24 Hazard and Risk

Section 24 Hazard and Risk

24.1 Introduction

This section of the Environmental Impact Statement (EIS) provides an assessment of the hazard and risk issues, particularly the health and safety risks, relevant to the development of the Alpha Coal Project (Mine), or the Project.

24.1.1 Purpose

This section presents the results of a preliminary hazard and risk assessment for the selected study area (i.e. the mine site, in accordance with the scope) for the Alpha Coal Project (Mine) to satisfy the requirements of the Terms of Reference (TOR) for the Project (Volume 4, Appendix A).

Accordingly, this assessment aims to identify and evaluate potential health and safety risks to employees, contractors and the community that might occur as a result of the Project and to identify mitigation measures, management plans and controls that will be established to manage the risk.

24.1.2 Scope

The selected study area of concern for this assessment is the mining lease area. Other parts of the Project, such as the rail and port, are not included in this assessment.

The scope of the preliminary hazard and risk assessment in this report includes the risks associated with the activities associated with the Alpha Coal Project (Mine). The assessment of risks identified includes both on-site and off-site impacts and covers all stages of the Project, including construction, operation and decommissioning of the mine site.

Per the TOR, the hazard and risk assessment particularly focuses on health and safety risks.

24.1.3 Approach

The following approach was adopted to complete this assessment of hazard and risk relevant to the Alpha Coal Project (Mine):

- Identify and assess the potential hazards and risks;
- Evaluate the risks, their impacts and safety management systems, including specific requirements for the implementation of risk control; and
- Outline the needs and objectives of proposed emergency management plans.

In identifying and assessing the potential hazards and risks, a set of representative incident scenarios was developed for the construction, operation and decommissioning stages of the Project and for both on-site and off-site impacts. The risk was assessed for the worst case consequences with consideration of both on-site and off-site impacts.

The risk assessment used criteria for consequence and likelihood to determine the level of risk incurred by the Proponent, where consequence was expressed in terms of safety, human health, injury and fatality.

With regards to emergency response, consultation was conducted with various emergency services to determine existing capabilities and needs analysis for the Project. With regard to the use of explosives, CHEM Services was consulted for advice on complying with the relevant legislation.

24.2 Preliminary Hazard Assessment

24.2.1 Objective

The objective of the Preliminary Hazard Assessment is to identify, assess and evaluate health and safety hazards and risks associated with the activity at the mine site of the Project.

The Preliminary Hazard Assessment considers hazard and risk impacts with potential to occur both on-site and off-site during all stages of the Project, including construction, operation and decommissioning.

24.2.2 Method

Health and safety risk registers were initially developed in a workshop forum involving the following representatives of the Proponent;

- Manager, Approvals;
- Manager, Mining;
- Coal Handling and Preparation Plant (CHPP) Manager;
- Mine Infrastructure Area (MIA) Manager;
- Technical Manager; and
- External Stakeholder Manager.

Marsh Risk Consulting (Marsh) was engaged by URS to assist with the hazard identification and assessment process, including facilitating the workshop. The EIS Project Manager from URS was also present during the workshop. The workshop comprised an introductory session regarding the context and method of assessment and subsequent risk identification.

Following the workshop, identified hazards and risks were described, tabulated in a hazard and risk register, and assessed by Marsh separately using the risk assessment criteria set out in Section 0 below. The risk assessment method uses a semi-quantitative approach using Severity and Probability to determine a Residual Risk Ranking, per the site-specific management system (refer to Hancock Integrated Management System (HIMS) discussed in Section 24.7.1 (KBR, 2007).

24.2.2.1 Risk Assessment Criteria

The criteria used to evaluate the Severity, Probability and Residual Risk Ranking are outlined in Table 24-1 below.

Table 24-1: Severity criteria

Severity Level	Description of Consequence	Severity Factor
7	> 500 fatalities or very serious irreversible injury to > 5000 persons	1000
6	> 50 fatalities or very serious irreversible injury to > 500 persons	300
5	Multiple fatalities or significant irreversible effects to > 50 persons	100
4	Fatality and/or severe irreversible disability (> 30%) to one or more persons	30
3	Moderate irreversible disability or impairment (< 30%) to one or more persons	10
2	Objective but reversible disability requiring hospitalisation (Medical Treatment)	3
1	No medical treatment required (First Aid Treatment)	1

The probability criteria used to assess the hazards and risks are defined in Table 24-2.

Table 24-2: Probability criteria

Probability	Probability Description	Probability Factor
Almost certain	Will occur during Project more than one time	10
Likely	Will probably occur during Project	3
Possible	May occur during the Project	1
Unlikely	Low probability but could happen during Project	0.3
Rare	Not expected to occur during this Project	0.1

The Residual Risk Ranking is defined per the following formula:

Equation1: *Residual Risk Ranking = Severity Factor x Probability Factor*

The Residual Risk Ranking in this case is only used to establish a risk ranking of the identified risks for prioritisation. The philosophy of ‘as low as reasonably practicable’ (ALARP) is applied to evaluate and treat the hazards and risks.

24.3 Risk Identification and Assessment

The registers presented in the following sections outline the hazards and risks identified and assessed through the Preliminary Hazard Assessment process. The hazard and risk register is structured to address each stage of the Project separately (i.e. construction, operations and decommissioning) and within each stage considers on-site and off-site risks.

The Project Hazard and Risk Register assessed both the on-site and off-site risks and is made up of the following components:

- Construction Hazard and Risk Register;
- Operations Hazard and Risk Register; and
- Decommissioning Hazard and Risk Register.

It was found that each stage had a similar list of hazards and risks and in most cases, the assessment of Severity and Probability was the same. Similarly, the safety management systems used to address the hazards and risks in each stage were mostly the same by name; however, in the actual implementation they would be applied specifically to the situation.

The Project Hazard and Risk Register was compiled according to the following specifications:

- Issue: Identifies a hazard or risk that could lead to a potential health or safety impact;
- Description: Provides extra detail that further defines the topic of the hazard, risk or issue;
- Consequence: Describes the most likely worst case health or safety impact for the hazard or risk given the proposed safety management systems in place;
- Safety Management: Outlines the broad safety management systems and controls that will be implemented as the primary means of managing the risk;
- Severity: Assigns a Severity Level using the risk criteria for Severity outlined in Table 24-1, based on the Consequence description described above. Note this is the mitigated severity (i.e. taking into account the proposed safety management systems in place);
- Probability: Assigns a Probability using the risk criteria for Probability outlined in Table 24-2, for the event described by the Consequence above; and
- Residual Risk Ranking: Calculated using the formula in Section 0 above. Note this is the mitigated risk ranking (i.e. taking into account the proposed safety management systems in place).

24.4 Construction Hazard and Risk Register

A range of hazard and risk scenarios during construction of the Alpha Coal Project (Mine) was considered. The hazard and risk registers for both on- and off-site risk issues are presented in Table 24-3 and Table 24-4, respectively.

Table 24-3: Hazard and Risk Register for on-site impacts during construction of the Alpha Coal Project (Mine)

Issue	Description	Consequence	Safety Management	Severity Level	Probability	Residual Risk Ranking
Wildlife hazards, e.g. snake bite	Field work, access to accommodation at night	Fatality	High-sided safety boots for field workers, long trousers, first response capability, access to emergency services, lighting and dedicated pathways at the camp, spider and snake identification charts around camps and site.	4	Possible	30
Vehicle management	Vehicle collision with wildlife or other vehicles	Multiple fatalities	Traffic rules, road design including signage, fatigue management policies, vehicle maintenance, Traffic Management Plan	5	Rare	10
Ground failure	Incorrect design, incorrect excavation, unidentified geological anomalies	Multiple fatalities	Mine plan, mine design, third party review of design, excavation surveys, daily inspections by Open Cut Examiner, geotechnical survey	5	Rare	10
Use of explosives	Misfire, premature detonation, over charge	Multiple fatalities	Safe work plan, licensed operators, storage and handling in accordance with relevant standards	5	Rare	10
Vehicle over highwall	Unidentified edge, equipment failure	Multiple fatalities	Edge protection (e.g. wind rows), Traffic Management Plan	5	Rare	10
Aerial surveys	Air incident	Multiple fatalities	Licensed operator	5	Rare	10
Emergency response helicopter	Air incident	Multiple fatalities	Licensed operator	5	Rare	10
Rainfall	Slippery roads, incident during response	Fatality	Emergency Management Plan, location and exposure review of infrastructures and access	4	Unlikely	9
Flooding	Inundation of water	Incident during response resulting in fatality	Emergency Management Plan, location and exposure review of infrastructures and access, weather monitoring, warning systems	4	Unlikely	9

Issue	Description	Consequence	Safety Management	Severity Level	Probability	Residual Risk Ranking
Uncontrolled or unintended movement of equipment and vehicles	Incorrect isolation, equipment failure	Fatality	Safe work method, vehicle maintenance	4	Unlikely	9
Tree falls on dozer	Clearing, tree penetrates the cabin	Fatality	Safe work method, experienced operators, fall-on protection	4	Unlikely	9
Manual handling	Heavy industry / incorrect handling	Recoverable injury	Avoidance of manual handling injuries by safe work method, provision of equipment fit for purpose and suitable allocation of human resources	2	Likely	9
Construction / Operations interaction during ramp-up	Misunderstanding between areas	Incident resulting in recoverable injury	Identification, demarcation and communication of areas, hand-over protocols, isolation procedures	2	Likely	9
Site management	Misunderstanding between areas	Incident resulting in recoverable injury	Construction management plan, management of change procedure	2	Likely	9
Slips and trips	Self fall or impact on another person	Hospitalised	Construction safety management plan, workplace inspection program, Personal Protective Equipment (PPE), ergonomic design, lighting, permits	2	Likely	9
Fall from height	Working at heights	Fatality	Safe work statement, scaffolding and lanyards, training	4	Rare	3
Electrocution	Working with electricity / electrical fault	Fatality	Safe work statement, qualified electricians and standard safety procedures, isolation procedures	4	Rare	3
Struck by object	Object falls from height	Fatality	Safe work statement, barricading, fall nets	4	Rare	3

Issue	Description	Consequence	Safety Management	Severity Level	Probability	Residual Risk Ranking
Crane accident	Roll-over, collision or falling object	Fatality	Licensed operators, safe work statement including knowing the correct weight of lifts and use of appropriate lifting equipment, lift studies	4	Rare	3
Suffocation	Confined space	Fatality	Safe work method, confined space permit system, identification of confined spaces, training	4	Rare	3
Pinch points	Uncontrolled or unintended movement of objects or vehicles	Fatality	Safe work method, guarding, communication protocols	4	Rare	3
Lightning	Struck by lightning	Fatality	Storm procedure, lightning arrestors/masts	4	Rare	3
Site security and safety / unauthorised access	Unauthorised assess to hazardous areas and/or use of equipment	Fatality	Security management plan	4	Rare	3
Sabotage	Attempt to destabilise the Project	Fatality	Security management plan	4	Rare	3
HR / IR issues	Discontentment / resentment amongst workforce	Fatality	Security management plan, contractor management plan, employee management plan	4	Rare	3
Radioactive measuring instruments	Exposure to radiation	Chronic effects of radiation	Identification, inspection program, monitoring, storage and handling procedure, demarcation, Radiation Safety Officer (RSO)	4	Rare	3
Falling into water	Working around pump out pits, site water storages	Drowning	Safe work method, PPE	4	Rare	3
Dozer roll-over	Dozer push earthmoving	Fatality	Safe work method, experienced operators	4	Rare	3

Issue	Description	Consequence	Safety Management	Severity Level	Probability	Residual Risk Ranking
Materials handling - storage and lay down	Drop something or struck by object, incorrect manual handling, slip, trip fall, caught in pinch point	Permanent partial disability	Safe work method including lay-down plan, provision of equipment for use in the lay-down area fit for purpose and suitable allocation of human resources	3	Unlikely	3
Heat stress	Working in the heat and over exertion for extended periods	Hospitalised	Avoidance of over exertion by safe work method, provision of equipment fit for purpose and suitable allocation of human resources, drinking water availability, PPE	2	Possible	3
Dehydration	Working in the heat and insufficient water	Hospitalised	Avoidance of dehydration by safe work method, provision of water and allocation of human resources, PPE	2	Possible	3
Lack of safety in design	Method of construction, order of construction creates unnecessary safety exposures in the workplace	Incident resulting in recoverable injury	Safety risk review during detailed design (HAZOP study), construction safety management plan, constructability reviews	2	Possible	3
Equipment failure	Tyre failure, brake failure, rope failure	Recoverable injury	Compliance with site rules and procedures (based on risk assessments and safe work methods), maintenance programs	2	Possible	3
Food poisoning	Contamination	Multiple persons affected by sickness	Specialist service provider, food management plan, personal hygiene awareness	2	Possible	3
Sun burn	Working in the sun without protection	Skin damage but not hospitalised	PPE, provision of sunscreen, safety awareness	1	Likely	3
High wind	Unsecured objects	Struck by object	Emergency Management Plan, weather monitoring	3	Rare	1
Noise	Engines, construction activity	Hearing loss	PPE, location of equipment, noise barriers	1	Possible	1

Issue	Description	Consequence	Safety Management	Severity Level	Probability	Residual Risk Ranking
Welding and cutting	Fumes, hot metal, sparks	Fume poisoning, skin burn, foreign object in eye	PPE, safe work method, qualified personnel	2	Unlikely	0.9
Bushfire	Incident during response	Recoverable injury	Emergency Management Plan, location versus exposure review of infrastructures and access	2	Unlikely	0.9
Disorientation	Field work in remote areas	Hospitalised	Safe work method including water and communication protocols, no man alone policies	2	Unlikely	0.9
Accommodation fire	Electrical fault, cooking	Skin burn	Emergency egress from accommodation and facilities, fire extinguishers, fire tender and suitable equipment available, emergency response plan, fire alarms	2	Rare	0.3
Exposure to hazardous materials	Diesel, oils, reagents spill	Mild eye or skin irritation	Non-flammable, non-corrosive, non-toxic, storage and transportation in accordance with appropriate standards, loading/unloading procedures, Material Safety Data Sheets (MSDSs)	1	Unlikely	0.3
Equipment fire	Conveyors, transformers, switch rooms, warehousing	Smoke inhalation	Emergency egress from all plant and equipment, fire extinguishers, fire tender and suitable equipment available, fire alarms, training	1	Unlikely	0.3
Vehicle fire	Hot engines components, oils, electrical wiring, batteries	Smoke inhalation	Emergency egress from all plant and equipment, fire extinguishers, automatic suppression on large machines, fire tender and suitable equipment available, emergency response plan, training	1	Unlikely	0.3
Diesel / oil storage fire	During loading / unloading	Smoke inhalation	Emergency egress from storage area, secondary containment, fire extinguishers, automatic suppression on large machines, fire tender and suitable equipment available, emergency response plan	1	Unlikely	0.3

Issue	Description	Consequence	Safety Management	Severity Level	Probability	Residual Risk Ranking
Dust	Travelling on unsealed roads, clearing, excavation, blasting	Respiratory irritation	Watering roadways, dust suppression, PPE, design	1	Unlikely	0.3
Fumes	Vehicle exhaust, welding, diesel storage, oil storage	Temporary sickness	Safe work methods regarding fumes, location and design of storage facilities and maintenance workshops, PPE	1	Unlikely	0.3

Table 24-4: Hazard and Risk Register for off-site impacts during construction of the Alpha Coal Project (Mine)

Issue	Description	Consequence	Safety Management	Severity Level	Probability	Residual Risk Ranking
Extra activity - higher road use / changed road conditions	Increased potential for an accident on the road	Multiple fatalities	Refer to Volume 2, Section 17 of this EIS for details on management of transport impacts	5	Unlikely	30
Extra activity - Life of mine risk due to change	Change to the baseline level of community risk due to the existence of the operation	Rated equivalent to the worst case community risk - Multiple fatalities	Community consultation	5	Unlikely	30
Air transport of personnel	Air accident	Multiple fatalities	Licensed operators	5	Rare	10
Transport of equipment, goods and services	Road accident	Multiple fatalities	Fatigue management policies, vehicle maintenance	5	Rare	10

Issue	Description	Consequence	Safety Management	Severity Level	Probability	Residual Risk Ranking
Transport of explosives	Vehicle engine fire as an ignition source leading to detonation, vehicle collision/roll-over	Multiple fatalities	Licensed operators, storage and handling in accordance with relevant standards	5	Rare	10
Multi passenger personnel transfers	Road accident	Multiple fatalities	Licensed operators, operating procedures and vehicle maintenance	5	Rare	10
Flight path interference	Blasting causes air incident	Multiple fatalities	Blasting procedure	5	Rare	10
Noise	Engines, construction activity	Emotional stress	Refer to Volume 2, Section 15 of this EIS for details on management of noise and vibration impacts	1	Almost certain	10
Individual personnel transfers	Road accident	Single fatalities	Fatigue management	4	Unlikely	9
Extra activity - increased demand on emergency services (including access)	Emergency services unable to respond to an incident	Single fatality	Emergency Management Plan, review of emergency services capabilities	4	Unlikely	9
Extra activity - development of support infrastructure / utilities (cumulative impact)	Increased potential for a work place accident	Single fatality	Licensed operators, operating procedures, vehicle maintenance	4	Unlikely	9
Breakdown of equipment	Unordinary response to breakdown, changed conditions	Fatality	Safe work method, maintenance programs	4	Unlikely	9

Issue	Description	Consequence	Safety Management	Severity Level	Probability	Residual Risk Ranking
Dust	Travelling on unsealed roads, clearing, excavation, blasting	Respiratory irritation	Refer to Volume 2, Section 13 of this EIS for details on management of air quality impacts	2	Likely	9
Equipment failure	Tyre failure, brake failure	Multiple fatalities	Maintenance of controlled vehicles	2	Possible	3
Community resistance	Community action	Injury during community action	Community management plan, community consultation	2	Unlikely	0.9
Diesel, oil, other fuel spills	Exposure to uncontained diesel, oil, etc. in the environment	Mild eye or skin irritation from the soil, mild sickness from water and some hospitalised	Licensed operators, Emergency Management Plan, designated transport routes and storage areas	2	Rare	0.3
Unauthorised release of water	Alteration of site storage and drainage	Mild sickness in community and some hospitalised	Refer to Volume 2, Section 11 of this EIS for details on management of surface water impacts	2	Rare	0.3

24.5 Operations Hazard and Risk Register

Hazards and risks relevant during operation of the Alpha Coal Project (Mine) are identified and assessed in the hazard and risk register for on-site impacts, presented in Table 24-5, and for off-site impacts, presented in Table 24-6.

Table 24-5: Hazard and Risk Register for on-site impacts during operation of the Alpha Coal Project (Mine)

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Wildlife hazards, snake bite	Field work, access to accommodation at night	Fatality	High-sided safety boots for field workers, long trousers, first response capability, access to emergency services, lighting and dedicated pathways at the camp, spider and snake identification charts around camps and site.	4	Possible	30
Light vehicle interaction / vehicle management	Vehicle collision with wildlife Vehicle / vehicle collision	Multiple fatalities	Traffic rules, road design including signage, fatigue management policies, vehicle maintenance, Traffic Management Plan	5	Rare	10
Heavy vehicle interaction / vehicle management	Vehicle / vehicle collision	Multiple fatalities	Traffic rules, road design including signage, fatigue management policies, vehicle maintenance, Traffic Management Plan	5	Rare	10
Ground failure	Incorrect design, incorrect excavation, unidentified geological anomalies	Multiple fatalities	Mine plan, mine design, third party review of design, excavation surveys, daily inspections by Open Cut Examiner, geotechnical survey	5	Rare	10
Use of explosives	Misfire, premature detonation, over charge	Multiple fatalities	Safe work plan, licensed operators, storage and handling in accordance with relevant standards	5	Rare	10
Vehicle over highwall	Unidentified edge, equipment failure	Multiple fatalities	Edge protection (e.g. wind rows), Traffic Management Plan	5	Rare	10
Aerial surveys	Air incident	Multiple fatalities	Licensed operator	5	Rare	10
Emergency response helicopter	Air incident	Multiple fatalities	Licensed operator	5	Rare	10

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Floor heave (inrush of water in the pit)	Inundation of water	Multiple fatalities	Geological surveys, mine design, emergency response plan	5	Rare	10
Construction / Operations interaction during ramp-up	Misunderstanding between areas	Incident resulting in fatality	Identification, demarcation and communication of areas, hand-over protocols, isolation procedures	4	Unlikely	9
Rainfall	Slippery roads, incident during response	Fatality	Emergency Management Plan, location and exposure review of infrastructures and access	4	Unlikely	9
Flooding	Inundation of water	Incident during response resulting in fatality	Emergency Management Plan, location and exposure review of infrastructures and access, weather monitoring, warning systems	4	Unlikely	9
Falling into water	Monitoring / working around tailings dam, pump out pits, site water storages	Drowning	Safe work method, PPE	4	Unlikely	9
Uncontrolled or unintended movement of equipment and vehicles	Incorrect isolation, equipment failure	Fatality	Safe work method, vehicle maintenance	4	Unlikely	9
Tree falls on dozer	Clearing, tree penetrates the cabin	Fatality	Safe work method, experienced operators, fall-on protection	4	Unlikely	9
Dozer roll-over	Working on stockpiles, dozer push mining	Fatality	Safe work method, experienced operators	4	Unlikely	9
Slips and trips	Self fall or impact on another person	Hospitalised	Workplace inspection program, PPE, ergonomic design, lighting, permits	2	Likely	9

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Fall from height	Working at heights	Fatality	Safe work statement, scaffolding and lanyards, training	4	Rare	3
Electrocution	Working with electricity / electrical fault	Fatality	Safe work statement, qualified electricians and standard safety procedures, isolation procedures	4	Rare	3
Struck by object	Object falls from height	Fatality	Safe work statement, barricading, fall nets	4	Rare	3
Crane accident	Roll-over, collision or falling object	Fatality	Licensed operators, safe work statement including knowing the correct weight of lifts and use of appropriate lifting equipment, lift studies	4	Rare	3
Suffocation	Confined space, engulfed in coal stockpile	Fatality	Safe work method, confined space permit system, identification of confined spaces, remote emergency stop of dozer on stockpile, breathing apparatus in dozer on stockpile, training	4	Rare	3
Pinch points	Uncontrolled or unintended movement of objects or vehicles	Fatality	Safe work method, guarding, communication protocols	4	Rare	3
Lightning	Struck by lightning	Fatality	Storm procedure, lightning arrestors/masts	4	Rare	3
Site security and safety / unauthorised access	Unauthorised assess to hazardous areas and/or use of equipment	Fatality	Security management plan	4	Rare	3
Sabotage	Attempt to destabilise the Project	Fatality	Security management plan	4	Rare	3
HR / IR issues	Discontentment / resentment amongst workforce	Fatality	Security management plan, contractor management plan, employee management plan	4	Rare	3

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Radioactive measuring instruments	Exposure to radiation	Chronic effects of radiation	Identification, inspection program, monitoring, storage and handling procedure, demarcation, Radiation Safety Officer (RSO)	4	Rare	3
Materials handling - storage and lay down	Drop something or struck by object, incorrect manual handling, slip, trip fall, caught in pinch point	Permanent partial disability	Safe work method including lay-down plan, provision of equipment for use in the lay-down area fit for purpose and suitable allocation of human resources	3	Unlikely	3
Heat stress	Working in the heat and over exertion for extended periods	Hospitalised	Avoidance of over exertion by safe work method, provision of equipment fit for purpose and suitable allocation of human resources, drinking water availability, PPE	2	Possible	3
Dehydration	Working in the heat and insufficient water	Hospitalised	Avoidance of dehydration by safe work method, provision of water and allocation of human resources, PPE	2	Possible	3
Manual handling	Heavy industry / incorrect handling	Recoverable injury	Avoidance of manual handling injuries by safe work method, provision of equipment fit for purpose and suitable allocation of human resources	2	Possible	3
Lack of safety in design	Design issues create unnecessary safety exposures in the workplace	Incident resulting in recoverable injury	Safety risk review during detailed design (HAZOP study), construction safety management plan, constructability reviews	2	Possible	3
Equipment failure	Tyre failure, brake failure, rope failure	Recoverable injury	Compliance with site rules and procedures (based on risk assessments and safe work methods), maintenance programs	2	Possible	3
Food poisoning	Contamination	Multiple persons affected by sickness	Specialist service provider, food management plan, personal hygiene awareness	2	Possible	3
Sun burn	Working in the sun without protection	Skin damage, not hospitalised	PPE, provision of sunscreen, safety awareness	1	Likely	3

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
High wind	Unsecured objects	Struck by object	Emergency Management Plan, weather monitoring	3	Rare	1
Exposure to hazardous materials	Diesel, oils, reagents spill	Mild eye or skin irritation	Non-flammable, non-corrosive, non-toxic, storage and transportation in accordance with appropriate standards, loading/unloading procedures, MSDS	1	Possible	1
Vehicle fire	Hot engines components, oils, electrical wiring, batteries	Smoke inhalation	Emergency egress from all plant and equipment, fire extinguishers, automatic suppression on large machines, fire tender and suitable equipment available, emergency response plan	1	Possible	1
Noise	Engines, operations activity	Hearing loss	PPE, location of equipment, noise barriers	1	Possible	1
Welding and cutting	Fumes, hot metal, sparks	Fume poisoning, skin burn, foreign object in eye	PPE, safe work method, qualified personnel	2	Unlikely	0.9
Site management	Misunderstanding between areas	Incident resulting in recoverable injury	Construction management plan, management of change procedure	2	Unlikely	0.9
Bushfire	Incident during response	Recoverable injury	Emergency Management Plan, location versus exposure review of infrastructures and access	2	Unlikely	0.9
Disorientation	Field work in remote areas	Hospitalised	Safe work method including water and communication protocols, no man alone policies	2	Unlikely	0.9
Accommodation fire	Electrical fault, cooking	Skin burn	Emergency egress from accommodation and facilities, fire extinguishers, fire tender and suitable equipment available, emergency response plan, fire alarms	2	Rare	0.3
Self heating of coal stockpiles	Hot spots and smouldering within coal stockpiles	Incident resulting in recoverable injury	Stockpile management plan, fire response capability	2	Rare	0.3

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Structural failure / Tailings dam failure	Fatigue, corrosion, over load / over topping, seepage	Recoverable injury	Design reviews (e.g. HAZOP for over loading), inspections and monitoring	2	Rare	0.3
Equipment fire	Conveyors, transformers, switch rooms, warehousing	Smoke inhalation	Emergency egress from all plant and equipment, fire extinguishers, fire tender and suitable equipment available, fire alarms, training	1	Unlikely	0.3
Diesel / oil storage fire	During loading / unloading	Smoke inhalation	Emergency egress from storage area, secondary containment, fire extinguishers, automatic suppression on large machines, fire tender and suitable equipment available, emergency response plan	1	Unlikely	0.3
Dust	Travelling on unsealed roads, clearing, excavation, blasting	Respiratory irritation	Watering roadways, dust suppression, PPE, design	1	Unlikely	0.3
Fumes	Vehicle exhaust, welding, diesel storage, oil storage	Temporary sickness	Safe work methods regarding fumes, location and design of storage facilities and maintenance workshops, PPE	1	Unlikely	0.3

Table 24-6: Hazard and Risk Register for off-site impacts during operation of the Alpha Coal Project (Mine)

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Extra activity - higher road use / changed road conditions	Increased potential for an accident on the road	Multiple fatalities	Environmental Management Plan - traffic	5	Unlikely	30
Extra activity - Life of mine risk due to change	Change to the baseline level of community risk due to the existence of the operation	Rated equivalent to the worst case community risk - Multiple fatalities	Community consultation	5	Unlikely	30
Air transport of personnel	Air accident	Multiple fatalities	Licensed operators	5	Rare	10
Transport of equipment, goods and services	Road accident	Multiple fatalities	Fatigue management policies, vehicle maintenance	5	Rare	10
Transport of explosives	Vehicle engine fire as an ignition source leading to detonation, vehicle collision/roll-over	Multiple fatalities	Licensed operator, storage and handling in accordance with relevant standards	5	Rare	10
Multi passenger personnel transfers	Road accident	Multiple fatalities	Licensed operator, operating procedures and vehicle maintenance	5	Rare	10
Flight path interference	Blasting causes air incident	Multiple fatalities	Blasting procedure	5	Rare	10
Individual personnel transfers	Road accident	Single fatalities	Fatigue management	4	Unlikely	9

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Extra activity - increased demand on emergency services (including access)	Emergency services unable to respond to an incident	Fatality	Emergency Management Plan, review of emergency services capabilities	4	Unlikely	9
Extra activity - development of support infrastructure / utilities (cumulative impact)	Increased potential for a work place accident	Fatality	Licensed operators, operating procedures, vehicle maintenance	4	Unlikely	9
Breakdown of equipment	Unordinary response to breakdown, changed conditions	Fatality	Safe work method, maintenance programs	4	Unlikely	9
Dust	Travelling on unsealed roads, clearing, excavation, blasting	Respiratory irritation	Environmental Management Plan - dust	2	Likely	9
Equipment failure	Tyre failure, brake failure	Multiple fatalities	Maintenance of controlled vehicles	2	Possible	3
Noise	Engines, operations activity	Emotional stress	Environmental Management Plan - noise	1	Likely	3
Unauthorised release of water	Alteration of site storage and drainage	Mild sickness in community and some hospitalised	Environmental Management Plan - water	2	Unlikely	0.9
Community resistance	Community action	Injury during community action	Community management plan, community consultation	2	Unlikely	0.9

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Diesel, oil, other fuel spills	Exposure to uncontained diesel, oil, etc. in the environment	Mild eye or skin irritation from the soil, mild sickness from water and some hospitalised	Licensed operators, Emergency Management Plan, designated transport routes and storage areas	2	Rare	0.3

24.6 Decommissioning Hazard and Risk Register

Decommissioning of the Alpha Coal Project (Mine) presents additional hazard and risk scenarios to be considered in the hazard and risk assessment. The hazard and risk register for on-site impacts is presented in Table 24-7. The hazard and risk register for off-site impacts during decommissioning is presented in Table 24-8.

Table 24-7: Hazard and Risk Register for on-site impacts during decommissioning of the Alpha Coal Project (Mine)

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Wildlife hazards, snake bite	Field work, access to accommodation at night	Fatality	High-sided safety boots for field workers, long trousers, first response capability, access to emergency services, lighting and dedicated pathways at the camp, spider and snake identification charts around camps and site.	4	Possible	30
Vehicle interaction / vehicle management	Vehicle collision with wildlife Vehicle / vehicle collision	Multiple fatalities	Traffic rules, road design including signage, fatigue management policies, vehicle maintenance, Traffic Management Plan	5	Rare	10
Ground failure	Incorrect design, incorrect excavation, unidentified geological anomalies	Multiple fatalities	Mine plan, mine design, third party review of design, excavation surveys, daily inspections by Open Cut Examiner, geotechnical survey	5	Rare	10
Use of explosives	Misfire, premature detonation, over charge	Multiple fatalities	Safe work plan, licensed operators, storage and handling in accordance with relevant standards	5	Rare	10
Vehicle over highwall	Unidentified edge, equipment failure	Multiple fatalities	Edge protection (e.g. wind rows), Traffic Management Plan	5	Rare	10
Aerial surveys	Air incident	Multiple fatalities	Licensed operator	5	Rare	10
Emergency response helicopter	Air incident	Multiple fatalities	Licensed operator	5	Rare	10
Floor heave (inrush of water in the pit)	Inundation of water	Multiple fatalities	Geological surveys, mine design, emergency response plan	5	Rare	10
Rainfall	Slippery roads, incident during response	Fatality	Emergency Management Plan, location and exposure review of infrastructures and access	4	Unlikely	9

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Flooding	Inundation of water	Incident during response resulting in fatality	Emergency Management Plan, location and exposure review of infrastructures and access, weather monitoring, warning systems	4	Unlikely	9
Uncontrolled or unintended movement of equipment and vehicles	Incorrect isolation, equipment failure	Fatality	Safe work method	4	Unlikely	9
Dozer roll-over	Working on stockpiles, dozer push mining	Fatality	Safe work method, experienced operators	4	Unlikely	9
Residual highwall	Remains of the open pit	Fatality	Barrier protection, signage	4	Unlikely	9
Site management	Misunderstanding between areas	Incident resulting in recoverable injury	Construction management plan, management of change procedure	2	Likely	9
Slips and trips	Self fall or impact on another person	Hospitalised	Decommissioning safety management plan, workplace inspection program, PPE, ergonomic design, lighting, permits	2	Likely	9
Fall from height	Working at heights	Fatality	Safe work statement, scaffolding and lanyards, training	4	Rare	3
Electrocution	Working with electricity / electrical fault	Fatality	Safe work statement, qualified electricians and standard safety procedures, isolation procedures	4	Rare	3
Struck by object	Object falls from height	Fatality	Safe work statement, barricading, fall nets	4	Rare	3
Crane accident	Roll-over, collision or falling object	Fatality	Licensed operators, safe work statement including knowing the correct weight of lifts and use of appropriate lifting equipment, lift studies	4	Rare	3
Suffocation	Confined space	Fatality	Safe work method, confined space permit system, identification of confined spaces, training	4	Rare	3

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Pinch points	Uncontrolled or unintended movement of objects or vehicles	Fatality	Safe work method, guarding, communication protocols	4	Rare	3
Lightning	Struck by lightning	Fatality	Storm procedure, lightning arrestors/masts	4	Rare	3
Site security and safety / unauthorised access	Unauthorised assess to hazardous areas and/or use of equipment	Fatality	Security management plan	4	Rare	3
HR / IR issues	Discontentment / resentment amongst workforce	Fatality	Security management plan, contractor management plan, employee management plan	4	Rare	3
Radioactive measuring instruments	Exposure to radiation	Chronic effects of radiation	Identification, inspection program, monitoring, storage and handling procedure, demarcation, Radiation Safety Officer (RSO)	4	Rare	3
Falling into water	Monitoring / working around tailings dam, pump out pits, site water storages	Drowning	Safe work method, PPE	4	Rare	3
Materials handling - storage and lay down	Drop something or struck by object, incorrect manual handling, slip, trip fall, caught in pinch point	Permanent partial disability	Safe work method including lay-down plan, provision of equipment for use in the lay-down area fit for purpose and suitable allocation of human resources	3	Unlikely	3
Heat stress	Working in the heat and over exertion for extended periods	Hospitalised	Avoidance of over exertion by safe work method, provision of equipment fit for purpose and suitable allocation of human resources, drinking water availability, PPE	2	Possible	3

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Dehydration	Working in the heat and insufficient water	Hospitalised	Avoidance of dehydration by safe work method, provision of water and allocation of human resources, PPE	2	Possible	3
Manual handling	Heavy industry / incorrect handling	Recoverable injury	Avoidance of manual handling injuries by safe work method, provision of equipment fit for purpose and suitable allocation of human resources	2	Possible	3
Lack of safety in method statement	Method of closure/demolition, order of demolition creates unnecessary safety exposures in the workplace	Incident resulting in recoverable injury	Safety risk review prior to closure, closure safety management plan	2	Possible	3
Equipment failure	Tyre failure, brake failure, rope failure	Recoverable injury	Compliance with site rules and procedures (based on risk assessments and safe work methods), maintenance programs	2	Possible	3
Food poisoning	Contamination	Multiple persons affected by sickness	Specialist service provider, food management plan, personal hygiene awareness	2	Possible	3
Sun burn	Working in the sun without protection	Skin damage but not hospitalised	PPE, provision of sunscreen, safety awareness	1	Likely	3
High wind	Unsecured objects	Struck by object	Emergency Management Plan, weather monitoring	3	Rare	1
Noise	Engines, closure activity	Hearing loss	PPE, location of equipment, noise barriers	1	Possible	1
Welding and cutting	Fumes, hot metal, sparks	Fume poisoning, skin burn, foreign object in eye	PPE, safe work method, qualified personnel	2	Unlikely	0.9

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Bushfire	Incident during response	Recoverable injury	Emergency Management Plan, location versus exposure review of infrastructures and access	2	Unlikely	0.9
Structural failure / Tailings dam failure	Fatigue, corrosion, over load / over topping, seepage	Recoverable injury	Design reviews (e.g. HAZOP for over loading), inspections and monitoring	2	Unlikely	0.9
Disorientation	Field work in remote areas	Hospitalised	Safe work method including water and communication protocols, no man alone policies	2	Unlikely	0.9
Accommodation fire	Electrical fault, cooking	Skin burn	Emergency egress from accommodation and facilities, fire extinguishers, fire tender and suitable equipment available, emergency response plan, fire alarms	2	Rare	0.3
Self heating of spoils and seams	Hot spots and smouldering within spoils and seams	Incident resulting in recoverable injury	Fire response capability, rehabilitation plan and covering of exposed coal surfaces	2	Rare	0.3
Exposure to hazardous materials	Diesel, oils, reagents spill	Mild eye or skin irritation	Non-flammable, non-corrosive, non-toxic, storage and transportation in accordance with appropriate standards, loading/unloading procedures, MSDS	1	Unlikely	0.3
Equipment fire	Conveyors, transformers, switch rooms, warehousing	Smoke inhalation	Emergency egress from all plant and equipment, fire extinguishers, fire tender and suitable equipment available, fire alarms, training	1	Unlikely	0.3
Vehicle fire	Hot engines components, oils, electrical wiring, batteries	Smoke inhalation	Emergency egress from all plant and equipment, fire extinguishers, automatic suppression on large machines, fire tender and suitable equipment available, emergency response plan, training	1	Unlikely	0.3

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Diesel / oil storage fire	During loading / unloading	Smoke inhalation	Emergency egress from storage area, secondary containment, fire extinguishers, automatic suppression on large machines, fire tender and suitable equipment available, emergency response plan	1	Unlikely	0.3
Dust	Travelling on unsealed roads, rehabilitation, blasting	Respiratory irritation	Watering roadways, dust suppression, PPE, design	1	Unlikely	0.3
Fumes	Vehicle exhaust, welding, diesel storage, oil storage	Temporary sickness	Safe work methods regarding fumes, location and design of storage facilities and maintenance workshops, PPE	1	Unlikely	0.3
Residual water quality	Residual water quality on site different from surrounding water quality	Illness	Rehabilitation	1	Rare	0.1
Residual infestation	Changed eco system within the mine site	Illness	Rehabilitation	1	Rare	0.1
Residual contamination	Residual soil quality on site different from surrounding soil quality	Contamination in the food chain, illness	Rehabilitation	1	Rare	0.1

Table 24-8: Hazard and Risk Register for off-site impacts during decommissioning of the Alpha Coal Project (Mine)

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Extra activity - higher road use / changed road conditions	Increased potential for an accident on the road	Multiple fatalities	Environmental Management Plan - traffic	5	Unlikely	30
Air transport of personnel	Air accident	Multiple fatalities	Licensed operators	5	Rare	10
Transport of equipment, goods and services	Road accident	Multiple fatalities	Fatigue management policies, vehicle maintenance	5	Rare	10
Transport of explosives	Vehicle engine fire as an ignition source leading to detonation, vehicle collision/roll-over	Multiple fatalities	Licensed operators, storage and handling in accordance with relevant standards	5	Rare	10
Multi passenger personnel transfers	Road accident	Multiple fatalities	Licensed operators, operating procedures and vehicle maintenance	5	Rare	10
Flight path interference	Blasting causes air incident	Multiple fatalities	Blasting procedure	5	Rare	10
Noise	Engines, closure activity	Emotional stress	Environmental Management Plan - noise	1	Almost certain	10
Individual personnel transfers	Road accident	Single fatalities	Fatigue management	4	Unlikely	9
Extra activity - increased demand on emergency services (including access)	Emergency services unable to respond to an incident	Single fatality	Emergency Management Plan, review of emergency services capabilities	4	Unlikely	9

Issue	Description	Consequence	Safety Management	Severity	Probability	Residual Risk Ranking
Extra activity - development of support infrastructure / utilities (cumulative impact)	Increased potential for a work place accident	Single fatality	Licensed operators, operating procedures, vehicle maintenance	4	Unlikely	9
Breakdown of equipment	Unordinary response to breakdown, changed conditions	Fatality	Safe work method, maintenance programs	4	Unlikely	9
Dust	Travelling on unsealed roads, clearing, excavation, blasting	Respiratory irritation	Environmental Management Plan - dust	2	Likely	9
Equipment failure	Tyre failure, brake failure	Multiple fatalities	Maintenance of controlled vehicles	2	Possible	3
Unauthorised release of water	Alteration of site storage and drainage	Mild sickness in community and some hospitalised	Environmental Management Plan - water	2	Unlikely	0.9
Community resistance	Community action	Injury during community action	Community management plan, community consultation	2	Unlikely	0.9
Diesel, oil, other fuel spills	Exposure to uncontained diesel, oil, etc. in the environment	Mild eye or skin irritation from the soil, mild sickness from water and some hospitalised	Licensed operators, Emergency Management Plan, designated transport routes and storage areas	2	Rare	0.3

24.7 Evaluation and Control of Risk

24.7.1 Safety Management System

Relevant safety management systems and controls to be implemented for each hazard and risk identified in the registers in Sections 24.4, 24.5 and 24.6 are also presented within each of those sections.

In general, the Proponent's approach to safety management has been structured on the management system model outlined in Australian Standard (AS) 4801 (2001) Occupational Health and Safety Management Systems - Specification with guidance for use.

Volume 2, Section 21 of this EIS provides a description of the Hancock Integrated Management System (HIMS), which encompasses the approach to safety management. Under the HIMS, the Proponent is committed to comply with all legislative requirements.

The primary occupational health and safety legislation applicable to the Project includes the following Acts and Regulations:

- *Workplace Health and Safety Act 1995*;
- *Workplace Health and Safety Regulation 2008*;
- *Coal Mining Safety and Health Act 1999*; and
- *Coal Mining Safety and Health Regulation 2001*.

The applicability of specific statutes will depend on the particular component and development stage of the Project.

24.7.2 Risk Management

Risk management principles have been integrated into safety management under the HIMS. Risk management will be used to identify hazards, assess risks and identify controls at various stages of the Project. The outcome of the risk management process will be the development of operational controls such as health and safety plans, safe operating procedures (see Section 24.7.3 for specific details), inspections and audits based on the risks identified. Risks requiring controls will use a preferred order of control (hierarchy of control). Elimination will be the first control method to be considered.

The following will be canvassed when evaluating Project risks:

- Lessons from other Hancock (the Proponent), stakeholders and other projects;
- Legislative requirements;
- Industry standards; and
- Lessons from industry.

The risk management process will be applied from the planning stages throughout the life of the Project. The activities or events that trigger the risk assessment process include:

- Design;

- Prior to commencing day-to-day tasks such as the Job Safety and Environmental Analysis (JSEA) and Take 5 tools (or similar);
- Prior to the introduction of new items of plant, equipment or substance;
- When there is a change in management systems, conditions, processes or plant;
- After a significant incident; and
- Periodic review (redo inductions after leave).

Hazards and risks identified during the Project risk assessment will be maintained within a risk register that is continually updated and relevant. The risk register will be reviewed at least annually to ensure that high level hazards and risks continue to be adequately controlled.

Activity-based risk assessments, such as those completed by using JSEA tools, will be maintained and used to continuously improve the methods of work undertaken during the Project.

Employees of the Project will be involved in the development, implementation and review of safe operating procedures relating to risk management.

24.7.3 Operational Controls

As part of the operational controls relating to the hazards and risks identified in this study, safe work methods, training and competency will be developed as outlined in Table 24-9 below.

Table 24-9: Operational controls

Operational control	Description
Safe work method	Safe work methods and operating procedures will be developed for all standard tasks and based on the risks identified. Specifically, with regard to the risk assessment conducted in this study, safe work methods and operating procedures will be developed for the following hazard and risk issues: • Field work – wildlife, heat stress, dehydration, disorientation and sun burn hazards; • Vehicle operation – task specific, e.g. dozer clearing, working on stockpiles, crane lifts, excavation, haul trucks, etc.; • Working at heights; • Working above other work areas; • Working with electricity; • Working in confined spaces; • Working near water; • Welding and cutting; • Storage and handling of explosives; • Storage and handling of diesel and oil; • Storage and handling of reagents; and • Storage and handling of radioactive devices.

Operational control	Description
Training and competency	HIMS will outline the requirements to identify, prioritise, plan, document and monitor training needs so that employees and contractors can competently meet their health and safety responsibilities. All personnel working on the Alpha Coal Project (Mine) will be required to participate in relevant training programs in accordance with the requirements of the HIMS, the Alpha Coal Project (Mine) Health and Safety Management Plan and relevant legislation. Induction training will include a summary of the critical risks and controls identified in the Project's health and safety risk assessment. Methods used to verify competency will be outlined in an Alpha Coal Project (Mine) safe operating procedure. This procedure will identify certain roles, such as those of electricians, boilermakers and surveyors, that require government certification or permits, and detail the process used to ensure that these competencies remain current. Specifically, with regard to the hazard and risk assessment conducted in this study, competency assessments will be formalised for the following hazard and risk issues: • Vehicle operation; • Aircraft operation; • Use of explosives; • Transport of explosives; • Transport of diesel and oil; • Working with electricity; • Working in confined spaces; • Working at heights; and • Scaffolding.

24.7.4 Specific Risk Controls

In order to address the hazard and risk issues identified during construction (refer to Section 24.4), operation (refer to Section 24.5) and decommissioning (refer to Section 24.6), the Project will commit to delivering a Health and Safety Management Plan under the HIMS, including the following elements:

- Principal Hazard Management Plans (refer to Section 24.8 below);
- Safe work methods;
- Operating procedures;
- Design and construction of infrastructure in accordance with relevant Australian Standards;
- Emergency Management Plans; and
- Training and competency.

Specific controls for on-site and off-site risks are described in the following sections.

24.7.4.1 On-site Hazard and Risk Management

Specific requirements for management of hazards and risks identified to occur on-site are detailed in Table 24-10.

Table 24-10: Specific risk controls to manage on-site hazard and risk issues

Issue	Safety Management	Specific Requirements
Wildlife hazards, snake bite	High-sided safety boots for field workers, long trousers, first response capability, access to emergency services, lighting and dedicated pathways at the camp, spider and snake identification charts around camps and site.	Specific PPE identified in safe operating procedure: • High side boots • Long trousers • First response capability including but not limited to the following: • Paramedic on each shift • Anti-venom on-site • Mine rescue team trained in first aid • Field workers trained in first aid
Light vehicle interaction / heavy vehicle interaction / vehicle management	Traffic rules, road design including signage, fatigue management policies, vehicle maintenance, Traffic Management Plan	Traffic Rules, having regard to the following points: • Speed limits • Licensed to drive • Seat belts • Pre-start checks • Site driving inductions Road design with regard to the following: • AGRD01: Guide to Road Design (Austroads, 2006) • HB 153:2002: Urban Road Design: A Guide to the Geometric Design of Major Urban Roads (Austroads, 2002) Road signs, having regard to the following points: • Pedestrian crossing areas • Site speed limits • Road features and obstacles e.g. bends, dips or causeways Physical Barriers, including: • Wind rows in areas of heavy vehicle / light vehicle interaction areas Applicable references: • AS 1318 (1985) Use of colour for the marking of physical hazards and the identification of certain equipment in industry (known as the SAA

Issue	Safety Management	Specific Requirements
		Industrial Safety Colour Code) • AS 1319 (1994) Safety Signs for the Occupational Environment • AS 1742.1 (2003) Manual of Uniform Traffic Control Devices – General Introduction and Index of Signs • AS 1742.15 (2007)_ Manual of uniform traffic control devices - Direction signs, information signs and route numbering • AS 1742.2 (1994) Traffic Control Devices for General Use • AS 1742.4 (2008) Speed Controls • AS 1742.10 (2009) Pedestrian Control and Protection • AS 1742.11 (1999) Parking Controls
Ground failure	Mine plan, mine design, third party review of design, surveys, daily inspections by Open Cut Examiner	Principal Hazard Management Plan – Ground control
Use of explosives	Safe work plan, licensed operators, storage and handling in accordance with relevant standards	Storage and handling in accordance with the following regulations: *Coal Mining Safety and Health Regulation 2001* *Explosives Regulation 2003*
Vehicle over highwall	Edge protection (e.g. wind rows), Traffic Management Plan	
Residual highwall	Barrier protection, signage	
Aerial surveys	Licensed operator	
Emergency response helicopter	Licensed operator	
Floor heave (inrush of water in the pit)	Geological surveys, mine design, emergency response plan	Principal Hazard Management Plan – Floor heave
Rainfall	Emergency Management Plan, location and exposure review of infrastructures and access	
Flooding	Emergency Management Plan, location and exposure review of infrastructures and access, weather monitoring, warning systems	

Issue	Safety Management	Specific Requirements
Uncontrolled or unintended movement of equipment and vehicles	Safe work method, vehicle maintenance	
Tree falls on dozer	Safe work method, experienced operators, fall-on protection	
Manual handling	Avoidance of manual handling injuries by safe work method, provision of equipment fit for purpose and suitable allocation of human resources	
Construction / Operations interaction during ramp-up	Identification, demarcation and communication of areas, hand-over protocols, isolation procedures	
Site management	Construction management plan, management of change procedure	
Slips and trips	Construction safety management plan, workplace inspection program, PPE, ergonomic design, lighting, permits	
Fall from height	Safe work statement, scaffolding and lanyards, training	Apply the following relevant regulations and standards: AS/NZS 1576.1:1995 Scaffolding General Requirements AS/NZS 1576.2:2009 Scaffolding Couplers and accessories AS/NZS 1576.3:1995 Scaffolding Prefabricated and tube end couplers AS/NZS 1576.4:1991 Scaffolding Suspended Scaffolding AS/NZS 1577-1993 Scaffold planks AS/NZS 1657-1992 Fixed platforms, walkways, stairs and ladders AS/NZS 1891.1:2007 Industrial fall-arrest systems and devices - Safety belts and harnesses AS/NZS 1891.2:2001 Industrial fall-arrest systems and devices - Horizontal lifeline and rail systems AS/NZS 1891.3:1997 Industrial fall-arrest systems and devices - Fall-arrest

Issue	Safety Management	Specific Requirements
		devices AS/NZS 1892.5:2000 Portable ladders – Selection, safe use and care *Workplace Health and Safety Regulation 2008*; Clauses 282-290, 316-324, 333-334. *Coal Mining Safety and Health Regulation 2001*; Clauses 74, 90, 92, 118, 128, 130, 258, 268, 332. *Occupational Health and Safety (Safety Standards) Regulations 1994*
Electrocution	Safe work statement, qualified electricians and standard safety procedures, isolation procedures	The following relevant regulations and standards apply: AS/NZS 3000:2000 Electrical Installations AS/NZS 3012:2003 Electrical installations - Construction and demolition sites AS 2225-1994 Insulating Gloves for Electrical Purposes AS 2978:1995 Insulating Mats for Electrical Purposes AS/NZS 3760:2003 In-service safety inspection and testing of electrical equipment AS 3820:1998 Essential Safety Requirements for Low Voltage Electrical Equipment AS/NZS 4836:2001 Safe working on low-voltage electrical installations *Workplace Health and Safety Regulation 2008*; s259 *Coal Mining Safety and Health Regulation 2001*; Clauses 19, 24, 135, 200, 251.
Struck by object	Safe work statement, barricading, fall nets	
Crane accident	Licensed operators, safe work statement including knowing the correct weight of lifts and use of appropriate lifting equipment, lifting studies or plans	
Suffocation	Safe work method, confined space permit system, identification of confined spaces, remote emergency stop of dozer on stockpile, breathing apparatus in dozer on stockpile, training	
Pinch points	Safe work method, guarding, communication protocols	

Issue	Safety Management	Specific Requirements
Lightning	Storm procedure, lightning arrestors/masts	The following relevant standard applies: AS 1768: 2007 Lightning Protection
Site security and safety / unauthorised access	Security management plan	
Sabotage	Security management plan	
HR / IR issues	Security management plan, contractor management plan, employee management plan	
Radioactive measuring instruments	Identification, inspection program, monitoring, storage and handling procedure, demarcation, Radiation Safety Officer (RSO)	The following relevant regulation applies: *Radiation Safety Regulation 1999*
Falling into water	Safe work method, PPE	PPE to be identified in safe operating procedure
Dozer roll-over	Safe work method, experienced operators	
Materials handling - storage and lay down	Safe work method including lay-down plan, provision of equipment for use in the lay-down area fit for purpose and suitable allocation of human resources	Design of lay-down area and assessment of suitable handling assist equipment to be defined
Heat stress	Avoidance of over exertion by safe work method, provision of equipment fit for purpose and suitable allocation of human resources, drinking water availability, PPE	
Dehydration	Avoidance of dehydration by safe work method, provision of water and allocation of human resources, PPE	
Lack of safety in design	Safety risk review during detailed design (HAZOP study), construction safety management plan, constructability reviews	
Equipment failure	Compliance with site rules and procedures (based on risk assessments and safe work methods), maintenance programs	
Food poisoning	Specialist service provider, food management plan,	

Issue	Safety Management	Specific Requirements
	personal hygiene awareness	
Sun burn	PPE, provision of sunscreen, safety awareness	
High wind	Emergency Management Plan, weather monitoring	
Noise	PPE, location of equipment, noise barriers	
Welding and cutting	PPE, safe work method, qualified personnel	
Bushfire	Emergency Management Plan, location versus exposure review of infrastructures and access	
Disorientation	Safe work method including water and communication protocols, no man alone policies	
Accommodation fire	Emergency egress from accommodation and facilities, fire extinguishers, fire tender and suitable equipment available, emergency response plan, fire alarms	The following relevant regulations and standards apply: *Building Fire Safety Regulations 2008* *Fire and Rescue Service Act 1990* Building Code of Australia AS 1851-2005 Maintenance of Fire Protection Systems and Equipment AS/NZS 2430.3.1:2004: Classification of hazardous areas - Examples of area classification - General AS 2444-2001 Portable Fire Extinguishers and Fire Blankets - Selection and Location With regard to kitchen and other service and maintenance facilities: *Dangerous Goods Safety Management Regulation 2001* Queensland Workplace Health and Safety: Notification Requirements under the *Dangerous Goods Safety Management Act 2001* National Occupational Health and Safety Commission (Australia) (NOHSC): 1015 (2001) National Standard Storage and Handling of Workplace Dangerous Goods AS 1692-2006 Tanks for Flammable and Combustible Liquids AS 1940-2004 The Storage and Handling of Flammable and Combustible Liquids

Issue	Safety Management	Specific Requirements
		AS 2906:2001 Fuel Containers - Portable - Plastics and Metal Also refer to Section 24.8.
Self heating of coal stockpiles	Stockpile management plan, fire response capability	
Structural failure / Tailings dam failure	Design reviews (e.g. HAZOP for over loading), inspections and monitoring	Designs to Australian Standards
Exposure to hazardous materials	Non-flammable, non-corrosive, non-toxic, storage and transportation in accordance with appropriate standards, loading/unloading procedures, MSDS	Diesel and oil tanks constructed and installed to comply with relevant standards: *Dangerous Goods Safety Management Regulation 2001* *Health Regulation 1996* NOHSC: 1015 (2001) National Standard Storage and Handling of Workplace Dangerous Goods AS 1692-2006 Tanks for Flammable and Combustible Liquids AS 1940-2004 The Storage and Handling of Flammable and Combustible Liquids AS 2906:2001 Fuel Containers - Portable - Plastics and Metal Anionic, Cationic Flocculent and Magnetite (Coal Handling and Preparation Plant reagents) require wash stations nearby. In general these are considered non-hazardous substances; however, storage and handling areas require ventilation and method to avoid dust formation.
Equipment fire	Emergency egress from all plant and equipment, fire extinguishers, fire tender and suitable equipment available, fire alarms, training	Two means of egress from all infrastructure for evacuation Fire extinguishers in accordance with AS 2444-2001: Portable Fire Extinguishers and Fire Blankets - Selection and Location Also refer to Section 24.8.
Vehicle fire	Emergency egress from all plant and equipment, fire extinguishers, automatic suppression on large machines, fire tender and suitable equipment available, emergency response plan, training	Two means of egress from all large mobile vehicles (such as multi-level excavators) for evacuation Fire extinguishers in accordance with AS 2444-2001: Portable Fire Extinguishers and Fire Blankets - Selection and Location Automatic fire suppression for dozers in stockpiles

Issue	Safety Management	Specific Requirements
		Also refer to Section 24.8.
Diesel / oil storage fire	Emergency egress from storage area, secondary containment, fire extinguishers, automatic suppression on large machines, fire tender and suitable equipment available, emergency response plan	Two means of egress from storage areas for evacuation Fire extinguishers in accordance with AS 2444-2001: Portable Fire Extinguishers and Fire Blankets - Selection and Location Also refer to Section 24.8.
Dust	Watering roadways, dust suppression, PPE, design	
Fumes	Safe work methods regarding fumes, location and design of storage facilities and maintenance workshops, PPE	*Dangerous Goods Safety Management Regulation 2001* *Health Regulation 1996*
Residual water quality	Rehabilitation	Rehabilitation plan
Residual infestation	Rehabilitation	Rehabilitation plan
Residual contamination	Rehabilitation	Rehabilitation plan

24.7.5 Off-site Hazard and Risk Management

Specific requirements for management of hazards and risks identified to occur off-site are detailed in Table 24-11.

Table 24-11: Specific risk controls to manage off-site hazard and risk issues

Issue	Safety Management	Specific Requirements
Extra activity - higher road use / changed road conditions	Refer to Volume 2, Section 17 of this EIS for transport safety management.	
Extra activity - Life of mine risk due to change	Community consultation	
Air transport of personnel	Licensed operators	
Transport of equipment, goods and services	Licensed operators	
Transport of explosives	Licensed operators, storage and handling in accordance with relevant standards	Transport in accordance with the following regulations: • *Coal Mining Safety and Health Regulation 2001* • *Explosives Regulation 2003*
Multi passenger personnel transfers	Licensed operators, operating procedures and vehicle maintenance	
Flight path interference	Blasting procedure	Apply the following relevant regulation and standard regarding obstacles entering air space: • *Civil Aviation Safety Regulations 1998* • Civil Aviation Safety Authority (CASA) Manual of Standards Part 139—Aerodromes Chapter 7: Obstacle Restriction and Limitation (1998)
Noise	Refer to Volume 2, Section 15 of this EIS	
Individual personnel transfers	Fatigue management	Shift rosters designed to consider fatigue
Extra activity - increased demand on emergency services (including access)	Emergency Management Plan, review of emergency services capabilities	Refer to Section 24.8
Extra activity - development of support infrastructure / utilities (cumulative impact)	Licensed operators, operating procedures, vehicle maintenance	

Issue	Safety Management	Specific Requirements
Breakdown of equipment	Safe work method, maintenance programs	
Dust	Refer to Volume 2, Section 13 Air Quality	
Equipment failure	Maintenance of controlled vehicles	
Community resistance	Community management plan, community consultation	
Diesel, oil, other fuel spills	Licensed operators, Emergency Management Plan, designated transport routes and storage areas	Refer to Section 24.8.
Unauthorised release of water	Refer to Volume 2, Section11 Surface Water	

24.8 Emergency Management Plan

This section provides an outline of the Emergency Management Plan and the proposed emergency management procedures for the range of hazard and risk situations identified in this study.

In order to prepare this section, consultation was made with the relevant emergency services and where applicable is referenced Table 24-14 below. A list of the emergency services contacted is provided in Table 24-12.

Table 24-12: Summary of consultation

Emergency Support Service Consulted	Contact
Queensland Health (including the Emergency Management Unit)	CEO central and western region
Royal Flying Doctor Service	Office Manager Longreach RFDS Base
Alpha Police	Officer in charge
Mines Inspectorate	District inspector of mines

Based on the consultation made, it is determined that the Proponent will provide all resources, training and equipment for first response capability for all foreseeable incidents. However, the local rural fire brigade will be relied upon for a coordinated response to wild fire, where the local police officer in charge is the Fire Chief. In this case, the Proponent will supplement the existing resources, capability and equipment of the rural fire brigade.

Regarding safety incidents, the Proponent will again provide first response capability; however, additional medical staff may be required in the region. Specifically, additional nurses may be required at the Alpha hospital. In the event of a safety incident the Proponent would rely on support from the Royal Flying Doctor Service (RFDS) to get injured people to suitable medical treatment facilities.

The RFDS has 17 aircraft in Queensland, which is considered adequate for the foreseeable worst case emergency situations. In the event that there are insufficient response aircraft available RFDS has been known to charter larger jets out of Brisbane and the Gold Coast.

24.8.1 Mine Emergency Management Plan

The mine site will have an Emergency Management Plan that is maintained up to date and is a controlled document. In addition to defining the manner in which on-site emergencies are to be managed, this plan will include the following information:

- The nature of the emergency situations that could occur at the site;
- The local public authorities involved (or potentially involved) with the management of emergencies that could arise at the site;
- Emergency management structure;
- Notification and escalation;
- Mine site layout;
- Specific Principal Hazard Management Plans (PHMP), e.g. vehicles, explosives, ground fall, floor heave;

- Specific Emergency Response Procedures; and
- Trigger Action Response Plans.

24.8.2 Notification

Where an emergency, potential emergency or reportable incident occurs, the Site Senior Executive (SSE) will immediately notify the appropriate stakeholders detailed in the Emergency Management Plan for the type of emergency or incident:

- Group Managing Director
- Group Safety Manager
- Emergency Management Unit (and the RFDS)
- Ambulance
- Mines Inspectorate
- Explosives Inspectorate
- Police
- Rural Fire Brigade

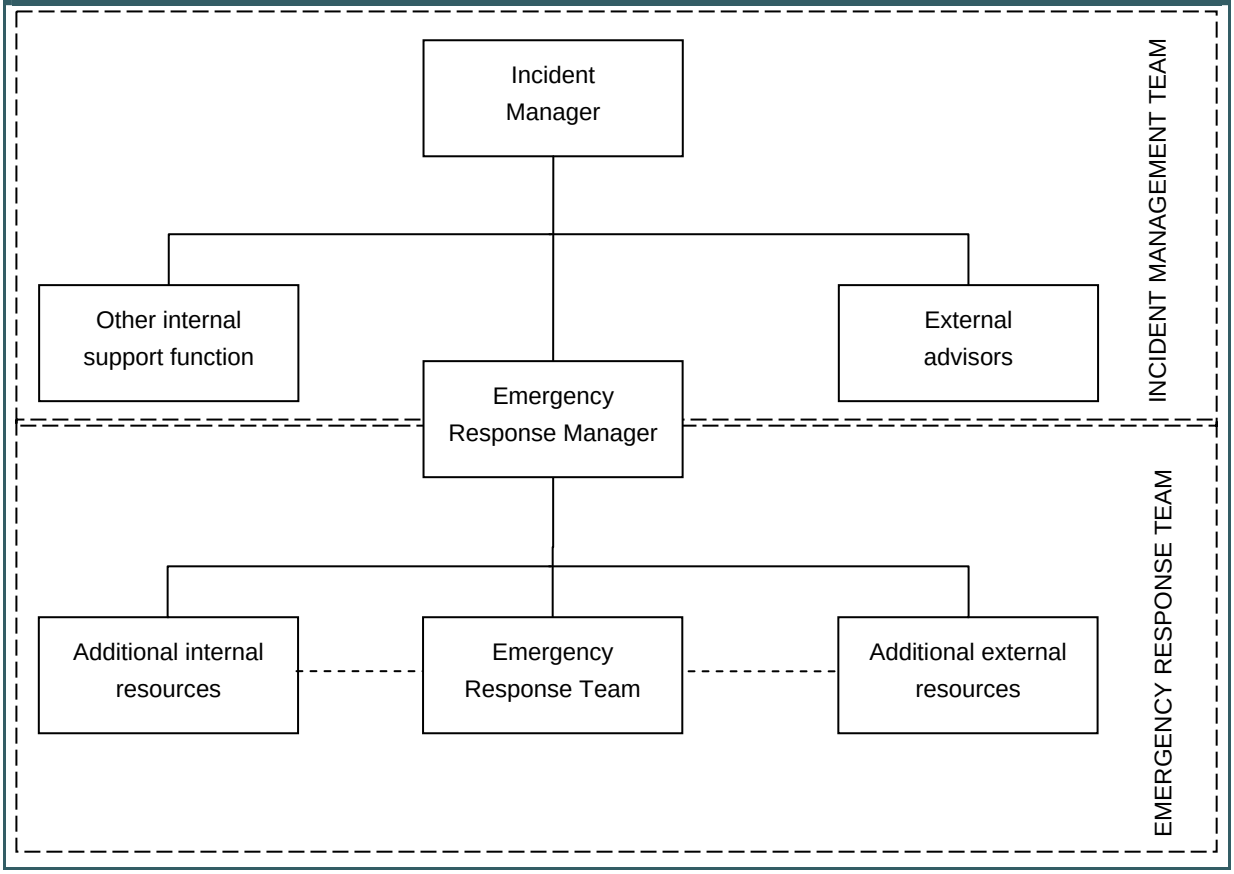
24.8.3 Emergency Management Structure

Fundamental to emergency management is the development and organisation of an Emergency Response Team and Incident Management Team. The general organisation structure is outlined in Figure 24-1.

This plan will be specifically developed for the Project site prior to construction and again for operations based on Project organisational structure and protocols established. In the generic plan below, the SSE may assume the role of Incident Manager or may appoint someone else as the Incident Manager that may be deemed more appropriate for the situation. The management of Project site emergencies remains the responsibility of the SSE.

External response and support are based upon the severity and the potential of the event for escalation. The Incident Manager will determine the response from information and details of the emergency gained from the first line emergency response personnel.

Figure 24-1 General structure of the incident management team and emergency response team



The roles and responsibilities of key personnel in an emergency event are described in Table 24-13.

Table 24-13: Emergency management roles and responsibilities

Role	Responsibility
Site Senior Executive (SSE)	• Appoint the Incident Manager; • Confirm the structure of the Incident Management Team; • Immediately make initial notifications.
Incident Management Team	• Ensure all immediate action is taken to make the incident site safe; • Manage the response to the incident; • Ensure appropriate resources are available for the Emergency Response Team; and • Contact appropriate regulators and ensure attendance of appropriate emergency services.
Emergency Response Team	• Make the incident site safe and attend to the safety and welfare of people affected; • Assess and undertake the tactical response to the incident; and • Report to the Incident Management Team.

24.8.4 Procedures

Details of emergency management procedures needed to respond to the range of emergency situations identified in this assessment are described in Table 24-14. Objectives and management principles to be adopted in the preparation of detailed emergency plans such as emergency response and recovery/cleanup procedures are presented.

Per the scope of this risk assessment, these management plans specifically address the health and safety aspect of the hazard and risk. Preservation of property and business continuity is an aside to this study; however, they will also be considered in the finalisation of emergency management plans.

Table 24-14: Summary of minimum requirements for Emergency Management Plans

Emergency Management Plan	Summary of Minimum Requirements
Fire management plan (Equipment, Building, Vehicle Fire, Wild fire)	The objective of this plan is ensuring life safety, and it will identify all fire risks and evaluate the specific needs to respond to a fire for the purpose of life safety. This will be achieved during final design when a detailed fire risk assessment will be undertaken. This will include a review of essential services to confirm suitable accessibility to plant. The fire management plan will include the following: • A list of all fire risks and an evaluation of the fire-fighting requirements; • Primary fire protection controls that are in place and to be maintained; • Location of fire equipment; • Material Safety Data Sheets; • Location and quantity of hazardous materials; • Isolation procedures for electricity; • Drainage plan and operation of drainage equipment e.g. bunds and sump pumps; • Back-up generator for emergency equipment; and • Evacuation procedure and evacuation points. In general, the following resources and equipment will be provided prior to the construction of the site. This is based on the requirements of the Australian Standard for the provision of fire hydrants and the logistics to achieve the application. • Six trained fire-fighting personnel available on-site at all times. • 150 ML of fire water. • 2 vehicles with fire-fighting ability and capable of carrying sufficient water for continuous application of water on a fire during refilling. One vehicle will include a fire tender with water-carrying capacity (which is required to assist with wild fires below). The other vehicle may be either water carts for dust suppression or another fire tender or water tanker. • Vehicles must have 10 L/s water production capacity per monitor. • 5 fire hydrant hoses of 30 m each. • Suitable branch pieces and foam. The following primary controls are listed as a minimum standard for the main fire risks. • Transformers: firewalls, bunds, snuffing stones, standard electrical protection. • Conveyors: secondary means of egress. • Smoke detection in switch rooms, warehouses, offices and accommodation. For wild fire emergencies, the Proponent will rely on the local rural fire brigade for a coordinated response where the local police officer in charge is the fire chief. An emergency response to wild fire will be documented as a subset of the fire

Emergency Management Plan	Summary of Minimum Requirements
	management plan. The objective of the wild fire response plan will be to outline the first response procedure for on-site wild fires for ensuring life safety, and the protocols to conduct a coordinated response with the rural fire brigade. The plan will identify wild fire threats with regard to life safety and establish controls to manage the hazard, including fire equipment needed for wild fire response.
Diesel / oil spill management plan	The objective of this plan will be to outline the first response procedure for protecting the health and safety of individuals involved and will cover both on-site and off-site incidents. The plan will also establish the procedure for containment, clean-up and rehabilitation and identify the equipment needed for the response.
Vehicle breakdown management plan	The objective of this plan is to outline a procedural response to an unexpected vehicle breakdown in order to establish a safe response. The procedure will call for a Job Safety and Environmental Analysis (JSEA) and assess the situation and plan the response.
High wind management plan	The objective of this plan is to identify actions that need to be undertaken for imminent high wind in order to make the situation safe. The plan will assess particular risks in the event of high wind, devise the methods of monitoring for high wind and formulate trigger action responses.
Rain response management plan	The objective of this plan is to identify actions that need to be undertaken in the event of rain and develop controls and procedures for ensuring a safe response. The plan will assess each of the actions and establish suitable controls as required e.g. specify an all weather road if a particular action requires driving to check a river level. The plan will also taking into account a storm / lightning procedure.
Flood management plan	The objective of this plan is to identify actions that need to be undertaken for imminent flooding in order to make the situation safe. The plan will assess particular risks in the event of flooding, devise the methods of monitoring for potential flooding and formulate trigger action responses.
Principal Hazard Management Plans (PHMPs)	In addition to the specific management plans identified above, PHMPs will be developed for high potential incidents that could occur. PHMPs will be developed for the following, for which specific emergency management plans will also be included: • Vehicles • Explosives • Ground • Floor Heave

24.9 Specific Requirements

While the details of personnel and resources involved in emergency response are yet to be fully developed, the following specifications for minimum resourcing requirements are provided, which will be effective prior to construction.

- Have an appropriate number of fully trained personnel in the following areas:
  - First aid and resuscitation;
  - Fire fighting;
  - Rescue – Ground failure;
  - Rescue – At heights;

  - Rescue – In water;
  - Rescue – Dealing with electricity;
  - Rescue – Dealing with explosives;
  - Rescue – Dealing with chemicals (e.g. diesel, oil, CHPP reagents);
  - Rescue – Confined spaces;
  - Rescue – From vehicles;
  - Rescue – From buildings; and
  - Rescue – Remote locations.
- Emergency Management Team will include a paramedic on-site at all times.
- Anti-venom will be held on-site.
- First response capability and resources for six injured personnel (corresponding to the maximum number of people likely to be together in a standard mine site based light vehicle).