



# IMPACT ASSESSMENT

# SECTION 4

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## 4 Impact Assessment

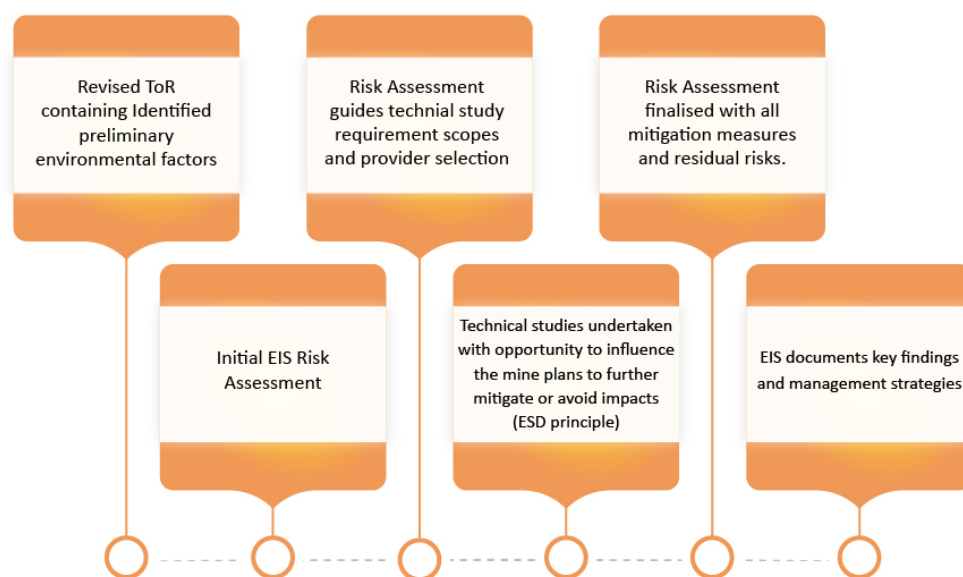
The concept of environment is a broad construct which considers both the traditional concept of environment but also consideration of the landscape, social and economic and heritage of the region (Kornov, Christensen and Zhang, 2012). Modern impact assessment has evolved to ensure that there is a holistic consideration of this broader construct as well as cumulative and indirect socio-economic impact assessment (Kornov *et al*, 2012). Guided by the *Jervois Base Metal Project EIS Terms of Reference* the impact assessment process has been undertaken with specific emphasis upon the identification, analysis and mitigation of potential environmental impacts and risk through a whole-of-project impact and risk assessment (NT EPA, 2017).

The methodology applied by KGL Resources Limited (KGL) and the Project Delivery Team is outlined in the sections below.

### Impact Assessment Methodology

In 2016, KGL undertook an internal review of the Jervois Base Metal Project (the Project) approvals progress. As part of this review the 2015 Terms of Reference was updated to reflect the Project description and a preliminary internal risk assessment process was undertaken with the focus being upon identifying the areas of the impact assessment process that required significant investments of time and technical expertise.

This internal process enabled KGL to thoroughly consider the Project risks, areas of uncertainty and the Project's consistency with the ecologically sustainable development principles. The impact assessment process adhered to is described in this Section of the EIS and has been described to set the context upon the structure and requirements of each technical aspect of Volume 4: Impact Assessment (Figure 4-1).



**Figure 4-1. The Impact Assessment Process**

## Identified Preliminary Environmental Factors

The ToR specified the NT EPA's identification of the following preliminary environmental factors that may be impacted by the project:

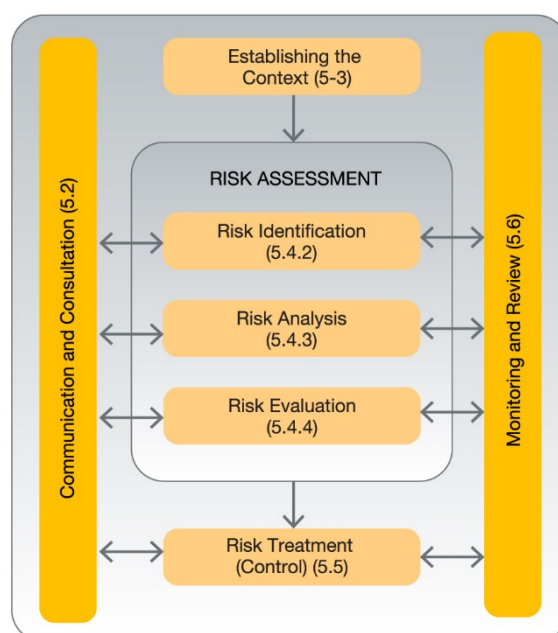
- Terrestrial flora and vegetation
- Terrestrial environmental quality
- Terrestrial fauna
- Hydrological processes
- Inland water environmental quality
- Air quality and greenhouses gases
- Social, economic and cultural surrounds; and
- Human health (NT EPA, 2017).

As per the requirements of the ToR the EIS has been structured to address each of these factors in a holistic fashion which draws upon each of the technical disciplines that contribute to each of these broad environmental factor groupings.

## Project Risk Assessment

The Project risk assessment was undertaken in accordance with the requirements of the ToR and provided valuable guidance on impacts associated with the Project and their likelihood. The detailed risk assessment process and findings is provided in Appendix C-11: Risk Assessment.

In accordance with the specifications of the AS/NZS ISO 31000:2009 Risk management – Principles and guidelines the potential events of the Jervois Project development, operation and closure were initially identified.



**Figure 4-2. Risk Assessment Process**

The risks and impacts of these potential events were then analysed and evaluated using the qualitative risk assessment matrix (Table 4-10-1). The likelihood of occurrence (Table 4-10-1) and the consequence (Table 4-10-2) of the risks were assessed to determine the initial risk rating. Thus, facilitating a detailed understanding of the potential impacts and risk and guided the technical studies and their subsequent identification of appropriate management initiatives.

**Table 4-1: Qualitative Risk Matrix**

Likelihood of the Consequence Occurring	Maximum Reasonable Consequence				
	1. Insignificant	2. Minor	3. Moderate	4. Major	5. Catastrophic
A. Almost Certain	<b>11 Low</b>	<b>16 Medium</b>	<b>20 High</b>	<b>23 Extreme</b>	<b>25 Extreme</b>
B. Likely	<b>7 Low</b>	<b>12 Medium</b>	<b>17 High</b>	<b>21 High</b>	<b>24 Extreme</b>
C. Occasionally	<b>4 Very Low</b>	<b>8 Low</b>	<b>13 Medium</b>	<b>18 High</b>	<b>22 High</b>
D. Unlikely	<b>2 Very Low</b>	<b>5 Very Low</b>	<b>9 Low</b>	<b>14 Medium</b>	<b>19 High</b>
E. Rarely	<b>1 Very Low</b>	<b>3 Very Low</b>	<b>6 Very Low</b>	<b>10 Low</b>	<b>15 Medium</b>

**Table 4-1: Risk Level**

Risk Level	
<b>Very Low</b>	Such risks are below the risk acceptance threshold, no significant action or further assessments required, can be managed under existing operational controls
<b>Low</b>	Such risks are below the risk acceptance threshold, some mitigation may be required - no detailed assessment of factors and aspects required but addressed in the Environmental Management Plan as routine controls
<b>Medium</b>	Such risks are above the risk acceptance threshold, active monitoring and substantial mitigation required - assessment required of factors and aspects
<b>High</b>	Such risks are above the risk acceptance threshold, monitoring program and major mitigation action required - assessment required of factors and aspects
<b>Extreme</b>	Such risks are significantly above the risk acceptance threshold, potentially unacceptable, urgent management and comprehensive mitigation action required

**Table 4-2: Qualitative Measure of Likelihood**

Level	Descriptor	Description	Guideline Frequency
<b>A</b>	Almost Certain	Consequences are expected to occur in most circumstances	Occurs more than once a month
<b>B</b>	Likely	Consequences will probably occur in most circumstances	Occurs once every month to once every year
<b>C</b>	Occasionally	Consequence SHOULD occur at some time	Occurs once every 1 year to once every 10 years
<b>D</b>	Unlikely	Consequence COULD occur at some time	Occurs once every 10 to 100 years
<b>E</b>	Rare	Consequence may only occur in exceptional circumstances	Occurs less than once every 100 years

The mitigation measures were based upon technical studies focused upon understanding the current historical site and the measures to remove and/or reduce further potential for impacts. The focus of this process was to ensure the mitigation measures reduced identified risks as low as practicably possible. Throughout the impact assessment sections of this EIS report the initial findings and residual risks are referred to assist readers with understanding of the operationally applicable purpose of each recommendation. For ease of reference, the risk assessment is presented concisely within the Appendix with risks categorised into social and economic, environmental or human health and safety.

## Technical Impact Assessments

Subsequent to the scoping of the critical environmental, socio-economic and heritage risks the process of undertaking the technical impact assessments was undertaken.

The process of selection was one that considered experience within the Northern Territory, qualifications suitable for completing works commensurate with the identified risk profiles and willingness and available to assist with the program of works. A list of the resulting independent technical specialties and their respective firms is provided in Appendix D: Personnel Qualifications and Experience.

The individual impact assessments for each technical discipline were undertaken in line with the relevant legislation, policies and guidelines with a focus on the following:

- Establishing the Existing Environmental context of the Project
- Determining the relevant activities that have the potential to cause impacts
- Determining the most appropriate methods to avoid or mitigate identified potential impacts; and
- Develop plans or recommendations for ongoing management strategies.

These technical study reports form the basis of the EIS Sections provided in Section 4: Impact Assessment. The technical study reports are provided within the Appendices of this EIS Report.

## Cumulative Impacts

In addition to thoroughly considering the potential impacts and their associated risk profiles, where relevant each section of the impact assessment also considers the potential for cumulative impacts.

Cumulative impact assessment is the process of using probabilistic conceptualisation models in combination with pre-determined zones of influence to calculate a measure of estimated risk or probability (likelihood) of impacts to existing environment, socio-economic and heritage aspects of the Project's environment and surrounds (Anthony, Dambacher, Walshe and Beeden, 2013).

The cumulative impact assessment aspect of each preliminary environmental factor is summarised in Section 4.10: Cumulative Impacts of this report.