



**Baralaba South Project**  
**Environmental Impact Statement**

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CHAPTER 17

**Hazards and Safety**

## Table of Contents

<b>17</b>	<b>Hazards and Safety</b> .....	<b>17-1</b>
17.1	Environmental objectives and performance outcomes.....	17-1
17.2	Risk assessment requirements .....	17-1
17.2.1.	Hazard and risk assessment process .....	17-1
17.2.2.	Risk assessment scheme .....	17-2
17.3	Sensitive receptors .....	17-4
17.4	Potential hazards and risks.....	17-4
17.4.1.	Natural hazards .....	17-4
17.4.2.	Anthropogenic hazards .....	17-6
17.4.3.	Mine products and waste materials.....	17-8
17.4.4.	Risk identification .....	17-9
17.5	Risk analysis and evaluation.....	17-10
17.6	Mitigation and management measures.....	17-11
17.6.1.	Safety and health management system.....	17-11
17.6.2.	Emergency response plan .....	17-12

## List of Tables

Table 17.1:	Likelihood of exposure to the hazard .....	17-2
Table 17.2:	Severity and consequence of hazard occurring .....	17-3
Table 17.3:	Risk level ranking matrix .....	17-3
Table 17.4:	Risk level actions .....	17-3
Table 17.5:	Anticipated hazardous materials and dangerous goods.....	17-8
Table 17.6:	Class III assessed risks .....	17-11
Table 17.7:	Key elements of the Emergency Response Plan .....	17-13
Table 17.8:	Consequence classification .....	17-15
Table 17.9:	Summary of identified risks and mitigation measures.....	17-17

## 17 Hazards and Safety

This section describes the potential hazards and risks to people and property which may result from the construction, operation, decommissioning and final rehabilitation phases of the Project. This includes the risk of potential adverse impacts to the community surrounding the Project as well as the Project workforce. Mitigation measures appropriate to the potential hazards are proposed.

### 17.1 Environmental objectives and performance outcomes

This chapter has been prepared to assist the DES in carrying out the environmental objective assessment in respect of the following environmental objectives as stated in the Project TOR:

The construction and operation of the Project should aim to ensure:

- the risk of, and the adverse impacts from, natural and man-made hazards are avoided, minimised or mitigated to protect people and property;
- the community's resilience to natural hazards is maintained or enhanced; and
- developments involving the storage and handling of hazardous materials are appropriately located, designed and constructed to minimise health and safety risks to communities and individuals and adverse effects on the environment.

### 17.2 Risk assessment requirements

Section 8.13 of the TOR requires the proponent to describe the potential risks to people and property that may be associated with the Project by way of a preliminary risk assessment of all components of the Project in accordance with relevant standards. Appropriately, a preliminary risk assessment has been carried out in accordance with:

- AS/NZS ISO 31000:2009 Risk management principles and guidelines; and
- HB203:2006 Environmental risk management principles and processes.

It should be noted that AS/NZS ISO 31000:2009 was updated in 2018 to 'AS ISO 31000:2018 Risk management–Guidelines' (Standards Australia, 2018) and HB203:2006 has been superseded by 'HB203:2012 Managing environment-related risk' (Standards Australia, 2012). The preliminary environmental risk assessment has been undertaken in accordance with the updated standards.

The risk assessment was based on a risk matrix aligned with 'A guide to risk management' (Queensland Treasury, 2020). The risk assessment considers only those risks applicable to the environment, community and workforce.

#### 17.2.1. Hazard and risk assessment process

Any risk assessment needs to be undertaken in consideration of the scope, context and criteria relevant to the assessment. For this risk assessment, the following scope and purpose was discussed and agreed to:

*The purpose of this risk assessment is to identify and analyse any risks arising as a result of the Project that may impact on environmental aspects, including socioeconomic aspects; at the local, regional and state levels and across the construction, operational and closure stages of the Project.*

Several important assumptions and/or criteria have also been identified, including:

- Occupational Health and Safety hazards are assumed to be assessed and managed at an operational level in accordance with legislated requirements and contemporary mining industry practice.
- The risk assessment is a preliminary and high-level assessment set at the overall Project level. Therefore, while some risk scenarios may be viewed as being generic, the assessment workshop process interrogates the risk scenarios sufficiently to focus on Project and site-specific aspects in assessing hazards and risks.
- Risks have been assessed on the basis that expected, contemporary operational controls will be in place and on the assumption that the proponent’s view of legal and constructive obligations, statutory controls and management systems are in line with current industry standards and expectations.

In accordance with the process outlined in ‘AS ISO 31000:2018 Risk Management–Guidelines’ (Standards Australia, 2018), risks were identified taking into account sensitive receptors and the broad set of potential hazards and risks associated with the Project. The sensitive receptors and potential hazards and risks considered for the risk assessment are outlined in sections 17.3 and 17.4.

A risk assessment was completed to identify and evaluates risk and their controls in accordance with the risk assessment scheme outlined in section 17.2.2. Note that a separate risk assessment was undertaken to assess the potential social impacts of the Project and is detailed within the Social Impact Assessment (Appendix S).

### 17.2.2. Risk assessment scheme

The risk assessment scheme used is representative of risk schemes used widely within the mining industry. For this risk assessment, the scheme comprised the following components:

- a likelihood classification table (Table 17.1);
- a severity and consequence classification table (Table 17.2); and
- more detailed qualitative descriptors to assist in classifying the consequence(s) specific to the identified impact type (Table 17.8).

Table 17.1: Likelihood of exposure to the hazard

Likelihood	Description	Frequency	Probability (%)
<b>Almost certain (AC)</b>	The event will occur often	More than once a year	> 95
<b>Likely (L)</b>	The event could easily happen	At least once in 1 year	60–95
<b>Possible (P)</b>	The event could happen and has happened elsewhere	At least once in 3 years	30–60
<b>Unlikely (U)</b>	The event has not happened but could	At least once in 10 years	5–30
<b>Rare (R)</b>	Conceivable but only in extreme circumstances	Less than once in 30 years	< 5

Following the hazard identification and assessment of likelihood and consequence criteria, the risk level was determined using Table 17.3, which then defines the assessed risk level. Table 17.4 describes the appropriate level of action required for each assessed risk level.

Table 17.2: Severity and consequence of hazard occurring

Severity level	Consequence		
	Human injury	Natural environment	Community/cultural heritage
<b>Very High (VH)</b>	Multiple fatalities, significant irreversible impairment to multiple persons	Very serious, long-term environmental impairment of ecosystem functions	N/A
<b>High (H)</b>	Single fatality, significant irreversible impairment to a person	Very serious, long-term environmental impairment of ecosystem functions	Ongoing serious social issues. Significant damage to structures/items of cultural significance
<b>Moderate (M)</b>	Significant reversible impairment to one or more persons (lost time injury, disabling injury)	Serious medium-term environmental effects	Ongoing serious social issues. Significant damage to structures/items of cultural significance
<b>Low (L)</b>	Reversible impairment requiring medical treatment (medical treatment injury)	Moderate, short-term effects but not affecting ecosystem functions	Ongoing social issues. Permanent damage to items of cultural significance
<b>Very Low (VL)</b>	No treatment or first aid treatment	Negligible/minor effects on biological or physical environment	Minor medium-term social impacts on local population. Mostly repairable

Table 17.3: Risk level ranking matrix

Likelihood	Consequence				
	Very Low (VL)	Low (L)	Moderate (M)	High (H)	Very High (VH)
<b>Almost Certain (AC)</b>	II	III	IV	IV	IV
<b>Likely (L)</b>	II	III	III	IV	IV
<b>Possible (P)</b>	I	II	III	IV	IV
<b>Unlikely (U)</b>	I	I	II	III	IV
<b>Rare (R)</b>	I	I	II	III	III

Table 17.4: Risk level actions

Risk level	Risk level actions
IV	Board and/or board level committee attention required; action plans and management responsibility specified.
III	Senior executive management attention required; action plans and management responsibility specified.
II	Manage by specific monitoring or response procedures, with management responsibility specified.
I	Manage by routine procedures, unlikely to need specific application of resources.

## 17.3 Sensitive receptors

Land in the Baralaba district is predominately used for rural activities, including cattle grazing, stud farms, dryland and irrigated cropping and improved pastures for grazing. Crops are mostly forage crops, with cotton and wheat produced on an opportunistic basis. Irrigation has also been established in the area to the west of the tenement.

The sensitive receptors identified during this assessment are consistent with those identified within Chapter 11, Air Quality and Chapter 12, Noise and Vibration. Figure 11.4 in Chapter 11, Air Quality shows the locations of sensitive receptors for the Project.

## 17.4 Potential hazards and risks

### 17.4.1. Natural hazards

The 'State Planning Policy July 2017' (DILGP, 2017a) requires that consideration be given to natural hazard areas, including:

- bushfire prone areas;
- flood hazard areas;
- landslide hazard areas;
- storm tide inundation areas; and
- erosion prone areas.

The 'State Planning Policy—state interest guideline: Natural hazards, risk and resilience' (DILGP, 2017c) has been reviewed with respect to bushfire, flooding and landslide hazards. The 'Natural Hazards Risk and Resilience' mapping layer published through the 'Development and Assessment Mapping System' (DILGP, 2017d) was reviewed to determine natural risks relevant to the Project area and surrounding community. The review identified the Project area as outside the tidal zone and erosion prone areas, and therefore, these matters are not considered further.

#### 17.4.1.1 Bushfire

The probability of a bushfire occurring in the area of the Project exceeds the 1 in 100-year average recurrence interval. The Development and Assessment Mapping System indicates that the Project area is of low bushfire risk. The MIA, including the CHPP and hazardous materials storage areas, are to be located within areas which will be cleared of vegetation as a bushfire risk mitigation measure. Buffers between vegetation and infrastructure will be maintained to ensure that all facilities are protected from radiant bushfire heat. The on-site availability of firefighting equipment, water trucks and earth moving machinery will contribute to bushfire control on-site, and bushfire management will be addressed in the Emergency Response Plan (ERP) to be prepared for the Project.

#### 17.4.1.2 Extreme weather events and flooding

The Project is located within the non-cyclonic wind region A4 (greater than 100 km from the coastline) as defined by the Australian/New Zealand Standard 'Structural design actions Part 2: Wind actions' (Standards Australia/Standards New Zealand Committee, 2011). The region is subject to tropical lows and ex-tropical cyclones which have the potential to result in substantial rainfall events and subsequent flooding. The existing environment with respect to localised flooding is detailed in Chapter 6, Flooding and Regulated Dams, which includes assessment of the probable maximum flood level and mitigation and management measures. This assessment included potential impacts associated with climate change. The DSDILGPs Development and

Assessment Mapping System resource indicates that the Project area is predominantly located outside the 0.1% (AEP) flood hazard area (Level 1, Queensland flood plain assessment overlay).

The existence of the Project has the potential to impact flooding risk through the modification of drainage pathways on the Project area.

#### **17.4.1.3 Landslide**

The existence of the Project has the potential to increase localised landslide risk through modification of the landform, including the excavation of the mine pit and construction of the WRE. The topography of the land within and surrounding the Project site is described in Chapter 10, Land and Visual Amenity, as relatively flat with only slight undulations present. As such, the existing risk of a landslide is negligible.

#### **17.4.1.4 Climate change**

For central Queensland, the effects of climate change are generally acknowledged to result in:

- increasing average temperatures;
- changes to rainfall patterns; and
- an increase in extreme weather driven events (e.g. storms, drought and flooding).

The safety and hazard implications for the Project and regional community in general are related to the potential increase in the frequency and intensity of natural hazards, including bushfire and flooding. Climate change is discussed in further detail in Chapter 11, Air Quality.

#### **17.4.1.5 Wildlife and disease vectors**

The construction and operational workforce may encounter potentially dangerous wildlife, particularly snakes. Sufficient suitably trained personnel will be available to ensure that any incidents concerning dangerous wildlife can be appropriately managed—in most cases, through avoidance, removal or containment. Any associated injuries or health consequences for personnel will be managed in accordance with established first aid, medical and emergency response procedures.

Disease vectors are living organisms that can transit infectious pathogens between humans or from animals to humans. Vector borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors. Potential disease vectors of consideration for the Project include vermin and mosquitoes. Mosquitoes have the potential to transmit a variety of diseases to humans such as Ross River Virus, Barmah Forest Virus and Dengue Fever (Queensland Health, 2019a). The construction and operation of the Project is not expected to lead to an increase in the risk of disease vectors. Site management planning will incorporate measures targeting good hygiene, vermin and mosquito control to aid in the prevention of the spread of viruses and diseases on-site and throughout the surrounding community. Key strategies include:

- materials storage protocols;
- housekeeping standards;
- personal hygiene standards;
- water management protocols;
- waste management protocols;
- inspections and monitoring; and
- eradication programs (where necessary).

Further details on mosquito management strategies are included in Chapter 8, Biosecurity.

## 17.4.2. Anthropogenic hazards

### 17.4.2.1 Incidents

On-site incidents have the potential to cause injury to personnel and harm to the environment. The management of health and safety incidents will be undertaken in accordance with the requirements of the *Work Health and Safety Act 2011* (Qld) and will include the development and implementation of a mandatory Safety and Health Management System (SHMS).

A risk-based environmental management system will be developed to identify and manage the environmental hazards associated with site mining operations. Both the SHMS and environmental management system will include procedures and systems for risk minimisation, as well as emergency response and clean-up procedures.

### 17.4.2.2 Hazardous materials and dangerous goods

Project construction, mining activities and coal handling and processing require the use and storage of dangerous goods and hazardous substances. These materials may pose a risk to human and wildlife health and safety and the environment through characteristics such as flammability, explosive or corrosive potential, toxicity and/or radioactivity.

The principal hazardous substances anticipated to be present during the lifecycle of the Project will include:

- explosives;
- fuels;
- lubricants;
- minor quantities of various construction and maintenance related chemicals (e.g. solvents, degreasers and paints);
- mining and processing wastes; and
- wastes from ancillary activities.

The Project was assessed against the major hazard facility criteria from the Work Health and Safety Regulation 2011 (Qld) and is not expected to meet the definition of a major hazard facility. At appropriate intervals, an assessment will be made to determine whether more than 10% of the threshold for any Schedule 15 chemical is likely to be present for the remaining life of the Project and, should this occur, undertake the required notification.

Table 17.5 lists the dangerous goods expected to be used and stored on-site during the Project lifecycle.

#### *Explosives*

The Project will utilise bulk explosives during the operational phase - primarily ammonium nitrate mixed with fuel oil and, where wet conditions are encountered, emulsion explosives. Other related explosives materials such as detonators, boosters and detonation cord will also be used in blasting activities. An explosives store will be established on-site for storage of ammonium nitrate, fuel oil, and ancillary explosives requirements. The explosives store will be located in accordance with prescribed regulations. Explosives materials will be transported to site as required to maintain sufficient stock for operations.

#### *Fuel*

Diesel will be the primary fuel used on-site throughout the Project life, unless decarbonisation alternatives are implemented, and will be the only fuel to be stored on-site in bulk. Diesel will be sourced from Mackay or Gladstone and transported to the site by authorised contractors/suppliers via road. Diesel storage will be located within the MIA and at the explosives mixing site. Appropriate aprons and hardstands for fuel transfer



will be provided to contain hydrocarbons and will be equipped with required safety signage, emergency information, spill clean-up equipment and fire extinguishers. Diesel storage is not expected to exceed 250 kL.

All personnel involved in fuel storage and handling activities will be trained in the safe operation of equipment. Training will include operating procedures for the refilling and maintenance of fuel storage tanks and mine vehicles and the relevant emergency response procedures in the event of an incident. Regular inspection programs will be undertaken to monitor the structural integrity of fuel tanks and bunds.

#### *Lubricants*

Large quantities of lubricating and hydraulic oils are required for use during operation of the Project. Storage of these materials will utilise secondary collection and storage such as bunded pallets or self-bunded shipping containers. The maximum total quantity to be held on-site will be approximately 20 kL of lubricating oil, hydraulic oil and waste oil. Bulk storage facilities will be located within the MIA. Storage areas will be designed to comply with AS1940 requirements with appropriate aprons and hardstands for lubricant transfer and will include emergency information, spill clean-up equipment and fire extinguishers. Other lubricants (and materials such as engine coolant and detergents) will be stored in containers up to 1,000 L within the workshop area. Spill clean-up equipment will be maintained throughout the workshop. The MIA and workshop will include a stormwater management system which incorporates oil/water separation systems to ensure potentially contaminated water is appropriately collected and disposed of off-site.

#### *CHPP reagents*

ROM coal will be processed in the CHPP. The coal preparation process requires the addition of reagents (floatation agents, flocculants and coagulants) to separate the coal product from waste materials (coal rejects). Based on available coal quality and feasibility analysis, the likely reagents to be used will include methyl isobutyl carbinol and diesel-based floatation agents and flocculants. The reagents will require bulk storage around the CHPP. Storage will utilise secondary collection and storage such as bunded pallets or self-bunded shipping containers constructed and operated in accordance with AS1940. Appropriate aprons and hardstands for reagent transfer will be provided and will include spill clean-up equipment and fire extinguishers.

#### *Other hazardous materials*

Small quantities of other hazardous materials and dangerous goods may be used and stored during the lifecycle of the Project; such materials include:

- welding and metal cutting gases;
- cleaning solvents;
- radioactive sources (used in laboratory instruments and testing equipment); and
- corrosives (e.g. acids).

All substances will be stored and handled in accordance with the relevant standards, label instructions and material safety data sheets. It is therefore not expected that they will present a significant risk to the workforce or surrounding community.

Table 17.5: Anticipated hazardous materials and dangerous goods

Hazardous substances	DG class <sup>1</sup>	UN Number <sup>2</sup>	Packing group <sup>3</sup>	Maximum quantity stored	Annual rate of use	Purpose/use
Ammonium nitrate	1.1D	0241	N/A	< 250 kg	< 100 kg	Mining activities (i.e. blasting)
Acetylene	2.1	1001	N/A	< 75 kg	< 300 kg	Welding and cutting
Liquified petroleum gas	2.1	1075	N/A	< 300 kg	< 1,500 kg	Fuel for forklifts
Diesel oil/fuels	3	1202	III	1,500 kL	100,000 kL	Fuel for vehicles and equipment and explosives use
Lubricating oils, grease and waste oil	9	3082	III	130 kL	1,100 kL	Used to lubricate vehicle engine and hydraulic machines
Oils rags	4.22	1856	N/A	< 5 t	< 10 t	Waste product
Acetone	3	1090	II (if quantity stored is > 1L)	< 30 kg	< 75 kg	Used as a solvent
Chlorine	2.3 (5.1, 8)	1017	N/A	< 150 L	< 15,000 L	Water treatment
Methyl isobutyl carbinol	3	2053	III	< 100,000 L	< 1,000 L	Required at the CHPP
Sodium hydroxide (caustic soda)	8	1823	II	< 1,000 kg	< 1,500 kg	Degreasing agent and sewage treatment
Solvents and thinners (acetone)	3	1090	II	< 500 L	< 1,000 L	Degreasing agent
Paints	3	1263	I	< 500 L	< 1,000 L	Paint during construction and operations

<sup>1</sup> DG class: Dangerous Goods class means the hazard class of the dangerous goods as stated in the Australian Dangerous Goods Code.

<sup>2</sup> UN number: A number that identifies hazardous substances and articles (such as explosives, flammable liquids, toxic substances, etc.) in the framework of international transport. UN numbers are assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods.

<sup>3</sup> Packaging group: Assigned to dangerous goods (other than Classes 1, 2 and 7) according to the degree of risk the goods present (I = great danger, II = medium danger and III = minor danger)

### 17.4.3. Mine products and waste materials

#### 17.4.3.1 Coal materials

ROM and product coal will be stockpiled near the CHPP in preparation for processing or bypass to product. Product coal and dewatered process reject waste will also be stockpiled. Tailings and reject material will be transported to the WRE and placed such that sufficient cover of waste rock material is achieved. Coal and

reject stockpiles have the potential to spontaneously combust, resulting in fires, smoke and environmental nuisance impacts. Coal materials may also present a potential hazard to the environment through generation of poor-quality leachate water as a result of its physical and chemical characteristics. See Chapter 14, Waste Management, for additional information.

#### **17.4.3.2 Mine wastes**

Waste rock material removed from the pit to access coal will be placed in out-of-pit emplacements and used to backfill the pit as mined-out areas become available. Emplacements have the potential to present safety hazards to personnel through machinery interaction and landform stability. Mine waste may also present a potential hazard to the environment through generation of poor-quality runoff or leachate water as a result of its physical and chemical characteristics. See Chapter 14, Waste Management, for additional information.

#### **17.4.3.3 Waste from consumables**

Construction, operation and decommissioning activities will generate relatively small amounts of wastes, including general, recyclable, and small quantities of hazardous waste. These waste streams will be segregated for removal and treatment off-site in accordance with a Waste Management Plan which will be developed for the Project. See Chapter 14, Waste Management, for further detail on consumables waste.

#### **17.4.3.4 Emissions**

There may be emissions that present a hazard to the community and natural environment, including air emissions (primarily dust), noise and emissions to water. Further detail on the potential impacts of emissions to water quality, air and noise values is provided in Chapters 4, 11 and 12, respectively.

### **17.4.4. Risk identification**

The various factors and relationships identified in section 6.4.2 of AS 31000, in conjunction with those listed in the TOR and outlined above, were used as the basis for identifying the hazards and risks associated with the Project. Identified risks were considered from three perspectives resulting in the following outcomes:

- 1) By environmental impact:
  - a) land impacts (e.g. loss of land resources, constraints on future land use);
  - b) noise and air quality (e.g. dust and other contaminants);
  - c) visual impacts (e.g. landscape and lighting);
  - d) surface water (e.g. hydrology and water quality);
  - e) groundwater (e.g. geohydrology and groundwater quality);
  - f) occupational health and safety impacts (e.g. impacts on personnel);
  - g) impacts arising from pests and diseases (either exacerbated or introduced by the Project);
  - h) socioeconomic impacts; and
  - i) exacerbation of impacts from natural events (e.g. fire, flood, cyclone/extreme weather, landslide, climate change).
- 2) By impacted receptor:
  - a) impacts on important environmental receptors (e.g. identified MNES, MSES, national parks); and
  - b) impacts on local and regional residents.
- 3) By introduced or exacerbated hazard:
  - a) anthropogenic: workplace occupational and health risks and hazards;

- b) anthropogenic: mining-related hazards including:
  - i) heavy earthmoving equipment;
  - ii) light vehicles;
  - iii) hazardous materials and dangerous goods; and
  - iv) geochemical and geotechnical hazards (e.g. waste rock materials, carbonaceous materials, WRE, final void).
- c) impacts arising from pests and diseases (either exacerbated or introduced by the Project); and
- d) non-anthropogenic causes from natural events (e.g. fire, flood, cyclone/extreme weather, landslide, climate change).

These risks and hazards were transferred to a risk assessment template developed for the specific purpose of assessing environmental risks and then analysed to identify associated causes, potential impacts and the expected base level of controls.

## 17.5 Risk analysis and evaluation

A risk assessment workshop has been undertaken to analyse and evaluate the risks and hazards identified with the following process steps established:

- The basis and purpose of the risk identification was discussed and agreed, as well as the process used to develop the risk scenarios, causes and impacts proposed in the risk assessment template.
- The risk assessment scheme, including the consequence descriptors for each consequence type, the likelihood classifications and the control effectiveness rankings were evaluated and agreed.
- Each of the identified risk scenarios or descriptions was then considered in turn. In most cases, one or more of the 'risk/hazard title', 'causes' and 'impacts' proposed were refined resulting from the discussion.
- The risk controls expected to be in place were nominated and a 'control effectiveness' ranking was agreed on for each control.
- The likelihood of each risk/hazard, subject to the expected control level, was then considered and a ranking was provided in accordance with the consensus view of the panel.
- The consequence category for the relevant impact or impacts was similarly assessed and ranked.
- The risk class was then determined based on the risk matrix in use.
- For risks and hazards determined as being of Class III, additional control measures were identified and assessed and, where effective and appropriate, proposed.

The detailed risk assessment outcomes are provided in Table 17.9. Of the 48 risks identified and assessed, no Class IV (Very High) risks were identified while three Class III (High) risks were identified (Table 17.6). Identified Class III risks related to occupational health and safety hazards associated with a mine workplace and particulate matter impacts to neighbouring properties.

Table 17.6: Class III assessed risks

Risk/hazard title physical environment	Causes (triggers/indicators)	Impacts (consequences)	Available/additional control measures	Risk management class
<b>Amenity of local residents</b>				
Increased risk of motor vehicle incidents	Increase light and heavy vehicle movements associated with the Project	Impacts limited largely to Moura-Baralaba Road to the south of site. Ranges from inconvenience to fatality	Fatigue management/fitness for work, alcohol and drug testing, road safety awareness training	III
<b>Occupational health and safety</b>				
OHS consequences	Construction, mining and industrial activities	Health, safety; operational cost	OHS performance to be closely monitored and assessed and, where required individual, issue specific risk assessments to be undertaken to identify fit-for purpose safety initiatives	III
<b>Air quality</b>				
Dust impacts to sensitive receptors	Equipment and vehicle movements on unsealed roads, and increased areas of disturbance (e.g. WRE)	Annoyance, amenity (sensitive receptors), harm to wildlife, crop impact, contamination of water tanks	Surface treatment of haul roads, may include binding agents, rescheduling of blasting operations, reactive dust control measures	III

## 17.6 Mitigation and management measures

The following processes and measures will be implemented in addition to expected and standard controls to reduce the risk of impacts associated with Class III identified risks on health, safety and the environment associated with the Project:

- Occupational health and safety performance to be closely monitored and assessed and, where required, individual issue specific risk assessments to be undertaken to identify fit-for-purpose safety initiatives.
- Routine watering of haul roads, scheduling of blasting operations and reactive dust control measures to be utilised to manage dust impacts to sensitive receptors.

### 17.6.1. Safety and health management system

The Project will adopt an SHMS in accordance with the requirements of the *Work Health and Safety Act 2011*. The SHMS will be based on AS/NZS 4801 'Occupational Health and Safety Management Systems' (Standards Australia/Standards New Zealand Committee, 2001) (ISO 45001) and incorporate risk management elements and practices with clearly defined and measurable objectives.

The SHMS will document the standards, methods and procedures necessary to ensure mitigation of risks relevant to the stages of the Project and ensure legislative compliance. The SHMS will be applicable to all personnel who enter the site (i.e. Project workforce, contractors and visitors).

A detailed hazard and opportunities assessment will be undertaken as part of the final planning process. The assessment will build upon the above preliminary hazard and risk assessment and identify the principle hazards for management focus during each phase of the Project.

The objectives of the SHMS will include (but are not limited to):

- compliance with regulatory requirements;
- leadership accountability at all levels;
- commitment to effectively communicate expectations and requirements;
- commitment to provide adequate resources, support and training;
- initiatives to actively involve and consult employees, contractors and other stakeholders;
- a commitment to keep personnel informed and provide open communication;
- a commitment to investigate all incidents and take the necessary corrective actions to prevent recurrence;
- occupational rehabilitation programs;
- a commitment to monitor, measure, review and audit SHMS adequacy and compliance with objectives;
- initiatives to implement changes to the SHMS based on monitoring and review outcomes; and
- a commitment to foster continuous improvement.

### **17.6.2. Emergency response plan**

Work Health and Safety Regulation 2011 (section 24) stipulates that all workplaces must have a written emergency plan. An ERP will be prepared for all phases of the Project and will:

- provide contact details relevant to emergency management;
- detail the roles and responsibilities of site personnel including, but not limited to, the:
  - Incident Commander (Project Manager/Site Senior Executive [SSE]);
  - Incident Controller;
  - Emergency Response Team;
  - Supervisors; and
  - mine workers.
- include the potential emergency situations that could occur as identified by the risk assessment;
- detail the equipment available to emergency responders;
- provide for emergency response training;
- provide for regular testing of the site's emergency response capability;
- outline the emergency response procedure to be followed, including raising the alarm and summoning of emergency assistance, and the termination of emergency response;
- identify emergency communications protocols, including requests for assistance from external emergency services (e.g. Queensland Mines Rescue Service, Queensland Fire and Emergency Service, Queensland Police);
- outline fire response procedures;
- detail evacuation procedures and muster points;
- include maps and relevant Global Positioning System information; and
- include duty cards detailing the roles and responsibilities of the Incident Commander, Incident Controller, Emergency Response Team, supervisors and mine workers.

Development of the ERP will include consultation with key external bodies involved in emergency response relating to site activities, including:

- Queensland Fire and Emergency Services;
- Queensland Mines Rescue Service
- Queensland Ambulance Service;
- Queensland Police Service;
- Rural Fire Service;
- Capricorn Helicopter Rescue Service; and
- Banana Shire Council (relative to regional emergency plans).

Access disruptions due to, for example, flooding will be considered during ERP development, as will potential accommodation village evacuation requirements. An outline of key events to be addressed by the ERP are provided in Table 17.7.

Table 17.7: Key elements of the Emergency Response Plan

Event	Location	Potential response and resources	Coordination of response
Severe injury or illness	On-site	On-site: emergency response and rescue External: ambulance from Queensland ambulance service, rescue helicopter from Capricorn Helicopter Rescue	Site delegate
Vehicle/machinery collision	On-site	On-site: emergency response and rescue. External: recovery equipment from Queensland Fire and Emergency Services, ambulance from Queensland ambulance service, rescue helicopter from Capricorn Helicopter Rescue	Site delegate
Vehicle collision	Off-site in the area of the Project	On-site: emergency response if required as first respondent. External: Queensland Police Service, recovery equipment from Queensland Fire and Emergency Services, ambulance from Queensland Ambulance Service, rescue helicopter from Capricorn Helicopter Rescue	Queensland Police Service, Queensland Fire and Emergency Services, Queensland Ambulance Service
Chemical/fuel spill	On-site	On-site: emergency response and rescue, firefighting equipment, spill clean-up equipment	Site delegate
Fire	On-site	On-site: emergency response and rescue. Water truck, firefighting equipment, spill clean-up equipment External: firefighting equipment from Queensland Fire and Emergency Services, (if required)	Site delegate
Bushfire	On-site and off-site	On-site: water truck, grader, dozer, firefighting equipment. External: mine site water truck, grader, dozer, firefighting equipment from Queensland Fire and Emergency Services	Site delegate for on-site response Queensland Fire and Emergency Services for off-site response
Spontaneous combustion	On-site	On-site: water truck, excavator, dozer, firefighting equipment	Site delegate

#### **17.6.2.1 Monitoring and improvement**

Monitoring of the effectiveness of the SHMS and environmental management system will be undertaken to ensure the effectiveness of the system. Audits of system implementation will also form a component of the monitoring program. Monitoring information will be provided for management team review, and corrective actions will be implemented as required. Corrective actions will include reviews of relevant policies, plans and procedures.



Table 17.8: Consequence classification

Consequence type	Consequences				
	Very low	Low	Moderate	High	Very high
<b>Greenhouse (%)</b>	< 0.6	0.6–2.5	2.5–7.5	7.5%–15	> 15
<b>Health</b>	Reversible health effects of little concern. First aid treatment.	Reversible health effects of concern. Medical treatment.	Severe reversible health effects of concern. Lost time illness.	Single fatality or irreversible health effects or disabling illness.	Multiple fatalities or serious disabling illness to multiple people.
<b>Safety</b>	Low-level, short-term subjective inconvenience or symptoms. First aid treatment.	Reversible injury requiring treatment but does not lead to restricted duties. Medical treatment.	Reversible injury or moderate irreversible damage or impairment to one or more persons. Lost time injury.	Single fatality and/or severe irreversible damage or severe impairment to one or more persons.	Multiple fatalities or permanent damage to multiple people.
<b>On-site Environment</b>	Near-source confined and promptly reversible impact. (Typically, a shift.)	Near-source confined and short-term reversible impact. (Typically, 1 week.)	Near-source confined and medium-term recovery impact. (Typically, 1 month.)	Impact that is unconfined and requiring long-term recovery, leaving residual damage. (Typically, years.)	Impact that is widespread, unconfined and requiring long-term recovery, leaving major residual damage. (Typically, years.)
<b>Off-site Environment</b>	Not applicable.	Near-source confined and promptly reversible impact. (Typically, a shift.)	Near-source confined and short-term reversible impact. (Typically, 1 week.)	Near-source confined and medium-term recovery impact. (Typically, 1 month.)	Impact that is unconfined and requiring long-term recovery, leaving residual damage. (Typically, years.)
<b>Community trust</b>	Tangible expressions of trust/mistrust among a handful of community members with no influence on public opinion and decision-makers.	Tangible expressions of trust/mistrust among a few community members with some influence on public opinion and decision-makers.	Tangible expressions of trust/mistrust among some community members with moderate influence on public opinion and decision-makers.	Tangible expressions of trust/mistrust among most community members with significant influence on decision-makers.	Widespread loss/gain of trust across the community setting the agenda for decision-makers and key stakeholders.

Consequence type	Consequences				
	Very low	Low	Moderate	High	Very high
<b>Compliance</b>	Non-conformance with internal requirement with very low potential for impact. Non-compliance with community commitment goes unnoticed by external party/parties. Minimal effort to correct.	Non-compliance with external or internal requirement with low potential for impact. Formal censure. Non-compliance with community commitment. Limited effort to correct.	Non-compliance with internal or external requirement with moderate impact. Moderate penalties for breach of legislation, contract, permit or licence. Non-compliance with community commitment requiring reporting formally. Significant effort to correct.	Breach of licence(s), legislation, regulation—high potential for prosecution. Contract breach—significant penalty. Systemic internal standards breach—high impact. Community commitment breach—high potential business impact. Significant effort to fix.	Suspended or severely reduced operations imposed by regulators. Breach of community commitment results in direct loss of established consents with widespread secondary effects.
<b>Stakeholders</b>	Key civil/political stakeholder(s) express support/dissatisfaction informally.	Key civil/ political stakeholder(s) express support/dissatisfaction formally.	Key civil/political stakeholder(s) threaten to oppose or disengage/ strengthen offers to support or engage.	Key civil/political stakeholder(s) actively oppose or actively refuse to engage/actively support and engage.	Key civil/political stakeholder(s) actively get others to oppose/engage.
<b>Cultural Heritage</b>	Reparable damage to site or item of low cultural significance.	Irreparable damage to site or item of low cultural significance.	Repairable damage to site or item of cultural significance.	Irreparable damage to site or item of cultural significance.	Irreparable damage to site or item of international cultural significance.

Table 17.9: Summary of identified risks and mitigation measures

Risk Description				Risk Evaluation		Risk Ranking							Risk Management						
Risk or Hazard Title	Causes (Triggers &/or Indicators)	Impacts (Consequences)	Inherent Risk with Assumed Expected or Standard Controls	Control Effectiveness	Likelihood / Probability	Risk Evaluation							Risk Management Class	Risk Mitigation Approach					
						Greenhouse Health Safety	Environment On-site	Environment Off-site	Community Trust	Compliance	Stakeholders	Cultural Heritage			Greenhouse Health Safety	On-site Environment	Off-site Environment	Community Trust	Compliance
<b>Amenity</b>																			
<b>Amenity of local residents</b>																			
Increased risk of motor vehicle incidents	Increase light and heavy vehicle movements associated with the Project	Impacts limited largely to Moura-Baralaba Road to the south of site. Ranges from inconvenience to fatality	Level of service of roads not significantly impacted; road turn treatments considered adequate for all intersections to operate well within industry standard performance (refer Appendix P)	C1	R		H											III	Fatigue management/fitness for work, alcohol and drug testing, road safety awareness training
Impacts to local farmers	Impeding access to properties (Construction phase specific)	Inconvenience	Road access and intersection assessment indicates all intersections will operate within industry standard performance	C2	U													I	
Increased rail movements	Increase in production	Annoyance, amenity	Moura handling facility (WECT) holds approvals	C2	P													II	
Increased activism associated with coal mining impacts on environmental values	Existence of operation	Inconvenience, worker safety	Media monitoring, community/ stakeholder engagement program	C2	P	L												II	
<b>Bushfire</b>																			
Impacts to surrounding properties	Project-related activities	Destruction to surrounding properties, operational cost	Low bushfire risk area (refer Chapter 17); onsite containment and control measures, staff training; firebreaks; ERT with fire-fighting capacity (refer also section 17.4)	C2	R													II	

Risk Description				Risk Evaluation								Risk Ranking					Risk Management
Risk or Hazard Title	Causes (Triggers &/or Indicators)	Impacts (Consequences)	Inherent Risk with Assumed Expected or Standard Controls	Control Effectiveness	Likelihood / Probability	Greenhouse Health Safety	Environment On-site	Environment Off-site	Community Trust Compliance Stakeholders	Cultural Heritage	Greenhouse Health Safety	On-site Environment	Off-site Environment	Community Trust Compliance Stakeholders	Cultural Heritage	Risk Management Class	Risk Mitigation Approach
<b>Flood</b>																	
Flood impacts	Project location and extents (floodplain extents largely outside revised mine footprint)	Flood depth afflux, inundation < 0.1% AEP range	Revised mine plan forecasts activities predominantly outside 0.1% AEP extent. Negligible impacts	C2	R			L	M	M			I	II	II	II	Revised mine plan, REMP, groundwater and surface water monitoring, water management plan, progressive rehabilitation to limit disturbance, flood monitoring and communications/ consultation with stakeholders
Flood impacts	Project location and extents (floodplain extents largely outside revised mine footprint)	Flood depth afflux, velocity, inundation 1% AEP northwest spoil toe	Flood study indicates negligible increase to the extent of inundation up to 0.1% AEP, and duration increases up to 48 hours	C1	R			L		VL			I		I	I	Revised mine plan, REMP, groundwater and surface water monitoring, water management plan, progressive rehabilitation to limit disturbance, flood monitoring and communications/ consultation with stakeholders
Flooding impacts on HES wetland	Project location and extents (floodplain extents largely outside revised mine footprint)	Changed hydrology behaviour impact to HES wetland ecology	Revised mine location minimises direct and indirect impacts on HES wetland	C1	R			L					I			I	REMP, groundwater and surface water monitoring, water management plan, progressive rehabilitation to limit disturbance
Flooding impacts to Baralaba township	Project location and extents (floodplain extents largely outside revised mine footprint)	Increase in flood inundation duration and extent	Modelling shows no significant change at Baralaba township	C1	R			L					I			I	
Flooding impacts to mine / final void	Project location and extents (floodplain extents largely outside revised mine footprint)	Pit/ final void flooding, loss of access, property damage	Revised mine plan has final void outside 0.1%AEP flood event. A embankment landform will provide protection from PMF event	C2	R			M					II			II	Operational business resilience plan
<b>Hazards</b>																	
<b>OHS</b>																	
OHS consequences	Construction, mining and industrial activities	Health, safety, operational cost	Staff awareness and training; legislated requirements for safety management system	C1	R	M	VH					II	III			III	OHS performance to be closely monitored and assessed and, where required individual, issue-specific risk assessments to be undertaken to
<b>Hazardous chemicals</b>																	
Impacts on emergency services	Significant incident involving major hazardous facility	Health, safety, operational cost	SIA indicates services capacity would not be impacted; Emergency Response Plan; staff awareness and training	C1	U			VL					I			I	

Risk Description				Risk Evaluation								Risk Ranking				Risk Management					
Risk or Hazard Title	Causes (Triggers &/or Indicators)	Impacts (Consequences)	Inherent Risk with Assumed Expected or Standard Controls	Control Effectiveness	Likelihood / Probability	Greenhouse Health Safety	Environment On-site	Environment Off-site	Community Trust	Compliance	Stakeholders	Cultural Heritage	Greenhouse Health Safety	On-site Environment	Off-site Environment	Community Trust	Compliance	Stakeholders	Cultural Heritage	Risk Management Class	Risk Mitigation Approach
<b>Physical Environment</b>																					
<b>Noise</b>																					
Noise impacts to sensitive receptors (residents)	Noise emissions from plant, equipment and processes, road haulage	Annoyance, loss of amenity, harm to wildlife	No noise limit objective exceedances outside MLA; distance from source, mine operations scheduling	C2	P			L	L	L							II	II	II	II	Long term monitoring; noise attenuation measures; receptor controls (e.g. double glazing at affected residences, elimination by purchase)
<b>Air quality</b>																					
Dust impacts to sensitive receptors	Equipment and vehicle movements on unsealed roads, and increased areas of disturbance (e.g. waste rock dumps)	Annoyance, amenity (sensitive receptors), harm to wildlife, crop impact, contamination of water tanks	There is a low to negligible chance of exceedances of all indicators (dust deposition, annual average TSP, 24hour average PM <sub>10</sub> or PM <sub>2.5</sub> and annual average PM <sub>2.5</sub> at receptors outside the MLA boundary, all particulate matter indicators remain within relevant criteria at sensitive receptors (refer Appendix L); routine haul road watering; progressive rehabilitation, speed limits	C2	L			M	L								III	III		III	Surface treatment of haul roads, may include binding agents, rescheduling of blasting operations, reactive dust control measures
Impacts to air quality from bushfire	Project-related activities	Health, safety, amenity, harm to wildlife, annoyance	Low bushfire risk area (refer Chapter 17); onsite containment and control measures, staff training	C2	R			L	M						I	II				II	
<b>Visual amenity</b>																					
Visual impact to sensitive receptors	Changed landforms, viewscape obstruction, prominent plant and equipment	Annoyance, visual amenity impact	Maximum elevations of 70 m above ground level; progressive revegetation of waste rock dumps, vegetative screening; visual impact assessment rating from very low to moderate with the exception of one vantage point located within the MLA	C1	P			L									II			II	
Visual impact to sensitive receptors	Changed landforms, viewscape obstruction, prominent plant and equipment	Annoyance, visual amenity impact	Maximum elevations of 70 m above ground level; progressive revegetation of waste rock dumps, vegetative screening; visual impact assessment rating from very low to moderate with the exception of one vantage point located within the MLA	C2	P			L									II			II	
Visual impact to community	Changed landforms, viewscape obstruction, prominent plant and equipment	Annoyance, visual amenity impact	Maximum elevations of 70 m above ground level; progressive revegetation of waste rock dumps, vegetative screening; visual impact assessment rating from very low to moderate with the exception of one vantage point located within the MLA	C1	P			L		L							II		II	II	Ensure progressive rehabilitation and visual bunding

Risk Description				Risk Evaluation							Risk Ranking					Risk Management											
Risk or Hazard Title	Causes (Triggers &/or Indicators)	Impacts (Consequences)	Inherent Risk with Assumed Expected or Standard Controls	Control Effectiveness	Likelihood / Probability	Greenhouse	Health	Safety	Environment On-site	Environment Off-site	Community Trust	Compliance	Stakeholders	Cultural Heritage	Greenhouse	Health	Safety	On-site Environment	Off-site Environment	Community Trust	Compliance	Stakeholders	Cultural Heritage	Risk Management Class	Risk Mitigation Approach		
<b>Land and land use suitability</b>																											
Airblast overpressure and/or vibration impacts to local land use infrastructure	Blast events	Personnel/stock health and/or safety; infrastructure damage/loss	Contemporary blast design, airblast overpressure and vibration monitoring (refer also Chapter 10.4)	C1	U				M	L								II	I					II	Ensure blast design impact, consultation with neighbours		
Geotechnical failure	Blasting, wet weather, or a combination of both	Personnel/stock health and/or safety; loss of land	Geotechnical advice for landforms, low-walls and high-walls	C1	R				M									II						II	Ensure engineering/geotechnical designs address alluvials/ foundation materials on site		
Impacts to the environment (downstream watercourses) from erosion of disturbed/rehabilitated areas	Dispersive soil characteristics, rehabilitated landform (slope, surface preparation, revegetation success, climate)	Downstream water quality, operational costs, compliance	Rehabilitation practices, ESC practices, sufficient non-sodic topsoil resources to mitigate erosion, Topsoil Management Plan (refer Chapter 10)	C2	U				M	L								II		I				II	Geochemical characterisation of topsoils and waste rock materials and amelioration measures as appropriate		
Surface water and groundwater impacts (acid mine drainage)	Waste rock inherent geochemical characteristics	Downstream water quality, flora, fauna, aquatic fauna, operational cost, compliance	Waste rock characterisation concluded spoil to be non-acid forming with excess ANC (refer Appendix E)	C1	U				M									II						II	Waste rock characterisation program scaled to match findings and identified geochemical risk		
Impacts to cattle, crops	Fugitive dust, operational noise, lighting	Crop damage, stock production impacts	air quality modelling indicates marginal dust increases over background levels; rain; noise increase below acoustical quality objectives; light spill restricted (refer Chapter 10)	C1	P				L									II						II	Support research, share other research with stakeholders.		
Land contamination	Presence of contaminating materials	Localised land contamination	Appropriate storage of hazardous chemicals and fuels, Hazchem training (refer section 17.4.2)	C1	R				L									I						I			
Localised air quality, odour and/or fire impacts	Presence of carbonaceous materials (spontaneous combustion)	Air quality, safety	No current indications of carbonaceous materials prone to spontaneous combustion; appropriate storage and handling of carbonaceous materials; staff training	C1	R		L		L									I		I				I			

Risk Description				Risk Evaluation								Risk Ranking					Risk Management										
Risk or Hazard Title	Causes (Triggers &/or Indicators)	Impacts (Consequences)	Inherent Risk with Assumed Expected or Standard Controls	Control Effectiveness	Likelihood / Probability	Greenhouse	Health	Safety	Environment	On-site Environment	Off-site Environment	Community Trust	Compliance	Stakeholders	Cultural Heritage	Greenhouse	Health	Safety	On-site Environment	Off-site Environment	Community Trust	Compliance	Stakeholders	Cultural Heritage	Risk Management Class	Risk Mitigation Approach	
<b>Surface water</b>																											
Impacts to local/regional surface water quality	Overtopping of mine pit/ final void	Adverse changes to salinity, water quality in receiving waterways	Modelling indicates the final void is not at risk of overtopping, inherent salinity and weather event circumstances mitigate impact	C3	R															II					II	Water management plan, REMP and water quality monitoring, flood protection landform, progressive rehabilitation to limit disturbance	
Impacts to local/regional surface water quality	Catchment disturbance, release of sediment laden waters	Adverse changes to TSS, turbidity, water quality in receiving waterways, HES wetland	Provision of engineered sedimentation structures and ESC measures	C2	U					L										I					I	ESC Plan, water management plan, REMP and water quality monitoring, progressive rehabilitation to limit disturbance	
Impacts to local/regional surface water quality	Releases of mine affected water	Adverse changes to salinity, water quality in receiving waterways	Water balance modelling indicates few controlled release events and significant dilution ratios during release events; engineered water management system; licensed release conditions	C1	P					L										II					II	Water management plan, REMP and water quality monitoring, water management system, progressive rehabilitation to limit disturbance	
Impacts on surface water resources	Loss of catchment reporting to receiving waterways and wetlands	Impacts to local and regional surface water quality, aquatic ecology and other uses	Lost catchment area equivalent to 0.05% of the relevant Dawson River catchment and 0.01% of the Fitzroy River catchment; water efficiency programs, water management plan	C1	L																II				II	Water management plan, REMP and water quality monitoring, progressive rehabilitation to limit disturbance	
<b>Groundwater</b>																											
Impacts to groundwater quality	Seepage from MAW water storages	Contamination of groundwater	Engineered MAW water storages	C1	U					M	M									II	II				II	Groundwater and surface water monitoring, REMP, groundwater model validation, make good agreements where required, regular site inspections and housekeeping checklists	
Impacts to local groundwater resources	Aquifer disturbance, leakage to mine/ final void	Aquifer drawdown; diminished resource for other users	Modelling results indicate negligible and/or immeasurable drawdown effect at all private landholder bores identified in the vicinity of the Project (refer Appendix B, section 9.1)	C3	U					M										II					II	Groundwater and surface water monitoring, REMP, progressive groundwater model validation, make good agreements as required	

Baralaba South Project Environmental Impact Statement | Hazards and Safety

Risk Description				Risk Evaluation										Risk Management															
Risk or Hazard Title	Causes (Triggers &/or Indicators)	Impacts (Consequences)	Inherent Risk with Assumed Expected or Standard Controls	Control Effectiveness	Likelihood / Probability	Greenhouse	Health	Safety	Environment	On-site	Off-site	Environment	Community Trust	Compliance	Stakeholders	Cultural Heritage	Greenhouse	Health	Safety	On-site	Environment	Off-site	Environment	Community Trust	Compliance	Stakeholders	Cultural Heritage	Risk Management Class	Risk Mitigation Approach
Impacts to local groundwater resource water quality	Aquifer disturbance	Diminished groundwater quality for other users	The localised hydraulic sink minimises the potential migration of saline/ poorer quality groundwater from the pit to other areas as the groundwater level will remain in the Permian (refer Appendix B, section 9.1)	C3	U																II						II	Groundwater quality monitoring, progressive groundwater model validation, make good agreements as required	
Impacts to groundwater dependent ecosystems	Drawdown/leakage to mine/ final void	Impacts to stygofauna habitat, springs, HES wetland	Modelling indicates no drawdown impacts to springs and HES wetland reliant on direct rainfall, runoff and floodwaters (refer Appendix B, section 9.1)	C3	U																I						I	Groundwater and surface water monitoring, REMP, progressive groundwater model validation	
Impacts to surface water baseflows	Aquifer disturbance, leakage to mine/ final void from Dawson River and Banana Creek	Diminished relevant watercourse baseflow	Modelling indicates < 0.01% reduction in flow of Dawson River and negligible impact on Banana Creek (refer Appendix B, section 9.1)	C3	R																						I	Groundwater and surface water monitoring, REMP, groundwater model validation	
<b>Safety</b>																													
Increased safety risk	Steeper landforms, rougher surfaces	Safety, community trust	Relinquishment, exclusion areas and barriers	C1	P			VL	L											I	II						II	Moderated landform design and surface preparation regime to reduce risk	
Increased incidence of weeds and/or disease	Weed and pest species	Biosecurity, environment and community trust	Personal protection measures, weed management program, monitoring, raising awareness	C2	P		L													II							II		
Increased incidence of pests	Pest species	Safety	Pest management program, monitoring, raising awareness	C1	R			M													II						II		
<b>Socio-economic</b>																													
Negative impacts to the local and regional economy	Equity of economic contribution	Community trust	Loss of potential agricultural value, increased competition for business resources (refer Appendix Y), local employment opportunities	C1	P																						I		
Negative impacts to the local and regional economy	Changes associated with closure	Community trust	Approximate 2-3 year wind-down of operations into closure, existing mine density	C2	P																						II		



Risk Description				Risk Evaluation										Risk Ranking	Risk Management									
Risk or Hazard Title	Causes (Triggers &/or Indicators)	Impacts (Consequences)	Inherent Risk with Assumed Expected or Standard Controls	Control Effectiveness	Likelihood / Probability	Greenhouse Health	Safety	Environment On-site	Environment Off-site	Community Trust	Compliance	Stakeholders	Cultural Heritage	Greenhouse Health	Safety	On-site Environment	Off-site Environment	Community Trust	Compliance	Stakeholders	Cultural Heritage	Risk Management Class	Risk Mitigation Approach	
<b>Cultural Heritage</b>																								
Impacts to cultural heritage values	Planned and/or unplanned disturbance	Degradation of cultural heritage values, compliance	CH surveys indicate low risk of presence of CH values; delineation; CHMP	C1	U								L									I	I	Cultural clearance of disturbed areas and cultural education of workforce.
<b>Incident</b>																								
Impacts to the environment (Surface water, groundwater, land contamination, flora, fauna, air quality)	Significant operational/process incident occurring on site (spill, fire, explosion)	Physical environment (soil, landforms, water source), harm to wildlife, compliance	Emergency Response Planning and Training, staff training and awareness, spill control, bunding and containment practices (refer section 17.4.2)	C1	U			M	M	M						II	II		II			II	Diligence on existing controls, Operational business resilience plan	
<b>Flora</b>																								
Impacts to flora	Vegetation clearing, land disturbance, increase in pest species	Loss of native flora	Weed management plan (staff training, equipment/vehicle wash-downs)	C2	P			L	L							II	II					II		
Impacts to flora from bushfire	Project-related activities	Loss of native flora	Low bushfire risk area (refer Chapter 17); onsite containment and control measures, staff training; firebreaks; ERT with fire-fighting capacity	C2	R				L								I					I		
<b>Fauna</b>																								
Impacts to fauna	Vegetation clearing, land disturbance, presence of introduced pests and/or disease	Loss of local fauna	Pest management program, habitat offset strategy	C2	P				L								II					II		
Impacts to fauna from bushfire	Project-related activities	Fauna, fauna habitat	Low bushfire risk area (refer Chapter 17); onsite containment and control measures, staff training; firebreaks; ERT with fire-fighting capacity	C2	R				L								I					I		

Risk Description				Risk Evaluation								Risk Ranking					Risk Management								
Risk or Hazard Title	Causes (Triggers &/or Indicators)	Impacts (Consequences)	Inherent Risk with Assumed Expected or Standard Controls	Control Effectiveness	Likelihood / Probability	Greenhouse	Health	Safety	Environment On-site	Environment Off-site	Community Trust	Compliance	Stakeholders	Cultural Heritage	Greenhouse	Health	Safety	On-site Environment	Off-site Environment	Community Trust	Compliance	Stakeholders	Cultural Heritage	Risk Management Class	
				C2	AC	VL																			
<b>Climate change</b>																									
Impacts to climate change	Direct and indirect greenhouse gas emissions from the Project	Global climate change contribution	Emissions estimated at 0.1% of Australian NGER emissions (refer Chapter 11)	C2	AC	VL									II									II	Energy efficiency programs, mine planning, energy management systems and decarbonisation plan.
<b>Essential services</b>																									
Impacts on essential services (power, telecoms, potable water)	Additional pressure from the Project	Wearing out of service infrastructure, economic (repair and maintenance)	Annual review, efficient and minimal energy use, audit and monitoring	C2	P				VL											I				I	Road provision, other infrastructure provision has a beneficial impact
<b>Future land use</b>																									
Loss of land resource value, State and regional land interests	Construction and operation of the Project	Loss of lands having agricultural value or other State or regional interest	No PAA or PLA impacts, temporary loss of approximately 556 ha of SCL; loss of 0.2% of Dawson River IAA (refer Chapter 10)	C2	U								L									I		I	Rehabilitation practices, land use assessments, alternative post mining land uses
Restrictions on possible future land uses in and around the project area	Post-closure of the Project	Future land uses	Rehabilitation practices, land use assessments, alternative post mining land uses	C1	U			VL									I							I	Draft Progressive Rehabilitation and Closure Plan