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 Kevin's Corner Coal Mine Project (the Project).

24.1.1 Purpose

The purpose of this section is to present the results of a preliminary hazard and risk assessment of the selected study area (i.e. the mine site) to satisfy the requirements of Section 6 of the Terms of Reference for this Project's EIS. Accordingly, this study aims to identify, assess and evaluate potential health and safety risks to employees, contractors and the community as well as third party property risks that might occur as a result of the Project and to determine the management plans and controls that will be established to manage the risk.

24.1.2 Scope

The scope of the preliminary hazard and risk assessment includes the risks associated with all activity associated with the mine site. 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. As per the EIS Terms of Reference, the study particularly focuses on health and safety risks as well as third party property risks.

24.1.3 Approach

The approach taken included the following main activities:

- Conduct a preliminary hazard analysis (PHA) to identify relevant hazards and risks associated with the Project;
- Evaluate the risks and their potential impacts, and identify safety management systems to determine 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, comprehensive sets of representative incident scenarios were developed for the construction, operation and decommissioning stages of the Project and for both on-site and off-site impacts. The assessment of consequences was based on a probable maximum loss basis whereby the consequence of a risk is the likely outcome of a risk scenario, allowing for the absence / failure of mitigating controls. In this respect the consequence estimate is therefore conservative, yet reasonable. The likelihood ascribed to the risk is the likelihood of the initiating event occurring and the probability of the defined consequence resulting, taking into account the reliability of the mitigating controls.

The risk assessment used the consequence, likelihood and level of risk criteria of Hancock Galilee Pty Ltd (HGPL) where consequence has been expressed in terms of health and safety, social/cultural heritage, property damage and natural environment.

In regard to emergency response, consultation was conducted with various emergency services to determine existing capabilities and needs analysis for the Project. The following emergency service organisations were contacted:

- Queensland Health;
- Royal Flying Doctor Service;
- Alpha police; and
- Mines inspectorate.

24.2 Preliminary Hazard Assessment

24.2.1 Purpose

The purpose of the PHA phase of the study is to conduct a broad-brush, high-level identification and evaluation of relevant hazards and risks associated with the Project. This allowed potentially significant risk exposures to be efficiently identified and prioritised for further, more detailed analysis. In this regard, the risk information collected during the PHA is not intended to provide a definitive, quantitative measure of risk, but rather is used for guiding and structuring closer consideration of significant risk issues where such analysis is warranted.

24.2.2 Approach

The hazard identification process was broken down into the Project areas as defined in the scope of works including the mine, coal preparation plant, airport and rail spur extension (from the Alpha Project). The process of identifying hazards and risks in this study has involved the following systematic approach:

- Understand the properties and characteristics of open-cut and underground coal mining operations and the associated hazards;
- Engage and integrate feedback from experienced mining personnel;
- Research the background on natural hazards and events that have occurred in the past;
- Review existing risk assessments for both open-cut and underground mines;
- Analyse the Project throughout its construction, commissioning, operation and decommissioning phases;
- Undertake a hazard identification and risk assessment workshop specific to the Project with a range of people and experience including representatives from Hancock, URS and IMC Mining Group;
- Review and capture applicable risks from the Proponent and the facilitator's existing risk registers; and
- Submit draft risk register for review and nomination of additional items by the Proponent.

The PHA was completed in a workshop, facilitated by Marsh Risk Consulting (Marsh) and attended by representatives from HGPL, URS and IMC to provide expertise into the planned design and mining operations. All relevant discussions were documented interactively using a laptop and data projector,

to confirm agreement between the workshop participants. A number of typical hazards and risks were identified by Marsh prior to the workshop via extensive research and previous work completed for other relevant projects. The PHA workshop then commenced with an unconstrained brainstorming session, which was eventually cross-matched against Marsh's internal hazard identification to provide greater certainty that all significant risks had been identified.

Risk scenarios were identified for each of the identified hazards and these risks were evaluated in terms of their potential consequences and likelihood of occurrence. The consequence ascribed to each risk was based on a probable maximum loss basis whereby the consequence of a risk is the likely outcome of a risk scenario, allowing for the absence / failure of mitigating controls.

Relevant preventative and mitigation control measures were considered and documented with respect to each identified risk. It should be noted, however, that the documentation of risk control measures in the PHA by no means represents a complete list. Further details regarding risk controls are presented in the detailed risk evaluations for significant risks (refer to Section 24.3).

As mentioned above, the PHA focussed on health and safety of workers, contractors, and the community as well as third party property damage. Following this analysis, each hazard was reviewed and where the underlying root cause was due to, or emanated from, atypical and/or abnormal circumstances, the hazard was identified for further analysis.

24.2.3 Risk Assessment Criteria

In accordance with the requirements of Australian and New Zealand Standards AS/NZS ISO 31000 (2009) *Risk management – Principles and guidelines,* an initial qualitative risk assessment of all identified hazards was performed and a comprehensive risk register prepared.

The criteria used in evaluating the risks are presented below. These criteria were selected in order to allow issues to be classified by the relative magnitude of the risk. A standard semi-quantitative risk matrix was applied, which is skewed toward the consequence measure, in order to ensure that potentially highest consequence risks receive a high level of priority.

24.2.3.1 Consequence Criteria

The consequence criteria used in conducting the semi-quantitative PHA are presented in Table 24-1.

Table 24-1: Consequence criteria

Severity Level	Health and Safety	Natural Environment	Social/Cultural Heritage	Property Damage	Severity Factor
7	>500 fatalities or very serious irreversible injury to >5,000 persons	Very significant impact on highly valued species, habitat or ecosystem	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order	> AUS$1 billion	1000
6	>50 fatalities, or very serious irreversible injury to >500 persons.	Significant impact on highly valued species, habitat, or ecosystem	Irreparable damage to highly valued items of cultural significance or breakdown of social order	AUS$100 million – AUS$1 billion	300
5	Multiple fatalities, or significant irreversible effects to >50 persons	Very serious, long-term environmental impairment of ecosystem function	Very serious widespread social impacts. Irreparable damage to highly valued items.	AUS$10 million – AUS$100 million	100
4	Single fatality and/or severe irreversible disability (>30%) to one or more persons	Serious medium-term environmental effects	Ongoing serious social issues. Significant damage to structures, items of cultural significance.	AUS$1 million – AUS$10 million	30
3	Moderate irreversible disability or impairment (<30%) to one or more persons	Moderate, short-term effects but not affecting ecosystem function	Ongoing social issues. Permanent damage to items of cultural significance	AUS$100,000 – AUS$1 million	10
2	Objective but reversible disability requiring hospitalisation	Minor effects on biological or physical environment	Minor medium-term social impacts on local population. Mostly repairable	AUS$10,000 – AUS$100,000	3
1	No medical treatment required	Limited damage to minimal area of low significance	Low-level repairable damage to commonplace structures	< AUS$10,000	1

24.2.3.2 Likelihood Criteria

The likelihood criteria used in conducting the semi-quantitative PHA, where the probability factor incorporates the potential frequency and exposure of an event, are presented in Table 24-2.

Table 24-2: Likelihood criteria

Probability	Description	Probability Factor
Almost Certain	Will occur at some time 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

24.2.3.3 Risk Rating

The residual risk ranking is determined from the consequence and likelihood using the formula below. The residual risk ranking in this case was only used to establish a risk ranking of the identified risks for prioritisation. The philosophy of ALARP (as low as reasonably practicable) was applied to evaluate and treat the hazards and risks.

Residual Risk Ranking = Severity Factor x Probability Factor

For example, an event that could result in a singular fatality corresponds to a severity factor of 30, which, hypothetically, may occur during the Project, which results in a probability factor of 1. Therefore:

Residual Risk Ranking = Severity Factor x Probability Factor

Residual Risk Ranking = 30 x 1

Residual Risk Ranking = 30

24.2.4 Risk Identification and Assessment

The hazard and risk register in Volume 2, Appendix U, outlines the hazards and risks identified and assessed through the PHA process. The register was structured to address on-site and off-site risks broken down into the three Project stages: construction, operations and decommissioning, as shown below:

Structure of the hazard and risk register:

- On-site hazards and risks
  - — Construction
  - — Operations
  - — Decommissioning
- Off-site hazards and risks
  - — Construction
  - — Operations
  - — Decommissioning

It was found that each stage has a similar list of hazards and risks, and in most cases the assessment of severity and probability is the same. Similarly, the safety management systems to address the hazards and risks in each stage were mostly the same by name; however, in the actual implementation they were applied specifically to the situation.

In the hazard and risk register in Appendix U, each column was used as follows:

1. Hazard / risk / issue: This column identifies a hazard, risk or issue that could lead to a potential health or safety impact.
2. Description: This column provides extra detail that further defines the topic of the hazard, risk or issue.
3. Consequence: Describes the most likely worst case health or safety impact for the hazard, risk or issue.

4. Safety management: Outlines the broad safety management systems and controls that will be implemented as the primary means of managing the risk.
5. Severity: Assigns a severity level using the risk criteria for severity.
6. Likelihood: Assigns a probability using the risk criteria for probability.
7. Level of Risk: Assigns a residual risk ranking using the formula for residual risk ranking.

24.2.4.1 Findings and Next Steps

The complete results of the PHA are presented in the form of a risk register, which is presented in Volume 2, Appendix U.

In total, 94 potentially significant on-site risks were identified, whilst 30 potentially significant off-site risks were identified. Superficially, the proportion of "High" risks may be surprising, but this is not unexpected given the following points:

- The intent of the PHA is to identify potentially significant risks for further analysis, rather than to identify every risk associated with the Project, regardless of its magnitude; and
- The method for evaluating consequences and therefore the risk level of identified risk issues is designed to be conservative, to ensure that potentially high-consequence issues are not neglected at this stage of the hazard and risk assessment due to a perceived low level of likelihood.

24.2.4.2 Comparison with Acceptable Risk Criteria for Land Uses

In order to compare the hazards and risks identified with acceptable risk criteria for land uses, the *Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning* (HIPAP 4) (New South Wales Department of Planning, 1992) has been referenced. The suggested risk tolerance criteria of HIPAP 4 is summarised in Table 24-3 below where tolerance criteria are presented as "risk in a million per year".

Table 24-3: Hazardous Industry Planning Advisory Paper No. 4 (HIPAP 4) risk criteria

Risk	Tolerance Criteria
Fatality risk at sensitive land uses, such as hospitals, schools, etc.	0.5
Fatality risk at residential land uses	1
Fatality risk at commercial land uses	5
Fatality risk at sporting complexes or active open space	10
Fatality risk at industrial land uses	50
Rural	No criteria given

As the mine site is considered to be a remote rural location there are no suggested risk criteria for the mine site and as such, HGPL's ALARP philosophy complies with the requirement of the safety regulations. There are, however, a number of off-site risks that are applicable for comparison with HIPAP 4 criteria that can impact facilities in the town of Alpha or en route, and these include:

- Aircraft crash; and
- Transport of oxidising agents and fuel.

Due to the strict regulation of these operations and the low likelihood of a catastrophic incident within the town and surrounding area of Alpha, the risk is considered to be low.

24.2.4.3 Significant Risks for Further Consideration

Presented in Tables 24-4 and 24-5 are summaries of on-site and off-site risks respectively, including all stages of the Project life which have been rated with a level of risk of 30 or above (see Section 24.2.3.3).

Presented in Tables 24-6 and 24-7 are summaries of on-site and off-site risks respectively, including all stages of the Project life which have been rated with a severity level of 5 (multiple fatalities) or above (see Section 24.2.3.1).

The complete risk register for on-site and off-site hazards and risks is provided in Volume 2, Appendix U.

Table 24-4: On-site risks - rated by Residual Risk Rating

Ref #	Risk	Description	Residual Risk Rating	Safety Management
72	Changed surface topography	Physical impacts upon the surface as a result of underground mining operations	100	- Subsidence management plan - Rehabilitation of surface water courses
52	Aircraft crash takeoff / landing	Due to foreign objects (including wildlife) on runway or runway damage	30	- Perimeter fencing - Runway inspections and maintenance - Civil Aviation Safety Authority (CASA) standards - Wildlife management plan
11	Wildlife hazards, snake bite	Throughout field work, and around storage areas and accommodation villages at night	30	- High side safety footwear for field workers - Long trousers - First response capability - Access to emergency services - Lighting and dedicated pathways at the camp - Identification posters - Induction awareness training

Ref #	Risk	Description	Residual Risk Rating	Safety Management
44	Underground vehicle interactions	Vehicle collisions; pinch points; accidents while towing, dragging and pulling	30	- Testing, Reporting and Maintenance Program (TRAMP) - Pre-start checks - Underground signage - Training - Road crews for maintenance and improvement - No-go zones for miners and equipment - Take 5s or equivalent - Traffic lights installed at portal - Communication protocol notifying location to control room - Pedestrian interaction protocols introduced and applied to all vehicles - High visibility Personal Protective Equipment (PPE) - Installed mirrors at high use blind intersections - Collision avoidance system - Vehicle principal hazard management plan - Investigate opportunities for remote operation

Ref #	Risk	Description	Residual Risk Rating	Safety Management
62	Strata failure	Uncontrolled collapse of overhead material / pillars / ribs	30	- Ground Control Hazard Management Plan (HMP) - Supporting procedures, Trigger Action Response Plan (TARP) - Monitoring of strata - No-go zones - Equipment design - Canopies on equipment - PPE - Long wall flippers - Design of excavations and secondary support systems

Table 24-5: Off-site risks - rated by Residual Risk Rating

Ref #	Risk	Description	Residual Risk Rating	Safety Management
110	Aircraft crash in transit	Air incident	30	- Licensed contractor - CASA controls - Off-site maintenance - Predominantly off-site fuelling
103	Extra activity - higher road use / changed road conditions	Increased potential for an accident on the road	30	- Environmental management plan - traffic - Traffic management plan - Community awareness - Fatigue management

Ref #	Risk	Description	Residual Risk Rating	Safety Management
122	Extra activity - Life of mine risk due to change	Change to the baseline level of community risk due to the existence of the operation	30	- Community awareness sessions

Table 24-6: On-site risks - rated by consequence

Ref #	Risk	Description	Consequence	Safety Management
52	Aircraft crash takeoff / landing	Due to foreign objects (including wildlife) on runway or runway damage	6	- Perimeter fencing - Runway inspections and maintenance - CASA standards - Wildlife management plan
20	Ground failure	Incorrect design, incorrect excavation, unidentified geological anomalies	5	- Ground Control HMP - Mine plan - Mine design - Drilling program - Third party review of design - Surveys - Daily inspections by Open Cut Examiner (OCE)
30	Use of explosives	Misfire, premature detonation, over charge	5	- Safe work plan - Licensed operators - Job Safety and Environmental Analyses (JSEAs) - Material Safety Data Sheets (MSDSs) - Storage and handling in accordance with relevant Australian Standards

Ref #	Risk	Description	Consequence	Safety Management
39	Vehicle over highwall	Unidentified edge, equipment failure	5	- Edge protection (beams) - Driver training
41	Aerial surveys	Air incident	5	- Licensed operator
42	Emergency response helicopter	Air incident	5	- Licensed operator
63	Explosion	- Gas explosion - Coal dust explosion	5	- Stone dusting - Spontaneous Combustion HMP - Mine Atmosphere HMP - Electrical engineering management plan - Gas monitoring system - Contraband controls and inspections - Intrinsically safe and explosion protected equipment - Control room monitoring - Mechanical engineering management plan - Management plans in place for diesel engine systems, including explosion protection - Mines inspection system - Inertisation of goaf and seal up - Ventilation - Emergency Response Procedure

Ref #	Risk	Description	Consequence	Safety Management
65	Fire	All causes except spontaneous combustion	5	- Fire and Explosion HMP - Fire control equipment standard - Emergency Response Procedure - Fire depots, substations and stations - Statutory inspections and clean-up of belts - Fire response and evacuation training - Audit of fire systems across site - 24/7 gas monitoring at control room and initiate fire response, TARPs for Mine Atmosphere - Mine Inspection Program HMP - Mechanical standards, e.g. fire-resistant anti-static (FRAS) belting - No smoking policy - At least two means of egress - Regular inspection of self rescue units - Register of self rescue units - Ventilation design - Fire suppression on mobile equipment - Transformer fire suppression - Conveyor drive fire suppression
70	Vehicle interaction / vehicle management	Vehicle collisions; pinch points; accidents while towing, dragging and pulling	5	- Traffic rules, road design including signage - Installation of mirrors at high use intersections

Ref #	Risk	Description	Consequence	Safety Management
77	Light vehicle interaction / vehicle management	Vehicle collisions; pinch points; accidents while towing, dragging and pulling	5	- Traffic rules - Road design including signage
78	Heavy vehicle interaction / vehicle management	Vehicle collisions; pinch points; accidents while towing, dragging and pulling	5	- Traffic rules - Road design including signage
81	Inrush of water	Inundation of water	5	- Geological surveys - Mine design - Pre-drainage

Table 24-7: Off-site risks - rated by consequence

Ref #	Risk	Description	Consequence	Safety Management
110	Aircraft crash in transit	Air incident	6	- Licensed contractor - CASA controls - Off-site maintenance - Predominantly off-site fuelling
103	Extra activity - higher road use / changed road conditions	Increased potential for an accident on the road	5	- Environmental management plan - traffic - Traffic management plan - Community awareness - Fatigue management
122	Extra activity - Life of mine risk due to change	Change to the baseline level of community risk due to the existence of the operation	5	- Community awareness sessions
94	Air transport of personnel	Air incident	5	- Licensed operators
95	Transport of equipment, goods and services	Road incident	5	

Ref #	Risk	Description	Consequence	Safety Management
96	Transport of explosives	Detonation of pre-packaged blast initiators resulting from traffic accident	5	- Licensed operators - Storage and handling in accordance with relevant standards
98	Multi-passenger personnel transfers	Road incident	5	- Licensed operators - Fly In/Fly Out (FIFO) and Bus In/Bus Out (BIBO) provided by HGPL - Operating procedures and vehicle maintenance
109	Flight path interference	Blasting causes air incident	5	- Blasting procedure - Flight path management
118	Train-Train collisions	Train incident	5	- In-cab signalling system - Train position known through transponder and global positioning system (GPS) - Radio communication - Signalling system
119	Train-Vehicle collision	Collision between train and private vehicle	5	- Grade-separated crossings on major roads - Signalised crossings on minor roads - Emergency response plan - Horns - Fencing of rail corridor - FIFO and BIBO provided by HGPL

24.2.4.4 Hazardous Materials

Due to the nature of underground coal mining, several hazardous materials will be used, stored, processed or produced throughout the site. Table 24-8 details the hazardous materials to be used and stored on-site with their predicted usage rates.

Table 24-8: Bulk hazardous materials and usage

Hazardous Material	Usage Rate	Units
Ammonium Nitrate and Fuel Oil (ANFO)	10,685	Tonnes per year
Heavy Ammonium Nitrate and Fuel Oil (HANFO)	11,688	Tonnes per year
Ammonium Nitrate (AN)	16,636	Tonnes per year
Emulsion	4,675	Tonnes per year
Fuel Oil (FO) (Diesel for ANFO production)	1,327,360	Litres per year
Diesel	17,304,926	Litres per year
Lubes	285,782	Litres per year
Aviation Fuel	To be provided	-

Note – Usage rates describe the average of the first 29 years of operations. For predicted usage rates over the life of the mine, refer to Volume 2, Appendix U

For the site layout, including locations for hazardous storage and fire fighting equipment please refer to Appendix U. Please note details provided are accurate as of the time of the EIS submittal and information provided is limited due to the project design schedule.

Emergency response plans for hazardous materials on site are detailed in Table 24-13.

24.3 Approach to Risk Management Plan

The Risk Management plan for the Kevin's Corner will be achieved using the following approach and methods:

- A safety management system;
- Operational controls, i.e. safe work methods, training and competency and principal hazard management plans;
- Specific risk controls, eg. use of explosives, underground vehicle interactions; and,
- Emergency management plans.

24.3.1 Safety Management System

For each of the hazards and risks identified in the risk register, the relevant safety management systems and controls that will be implemented are identified. In general, HGPL's approach to safety management has been structured on the management system model outlined in Australian Standard AS4801 (2001) *Occupational health and safety management systems - Specification with guidance for use*. HGPL is committed to complying 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 (Queensland Government [Qld]);

- Workplace Health and Safety Regulation 2008 (Qld);
- Coal Mining Safety and Health Act 1999 (Qld); and
- Coal Mining Safety and Health Regulation 2001(Qld).

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

24.3.2 Risk Management

Risk management principles have been integrated into safety management. 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 the next subsection for more specific detail), 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.

When evaluating Project risks, the following will be canvassed:

- Lessons from experienced personnel and other projects;
- Legislative requirements;
- Industry standards; and
- Lessons from industry.

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

- During design;
- During construction;
- Prior to commencing day-to-day tasks, such as the Job Safety and Environmental Analysis (JSEA) and Take 5 tools;
- At end of new work front;
- Prior to the introduction of new items of plant, equipment or substance on-site;
- When there is a change in management systems, processes or plant; and
- After a significant incident; and
- Periodic review.

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 periodic intervals 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.

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

Some of the various other types of risk assessments which will be undertaken during the project that contribute to the Safety Management Study are shown in Table 24-9.

Table 24-9: Project Activity Matrix showing Risk Management Activities during the life of the project

	Concept Development	Definition stage/ Economic Feasibility Stage	Definition Stage/ Basic Engineering	Detailed Engineering	Construction	Commissioning	Handover	Operations	Decommissioning
Risk Management Plan		✓	✓	✓	✓	✓	✓		✓
Project Risk Register (High Level)	✓	✓	✓	✓	✓			✓	✓
Sensitivity Analysis for Contingency		✓	✓	✓	✓				
EIS			✓						
EPCM Function & Discipline Risk Registers				✓	✓	✓	✓		
Engineering Reviews (including Technology)		✓	✓	✓	✓				
Preliminary Hazard Analysis		✓	✓						
Safety Management Study			✓	✓				✓	✓
HAZOP			✓	✓					
CHAZOP			✓	✓					
SIL determination study			✓	✓					
Construction risk reviews			✓	✓	✓				
Commissioning risk assessments						✓	✓		
Topic specific risk assessments (as required)	✓	✓	✓	✓	✓	✓			✓
Fire protection and machinery breakdown reviews			✓	✓	✓				
Security risk reviews (site versus country)			✓	✓	✓				
Transportation risk reviews			✓	✓	✓				
Design Reviews			✓	✓	✓	✓			
Punchlisting					✓				
Residual Risk Reviews for Handover					✓	✓	✓	✓	
Safety Management Reviews					✓	✓	✓	✓	✓
Decommissioning Plan									✓

Notes:
HAZOP - Hazard and Operability Study
CHAZOP – Control Hazard and Operability Study
SIL – Safety Integrity Level
Topic specific risk assessments – this risk activity is included as it is typically used to assist in the decision making processes that occur along the way.
Design Reviews – the focus of these reviews is on Maintenance and Operational activities and requires significant input from intended Operational and Maintenance personnel
Punchlisting – focus on operability and maintainability issues at the completion (or near completion) of construction. Completed on a facility by facility basis.
Residual Risk Reviews – for the Operations stage, the output effectively delivers the Area (or Facility) risk register. Any further risk reduction activity identified at this point will be considered beyond the scope of the Project and rest with Operations.

24.3.3 Operational Controls

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

Table 24-10: 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 sunburn hazards • Vehicle operation – task specific, e.g. dozer clearing, working on stockpiles, crane lifts, excavation, haul trucks, personnel transport, 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 • Storage and handling of radioactive devices • Use of flammable substances underground • Rotating equipment

Operational Control	Description
Training and Competency	The management system 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 Project will be required to participate in relevant training programs in accordance with the requirements of the management system, the Kevin's Corner Project 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 a Project safe operating procedure. This procedure will identify certain roles, such as those of electricians, boilermakers and surveyors, which require government certification or permits, and will 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; • Equipment operation; • Aircraft operation; • Use of explosives; • Stored energy; • Transport and storage of explosives; • Transport and storage of diesel and oil; • Use of flammable substances underground; • Working with electricity; • Working at heights; • Scaffolding and rigging; • Hot work; • Second workings; and • Underground mines rescue.

Operational Control	Description
Principal Hazard Management Plan	Per the *Coal Mining and Safety Act 1999*, a principal hazard at a coal mine is a hazard at the coal mine with the potential to cause multiple fatalities. As a result, the underground mine will have principal hazard management plans that provide for at the least the following: • Emergency response; • Gas management; • Methane drainage; • Mine ventilation; • Spontaneous combustion; • Explosion; • Strata control; • Vehicles; and • Any event that can result in multiple fatalities.

24.3.4 Specific Risk Controls

In order to address the hazard and risk issues identified in this study the following detail is provided for the management systems and controls required. The following controls will be supported by the Kevin's Corner Health and Safety Management Plan.

24.3.4.1 Hazard and Risk Controls

Table 24-10 below outlines the Project hazards and risk controls:

Table 24-11: Hazards and risk controls

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Physical surface impacts	On-site	- Surface impact management plan - Rehabilitation of surface water courses	Rehabilitation Management Plan
Aircraft crash takeoff / landing	On-site	- Perimeter fencing - Runway inspections and maintenance - CASA standards - Wildlife management plan - Licensed operators	Aircraft and landing area standards: • *Civil Aviation Safety Regulations 1998* (CASR); and • *Civil Aviation Regulations 1988*.
Wildlife hazards, snake bite	On-site	- High side safety footwear for field workers - Long trousers - First response capability - Access to emergency services - Lighting and dedicated pathways at the camp - Induction and Awareness training - Designated pathways, lighting and identification charts around the camp	Specific PPE identified in safe operating procedure: • High side boots; and • 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; and • Field workers trained in first aid.
Strata / ground failure	On-site	- Strata control HMP - Supporting procedures - TARPs - Monitoring of strata - No-go zones - Equipment design - Canopies on equipment - PPE - Long wall flippers - Design of excavations and secondary support - Mine plan - Mine design - Third party review of design - Surveys - Daily inspections by OCE of active work areas	Principal Hazard Management Plan – ground control

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Use of explosives	On-site	- 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*; and • *Explosives Regulation 2003*
Vehicle over highwall	On-site	- Vehicle parking procedures - Edge protection (rill) - Transport management plan	Safety berms Vehicle immobilisation
Residual highwall	On-site	Barrier protection, signage	
Aerial surveys	On-site	- Licensed operator	
Emergency response helicopter	On-site	- Licensed operator	
Explosion	On-site	- Stone dusting - Spontaneous combustion HMP - Mine atmosphere HMP - Electrical engineering Management Plan - Gas monitoring system - Contraband controls and inspections - Intrinsically safe and explosion protected equipment - Control room monitoring - Mechanical engineering management plan - Management plans in place for diesel engine systems, including explosion protection - Mines inspection system - Inertisation of longwall and seal up	Principal Hazard Management Plan - explosion

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Fire (all causes except spontaneous combustion)	On-site	- Fire and explosion HMP - Fire control equipment standard - Emergency response procedure - Fire Depots, Substations and Stations - Statutory inspections and clean-up of belts - Fire response and evacuation training - Audit of fire systems across site - 24/7 gas monitoring at control room and initiate fire response -TARPs for mine atmosphere - Mine inspection program HMP - Mechanical standards, e.g. FRAS belting - No smoking policy - At least two means of egress - Regular inspection of self rescue units - Register of self rescue units - Ventilation design - Fire suppression on mobile equipment - Transformer fire suppression - Conveyor drive fire suppression	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*; and • 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 & Safety: Notification Requirements under the *Dangerous Goods Safety Management Act 2001*; • National Occupational Health and Safety Commission (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*; and • AS 2906 (2001) *Fuel Containers - Portable - Plastics and Metal*.

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Fire (all causes except spontaneous combustion) (continued)	On-site		Two means of egress from all infrastructure for evacuation At least two means of egress from all large mobile vehicles (such as multi-level excavators) for evacuation 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* Automatic fire suppression for dozers in stockpiles
Vehicle interaction / vehicle management	On-site	- Traffic rules - Road design including signage	Traffic Rules, with regard to the following points: • Speed limits; • Licensed to drive; • Seat belts; • Pre-start checks; • Site driving inductions; • Regular and scheduled maintenance; • Mine regulation vehicles with radios, flags, beacons etc; and • Separation of light and heavy vehicles. Road design with regard to the following: • Austroads Guide to Road Design Part 1 AGRD01: *Guide to Road Design*; and • Handbook (HB)153 (2002) *Urban Road Design: A Guide to the Geometric Design of Major Urban Roads*. Road signs, with regard to the following points: • Pedestrian crossing areas; • Site speed limits; and • Road features and obstacles, e.g. bends, dips or causeways. Physical barriers, including: • Wind rows in areas of heavy vehicle / light vehicle interaction areas. Notification protocols adhering to: • *Coroners Act 2003; and* • *Transport Operations (Road Use*

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
			Management) Act 1995 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 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*; and • AS 1742.11 (1999) *Parking Controls*.
Light vehicle interaction / vehicle management	On-site	- Traffic rules - Road design, including signage	Refer to vehicle interaction / vehicle management
Heavy vehicle interaction / vehicle management	On-site	- Traffic rules - Road design including signage	Refer to vehicle interaction / vehicle management

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Underground vehicle interactions	On-site	- TRAMP - Pre-start checks - Underground signage - Training - Road crews for maintenance and improvement - No-go zones for miners and equipment - Take 5s or equivalent - Traffic lights installed at portal - Communication protocol notifying location to control room - Pedestrian interaction protocols introduced - High visibility PPE - Installed mirrors at blind intersections - Pedestrian interaction protocols to apply to all vehicles - Collision avoidance system - Vehicle principal hazard management plan - Investigate opportunities for remote operation	Traffic Rules, having regard to the following points: • Speed limits; • Licensed to drive; • Seat belts; • Pre-start checks; and • Site driving inductions. 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 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*; and • AS 1742.11 (1999) *Parking Controls*.
Inrush of water	On-site	- Geological surveys - Mine design	
Use of explosives	On-site	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*; and • *Explosives Regulation 2003*
Air Blast	On-site	- Caving capability for goaf behaviour - Deputies and geologists inspections - Identification of sandstones from exploration drill holes. - Strata Failure HMP - Wind blast switch and trollex monitoring capable of removing power	
Aerial surveys	On-site	Licensed operator	

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Emergency response helicopter	On-site	Licensed operator	
Rainfall	On-site	Emergency management plan, location and exposure review of infrastructures and access	
Flooding	On-site	Emergency management plan, location and exposure review of infrastructures and access, weather monitoring, warning systems	
Uncontrolled or unintended movement of equipment and vehicles	On-site	Safe work method, vehicle maintenance	
Tree falls on dozer	On-site	Safe work method, experienced operators, fall-on protection	
Manual handling	On-site	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	On-site	Identification, demarcation and communication of areas, hand-over protocols, isolation procedures	
Site management	On-site	Construction management plan, management of change procedure	
Slips and trips	On-site	Construction safety management plan, workplace inspection program, PPE, ergonomic design, lighting, permits	

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Fall from height	On-site	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 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; and • *Occupational Health and Safety (Safety Standards) Regulations 1994*.

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Electrocution	On-site	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 & 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*; Section 259; and • *Coal Mining Safety and Health Regulation 2001*; Clauses 19, 24, 135, 200, 251.
Struck by object	On-site	Safe work statement, barricading, fall nets	
Crane accident	On-site	Licensed operators, safe work statement including knowing the correct weight of lifts and use of appropriate lifting equipment, lifting studies or plans	
Suffocation	On-site	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	On-site	Safe work method, guarding, communication protocols	
Lightning	On-site	Storm procedure, lightning arrestors/masts	The following relevant standard applies: • AS 1768 (2007) Lightning Protection.
Site security and safety / unauthorised access	On-site	Security management plan	
Sabotage	On-site	Security management plan	

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Human Resources (HR) / Industrial Relations (IR issues	On-site	Security management plan, contractor management plan, employee management plan	
Radioactive measuring instruments	On-site	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	On-site	Safe work method, PPE	PPE to be identified in safe operating procedure
Dozer roll-over	On-site	Safe work method, experienced operators	
Materials handling - storage and lay down	On-site	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	On-site	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	On-site	Avoidance of dehydration by safe work method, provision of water and allocation of human resources, PPE	
Lack of safety in design	On-site	Safety risk review during detailed design (Hazard and Operability [HAZOP] study), construction safety management plan, constructability reviews	
Equipment failure	On-site	Compliance with site rules and procedures (based on risk assessments and safe work methods), maintenance programs	
Food poisoning	On-site	Specialist service provider, food management plan, personal hygiene awareness	
Sunburn	On-site	PPE, provision of sunscreen, safety awareness	
High wind	On-site	Emergency management plan, weather monitoring	

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Noise	On-site	PPE, location of equipment, noise barriers	
Welding and cutting	On-site	PPE, safe work method, qualified personnel	
Bushfire	On-site	Emergency management plan, location versus exposure review of infrastructures and access	
Disorientation	On-site	Safe work method including water and communication protocols, no man alone policies	
Self heating of coal stockpiles	On-site	Stockpile management plan, fire response capability	
Self heating of spoils and seams	On-site	- Fire response capability - Rehabilitation plan and covering of exposed coal surfaces	
Frictional ignition	On-site	- Maintenance program for cutting machines - Gas monitoring and sprays on cutting machines - Mine Atmosphere HMP - Ventilation standards for the face	
Structural failure / Tailings dam failure	On-site	Design reviews (e.g. HAZOP for overloading), inspections and monitoring	Designs to Australian Standards

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Exposure to hazardous materials	On-site	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*; and • AS 2906 (2001) Fuel Containers - Portable - Plastics and Metal. Anionic, Cationic Flocculent and Magnetite (Coal Handling and Preparation Plant [CHPP] 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.
Dust	On-site	Watering roadways, dust suppression, PPE, design	
Fumes	On-site	Safe work methods regarding fumes, location and design of storage facilities and maintenance workshops, PPE	• *Dangerous Goods Safety Management Regulation 2001*; and • *Health Regulation 1996*.
Residual water quality	On-site	Rehabilitation	Rehabilitation plan
Residual infestation	On-site	Rehabilitation	Rehabilitation plan
Residual contamination	On-site	Rehabilitation	Rehabilitation plan
Aircraft crash in transit	Off-site	- Licensed operator - CASA controls - Off-site maintenance - Predominantly off-site fuelling	
Extra activity - higher road use / changed road conditions	Off-site	- Environmental management plan - traffic	Refer to Volume 1, Section17 Transport

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Extra activity - Life of mine risk due to change	Off-site	Community consultation	
Air transport of personnel	Off-site	Licensed operators	
Transport of equipment, goods and services	Off-site	Licensed operator	
Transport of explosives	Off-site	- 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*; and • *Explosives Regulation 2003*.
Multi-passenger personnel transfers	Off-site	- Licensed operators - Operating procedures and vehicle maintenance	
Flight path interference	Off-site	- Blasting procedure - Flight path management	Apply the following relevant regulation and standard regarding obstacles entering air space: • *Civil Aviation Safety Regulations 1998*; and • CASA Manual of Standards Part 139—Aerodromes, Chapter 7: *Obstacle Restriction and Limitation*.
Train-Train collision	Off-site	- In-cab signalling system - Train position known through transponder and GPS - Radio communication - Signalling system	Apply the following relevant regulation and standards: • *Workplace Health and Safety Act 1995* (Qld); • *Workplace Health and Safety Regulation 2008* (Qld); • *Mining and Quarrying Safety and Health Regulation 2001*; • *Transport (Rail Safety) Act 2010*; and • *Transport (Rail Safety) Regulation 2010*.
Train-Vehicle collision	Off-site	- Grade-separated crossings on major roads - Signalised crossings on minor roads - Emergency response plan - Horns	Refer to Train-Train collisions

Hazard / Risk / Issue	Location	Safety Management	Specific Requirements for Safety Management
Train Derailment	Off-site	- Train position known through transponder and GPS - Radio communication - Grade-separated crossings on major roads - Signalised crossings on minor roads - Emergency response plan	Refer to Train-Train collisions
Transport of equipment, goods and services	Off-site	Licensed operators	
Noise	Off-site	Refer to Volume 1, Section 15 Noise and Vibration	
Individual personnel transfers	Off-site	Fatigue management	Shift rosters designed to consider fatigue
Extra activity - increased demand on emergency services (including access)	Off-site	Emergency management plan, review of emergency services capabilities	Refer to emergency management plan
Extra activity - development of support infrastructure / utilities (cumulative impact)	Off-site	Licensed operators, operating procedures, vehicle maintenance	
Breakdown of equipment	Off-site	Safe work method, maintenance programs	
Dust	Off-site	Refer to Volume 1, Section 13 Air Quality	
Equipment failure	Off-site	Maintenance of controlled vehicles	
Community resistance	Off-site	Community management plan, community consultation	
Diesel, oil, other fuel spills	Off-site	Licensed operators, Emergency management plan, designated transport routes and storage areas	Refer to emergency management plan
Unauthorised release of water	Off-site	Refer to Volume 1, Section 11 Surface Water	

24.3.5 Emergency Management Plan

The mine will have an Emergency Management Plan that will be kept up to date and will be 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 procedures;
- Mine site layout;
- Principal hazard management plans, e.g. vehicles, explosives;
- Emergency response procedures; and
- Trigger action response plans.

24.3.5.1 Notification

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

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

24.3.5.2 Emergency Management Structure

The range of emergency situations are described in Table 24-13 below, including the objectives and management principles that will be adopted for the preparation of detailed emergency plans (including emergency response and recovery/clean-up procedures). These management plans specifically address the health, safety and third party property and business interruption aspects of the hazard and risk. In order to prepare this section, consultation was undertaken with the relevant emergency services. A list of the emergency services contacted is provided in Table 24-12.

Table 24-12: Emergency Support Services

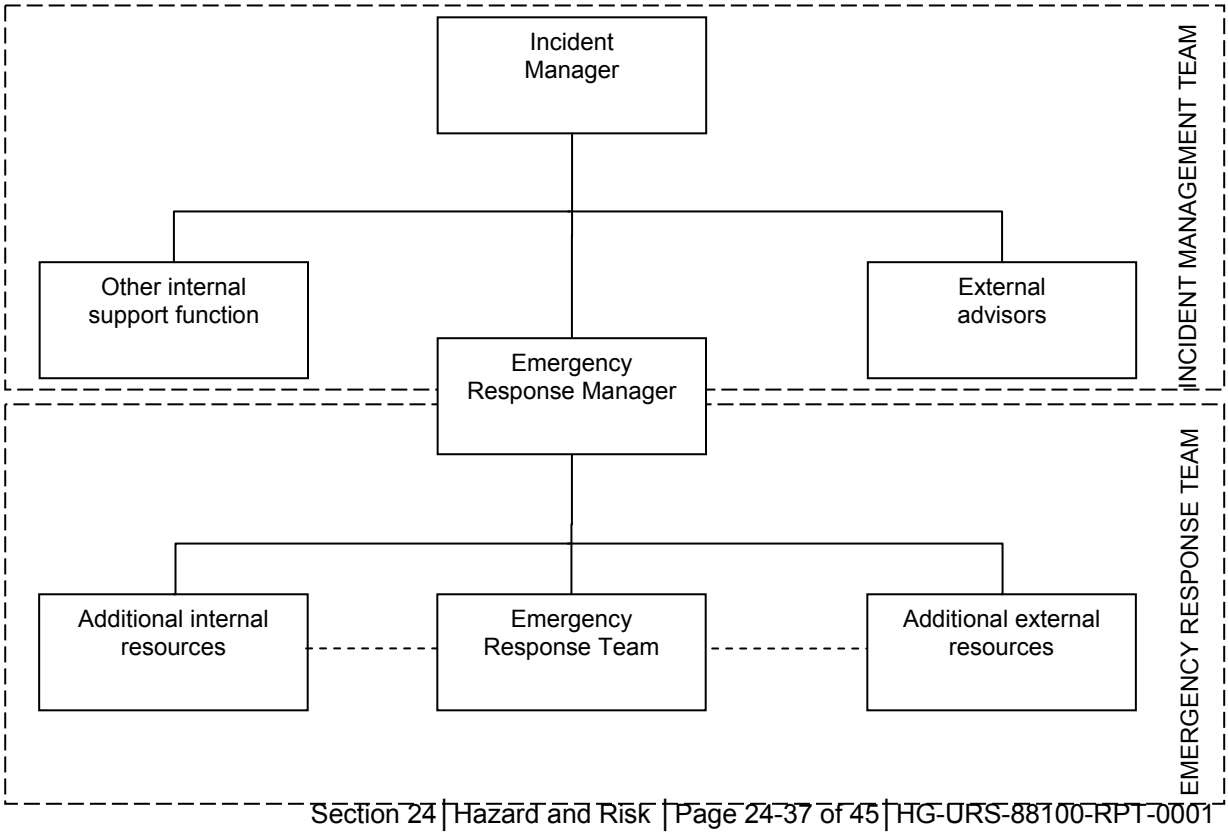
Emergency Support Service Consulted	Contact
Queensland Health	CEO central and western region
Royal Flying Doctors Service (RFDS)	Office Manager Longreach RFDS Base
Alpha Police	Officer in charge
Mines Inspectorate	District inspector of mines

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

Regarding safety incidents, HGPL will again provide first response capability with a paramedic full-time on-site; 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 serious safety incident, HGPL would rely on support from the 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 there are insufficient response aircraft available, RFDS has been known to charter larger jets from Brisbane and the Gold Coast.

Fundamental to emergency management is the development and organisation of an emergency response team and incident management team. The general organisation structure for incident management is outlined on Figure 24-1 below.

Figure 24-1: Organisational structure for incident management



The objectives of the incident management team and the emergency response team are as follows:

Objectives of the 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
- Immediately contact the appropriate regulator and ensure attendance of appropriate emergency services

Objectives of the 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
- Report to the Incident management team

While the details of personnel and resources are yet to be fully developed, specifically for this study the minimum requirements to be provided are:

- At least 15 fully trained personnel in the following areas:
  - First aid and resuscitation
  - Fire fighting
  - Rescue – Ground failure
  - Rescue – Underground mines
  - 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
  - Rescue – Remote locations
- The 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

Table 24-13: Emergency Management Plans

Emergency Situation	Emergency Management and Response Plan
Equipment, Building, Vehicle Fire	**Fire management plan** The objective of this plan is ensuring life safety, and will identify all fire risks and evaluate the specific needs to respond to a fire for the purpose of life safety [4]. 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 emergency management plan will include the following: • procedure to follow in case of fire; • key personnel such as fire wardens; • 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 (MSDS); • 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; • evacuation procedure; and, • evacuation points. 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; • smoke detection in warehouses; • smoke detection in office dwellings; and, • smoke detection in accommodation. In general for above ground, the following resources and equipment will be provided prior to the construction of the site: • six trained fire-fighting personnel available on site at any one time; • 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 Bushfires below). The other vehicle may be either water carts for dust suppression or another fire tender or water tanker;

Emergency Situation	Emergency Management and Response Plan
	• vehicles must have 10 l/s water production capacity per monitor; • 5 x fire hydrant hoses of 30 m each; and, • suitable branch pieces and foam. For underground, the following additional resources will include: • Foam; • Foam generator; • Fire hydrants and equipment located in fire cabinets U/G; • Self Contained Breathing Apparatus; • Fire detection installed to identify the location of a fire; • Fire resistant anti static conveyors; and, • Sprinkler protection over drive ends, tail ends and take up points of conveyors. For the locations of fire fighting equipment and incident control points, please refer to appendix U.
Bushfire	**Bushfire management plan** For Bushfire 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. The objective of this plan will be to outline the first response procedure for on-site Bushfires for ensuring life safety, and the protocols to conduct a coordinated response with the rural fire brigade. As part of the bushfire management plan, a bushfire hazard assessment will be completed of the area which will rank the vegetation community, slope and aspect to determine the hazard score for the different areas and to understand and mitigate the risk of bushfire. The assessment will also incorporate safety buffers as land adjacent to bushfire hazard areas is vulnerable to bushfire attack from these areas and other site specific factors that are important in devising suitable bushfire mitigation strategies. These factors will include matters such as: likely direction of bushfire attack, environmental values that may limit mitigation options, location of evacuation routes and/or safety zones. An assessment will also be completed noting specific risk factors associated with the development, including matters such as the nature of activities and materials to be conducted/stored on the site, numbers and types of persons likely to be present, particular warning and/or evacuation requirements. Measures for mitigating bushfire will include: • road and lot layout and land use allocations; • firebreaks and buffers; • building locations or building envelopes; • landscaping treatments;

Emergency Situation	Emergency Management and Response Plan
	• warning and evacuation procedures and routes; • firefighting requirements including infrastructure and water supply; • specific measures such as external sprinkler systems and alarms; • owner education and awareness programs; and • ongoing maintenance and response awareness programs. [5] In summary, the plan will identify Bushfire threats with regard to life safety and establish controls to manage the hazard.
Diesel / Fuel / Oil spill	**Diesel / fuel / 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.
Dangerous Goods and Explosives	**Dangerous goods and explosives 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 emergency management and response plan will address: • the equipment and facilities that will be available; • the procedures that will be followed and the measures that will be taken, including matters such as sounding alarms and evacuating people; • the measures that will be taken to investigate why the incident or situation occurred; • the individuals who will be responsible for implementing the emergency management plan; • the measures that will be taken to train people to execute the emergency management plan; and, • which emergency services and other people will be given a copy of the emergency management plan.
Vehicle breakdown	**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

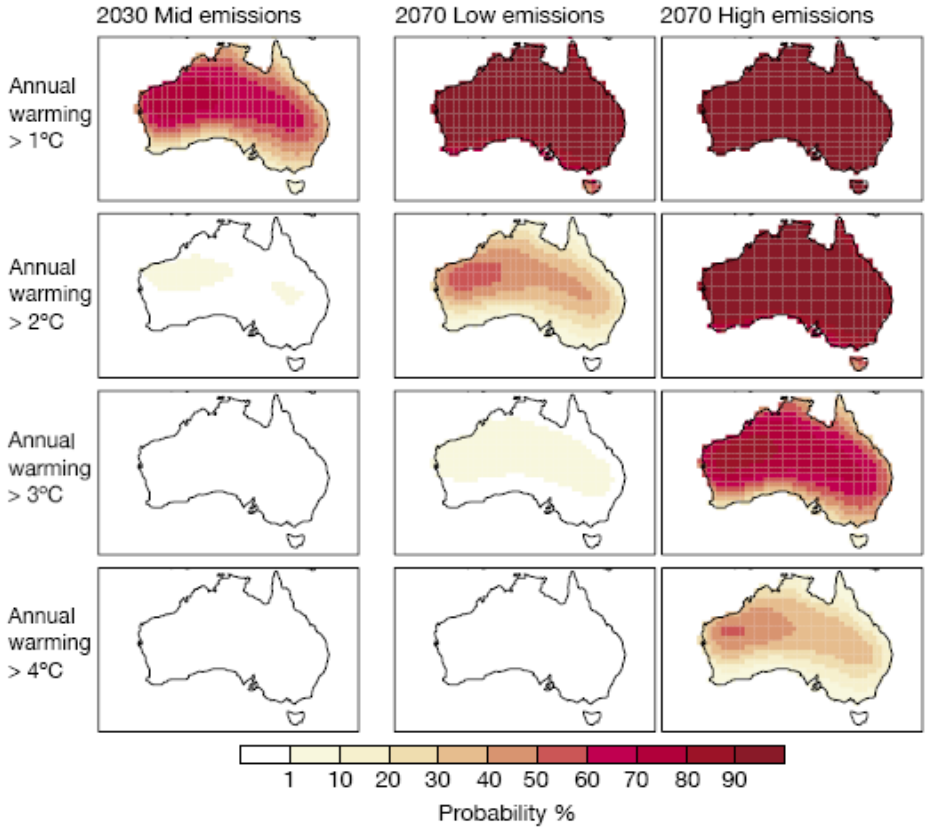
Emergency Situation	Emergency Management and Response Plan
	and assess the situation and plan the response.
High wind	**High wind management plan** The objective of this plan is to identify actions that need to be undertaken for immanent high wind in order to make the situation safe. The plan will assess particular risks in the event of high wind, devise the methods of monitoring for high wind and formulate trigger action responses.
Rainfall	**Storm response management plan** The objective of this plan is to identify actions that need to be undertaken in the event of heavy rain and storms 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. an all weather road may be specified if a particular action requires driving to check a river level.
Flooding	**Flood management plan** The objective of this plan is to identify actions that need to be undertaken for immanent flooding in order to make the situation safe. A flood management area is defined by an area which falls within the 1% AEP flood level. As part of flood management, flood studies will be completed to complement available flood history data. The plan will assess particular risks in the event of flooding, devise the methods of monitoring for potential flooding and formulate trigger action responses [5].
Mine Rescue	**Mine rescue plan** The objective of this plan is to identify actions that need to be undertaken in an event requiring mine rescue to develop controls and procedures for ensuring a safe response. Furthermore, the plan will include: • Water reticulation and communication arrangements; • The location of each entry into the mine; • The location of ventilation fan installations; • Access roads to mines infrastructure; • Each surface installation, administration building and other infrastructure; • Ventilation control devices; • Atmospheric monitoring sites, stations and sampling lines;

Emergency Situation	Emergency Management and Response Plan
	• Gas drainage ranges and drainage boreholes; • Stored pressure vessels; • The location and type of refuges; • The location and contents of caches of self-rescuers; • The direction of the ventilating air currents; and, • Primary escapeways. In an emergency, sufficient copies of the plan will be available for use by the mines rescue team

24.3.6 Implications of Climate Change

By 2030, Queensland's annual average temperatures are projected to increase by approximately 0.9 °C in coastal areas and approximately 1.1 °C inland, relative to the climate of recent decades. Warming by 2070 depends heavily on the level of greenhouse gas emissions from now into the future. Therefore, by 2070, annual average temperatures are projected to increase by about 1.7 °C across the state for a low emissions scenario and by about 3 °C for a high emissions scenario (Commonwealth Scientific and Industrial Research Organisation [CSIRO], 2007). Predicted temperature levels are presented on Figure 24-2.

Figure 24-2: Predicted temperature levels due to climate change*

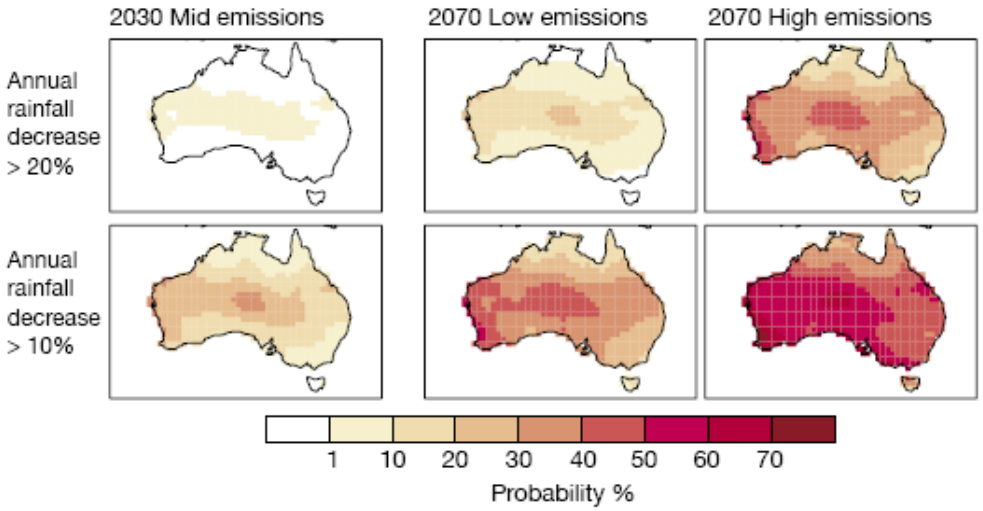


Source: *Climate Change in Australia Technical Report 2007*, vol 4, p49-10 (CSIRO, 2007),

Queensland projections include a tendency for less rainfall, increased evaporation, more severe droughts, an increase in extreme daily rainfall when it does rain, sea-level rises, more intense tropical cyclones and an increased risk of storm surge. Rainfall in winter and spring is likely to decrease in central Queensland; however, changes in summer and autumn rainfall are less certain. Annual rainfall predictions are presented on Figure 24-3.

Potential evaporation from soils, water and vegetation is projected to increase over Queensland. Irrespective of changes in rainfall, increased evaporation will result in an increase in aridity and the severity of droughts. Increased intensity of tropical cyclones in the Queensland region is likely, but total numbers of cyclones may decrease. Storm surge risk is also projected to increase from sea-level rise and increased cyclone intensity.

Figure 24-3: Predicted annual rainfall due to climate change*



Source: *Climate Change in Australia Technical Report 2007*, vol 4, p49-10 (CSIRO, 2007),

The information gathered from the Intergovernmental Panel on Climate Change (IPCC) (CSIRO, 2007) describes an increase in vulnerability within the Project area, which may affect the operating, maintenance and decommissioning phases. The predicted increase in temperature, coupled with reduced rainfall and increased evaporation, raises the risk of bushfire, although the projected increase in aridity would largely offset the bushfire frequency increase by reducing the available fuel load and associated fire intensity.

The increase in wind due to cyclones will not significantly increase the risk of structural overloading for infrastructure and buildings due to the inland Project location. The predicated higher daily rainfall intensity is to be mitigated through the design and construction of flood levees.