 respectively.

2 The regional study is defined in the economic impact assessment and social impact assessments, Chapters 22 and 23 respectively.

6.1.9 Assess Whether the Impact is Acceptable

The EIA was an iterative process. For the purposes of this assessment, impacts categorised as ‘negligible’ or ‘low’ were considered acceptable. ‘Medium’ and ‘High’ impacts required review to confirm whether they were ALARP. If impacts were not found to be ALARP, changes were implemented to the project to reduce the impact to an acceptable level. Reduction of impact level was achieved through consideration of alternative design measures or management controls. The level and categorisation of impact was then reassessed.

6.2 Risk Assessment

Faults, failures and unplanned events may occur with the potential to cause environmental impact despite best efforts to avoid or mitigate impacts. Risks may also arise as a result of uncertainties around the assessment of impacts. The effect of these events/uncertainties may be that the actual impact on an environmental value from the project is greater (or less) than expected. The EIA process has accounted for this via an environmental risk assessment (potential credible impact events).

A key distinction from the impact assessment process is that the identified risks may or may not eventuate. The risk assessment process integrates approaches from the following sources:

- AS 31000: 2009 Risk Management – Principles and Guidelines
- HB 203: 2012 Managing Environment Related Risk

The following definitions were adopted for the risk assessment:

- **Event:** Occurrence or change of a particular set of circumstances. An event can have one or more occurrences and can have multiple causes. An event may not have a physical consequence. An event may consist of something not happening.
- **Consequence:** Outcome of an event that affects environmental values (including social and economic).
- **Likelihood:** The chance of an event occurring resulting in an identified outcome.

- **Risk:** The effect of uncertainty on the environmental outcomes that can be achieved by the project. An effect is a deviation from the expected – positive or negative. Risk is expressed as a combination of the consequences of an event and the associated likelihood of occurrence.

The risk assessment included the steps outlined in the following section.

6.2.1 Identify Limitations in the Impact Assessment

Regulation 30(2)(b) requires a mining proposal to state any limitations that apply, or should apply, to the use of information in the assessment.

Limitations could derive from such factors as:

- Availability of baseline and contextual information
- Any scope limitations in technical studies, for example, whether information is based on desktop studies or fieldwork; or whether the scope was limited to only considering certain factors and not others.
- The competency/experience of the person undertaking the technical studies on which the information is based.
- The proportion of the planned task achieved in the studies. For a range of factors (e.g. adverse weather), it may not have been possible to complete a study as planned.
- The timing of a study, e.g. whether an ecological study was completed at the optimum time of year/season to detect target species.
- Intensity of the sampling/data collection in studies (in retrospect, whether the intensity was adequate).
- Inadequate information on the effectiveness of proposed control and management strategies.

Limitations were rated in the risk assessment process as follows:

- **Low:** Sufficient information available to undertake a rigorous science-based assessment. Additional studies/sampling would be unlikely to result in any significant new information that would change conclusions reached.
- **Medium:** Some deficiencies in the information available. Additional information may change conclusions reached but not in a substantial way.
- **High:** Significant gaps in the information required and/or low level of confidence in the reliability of information obtained. Potential for improved information to significantly change the conclusions reached in the assessment.

6.2.2 Identify Level of Certainty in the Impact Assessment

Under Regulation 30(2)(c), the information provided for the purposes of a mining proposal must identify any matter in relation to which there is a significant lack of relevant information or a significant degree of uncertainty.

The limitations identified above can affect the level of confidence in the conclusions reached in the impact assessment. Uncertainties can relate to:

- The understanding of the source, pathway and/or receptor
- The extent to which any modelling used in impact assessment has been validated
- The extent to which the effectiveness of proposed control and management strategies has been demonstrated

Consequently, the level of certainty in the impact assessment was assessed and a qualitative rating applied as shown in Table 6-3.

Table 6-3 Rating of Level of Certainty

Level of Certainty	Understanding of Source, Pathway, Receptor	Extent to which Modelling has been Validated	Effectiveness of Design Measures	Effectiveness of Management Measures
High	Limitations in information rated as low.	Excellent baseline data available. Model has been run and provides accurate predictions over different seasons. Model has been extensively used and is regarded by discipline experts as leading practice and/or the impact assessment does not rely to any significant extent on the use of a model.	Widely used and demonstrated to be effective at a range of mining sites including sites with similar topographical/climatic conditions. Requires minimal checking and failure risk has been shown to be low.	Management measures are considered routine and used effectively throughout industry. Reduction in the level of impact from an unmitigated level does not rely primarily on the management measures.
Medium	Limitations in information rated as medium.	Some baseline data available. Model shows a reasonable approximation of real conditions but relies on a number of assumptions and sufficient data not available to demonstrate the model accurately portrays seasonal conditions.	Has been used at sites with similar conditions but requires regular checking or maintenance to ensure performance. OR: Has only been used at limited sites. Effectiveness has not been established in the long term or at sites similar to the project site.	Management measures have been effectively used at a limited number of sites and have not been demonstrated at similar sites or in the long term and/or reduction in the level of impact from an unmitigated level relies primarily on the management measures.
Low	Limitations in information rated as high.	Minimal baseline data. Model is unable to be validated with current data.	Measures are novel and have not been demonstrated in the field.	Management measures are novel and/or heavily reliant on specialised technical expertise.

6.2.3 Assess the Sensitivity to Change of any Assumptions

Under Regulation 30(2)(d), the information provided for the purposes of a mining proposal must, so far as it is relevant, identify the sensitivity to change of any assumption that has been made and any significant risks that may arise if an assumption is later found to be incorrect.

The level of certainty assessed above required certain assumptions to be made in the impact assessment. The risk assessment rated the sensitivity to change of assumptions as follows:

- **Low:** Sensitivity testing demonstrates conclusions reached in the impact assessment are highly unlikely to change if assumptions are found to be incorrect.
- **Medium:** Sensitivity testing shows conclusions reached in the impact assessment may change if assumptions are found to be incorrect but the level of impact would not increase significantly.
- **High:** Conclusions reached in the impact assessment would be erroneous and could not be relied on if assumptions were found to be incorrect. Sensitivity testing not undertaken, or unable to be undertaken with meaningful results.

6.2.4 Categorise the Risk

The assessment considered the risk that an impact may be greater than that predicted in the impact assessment. The risk categorisation (Table 6-4) considered the:

- Credible worst case consequence that could occur if assumptions made were found to be incorrect or unexpected events occur (Table 6-5)
- Likelihood of such a consequence occurring (Table 6-6)

Table 6-4 Risk Matrix

			Consequences				
			1	2	3	4	5
			Insignificant	Minor	Moderate	Major	Catastrophic
Frequency	A	Almost Certain	Low	Medium	High	Extreme	Extreme
	B	Likely	Low	Medium	High	Extreme	Extreme
	C	Possible	Low	Low	Medium	High	Extreme
	D	Unlikely	Low	Low	Medium	High	High
	E	Rare	Low	Low	Low	Medium	High

The consequence and likelihood ratings were then used to determine the level of risk using Table 6-5 and Table 6-6.

Table 6-5 Criteria for Categorising Consequence

Table A

Category	Level	Injury and/or Fatality	Air Quality, Noise and Vibration	Cultural	Social
Insignificant	1	No injury to the public.	Insignificant effect.	No impact to items of cultural significance.	No impact or minor social impacts on local population. Mostly reparable.
Minor	2	Moderate level of injuries to the public requiring off-site (doctor) medical treatment.	Local short-term and minor surpass of air quality or noise standard.	Damage to items of cultural significance without authorisation by the Minister	Ongoing minor social issues. Minor reparable/reversible damage to landowner property/ structures.
Moderate	3	Significant level of injuries requiring hospitalisation.	Local minor long-term surpass of air quality or noise/vibration standards. Widespread minor short-term surpass of air quality or noise/vibration standards. Local major short-term surpass of air quality or noise/vibration standards.	Significant damage to items of cultural significance without authorisation by the Minister	Ongoing serious social issues. Significant damage to local landowner property/structures which are reparable/reversible in the short term.
Major	4	Irreversible disability or impairment or serious injuries requiring long-term hospitalisation to one or more people. Single fatality.	Widespread (regional) major short-term surpass of air quality or noise/vibration standards. Regional long-term surpass of air quality or noise/vibration standards.	Irreparable damage to items of cultural significance without authorisation by the Minister.	Very serious wide spread social impacts. Significant damage to local landowner property/structures which are reparable/reversible in the long term.
Catastrophic	5	Several fatalities.	Regional major surpass of air quality or noise/vibration standards.	Irreparable damage to highly valued items of great cultural significance without authorisation by the Minister.	Complete breakdown of social order.

Table B

Category	Level	Effect on Behaviour of Listed Fauna Species ¹	Effect on Viability of Listed Flora and Fauna Species ¹	Effect on Behaviour and Viability of Fauna Species (non-listed)	Effect on Flora Community
Insignificant	1	Insignificant effect.	Insignificant effect.	Local short-term behavioural effect and/or local short-term decrease in abundance with no lasting effects on local population.	Local short-term decrease in abundance of some species without reduction in local community viability.
Minor	2	Local short-term behavioural effect.	Local short-term decrease in abundance with no lasting effects on local population.	Local long-term behavioural effect that does not unduly affect the ecology of the population and/or local long-term decrease in abundance without reduction in local population viability.	Local long-term decrease in abundance of some species resulting in little or no change to community structure.
Moderate	3	Local long-term behavioural effect with no significant effects on the ecology of the species.	Local long-term decrease in abundance without reduction in local population viability.	Local long-term behavioural impact that significantly affects the ecology of the population and/or regional long-term decrease in abundance and/or local reduction or loss of population viability.	Regional long-term decrease in abundance of some species and/or local loss of some species diversity resulting in some change to the community structure.
Major	4	Local long-term behavioural effect that significantly affects the ecology of the species.	Regional long-term decrease in abundance and/or local loss resulting in reduction in regional viability.	Local long-term behavioural impact that significantly affects the ecology of the species and/or regional reduction or loss of population viability.	Regional long-term decrease in abundance of numerous species and/or some loss of species diversity resulting in significant changes to community structure.
Catastrophic	5	Regional extinction of the species.	Regional extinction of the species.	Regional extinction of the species.	Regional long-term loss of numerous species resulting in the dominance of only a few species.

¹ Listed species are those with conservation significance under the *National Parks and Wildlife Act 1972* and the *Environment Protection and Biodiversity Conservation Act 1999*.

Table C

Category	Level	Contamination	GW table / Recharge	Habitat	Ground or Surface Water Quality (WQ)
Insignificant	1	Insignificant effect.	Insignificant effect.	Insignificant effect.	Minimal change with no loss of WQ (beneficial use).
Minor	2	Local contamination that can be immediately remediated.	Local minor change in GW levels and/or recharge within sub-catchments.	Disturbance of well-represented landforms/ habitats.	Local minor short-term reduction or change in WQ.
Moderate	3	Local contamination that can be remediated in the long term.	Local significant change in GW levels and/or recharge within sub-catchments.	Local loss of well-represented landforms/ habitats.	Local minor long-term, widespread short-term, or local major short-term reduction or change in WQ.
Major	4	Local contamination that cannot be remediated in the long term and/or widespread contamination that can be remediated in the long term.	Widespread (regional) minor changes in GW levels and/or recharge within catchments.	Local loss of unique or critical landforms/habitats.	Widespread (regional) major short-term reduction or change in WQ.
Catastrophic	5	Widespread contamination that cannot be remediated.	Widespread regional significant changes in GW levels and/or recharge patterns.	Regional loss of unique or critical landforms/habitats.	Widespread (regional) long-term reduction or change in WQ.

Table 6-6 Criteria for Categorising Likelihood

Descriptor	Level	General Description	Chance per Year	Frequency
Almost Certain	A	This event is expected to occur in most circumstances. <i>Expected to occur at least once each year.</i>	>90%	1/year
Likely	B	This event may occur in some given circumstances. <i>May occur during any given year.</i>	20%	1/5 years
Possible	C	This event might occur at some time. <i>Not likely to occur in any given year, but is possible.</i>	5%	1/25 years
Unlikely	D	This event could occur at some time. <i>Very unlikely to occur in any given year.</i>	1%	1/100 years
Rare	E	This event may only occur in very exceptional circumstances. <i>Examples of this have occurred historically, but it is not anticipated.</i>	<1%	<1/100 years

Note: The intention is to describe the probability or frequency of an event on an annualised basis such that the impacts or exposure (risks) faced by society and the environment are recorded as those present during any given year of the life of the project, including the construction phase.

6.2.5 Assess Whether the Risk is Acceptable

For the purposes of this risk assessment, risks categorised as 'Low' were considered acceptable. 'Medium', 'High' and 'Extreme' risks required review to determine whether each risk was ALARP. If a risk was not found to be ALARP, changes were implemented to the project to reduce the risk to an acceptable level. Whilst no extreme risks were identified, it is almost inconceivable that an extreme risk could be considered ALARP.

6.3 Outcomes and Criteria

Under Section 35(1)(a)(ii)(C) of the Mining Act, mining proposals must include 'a statement of the environmental outcomes that are accordingly expected to occur', taking into account the findings from the impact and risk assessment, along with 'a draft statement of the criteria to be adopted to measure the expected environmental outcomes'. Regulation 30(1)(c) and Regulation 30(1)(d) set out the need to consider view of directly affected landowners in developing outcomes and to include mine rehabilitation outcomes respectively.

An outcome is a statement of the acceptable impact on the environment (which may be no impact) caused by the proposed mining activities. Outcome statements must be accompanied by measurable assessment criteria which are designed to demonstrate that the outcome has been achieved. The Department of State Development will regulate the operation against the approved criteria.

Proposed outcomes and outcome measurement criteria are a critical component of the mining proposal assessment and approvals process. Iron Road would need to meet any agreed outcomes should the mining lease be granted. From a State Government perspective as a regulator, a robust and achievable set of environmental outcomes provides confidence that the mine will be managed in a sustainable and competent manner which will result in minimisation of risks to the environment, impacted and adjacent landowners and the broader community. In addition, a clear and well defined set of outcomes provides an agreed process and target for leaving the site in an acceptable condition at the surrender of the lease.

Outcomes have been developed for all impact events where a source, pathway and receptor were present (prior to the implementation of control and management strategies) such that an environmental impact that is not trivial in consequence could reasonably be expected to occur (as described in 6.1.4).

An overview of the process used for the impact and risk assessment and to determine when outcomes will be required is shown in Figure 6-1.

Each outcome is supported by measureable assessment criteria that will be used during specific phases of the project life to assess compliance against the proposed outcomes. Where there is a high level of reliance on control strategies to reduce risk to the environment, draft leading indicator criteria have been developed (Regulation 65(2)(e)). These will be monitored to give an early warning that the control measure is failing and the outcome is potentially at risk of not being achieved. This allows prompt action to be taken to address the risk and ensure ongoing compliance.

Proposed outcome measurement and leading indicator criteria are included in this mining proposal and will be finalised in the Program for Environment Protection and Rehabilitation.

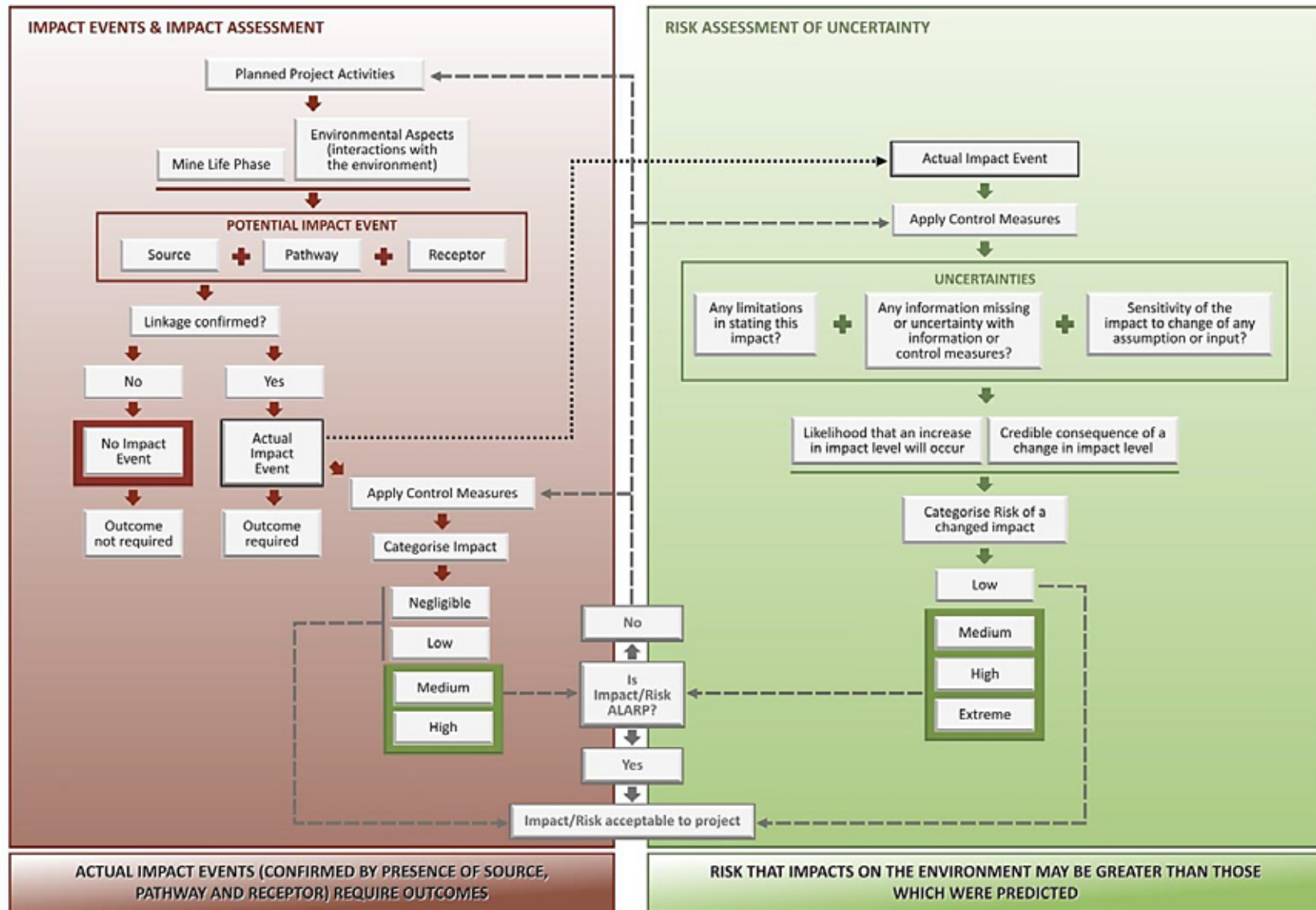


Figure 6-1 Overview of Environmental Impact Assessment Methodology

6.4 Alignment with Ministerial Determination

Each impact assessment chapter has been developed in a consistent format in accordance with the Ministerial Determination (MD). However, some terminology differs between the impact assessment process undertaken and the MD. As a point of reference, a comparison between the terminology used in the EIA process and the MD is provided in Table 6-7.

Table 6-7 Terminology Used within EIA Compared with Ministerial Determination

Mining Lease EIA	MD Equivalent	Comment
Assessment Method: <ul style="list-style-type: none"> Overview of investigations undertaken to quantify level of impact/risk 	N/A	
Existing Environment: <ul style="list-style-type: none"> Description of the existing environment Summary of key environmental values relevant to the mine site 	Description of the existing environment relevant to the mine site (Section 2). Context of environmental component being considered (Section 6.1).	Existing environment incorporated into environmental component discussion.
Context and Views of Affected Parties: <ul style="list-style-type: none"> Key environmental values identified by stakeholders Impacts/risks of concern identified by stakeholders 	Identify the views of affected parties relevant to the environmental component (Section 6.1).	Mining Lease EIA consistent with MD requirements.
Applicable Legislation and Standards: <ul style="list-style-type: none"> Identification of relevant legislation and standards Overview of specific legislative limits/criteria 	Identify all applicable legislation and standards, including environment protection policies (Section 6.2).	Mining Lease EIA consistent with MD requirements.
Design Measures to Protect Environmental Components: <ul style="list-style-type: none"> Overview of the measures incorporated into project design that minimise impacts and risks 	General description of proposed control and management strategies to reduce environmental impacts (Section 6.4).	Description of controls and management strategies discussed separately as design and management measures.
Construction, Operation and Closure Impacts: <ul style="list-style-type: none"> Discussion of impacts during each phase of mining activities 	Describe actual impact events associated with each phase of mining activities (Section 6.3).	'Impact' is the equivalent of 'actual impact' in the MD.
Control and Management Strategies: <ul style="list-style-type: none"> Overview of control and management measures proposed to be implemented to minimise impacts and risks 	General description of proposed control and management strategies to reduce environmental impacts (Section 6.4).	Description of controls and management strategies discussed separately as design and management measures.
Residual Risk Assessment: <ul style="list-style-type: none"> Discussion of residual risks during each phase of mining activities 	Describe credible potential impact events associated with each phase of mining activities (Section 6.3). Estimation of residual risk (Section 6.5).	'Risk' is the equivalent of 'credible potential impact' in the MD.

Mining Lease EIA	MD Equivalent	Comment
Justification and Acceptance of Residual Impact and Risk: <ul style="list-style-type: none"> · Acceptability of impacts and risks to the project based on identified environmental values and stakeholder issues 	Justification for acceptance of residual risk (Section 6.6).	Mining Lease EIA consistent with MD requirements.
Proposed Outcome(s): <ul style="list-style-type: none"> · Establishment of proposed outcomes for each impact/risk with a source, pathway and receptor · Nomination of measurement criteria for each proposed outcome · Nomination of leading indicators where there is a high reliance on management strategies 	Description of expected impact on the environment subsequent to control strategies (Section 6.7). Development of leading indicator measurement criteria where there is a high reliance on control strategies (Section 6.8). Development of measurement criteria to evaluate compliance against proposed outcomes (Section 6.9).	Mining Lease EIA consistent with MD requirements.