

ENVIRONMENTAL IMPACT STATEMENT

RED HILL
MINING LEASE

Section 20
Health, Safety and Risk

Section 20 Health, Safety and Risk

20.1 Overview

The Red Hill Mining Lease is located adjacent to the existing Goonyella, Riverside and Broadmeadow (GRB) mine complex in the Bowen Basin, approximately 20 kilometres north of Moranbah and 135 kilometres south-west of Mackay, Queensland.

BHP Billiton Mitsubishi Alliance (BMA), through its joint venture manager, BM Alliance Coal Operations Pty Ltd, proposes to convert the existing Red Hill Mining Lease Application (MLA) 70421 to enable the continuation of existing mining operations associated with the GRB mine complex. Specifically, the mining lease conversion will allow for:

- An extension of three longwall panels (14, 15 and 16) of the existing Broadmeadow underground mine (BRM).
- A future incremental expansion option of the existing Goonyella Riverside Mine (GRM).
- A future Red Hill Mine (RHM) underground expansion option located to the east of the GRM.

The three project elements described above are collectively referred to as 'the project'.

This section assesses the potential health, safety, and risk issues associated with the project construction, operation, and decommissioning phases. Potential risks of the project to health and safety of project employees, the public and the environment are assessed, and controls and mitigation strategies are outlined where appropriate.

In relation to potential risks to the health and safety of employees, a high level assessment only is provided. The *Coal Mining Safety and Health Act 1999* (CMSH Act) places strict obligations on coal mine operators to ensure that the risk to coal mine workers is at an acceptable level. This requires comprehensive hazard identification and preparation of health and safety risk management procedures which are beyond the scope of this study.

20.2 Legislation and Policies

20.2.1 Legislative Compliance

The principal legislative and regulatory requirements relevant to hazard identification, risk assessment and health and safety relate to:

- the CMSH Act;
- Coal Mine Safety and Health Regulation 2001 (CMSH Regulation);
- *Transport Infrastructure Act 1994*; and
- Australian Dangerous Goods Code 2008 (ADG Code) (DIT 2008).

The relevant legislation for the project and how compliance will be achieved are described in **Table 20-1**.

Table 20-1 Relevant Legislation, Guidelines and Australian Standards

Relevant Document	Legislative Requirements	Compliance
CMSH Act CMSH Regulation	Sets obligations for the operator, designer, constructor, contractors and others on a coal mine.	Undertake the requirements in the Act, Regulation and standards and by applying due diligence and taking reasonable precautions.
Safety and health management system (SHMS) of the coal mine site	Execution of site works must be completed under the governance of the SHMS.	Execution of site works will be completed under the governance of the SHMS.
<i>Work Health and Safety Act 2011</i> Work Health and Safety Regulation 2011	This Act applies to the operation or use of high risk plant, and storage and handling of dangerous goods even if the plant and/or dangerous goods are not at a workplace or for use in carrying out work.	Coal mines are exempt from this Act, but are regulated under the CMSH Act and CMSH Regulation. This Act would apply to any work activities outside the mining lease.
<i>Radiation Safety Act 1999</i>	Sets the requirements for handling radioactive substances and the monitoring of persons exposed to the hazard.	Undertake the requirements of the regulations as stated including radiation monitoring and screening as required. Coal mine regulations require that a coal mine have a standard operating procedure (SOP) for radioactive substances which forms part of the SHMS, which will be followed for execution of works on the coal mine site.
<i>Explosives Act 1999</i> and Australian Standard (AS) 2187 <i>Explosives—Storage, Transport and use</i>	The Act sets out the requirements for the handling, storage, transport and manufacture of explosives. The Australian Standard is called up by the CMSH Regulation.	Undertake storage and handling of explosive materials / substances in accordance with the requirements of the <i>Explosives Act 1999</i> . Execution of site works will be completed under the governance of the safety and health management system (SHMS).
National Occupational Health and Safety Commission National Standard for the Control of Major Hazard Facilities	The objective of this standard is to prevent major accidents and near misses and to minimise the effects of any major accident and near miss.	
ADG Code (DIT 2008)	The code lists all provisions applicable to the transport of dangerous goods.	
AS 1678.5.1.002-1998 <i>Emergency procedure guide - Transport - Ammonium nitrate</i>	This standard details the requirements for transporting ammonium nitrate.	Suppliers transporting ammonium nitrate to the project will be required to comply.

Relevant Document	Legislative Requirements	Compliance
AS 1940-2004 <i>The storage and handling of flammable and combustible liquids</i>	The standard details the separation distances and considerations for storing flammable and combustible liquids.	Undertake the storage and handling of flammable and combustible liquids in accordance with the standard.
AS 2436-2010 <i>Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites</i>	This standard details the measures that can be implemented if required to manage noise levels during construction. Measures may also be applicable to mobile plant and equipment during operations.	Utilise these measures if required to address occupational noise levels, or in response to noise complaints.
AS/ New Zealand Standards (NZS) 3000 <i>Wiring Rules: Electrical installations</i>	This standard details the measures to be implemented when conducting electrical installations.	Electrical wiring will be conducted as per the standard.
<i>Transport Infrastructure Act 1994</i>	This Act provides for and encourages effective integrated planning and efficient transport infrastructure management.	Adhere to requirements that govern the use of public roads, in accordance with State regulations.
Transport Infrastructure (State-controlled Roads) Regulation 2006	This details traffic regulations and requirements relating to ancillary works and encroachments on state roads.	
<i>National Gas (Queensland) Act 2008</i> applies the <i>National Gas Law and National Gas Rules</i> in Queensland	The gas laws and rules regulate third-party access to natural gas pipelines and establishes the short term trading market and a bulletin board for information on natural gas services.	Any possible management of incidental mine gas (IMG) to third parties will be compliant to this legislation.
<i>Petroleum and Gas (Production and Safety) Act 2004</i>	Regulates the technical and safety aspects of gas production, transmission, distribution and use and deals with licensing of gas transmission pipelines.	IMG will be managed during the mining operations through the SHMS for the coal mine. This will ensure an acceptable level of risk taking into consideration the requirements under the <i>Petroleum and Gas (Production and Safety) Act 2004</i> (sections 675 and 388).

20.2.2 BHP Billiton Mitsubishi Alliance Safety and Risk Management

BMA will implement the BHP Billiton Group Level Documents (GLD) that are currently in use at all BMA operations and provide the basis for effective management of employee and public health and safety. The GLD on risk management focuses on the management of material risk issues across the business. These include extreme and high risks to workers, the community and environment, which are managed at a corporate level. Lower level risks are also managed at a site or project level through preparation of site based safety and health management plans and environmental management plans.

BHP Billiton has developed fatal risk controls aimed at seven risk areas with potentially fatal consequences; vehicles and mobile equipment, explosives and blasting, ground control, hazardous materials, isolation and permit to work, work at heights and lifting operations (BHP Billiton 2011). BMA has also developed seven life-saving rules based on potentially fatal aspects of operations:

1. Apply a personal isolation lock, tag and test before working on equipment.
2. Protect yourself against a fall and falling objects if working above 1.8 metres, within 2 metres of an edge and before approaching highwalls, low walls, and operating faces.
3. Never stand, walk or work under a suspended load or an unsupported roof (underground).
4. Use safety protection devices correctly, without interference.
5. Establish positive contact with operating heavy equipment before approaching.
6. Park equipment securely so that it cannot move in an uncontrolled way.
7. Only operate equipment for which you are trained, assessed and authorised.

BMA's commitment to health, safety, environment and community is demonstrated in the BMA Charter which includes a commitment to '*putting health and safety first, being environmentally responsible and supporting our communities*' (refer to **Appendix R**).

20.3 Description of the Proposed Development

Aspects which may be associated with additional hazards to the health and safety of the workforce or the community or to the environment occur in all three project phases of the RHM underground expansion option as described below:

Construction Phase

- transport of personnel, equipment and materials to and from site (including air travel);
- transport, storage and use of dangerous goods on site;
- construction of surface and underground infrastructure;
- clearing vegetation, stripping and removal of soil;
- equipment maintenance;
- plant and equipment commissioning;
- construction of mine buildings, accommodation facilities and infrastructure;
- water, waste, chemical and oil handling, storage and management activities;

- drilling and blasting for mine access;
- construction or upgrading of waste water treatment plants and potable water treatment plants;
- transport of regulated waste off site; and
- installation of IMG management infrastructure.

Operational Phase

- transport of mine personnel, equipment and materials to and from site (including air travel);
- transport, storage and use of dangerous goods on site;
- equipment maintenance;
- coal removal using underground longwall mining;
- coal handling, stockpiling and preparation;
- subsidence of land surface;
- water management, including water storages;
- IMG management, flaring, storage and transport;
- goaf gas infrastructure installation and goaf gas removal;
- rejects and dewatered tailings disposal;
- sewage treatment;
- remote workforce impacts on local services, such as doctors, hospitals, ambulances, medicine supplies; and
- subsidence adaptive management, such as erosion control and rehabilitation earthworks.

Decommissioning Phase

Once mining operations have completed the planned coal extraction, the mine and associated infrastructure will be decommissioned. The surface may require minor earthworks to achieve the final desired landform and the disturbed area revegetated as discussed in **Section 5.4**.

Activities undertaken during this phase, which may be considered a health and safety risk, will include:

- ensuring final landforms and agreed structures are safe;
- reshaping subsidence depressions (where required) to achieve the final agreed landform;
- applying agreed rehabilitation measures such as shaping, top soiling and revegetating remaining areas;
- decommissioning and removing mine infrastructure from the site, including conveyors, coal handling and preparation plant (CHPP) equipment and structures, coal load-out systems, an on site gas fired power station (if constructed) and IMG pipelines, and potable water and sewage pipelines; and
- IMG management – removal of surface infrastructure including the backfilling of holes, final revegetation of drill pads, access tracks and utility corridors.

Negotiations will be undertaken with government and landholders at the time to determine which infrastructure will remain and which infrastructure will be decommissioned and removed.

20.4 Dangerous Goods and Hazardous Substances

There are hazards for the project associated with the storage and handling of dangerous goods and hazardous substances utilised during construction, mining and coal handling and processing. The project will use fuels and chemicals which are classified as dangerous goods. The project will also use a number of hazardous substances, which are managed in accordance with BMA standard operating procedures that are based on National Occupational Health and Safety Council guidelines and a risk management approach. Transport of dangerous goods is covered by the Australian Code for the Transport of Dangerous Goods by Road and Rail.

Table 20-2 lists the principal fuels and other chemicals that may be used on site by name, classification, raw and storage concentration, UN number and packaging group. Chemicals that will be used on site in large volumes but are not classed as dangerous goods are also included in **Table 20-2**, to provide a complete description of the chemical usage on site.

Blasting will not involve the use of ammonium nitrate. A small number of detonators and packaged explosives will be used, where necessary, during the construction and operational phases of the project.

Table 20-2 Indicative List of Dangerous Goods and Hazardous Substances to Potentially be Used On Site during Construction and Operation

Chemical Name/ Shipping Name	DG Class	Raw conc. (wt%)	Storage conc. (wt%)	UN Number	Packaging Group	Purpose/ Use
Diesel fuel	3 (Class C1) ¹	N/A	N/A	1202	III	Fuel for mobile equipment
Lubrication oils (hydraulic oil) - solsenic fluid/emulsion	3 (Class C2) ²	N/A	N/A	N/A	N/A	Lubricate plant and equipment
Caustic soda (sodium hydroxide)	8	50	50	1823	II	Concrete degreasing agent
Flotation agents (methyl isobutyl carbinol)	3	99.5	99.5	2053	III	CHPP
Anionic flocculants (acrylamide / acrylate copolymer)	N/A	99.5	10	N/A	N/A	CHPP
Cationic flocculant (polydimethyl diyl ammonia chloride)	N/A	40	40	N/A	N/A	CHPP
Sodium Hypochlorite	8	12	12	1791	II or III	Water treatment plant Sewage treatment plant

Chemical Name/ Shipping Name	DG Class	Raw conc. (wt%)	Storage conc. (wt%)	UN Number	Packaging Group	Purpose/ Use
Sodium Hydroxide	8	10	10	1824	II or III	Water treatment plant Sewage treatment plant
Aluminium sulphate	N/A	40	40	N/A	N/A	Water treatment plant Sewage treatment plant
Citric acid	N/A	95	95	N/A	N/A	Water treatment plant
Powdered activated carbon	N/A	100	100	N/A	N/A	Water treatment plant
Powdered polymer (cationic polyacrylamide)	N/A	100	100	N/A	N/A	Water treatment plant
Lime (calcium oxide)	8	100	100	1910	III	Water treatment plant
Solvents (e.g. acetone)	3	99.5	99.5	1090	II	Workshop degreasing agent
Sulphuric acid	8	15-51	15-51	2796	II	Batteries
Paints	3	N/A	N/A	1263	III	Paint

Note 1: Class C1 – a combustible liquid that has a flashpoint of 150°C or less.

Note 2: Class C2 – a combustible liquid that has a flashpoint exceeding 150°C.

20.4.1 Construction Phase

Table 20-3 provides an indicative list of dangerous goods and hazardous substances and materials that may be used during construction and estimates of the rate of use and maximum amount of the goods/substances likely to be stored within existing facilities within GRB mine complex, or at the Red Hill construction sites during construction.

The physical properties of these materials are presented in **Table 20-2**. Material safety data sheet (MSDS) information will be obtained and communicated to all site personnel involved in the storage, handling, use and disposal of dangerous goods and hazardous substances. The MSDS information will also be available in relevant lunchrooms and offices. An MSDS register will be maintained on site during construction.

Table 20-3 Indicative Usage of Dangerous Goods and Hazardous Substances, Construction

Chemical Name / Shipping Name	Rate of Use	Indicative Maximum Inventory
Diesel fuel	36,000 L/day - peak	1 ML
Lubrication oils (hydraulic oil)	5,000 L/year	1,000 L
Hypochlorite solution (liquid chlorine)	200 L/month	400 L

20.4.2 Operational Phase

Table 20-4 provides an indicative list of dangerous goods and hazardous substances and materials that may be stored and handled on site during operation and the estimated rate of use and maximum amount of the goods/substances likely to be stored within existing facilities within GRB mine complex, or at the RHM sites during operation.

The physical properties of these materials are presented in **Table 20-2**. MSDS information will be obtained and communicated to all site personnel involved in the storage, handling, use and disposal of dangerous goods and hazardous substances. The MSDS information will also be available in relevant lunchrooms and offices. An MSDS register will be maintained on site during operation.

Table 20-4 Indicative Usage of Dangerous Goods and Hazardous Substances, Operations

Chemical Name / Shipping Name	Rate of Use	Indicative Maximum Inventory
Diesel fuel oil	4 ML/annum	1 ML
Lubrication oils (hydraulic oil)	900 kL/annum	200 kL
Sodium hypochlorite	100 kg/annum	2,000 L
Sodium hydroxide	100 kg/annum	1,000 L
Caustic soda (sodium hydroxide)	100 kg/annum	2,000 L
Aluminium sulphate	500 kg/annum	2,000 L
Citric acid	125 kg/annum	500 L
Powdered activated carbon	25 kg/annum	200 kg
Powdered polymer (cationic polyacrylamide)	25 kg/annum	200 kg dry
Lime (calcium oxide)	50 kg/annum	500 kg
Ozone	N/A	Not stored on site – generated and consumed as part of the water treatment process
Lime (calcium oxide)	120 kg/annum	20 kg
Caustic soda (sodium hydroxide)	480 kg/annum	500 kg
Flotation agents (methyl isobutyl carbinol)	6 L/min	20,000 L
Anionic flocculants (acrylamide /acrylate copolymer)	5 L/min	15,000 L
Cationic flocculant (polydimethyl diyl ammonia chloride)	0.1 L/min	2,000 L
Solvents (e.g. acetone)	480 L/annum	200 L
Acids (e.g. sulphuric)	720 L/annum	500 L
Hypochlorite solution (liquid chlorine)	<5,000 L/annum	500 L

As indicated in **Table 20-4**, by far the largest quantity and highest use of dangerous goods/hazardous substances will involve diesel fuel.

20.4.3 Concentration of Raw Materials

Dangerous goods and hazardous substances will be acquired from BMA approved manufacturers and suppliers. MSDS will be developed specific to the raw concentration of goods/substances acquired for the project. The concentration of goods/substances stored on site is unlikely to change during storage. Some goods/substances may be diluted prior to use to concentrations recommended by the manufacturer, in order to attain optimum efficacy. It is unlikely that the concentration of any dangerous good or hazardous substance will be increased during storage.

20.5 Project Risk Assessment

20.5.1 Method

This section presents the assessment method and results for the hazards and risks assessment conducted for the project. The potential hazards and risks were identified through the use of a preliminary hazard analysis (PHA), in line with the BHP Billiton Group Level Document (GLD) 017 Risk Management. The PHA took into consideration the AS/NZS ISO 31000:2009 *Risk management – Principles and guidelines* and IEC / ISO 31010 *Risk management – Risk assessment techniques*.

The PHA was carried out in accordance the New South Wales 'Hazardous Industry Planning Advisory Paper 6: Hazard Analysis (Consultation Draft) 2008' (DoP 2008) and the probability criteria matrix technique detailed in the IEC / ISO 31010 *Risk management – Risk assessment techniques*. Further, the PHA was carried out based on BMA experience with construction and operational projects for coal mines and is in accordance with BHP Billiton's overarching guidance information, the GLDs.

The assessment outlines the implications for, and the impact on, the surrounding land uses. The PHA incorporates:

- relevant hazards (minor and major);
- the possible frequency of the potential hazards, accidents, spillages and abnormal events occurring;
- indication of cumulative risk levels to surrounding land uses;
- life of any identified hazards;
- the effects and rate of usage of the dangerous goods and hazardous substances to be used, stored, processed or produced by the project, as presented in **Table 20-3** and **Table 20-4**; and
- the type of machinery and equipment used.

Potential incident scenarios during the project were identified through consideration of:

- The range of activities carried out and facilities present during the construction, operation, and decommissioning phases. These included construction activities, energy supply, coal mining, transport, and waste water management.
- The range of potentially hazardous incidents that might be associated with each of the activities/facilities identified in association with the project.

The identification of hazards was conducted using a prompt list, as detailed below.

- animal;
- biological;
- chemical;
- electrical;
- falling objects;
- falls, slips and trips;
- fire and explosion;
- kinetic;
- manual handling;
- mechanical;
- noise;
- proximity;
- pressure;
- radiation;
- temperature;
- vibration;
- ultra-violet radiation;
- interface;
- sharp;
- vacuum;
- dust, fume, vapour;
- stressors; and
- confined spaces.

Having identified the range of hazards potentially occurring as a result of project activities, the following matters were considered for each hazard:

- Appropriate controls and mitigation factors expected to be put in place for the management of each hazard. These may include prevention and response measures.
- The consequences of each of the hazardous incidents if they were to occur. Consequences might include direct impacts of incidents and the potential for propagation and secondary incidents. Assessment of the severity of the consequences takes into consideration the proposed controls.
- Possible causes and the probability of these causes occurring and leading to the hazardous incident. The probability of each hazardous incident occurring takes into consideration the proposed controls. This information was then tabled to prioritise the risks and evaluate these levels against the concept of practicable.
- Where an extreme or high risk was identified, appropriate controls and mitigation measures were identified and the hazardous incident reassessed with these controls in place.

20.5.2 Risk Analysis Criteria

A likelihood of occurrence was assigned to each identified hazardous incident based on definitions described in **Table 20-5**. The contribution of preventative and protective management controls were taken into account when assessing the likelihood of occurrence and potential consequence from each hazardous incident. The probability of occurrence used for this risk assessment is based on the then AS 4360-2004 *Risk Management*. The risk levels denote residual risk.

The consequences assessed include both threats to health and safety of the public and the workforce and to the natural environment based on definitions shown in **Table 20-6**. Where a hazardous incident may have several outcomes, each potential outcome was assessed in turn. The severity classes for health and safety type outcomes are based on the then AS 4360-2004 *Risk Management*, while those for the threat to the natural environment are based on common environmental risk management consequence categories.

Table 20-5 Likelihood of Occurrence for Hazardous Incidents

Likelihood Rank	Descriptor	Description
A	Almost certain	80% chance of occurring; may occur more than once per year; happens often
B	Likely	50% chance of occurring; may occur once in a few years; easily happens
C	Possible	20% chance of occurring; may occur once in 5 years; has happened before
D	Unlikely	10% chance of occurring; may occur once in 10 years; is considered possible
E	Rare	2% chance of occurring; may occur once in 50 years; is considered conceivable

Table 20-6 Consequence Classes for Public / Workforce Safety and Environmental Impact

Consequence Rank	Descriptor	Public / Workforce Health and Safety	Environmental Severity
5	Catastrophic	Multiple fatalities (2-20), or significant irreversible effects to >50 persons	Unplanned serious or extensive impact on ecosystem or threatened species.
4	Major	Single fatality or severe irreversible disability (>30%) to one or more persons	Unplanned major impact on ecosystem or threatened species.
3	Moderate	Moderate irreversible disability or impairment (<30%) to one or more people. Days lost.	Unplanned moderate impact to ecosystem or non-threatened species.
2	Minor	Objective but reversible disability/impairment. Medical treatment injury.	Unplanned minor impact to non-threatened species or their habitat.
1	Insignificant	Low level short-term inconvenience or symptoms. Not medical treatment.	Unplanned low level environmental impact.

The shading in the risk matrix at **Table 20-7** refers to qualitative bands of risk level in accordance with Appendix E of AS 4360-2004 *Risk Management* and the probability criteria matrix technique included in the IEC / ISO 31010 *Risk management – Risk assessment techniques*.

Table 20-7 Risk Assessment Matrix

		Consequence				
		1	2	3	4	5
Likelihood	A	High	High	Extreme	Extreme	Extreme
	B	Moderate	High	High	Extreme	Extreme
	C	Low	Moderate	High	Extreme	Extreme
	D	Low	Low	Moderate	High	Extreme
	E	Low	Low	Moderate	High	High

20.5.3 Hazard Identification and Assessment

The potential incident scenarios for the construction, operation and decommissioning phases of this project are outlined in **Table 20-8**, **Table 20-9** and **Table 20-10**. These include potential hazards and proposed controls for these hazards. The risk assessment is based on residual risk, that is, the remaining risk taking into account the proposed controls. The risk assessment results also assume that existing legal requirements, for example, in relation to road rules, are complied with.

The assessed risks are residual risks assuming that the proposed controls are in place. Health and safety risks include risks to members of the community and also risks to workers involved in the construction and mining activities. Environmental risks are also included.

Table 20-8 Risk Assessment Table (Residual Risk), Construction Phase

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	R	C	L	R	C	L	R
1. Traffic incidents off site - movement of heavy equipment to site, construction and public vehicle interactions.	1. Traffic management plan.	2	D	Low	4	D	High	4	D	High
	2. Police escorts for overdimensional vehicle movements and public notices about overdimensional vehicle movements.									
	3. BMA defensive driver training for all persons (employees and contractors) driving on public roads while undertaking project related activities.									
	4. Use of buses for workforce commuting.									
	5. BMA fatigue management requirements.									
	6. BHP Billiton fatal risk controls.									
2. Traffic incidents on site - heavy and light vehicle and	1. Traffic management plan including exclusion zones, separation of construction/operation and heavy/light vehicle routes.	3	D	Mod	4	D	High	NA	NA	NA

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	R	C	L	R	C	L	R
pedestrian interactions, construction and existing mine operation interactions, fuel spill.	2. Safety inductions and competency based driving assessment for workers.									
	3. Speed controls for site.									
	4. Radio communication protocols to warn of oncoming vehicles and hazards.									
	5. BMA fatigue management requirements.									
	6. BHP Billiton fatal risk controls.									
3. Construction activity hazards – use of cranes and heavy equipment, working at heights, electrical and mechanical equipment, use of dangerous goods, fires and explosions, excavation and trenching.	1. Construction planning – separation of incompatible activities, exclusion zones.	NA	NA	NA	4	D	High	NA	NA	NA
	2. Storage and handling of dangerous goods in accordance with Australian Standards.									
	3. Site safety procedures, lifting plans, job safety analyses.									
	4. Experienced supervision.									
	5. Safety harnesses and personal protection equipment (PPE).									
	6. Safety inductions and competency based assessment for all project workforce (including contractors) operating machinery.									
	7. Equipment inspection and selection.									
	8. Contractor and supplier selection.									
	9. Emergency response procedures, equipment and training.									
	10. BMA fatigue management procedures.									
	11. BHP Billiton fatal risk controls.									
4. Manual handling – injury caused by poor or incorrect manual handling.	1. Basic manual lifting education, weight limitations, and ergonomic surveys.	NA	NA	NA	2	C	Mod	NA	NA	NA
	2. Safe spine exercising regime.									
	3. Supply sufficient mechanical aids on site.									
5. Spills / leaks of fuel, oil, chemicals or liquid wastes off-site.	1. Placarding of dangerous goods loads.	3	D	Mod	2	D	Low	2	D	Low
	2. Transport in accordance with the Australian Dangerous Goods Code.									
	3. Engage authorised waste contractors.									

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	R	C	L	R	C	L	R
6. Spills / leaks of fuel, oil, chemicals or liquid wastes on-site.	1. Refuelling and storage facilities in designated areas fitted with spill containment.	3	D	Mod	2	C	Mod	NA	NA	NA
	2. Storage and handling in accordance with Australian Standards.									
	3. Engage licensed waste contractors.									
	4. Emergency response procedures, equipment and training.									
7. Underground drift construction – inadequate ventilation, blasting, water in-rush, caving / roof stability, spontaneous combustion / fire.	1. Requirements of CSMH Act are met.	NA	NA	NA	4	E	High	NA	NA	NA
	2. Detailed safety hazard assessment.									
	3. Preparation of health and safety management plan and procedures.									
	4. Geotechnical investigation, design and controls.									
	5. Gas drainage prior to drift construction commencing.									
	6. Gas ventilation, monitoring and alarm system.									
	7. Hazard management plan and safe working procedures.									
	8. Emergency response procedures, equipment and training.									
	9. BHP Billiton fatal risk controls.									
8. Gas drainage during construction – uncontrolled gas leak, fire and explosion. Working on active high pressure gas pipeline – uncontrolled gas leak, fire and explosion.	1. Bore / reticulation construction standards, experienced supervision.	NA	NA	NA	4	E	High	3	E	Mod
	2. Gas monitoring and alarm system.									
	3. Hazard management plan and safe working procedures.									
	4. Emergency response procedures, equipment and training.									
	5. BHP Billiton Fatal Risk Controls.									
	6. Engage qualified / experienced contractors.									
	7. Undertake works in accordance with approval/requirements of pipeline owner.									
	8. Hazard management plan and safe working procedures, including permit to excavate.									

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	R	C	L	R	C	L	R
9. Accommodation area activities – occupational health hazards, hygiene, use of dangerous goods, fire / explosion, security.	1. Storage and handling of dangerous goods in accordance with Australian Standards.	NA	NA	NA	3	D	Mod	NA	NA	NA
	2. Site security provided as required.									
	3. Catering and waste collection provided in accordance with health standards and regulations.									
	4. Emergency response procedures, equipment and training.									
10. Dust exposure from construction activities	1. Water trucks to suppress dust.	1	C	Low	2	C	Mod	1	E	Low
	2. Speed limits.									
	3. Rehabilitation of disturbed areas.									
11. Noise exposure from construction activities.	1. Construction works undertaken in accordance with Work Health and Safety Qld Noise Code of Practice.	1	D	Low	2	D	Low	1	E	Low
	2. Plant and vehicles maintained in accordance with manufacturers' specification.									
	3. PPE.									
12. Unauthorised clearing and surface disturbance.	1. Permit to disturb procedure.	3	D	Mod	NA	NA	NA	NA	NA	NA
	2. Staff induction.									
13. Flooding of the mine industrial area (MIA) and underground works from the Isaac River, contamination of flood waters.	1. Emergency management plan.	3	D	Mod	3	E	Mod	NA	NA	NA
	2. Development of levee(s).									
	3. Hazard management plan and safe working procedures.									
	4. Weather monitoring, flood warning systems.									

Note: C – consequence; L – likelihood; R – risk ranking; Mod – moderate; Ext – extreme; NA – non-applicable.

Table 20-9 Risk Assessment Table, Operational Phase

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	C	L	R	R	C	L	R
1. Traffic incidents off site - movement of heavy equipment to	1. Traffic management plan.	3	D	Mod	4	D	High	4	D	High
	2. Police escorts for overdimensional vehicle movements and public notices about overdimensional vehicle movements.									

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	C	L	R	R	C	L	R
site, mine and public vehicle interactions, fuel spill.	3. BMA defensive driver training for all persons (employees and contractors) driving on public roads while undertaking project related activities.									
	4. Visitors will be escorted when on site at all times.									
	5. Use of buses for workforce commuting.									
	6. BMA fatigue management requirements.									
	7. Transport of dangerous goods in accordance with ADG Code.									
2. Traffic incidents on site – heavy and light vehicle and pedestrian interactions, underground vehicle interactions, use of mobile equipment, construction and existing mine operation interactions, fuel spill.	1. Safety inductions and competency based driving assessment for workers.	3	D	Low	4	D	High	NA	NA	NA
	2. Speed controls for site.									
	3. Radio communication protocols to warn of oncoming vehicles and hazards.									
	4. BMA fatigue management requirements are met.									
	5. Colour and mark vehicles and mobile equipment for adequate visibility and easy identification at a safe distance by other vehicles, mobile equipment and pedestrians.									
	6. Provide safe access and egress, including emergency egress, from mobile equipment.									
	7. Provide suitable walkways, handrails or other safe systems of work for operation and maintenance of components where there is a potential to fall two or more metres, or where a fall could result in a significant incident.									
	8. BHP Billiton fatal risk controls.									
3. Operation activity hazards, use of heavy equipment, working at heights, moving equipment, electrical and mechanical equipment, use of dangerous goods, fires and explosions.	1. Operational planning – separation of incompatible activities, exclusion zones.	NA	NA	NA	4	E	High	NA	NA	NA
	2. Storage and handling of dangerous goods in accordance with Australian Standards.									
	3. Site safety procedures, lifting plans, job safety analyses.									
	4. Experienced supervision.									
	5. Safety harnesses and PPE.									
	6. Safety inductions and competency based assessment for workers.									

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	C	L	R	R	C	L	R
	7. Equipment inspection and selection.									
	8. Contractor and supplier selection.									
	9. Emergency response procedures, equipment and training.									
	10. Protection / guards on moving parts – conveyor.									
	11. BHP Billiton fatal risk controls.									
4. Manual handling – injury caused by poor or incorrect manual handling.	1. Basic manual lifting education, weight limitations, and ergonomic surveys.	NA	NA	NA	2	C	Mod	NA	NA	NA
	2. Safe spine exercising regime.									
	3. Supply sufficient mechanical aids on site									
5. Spills / leaks of fuel, oil, chemicals or liquid wastes off-site.	1. Placarding of dangerous goods loads.	3	D	Mod	2	C	Mod	2	D	Low
	2. Transport in accordance with ADG Code.									
	3. Engage authorised waste contractors.									
6. Spills / leaks of fuel, oil, chemicals or liquid waste on site.	1. Refuelling and storage facilities in designated areas fitted with spill containment.	3	E	Mod	2	C	Mod	NA	NA	NA
	2. Storage and handling in accordance with Australian Standards.									
	3. Engage licensed waste contractors.									
	4. Emergency response procedures, equipment and training.									
7. Underground mining – inadequate ventilation, blasting, water in-rush, caving / roof stability, spontaneous combustion / fire, gas outburst.	1. Requirements of CSMH Act are met.	NA	NA	NA	4	E	High	NA	NA	NA
	2. Detailed safety hazard assessment.									
	3. Preparation of health and safety management plan and procedures.									
	4. Geotechnical investigation, design and controls.									
	5. Gas drainage ahead of mining.									
	6. Gas ventilation, monitoring and alarm system.									
	7. Fire resistant equipment.									
	8. Armoured conveyors / equipment.									
	9. Hazard management plan and safe working procedures.									
	10. Emergency response procedures, equipment and training.									

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	C	L	R	R	C	L	R
	11. BHP Billiton fatal risk controls.									
8. Gas drainage – uncontrolled gas leak, fire and explosion.	1. Bore / reticulation construction standards, experienced supervision.	NA	NA	NA	4	E	High	3	E	Mod
	2. Gas monitoring and alarm system.									
	3. Hazard management plan and safe working procedures.									
	4. Emergency response procedures, equipment and training.									
	5. BHP Billiton fatal risk controls.									
9. Unexpected dam failure – release of mine water.	1. Failure impact assessment.	2	E	Low	3	E	Mod	2	E	Low
	2. Design to 2012 Department of Environment and Heritage Protection dam safety guidelines.									
	3. Annual inspection of dam structure.									
	4. Emergency response plan for referable dams.									
10. Unauthorised mine water discharge off site.	1. Mine water management plan.	2	D	Low	NA	NA	NA	NA	NA	NA
	2. Implement design standards.									
11. Accommodation area activities – occupational health hazards, hygiene, use of dangerous goods, fire / explosion, security.	1. Storage and handling of dangerous goods in accordance with Australian Standards.	NA	NA	NA	3	D	Mod	NA	NA	NA
	2. Site security provided as required.									
	3. Catering and waste collection provided in accordance with health standards and regulations.									
	4. Emergency response procedures, equipment and training.									
12. Dust exposure from mine operations.	1. Water trucks to suppress dust.	1	C	Low	2	C	Mod	1	E	Low
	2. Speed limits.									
	3. Rehabilitation of disturbed areas.									
13. Noise exposure from mine operations.	1. Construction works undertaken in accordance with Work Health and Safety Qld Noise Code of Practice.	1	D	Low	2	D	Low	1	E	Low
	2. Plant and vehicles maintained in accordance with manufacturers' specification.									
	3. PPE.									
14. Unauthorised clearing and surface disturbance.	1. Permit to disturb procedure.	3	D	Mod	NA	NA	NA	NA	NA	NA
	2. Staff induction.									
15. Flooding of the MIA and	1. Emergency management plan.	2	E	Low	2	E	Low	NA	NA	NA
	2. Development of Levee(s).									

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	C	L	R	R	C	L	R
underground works from the Isaac river.	3. Hazard management plan and safe working procedures.									
	4. Weather monitoring, warning systems.									
16. Spontaneous combustion – underground, run-of-mine, and product stockpiles	1. Manage stockpile inventory such that coal does not remain in the stockpile for long periods.	1	D	Low	3	D	Mod	1	E	Low
	2. Minimise air leakage.									
	3. Minimise production of fines.									
	4. Monitor and keep coal temperature as low as possible.									
	5. Use of coal wetting systems to prevent dry coal.									
	6. Stockpile location selection considering wind direction.									

Note: C – consequence; L – likelihood; R – risk ranking; Mod – moderate; Ext – extreme; NA – non-applicable

Table 20-10 Risk Assessment Table, Decommissioning Phase

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	R	C	L	R	C	L	R
1. Traffic incidents off site - movement of heavy equipment to and from site, heavy and public vehicle interactions, fuel spill.	1. Traffic management plan.	3	D	Mod	4	D	High	4	D	High
	2. Police escorts for over-dimensional vehicle movements and public notices about over-dimensional vehicle movements.									
	3. BMA defensive driver training for all persons (employees and contractors) driving on public roads while undertaking project related activities.									
	4. Visitors will be escorted when on site at all times.									
	5 Use of buses for workforce commuting.									
	6. BMA fatigue management requirements are met.									
	7. Transport of dangerous goods in accordance with ADG Code.									
	8. BHP Billiton fatal risk controls.									
2. Traffic incidents on site – heavy and light vehicle and pedestrian interactions, fuel spill.	1. Traffic management plan including exclusion zones, separation of heavy/light vehicle routes.	3	D	Mod	4	D	High	NA	NA	NA
	2. Safety inductions and competency based driving assessment for workers.									
	3. Speed controls for site.									

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	R	C	L	R	C	L	R
	4. Radio communication protocols to warn of oncoming vehicles and hazards.									
	5. BMA fatigue management requirements are met.									
	6. BHP Billiton fatal risk controls.									
3. Decommissioning activity hazards – use of cranes and heavy equipment, working at heights, electrical and mechanical equipment, use of dangerous goods, fires and explosions, excavation and trenching.	1. Decommissioning planning – separation of incompatible activities, exclusion zones.	NA	NA	NA	4	D	High	NA	NA	NA
	2. Storage and handling of dangerous goods in accordance with Australian Standards.									
	3. Site safety procedures, lifting plans, job safety analyses.									
	4. Experienced supervision.									
	5. Safety harnesses and PPE.									
	6. Safety inductions and competency based assessment for workers.									
	7. Equipment inspection and selection.									
	8. Contractor and supplier selection.									
	9. Emergency response procedures, equipment and training.									
	10. BHP Billiton fatal risk controls.									
4. Manual handling – injury caused by poor or incorrect manual handling.	1. Basic manual lifting education, weight limitations, and ergonomic surveys.	NA	NA	NA	2	C	Mod	NA	NA	NA
	2. Safe spine exercising regime.									
	3. Supply sufficient mechanical aids on site.									
5. Site remediation activities – excavation and handling of contaminated materials.	1. Contaminated site investigation.	2	C	Mod	2	C	Mod	NA	NA	NA
	2. Remediation planning and safety procedures.									
	3. Engage licensed contractors.									
	4. PPE.									
6. Spills / leaks of fuel, oil, chemicals or liquid wastes off-site.	1. Placarding of dangerous goods loads.	3	D	Mod	2	C	Mod	2	D	Low
	2. Transport in accordance with ADG Code.									
	3. Engage authorised waste contractors.									

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	R	C	L	R	C	L	R
7. Spills / leaks of fuel, oil, chemicals or liquid wastes on-site – decommissioning of equipment and facilities containing hazardous materials.	1. Pre-demolition hazardous materials survey and stripping/draining from equipment, reticulation, tanks and buildings.	3	D	Mod	2	C	Mod	NA	NA	NA
	2. Dismantling and demolition planning and safety procedures.									
	3. Refuelling and storage facilities in designated areas fitted with spill containment.									
	4. Storage and handling in accordance with Australian Standards.									
	5. Engage experienced demolition contractors and licensed waste contractors.									
	6. Emergency response procedures, equipment and training.									
8. Decommissioning of underground mine – inadequate ventilation, blasting, water inrush, caving / roof stability, spontaneous combustion / fire, gas outburst	1. Gas drainage system.	NA	NA	NA	4	E	High	NA	NA	NA
	2. Gas ventilation, monitoring and alarm system.									
	3. Hazard management plan and safe working procedures.									
	4. Emergency response procedures, equipment and training.									
	5. BHP Billiton fatal risk controls.									
9. Final landform hazards – steep slopes, unstable landform, tension cracks caused by subsidence	1. Final landform will be stable, and not subject to subsidence, slumping or erosion.	NA	NA	NA	3	E	Mod	2	E	Low
	2. Mine plan to include in pit dumping as far as practical.									
	3. Ripping and seeding of subsidence areas where required.									
	4. Clay material will be imported to fill and seal large tension cracks.									
	5. All areas to be seeded with appropriate plant species.									
10. Accommodation village activities – occupational health hazards, hygiene, use of dangerous goods, fire / explosion,	1. Storage and handling of dangerous goods in accordance with Australian Standards.	NA	NA	NA	3	D	Mod	NA	NA	NA
	2. Site security provided as required.									
	3. Catering and waste collection provided in accordance with health standards and regulations.									

Hazards	Proposed Controls	Environment			Worker Health and Safety			Public Health and Safety		
		C	L	R	C	L	R	C	L	R
security.	4. Emergency response procedures, equipment and training.									
11. Dust exposure from decommissioning activities.	1. Water trucks to suppress dust.	1	C	Low	2	C	Mod	1	E	Low
	2. Speed limits.									
	3. Rehabilitation of disturbed areas.									
12. Noise exposure from decommissioning activities.	1. Decommissioning works undertaken in accordance with Work Health and Safety Qld Noise Code of Practice.	1	D	Low	2	D	Low	1	E	Low
	2. Plant and vehicles maintained in accordance with manufacturers' specification.									
	3. PPE.									

Note: C – consequence; L – likelihood; R – risk ranking; Mod – moderate; Ext – extreme; NA – non-applicable.

20.5.4 Risk Assessment – Conclusion

Some hazards outlined in **Table 20-8**, **Table 20-9**, and **Table 20-10** have been identified as high risk, even with controls in place. This is because either significant stored energy is involved, or there may be serious (fatal) consequences. The controls to be implemented can reduce the probability but are less effective at reducing the consequence of these events. BHP Billiton has developed fatal risk controls to address categories of hazard that cannot be otherwise reduced. These areas are:

- vehicles and mobile equipment;
- explosives and blasting;
- ground control, including falls of ground in underground mining;
- hazardous materials;
- isolation of equipment and permits to work systems;
- working at height; and
- heavy lifting operations.

The fatal risk controls highlight measures required to manage these risks, including planning, appropriate equipment and personal protective equipment, procedures and controls and training and competency requirements.

These hazards are common to all underground mining operations and are also subject to the controls contained in the CSMH Act and CSMH Regulation.

Hazard mitigation measures are discussed in more detail in **Section 20.6**.

20.6 Hazard Mitigation Measures

20.6.1 Environmental Hazards and Controls

All identified environmental hazards for the construction, operation, and decommissioning have been tabulated and assessed in **Table 20-8**, **Table 20-9**, and **Table 20-10**, respectively. The tables include the controls to be implemented and the resultant risk rating.

No high residual risks have been identified.

20.6.1.1 Air Quality / Dust

During construction and operation there is the potential for localised dust exposure of vegetation, mostly associated with earthworks for construction activities and IMG management activities. Mitigation measures will be put into place to ensure environmental damage does not occur. These will include:

- water trucks to suppress dust;
- speed limits; and
- rehabilitation of disturbed areas.

Further details on ensuring air quality is not compromised and dust will not cause environmental harm are detailed in **Section 11**.

20.6.1.2 Noise

During construction and operation there is the potential for increased noise levels to impact on fauna utilising habitat adjacent to disturbance areas. This is mostly associated with earthworks for construction activities and IMG management activities. Assessment of noise impacts on fauna in **Section 13** of the environmental impact statement (EIS) did not identify any that noise levels would be such that particular measures were required to address impacts on fauna.

20.6.1.3 Chemical, Fuel, and Oil Storage and Handling

During construction and operation there is the risk that spills and leaks of fuel, oil, chemicals or liquid wastes both on and off site may impact on environmental values including soils and surface water quality. Mitigation measures are required to minimise the likelihood of spills and leaks occurring, and to respond to any spills and leaks to minimise consequences of spills in terms of degradation of environmental values. These will include:

- transport of dangerous goods in accordance with the ADG Code (DIT 2008) requirements;
- engaging authorised waste contractors for the transport of waste from site to a licenced waste disposal site;
- refuelling and storage facilities in designated areas fitted with spill containment;
- storage and handling in accordance with Australian Standards;
- emergency response procedures, equipment and training; and
- containment and clean up of spills and leaks.

Further details on management of fuels and chemicals to minimise risk of environmental harm are outlined in **Section 5.4**.

20.6.1.4 Flooding / Dam Failure

During construction and operation there is a risk of flooding of the mine industrial area and underground works from the Isaac River. If this was to occur, floodwaters may become contaminated, leading to degradation of downstream surface water quality and effects on aquatic ecosystems. **Section 7.3.5** discusses potential water quality impacts associated with this and concludes that with flood protection in place for the MIA and mine access, potential water quality impacts are negligible.

Environmental impacts from dam failure are assessed in **Section 7.3.5**. The likelihood of dam failure is considered very low if dams are designed in accordance with 2012 Department of Environment and Heritage Protection dam safety guidelines. Consequences of dam failure are also relatively low due to the small volumes contained in the proposed dams, and the likely quality of water in these dams.

Further details on ensuring flooding and dam failure do not cause environmental harm are detailed in the **Section 7**.

20.6.1.5 Mine Water Discharge

It is proposed to manage water from mine dewatering and IMG production by transferring this water to the mine water management network at the adjacent GRB mine complex. In the event of failure of pipes or pumps associated with the transfer system, small quantities of saline and possibly high turbidity mine water may be released to the land and surface water environment. Assessment of potential impacts arising from this hazard is provided in **Section 7.3.5** and concluded that, provided that the likelihood of pipeline and pump failures is minimised through proper design and maintenance, the overall risk to the environment from this hazard is low.

20.6.2 Workforce Safety

The key hazards to the workforce during the construction and operation phase will be detailed within the project's safety and health management system (SHMS) which will be prepared under the CSMH Act and CSMH Regulation and in compliance with BHP Billiton GLDs. General key hazards are outlined below, along with appropriate prevention, detection and protection measures. Public health and safety risks are addressed in **Section 20.6.3**.

20.6.2.1 Emergency Services

The proposed RHM will have a range of on-site medical and emergency services and will also consult with Queensland Government emergency service providers as set out in the Social Impact Assessment (**Appendix P**).

Designated first aid and emergency rescue facilities and equipment will be available during the construction, operation and decommissioning phases of the project. Appropriately trained personnel will be on site throughout the life of the project to provide first aid and respond to on site emergencies. Worker inductions will cover basic medical and other emergency response and signs throughout the site will direct workers to first aiders and other emergency contacts.

All fire fighting facilities and equipment will be installed, serviced, maintained and inspected by the local Queensland Fire and Rescue Service (QFRS).

Stores, workshops and offices will be fitted with approved and certified fire detection (smoke detectors) and sprinkler systems. First response fire fighting equipment (hand held extinguishers and fire hoses) will be installed at strategic points within each building. Fire fighting equipment and exit locations will be suitably signed. All work areas will be within the required distance to reach emergency exits.

Worker induction training will include basic fire response requirements and workers will be trained in the use of a fire extinguisher, depending on their work tasks and location. Site fire fighting capabilities also will be addressed in an emergency response plan to be developed prior to construction and operation in consultation with Queensland Emergency Services.

Fire drills will be undertaken on a regular basis. Permanent facilities, such as fuel storage areas, will have a dedicated fire alarm, fire suppression and fire fighting systems.

BMA will liaise with the local office of the Department of Community Safety (DCS) and local ambulance and hospital services with respect to planning for emergency response. An industrial paramedic will provide initial care on site in an emergency, and a paramedic from Moranbah is available to provide additional support if required. An intensive care paramedic is also available from Mackay.

The paramedics are also involved in health promotion and safety training for BMA workers.

Broadmeadow extension will be managed through existing GRB mine complex site arrangements.

20.6.2.2 Underground Working

The health and safety of underground mining operations is strictly controlled under the provisions of the CSMH Act and the CSMH Regulation. The Act imposes health and safety obligations on both the workers and BMA as the operator of the mine including the obligation to ensure that the risk to workers is at an acceptable level. In discharging this obligation, BMA will develop and implement a safety and health management system and a principal hazard management plan in accordance with the requirements of the act. These will include consideration of all relevant health and safety risks associated with underground mining, such as mine ventilation and ground stability.

BMA already operates the BRM, an underground mine adjacent to the proposed RHM. BMA is fully conversant with the health and safety requirements of underground mining. Similar health and safety controls will be implemented at RHM.

20.6.2.3 Equipment and Plant

Construction vehicles and equipment will be operated according to the manufacture's specifications and BHP Billiton's GLD Fatal Risk Controls. All vehicles and equipment will be maintained and serviced on a regular basis. Records of maintenance and servicing will be retained by contractors.

All equipment and plant will comply with any specific requirements set out in relevant safety standards and guidelines.

Standard operating procedures will be developed for equipment and plant, and operators will be trained in the implementation of procedures. BMA's life-saving rules stipulate that workers only operate equipment for which they are 'trained, assessed and authorised'.

During operations, mining or coal processing equipment that contains radionuclide material, such as industrial gauges or soil / moisture density gauges, will be held under licence (issued under the *Radiation Safety Act 1999*). For machinery and equipment which contain radionuclide material, operators will be trained and carry the current licenses, where necessary.

20.6.2.4 Vehicle Collision and Driving Conditions – On Site Activities

Construction

Vehicles on the construction site are likely to include front-end loaders, graders, rollers, water trucks, dump trucks and light vehicles that operate on roads and access roads around the site. Collisions with these vehicles have the potential to cause serious injury to operators and passengers.

Construction workers operating vehicles on site will be trained and licensed, so that these vehicles are driven in a safe and appropriate manner. Speed control (signage), driving to conditions, and prescribed driving procedures on the RHM site will be used to control the risk. All site vehicles will be fitted with radios for two-way communication. Positive communication procedures will be developed to reduce the risk of vehicle interactions. Construction workers will also be required to comply with BHP Billiton Fatal Risk Controls and driver training requirements.

Watering of roads and access areas will be undertaken regularly to suppress dust and maintain visibility. Adequate night lighting through the provision of lighting towers and vehicle headlights will be provided to ensure night operating and driving conditions are safe.

Operation

During operations, vehicles on the site will include light vehicles, loaders and specialised mining vehicles that operate underground and on access roads around the RHM site and Red Hill CHPP. There is the potential for collisions. Mine traffic will occur 24 hours per day, thus night driving will occur, which may increase the risk of collisions. Positive communication procedures will be adopted to reduce the risk of vehicle interactions.

BHP Billiton Fatal Risk Controls apply to vehicle operation, as do BMA driver training requirements.

BMA life-saving rules require training for all drivers, so that the vehicles are driven in a safe and appropriate manner. Speed control, driving to conditions, and prescribed driving etiquette on the mine site will be used to control the risk.

20.6.2.5 Personnel Interaction with Machinery

Personnel may be at risk when interacting with construction machinery, Red Hill MIA/CHPP machinery and earth moving equipment, resulting in the potential for personnel injury or fatality. BHP Billiton Fatal Risk Controls apply to moving machinery. BMA's life-saving rules also include requirements to establish positive communication with heavy equipment before approaching.

The hazards from interaction with machinery may occur during the construction of the RHM, CHPP, infrastructure and water supply pipeline as a result of heavy equipment movement. Although the potential for injury is moderate, strict adherence to the site's work place health and safety rules and established safety systems will reduce the likelihood of occurrence.

During operations, although the potential for injury is high, the implementation of road traffic rules and maintenance lock-out/tag-out safety systems will reduce the likelihood of occurrence.

20.6.2.6 Fuel Storage

As a coal mine, dangerous goods licensing under the *Work Safety and Health Act 2011* is not required; however, the project is subject to the provisions of the CSMH Act and CSMH Regulation. Fuel stored on site will be predominantly diesel, which presents a relatively low combustion risk and a moderate environmental risk. Ignition sources will be controlled around bulk fuel storages to avoid fire. Fire fighting facilities will be provided at fuel storage facilities.

All fuels will be stored and handled in accordance with the bunding (secondary containment) requirements of AS 1940:2004 *The storage and handling of flammable and combustible liquids* (Section 5.8 Bunds and Compounds) and fire safety requirements will conform with the *Building Act 1975*.

Fuel storage areas will be suitably banded and constructed in a manner that minimises the potential for leaks to cause environmental harm. All fuel will be stored, handled and used according to provisions in the MSDS. The health risk to the workforce presented by these materials is relatively low.

To minimise the hazards associated with fuel leaking during tanker loading and unloading, the following measures will be in place:

- tankers will unload in banded areas (rollover bunds);
- a program of regular equipment inspection and testing will be implemented to ensure reliable performance;
- operators will be trained in the safe operation of the system and emergency procedures in the event of fuel leakage;
- spill containment equipment will be available at the unloading pad for use in the event of spillage;
- a sump will be provided to collect any spillage and allow recovery;
- ignition sources will be strictly controlled and limited to avoid a fire;
- appropriate fire fighting materials and equipment will be available to suppress fires; and
- an approved fire protection system will be installed around hydrocarbon storage areas.

During operations, the hazard associated with the storage of fuel arises from leaks and/or failures in the system. The following measures will be taken to minimise the potential for the leakage of fuel or from storage tanks:

- Adequate containment will be provided to contain spills, in accordance with AS 1940:2004 *The storage and handling of flammable and combustible liquids* (Section 5.8 Bunds and Compounds).

- Maintenance of fuel tanks will be undertaken, to ensure safe and effective operation of all components.
- Tanks will be designed in accordance with AS 1692-2006 *Steel tanks for flammable and combustible liquids* to minimise the potential for failure of the diesel storage vessel.

Licensed transporters operating in compliance with the Australian Code for the Transport of Dangerous Goods by Road and Rail will undertake the transportation of dangerous goods to the project during construction, operation, and possibly decommissioning.

Mobile equipment will generally be refuelled at designated refuelling locations which will be suitably bunded and constructed to minimise the potential for leaks to cause environmental harm. Should in-field refuelling be required, temporary bunding and emergency clean up equipment will be provided to minimise the potential for leaks to cause environmental harm.

20.6.2.7 High Voltage Exposure

Incoming power will be supplied from a 132 kilovolt sub-station at North Goonyella mine and a 66/11 kilovolt substation at the Riverside MIA. Power will be supplied to the project via 66 kilovolt overhead lines and will be routed to align as straight as possible while avoiding infrastructure or crossing haul roads. This power supply will provide power distribution for the Red Hill CHPP, infrastructure facilities and the electric equipment.

Electricity use for RHM lighting, electrically powered vehicles and equipment (longwall, continuous miners and shuttle cars and much associated underground ancillary equipment), the Red Hill CHPP and electrical operation of infrastructure will require the use of potentially lethal levels of voltage and amperage.

Equipment used for IMG management infrastructure may work close to and have to pass under HV powerlines.

Specialist electrical engineers will undertake the construction of the substation, 66 kilovolt power lines, and RHM site and CHPP power reticulation systems using approved codes of practice and procedures. There will be specific and detailed standard operating procedures under the project's SHMS implemented to address the safety risks posed by high voltage exposure. The residual high risk can be managed by ensuring the preventative controls are implemented and monitored.

20.6.2.8 Flooding

The current location of the MIA and drift (mine access) is in a flood prone area and flood protection will be required at this location. Measures have not yet been confirmed. Flood modelling undertaken in **Section 7.3.4** has demonstrated that a levee would provide the appropriate level of protection; however, other approaches may also be considered in the detailed design stage.

20.6.2.9 Noise

In relation to occupational exposure to noise, BMA will follow the requirements of AS/NZS 1269.1:2005 *Occupational noise management Part 1: Measurement and assessment of noise emission and exposure* (Sections 9.3 and 9.4), or equivalent standard. Noise hazards will be assessed as part of a health and safety hazard assessment and measures identified to address risk to workforce. Noise control requirements will be built into the health and safety plan and procedures,

including use of hearing protection devices, particularly where employees are exposed to noise levels exceeding $L_{Aeq}(8 \text{ hour})$ 85 dB(A).

Workers from the GRB mine complex accommodated at the Eureka accommodation village may be exposed to higher noise levels during construction and operation of the Red Hill CHPP conveyor and further assessment is required in the detailed design stage to determine suitable separation distances and appropriate mitigation measures.

20.6.2.10 Vectors and Pests

It is not expected that the project will increase the risk of staff members being exposed to disease vectors such as mosquitoes or rodents due to its climate, but mitigation measures will include:

- All site personnel will wear appropriate PPE in the field and where appropriate use insect repellent, and ensure first aid kits are available.
- Awareness of appropriate hygiene will be developed through staff induction and training.
- On site water management will limit the potential for increase in disease vectors such as mosquitoes and biting midge breeds.
- Should the ponds created through subsidence result in mosquito or midge breeding, eradication programs will be implemented in conjunction with Queensland Health and the local authority.

Control measures to prevent increase in local populations and spread of biting insect species and feral animals, of pest and health significance will be contained within a pest management plan, to be implemented on an as-needs basis.

The terrestrial ecology assessment did not identify any significant impacts associated with other pest species (**Section 9.6.4.7**).

20.6.2.11 Working at Height and Falling Objects

There will be instances during the construction and operation where workers are required to work at height (e.g. RHM site buildings and the Red Hill CHPP). BMA will plan activities to eliminate the requirement to work at heights wherever practical. Where working at heights is unavoidable, safe operating procedures for working at height will be used to control this risk. Mandatory PPE on the construction site which protects against objects falling from height include safety boots and hard hats.

BMA's life-saving rules include use of protection when working at heights or near to edges. BHP Billiton's fatal risk controls also cover working from height and lifting operations. The risk of objects falling from significant height will be controlled through exclusion zones and PPE.

The residual risk for construction is moderate with these controls, as safety statistics during construction activities indicate that injuries caused from falls contribute significantly to work related injuries.

The residual hazard for operations remains high, as safety statistics at mine sites indicate that injuries caused from falling objects and falls contribute significantly to work related injuries. Hence, the preventative controls will be strictly enforced.

20.6.2.12 Spontaneous Combustion of Coal

The propensity for spontaneous combustion of the GMS coal is low (refer to **Section 5.3.2**); however the underground and run-of-mine (ROM) and product stockpiles will require appropriate management systems to prevent and control spontaneous combustion.

ROM coal is planned to be stockpiled at the MIA and product coal will be stockpiled at the train load-out. Coal stockpiles have the potential to combust spontaneously, which may result in fires, smoke and environmental nuisance effects. Stockpile inventory will be managed such that coal does not remain in the stockpile for long period of time. With the coal produced at the project, spontaneous combustion hazards are considered to be low and relatively easily controlled.

Management systems at other BMA operated underground coal mines have been developed to minimise the risk of spontaneous combustion of the coal. These systems will be adopted and modified for use at the project, as necessary.

Little or no risk of spontaneous combustion is considered while coal is underground; however, IMG is present and will be drained prior to mining.

20.6.2.13 Security and Unauthorised Access

Visitors and unauthorised persons within a mine site may be exposed to a higher level of hazards compared to workers due to unfamiliarity of the site and, in the case of unauthorised persons, because operators are not aware of their presence.

The RHM will be enclosed with suitable fencing depending on the level of security required, and public accessibility. Prior to being given access to the site, visitors will complete mandatory registration and an environmental, health and safety induction. The scope of induction will reflect those areas of the site to which a visitor will be permitted access. Visitors will be escorted on site at all times. BMA has a system in place to track access into and within its operating sites by all personnel and visitors.

Access to the site will also be denied to any site staff/visitor not wearing the following minimum mandatory PPE:

- safety helmet;
- safety boots;
- safety glasses;
- ear protection; and
- high visibility clothing.

20.6.2.14 Safety and Health Management System

The project will implement a safety and health management system as described by the CSMH Act. The project specific SHMS will be developed, approved, and implemented similar to those presently implemented at the two other BMA Bowen Basin underground coal mine operations (Crinum and Broadmeadow).

The SHMS will adopt an integrated approach to risk management of the operations, recognising the hazards at all points in the operations and how these are controlled. This approach will ensure that the coal mining operations will be conducted at an acceptable level, such that the operations will be

carried out so that the level of risk from operations is within acceptable limits and as low as reasonably achievable. The acceptable limits will be determined using the integrated approach through the assessment of the likelihood of injury or illness to a person and the severity of the injury or illness. The system will include all existing BMA safety and incident management systems and include the following core elements:

- leadership and accountability;
- legal requirements and document control;
- risk and change management;
- planning, goals and targets;
- awareness, competence and behaviour;
- health and hygiene;
- communication, consultation and participation;
- business conduct, human rights and indigenous affairs;
- design, construction and commissioning;
- operations and maintenance;
- suppliers, contractors and partners;
- product stewardship;
- incident reporting and investigation;
- crisis and emergency management; and
- monitoring, audit and review.

During construction, contractors will also be required to prepare and implement BHP Billiton compliant safety and health management systems.

The SHMS, considering the core elements listed above, will allow for the optimum risk management and procedures, appropriate to the project, which will:

- identify, analyse, and assess risk;
- avoid or remove unacceptable risk;
- monitor levels of risk and the adverse consequences of retained residual risk;
- investigate and analyse the causes of any potential serious accidents and high potential incidents with a view to preventing their recurrence;
- review the effectiveness of risk control measures, and take appropriate corrective and preventative action; and
- mitigate the potential adverse effects arising from residual risk.

IMG will be managed during the mining operations through the SHMS for the coal mine. This will ensure an acceptable level of risk taking into consideration of the requirements under the *Petroleum and Gas (Production and Safety) Act 2004* (sections 675 and 388).

20.6.3 Public Health and Safety

A summary of the potential public health risks to these sensitive receivers is presented in **Table 20-11** and discussed further in the subsections below. Worker health and safety risks are addressed in **Section 20.6.3**.

Table 20-11 Summary of Risks to Public Health and Environment

Potential Health/Environmental Impact	Risk to Nearby Receptors	Comments
Odour	Low	The sewage treatment plant is a potential source of odours, however if properly managed it is not expected to have significant odour issues.
Gas vapours	Low	Gas vapour emissions from the project are predicted to be primarily due to the release of fugitive emissions associated with the venting and flaring of IMG from the RHM. Project emissions are unlikely to have any significant effect on the health of the public.
Particulates	Low	Dust emissions from the project are predicted to have a minimal incremental dust impact at any of the off site receptor locations considered. The risk of inhalation or exposure to particulate dust to the public associated with the proposed project is low.
Noise	Low	Construction and operation noise levels associated with the project are considered to be acceptable at all sensitive noise receivers except Eureka Village, where a further assessment of operational noise (including conveyor alarms) is required at the detailed design stage. The project is not predicted to cause any discernible vibration at nearby noise sensitive receptors.
Pests and disease vectors	Low	On site water management will limit the potential for increase in disease vectors such as mosquitoes and biting midge breeds. Availability of ponds in subsidence troughs may provide breeding sites, however these are remote from sensitive receptors. Control measures to prevent an increase in local populations and spread of biting insect species and feral animals of pest and health significance will be contained within a pest management plan to be implemented on an as-needs basis. No predicted increase in pests due to construction or operation.
Hazardous and putrescibles waste	Low	Project-generated wastes will be effectively managed at suitably located waste segregation, recycling and disposal facilities. Project wastes may be reused on site where appropriate or removed off site by a licensed waste contractor for recycling or final disposal.
Chemicals	Low	Construction and operational chemicals are manageable through design, storage and handling in accordance with Australian Standards and industry requirements.

Potential Health/Environmental Impact	Risk to Nearby Receptors	Comments
Groundwater quality	Low	<p>Low potential for acid mine drainage.</p> <p>Very low likelihood of chemical and waste spills infiltrating to groundwater.</p> <p>Very low likelihood of groundwater contamination from mining activity.</p> <p>Groundwater flows will be towards the mine during and after operation.</p> <p>Post-mining water quality within all aquifers surrounding the EIS study area is expected to remain the same as pre-mining water quality.</p> <p>Mine water storages will be designed to minimise seepage.</p>
Flooding	Low	<p>The flood assessment (Section 7.3.4 and Appendix I4) did not identify any increased risk of flooding outside of the proposed mining lease.</p>
Surface water quality	Low	<p>Low potential for acid mine drainage.</p> <p>Mine affected water will only be released in accordance with the mine's environmental authority.</p> <p>Very low likelihood of chemical or wastewater spills to waterways.</p>
Traffic	High	<p>Project will contribute to road and intersection upgrades if monitored traffic volumes exceed performance criteria.</p> <p>Existing risk associated with traffic accidents is high; project is not expected to materially increase existing risk of traffic accidents.</p> <p>Traffic management plans will be developed to address overdimensional vehicle movements</p>

20.6.3.1 Odour

The project is not expected to produce any odour that may be detrimental to the health and safety of employees, visitors or the general public. The sewage treatment plants are not expected to generate significant odours that could impact on nearby receptors.

20.6.3.2 Particulates and Gases/Vapours

Hazards associated with exposure of the public to particulates and gases will be addressed through a comprehensive risk assessment and preparation of a health and safety management plan and procedures. Controls are proposed to minimise particulate emissions from project activities.

An air quality assessment determined that an increase in particulate levels arising from the project in adjacent areas was negligible.

The potential impacts and mitigation measures for air quality are further addressed in **Section 11** of this EIS.

Thus, dust mitigation for the operation of RHM (in particular) involves several elements to ensure adequate management of air quality in the vicinity of the mine, namely:

- engineering control measures;
- dust suppression measures;

- operational procedures; and
- measurement of ambient air quality.

Based on the scale of predicted impacts, no additional mitigation measures for the project are recommended in relation to protecting public health and adjacent environmental receptors.

20.6.3.3 Noise

The potential impacts and mitigation measures for noise are further addressed in **Section 13**.

The noise assessment identified that acceptable noise levels are met for all off site sensitive receptors during both construction and operation. Vibration impacts are not predicted. Transport noise is within acceptable limits.

20.6.3.4 Disease Vectors and Pests

Vectors and Pests

It is not expected that the project will increase the risk of members of the community being exposed to disease vectors such as mosquitoes or rodents due to its climate. Control measures to prevent an increase in local populations and spread of biting insect species and feral animals, of pest and health significance will be contained within a pest management plan to be implemented on an as-needs basis.

The terrestrial ecology assessment did not identify any significant impacts associated with other pest species (**Section 9.6.4.7**).

Communicable Diseases

The SIA (**Appendix P**) contains measures to address public health impacts potentially arising from the project.

20.6.3.5 Waste

Waste will be managed to avoid adverse impacts on public health and minimise impacts on land, air and water.

There will be small amounts of wastes generated during the construction of the mine, CHPP and mine infrastructure. This waste will consist of scrap steel, timber, concrete, general waste, recyclable waste and some hazardous waste from the operation and service of equipment. Some mineral waste will also be generated.

Waste management for each element of the project is further addressed in **Section 6** and **Section 15** of this EIS.

Reuse of the sewage sludge on site will be investigated, and where this is not practicable, the sludge will be transported and disposed of by a licensed contractor to a licensed facility.

Operational activities are also expected to produce small quantities of hazardous (regulated) wastes such as hydrocarbons and hydrocarbon contaminated products (oily wastes and oil filters). Hydrocarbon wastes will be collected in a suitably bunded above ground waste storage tanks or other

suitable containment devices and removed off site by a licensed contractor for reprocessing, recycling or final disposal. The associated risk to public health is low.

20.6.3.6 Chemicals

Fuel (predominantly diesel), lubricants, oils, minor quantities of solvents and acids, degreasers and domestic cleaning agents will form the majority of chemicals on site (**Table 20-3** and **Table 20-4**). Standard procedures for the storage, containment, disposal and spill response for potentially hazardous materials will be implemented. All hydrocarbons will be stored and handled in accordance with the bunding (secondary containment) requirements of AS 1940-2004 *The storage and handling of combustible and flammable liquids*. Chemical storage areas will be designed in accordance with relevant Australian standards, including containment requirements. All chemicals will be stored, handled and used according to provisions in the MSDS and Australian standards. With these measures in place, and having regard to the quantities to be stored and used, it is unlikely that a spill on site would reach areas accessible to the public.

20.6.3.7 Groundwater Quality

The potential for impacts to groundwater quality is assessed in **Section 8** of the EIS. In summary, the risk posed to groundwater quality and, hence, groundwater users is low as there is a low potential for acid mine drainage (see **Section 6** of this EIS) and the potential for spills of chemicals and wastes to infiltrate into groundwater is very low and will be minimised as outlined in **Section 20.6.2.6** and detailed in **Section 8**.

Groundwater (depressurisation) will be extracted before and during mining for IMG drainage. This is required for mine safety and to maintain dry working conditions within the underground mine. This dewatering will mitigate any movement of potentially lower quality groundwater away from the mine and into the surrounding aquifers. Post-mining water quality within all aquifers surrounding the EIS study area is expected to remain the same as pre-mining water quality, and hence, no impact on public health in relation to public use of groundwater is expected.

Predictive groundwater modelling indicates that drawdown (five metre contours) could occur over a distance of approximately four kilometres from the RHM boundary, within the target coal seam.

Groundwater drawdown will also occur in the units above the targeted Goonyella Middle Seam (GMS) due to induced vertical leakage and the impact of the goaf increasing vertical permeability; however the extent and degree of this drawdown decreases with increasing distance above the dewatered seams. There are few groundwater users in close proximity to the mine site, and if groundwater users are affected, BMA will 'make good' supplies. On this basis, health of individuals relying on groundwater will not be compromised.

Good environmental practice requires that seepage to the groundwater system be minimised. Potential sources of seepage, such as mine water storages will be lined if the natural material is not of sufficiently low permeability to limit seepage, in accordance with the Department of Natural Resources and Mines (NRM) *Queensland dam safety management guidelines* (NRM 2002).

A monitoring bore network will be maintained to enable the long term monitoring of groundwater levels and groundwater quality. This is discussed further in **Section 8.2.4**.

20.6.3.8 Surface Water Quality

The potential for impacts to surface water quality is assessed in **Section 7** of this EIS. In summary, the risk posed to surface water quality is low, as there is a low potential for acid mine drainage (see **Section 5**) and there is a low likelihood for chemical spills or waste water to discharge into waterways.

There are no planned discharges from the RHM to surface waters. Mine water from RHM will be transferred to the adjacent GRB mine complex as part of an integrated water management system.

Mine water discharges to waterways will be undertaken from the GRB mine complex in accordance with existing environmental authority EPML00853413 (formerly EA MIN100921609). This environmental authority contains requirements in relation to protecting water quality that will minimise risk to persons using water downstream of the proposed mine for potable or recreational purposes.

20.6.3.9 Flooding

A study of the hydraulic conditions within the watercourses traversing the EIS study area was undertaken to assess the flooding impacts of the proposed RHM underground expansion option. The key objectives of this investigation were to identify adverse flooding impacts from the RHM underground expansion option on the environment, and to estimate the likely flood risk to the project development and operations. The study considered a wide range of design flood estimates with annual exceedence probabilities (AEP) ranging up to the 2,000 year event (refer to **Section 7.3.4** for further details).

The results showed that there is potential for reduced flood capacity in the existing Isaac River and creek channels, resulting in more frequent inundation of floodplain areas. The proposed scenario, however, does not significantly increase flood levels or extents for events 1:50 to 1:2000. Flood levels increase by up to 0.2 metres immediately downstream of the subsidence panels for frequent events (1:10 and 1:20 AEP); however, are noted to be within acceptable tolerance based on the accuracy of digital terrain data. There are no flood-sensitive receptors in this area.

20.6.3.10 Traffic Accidents

Traffic management is detailed in **Section 14**. The majority of traffic associated with the project will use Red Hill Road to access the EIS study area and associated MIA. In addition, some increased traffic will be expected on the Riverside Access Road to support the construction and operation of the new Red Hill CHPP.

The assessment reviewed the road crash history of the area north of Moranbah (2006 to 2013). **Table 20–12** provides a summary of the severity of road crashes reported as occurring within this six year period.

Table 20-12 Summary of Crash Statistics

Crash Severity	Number of Crashes	Per cent
Fatal (1 Jan 06 to 30 Apr 13)	0	0
Hospitalisation (1 Jan 06 to 31 Dec 12)	5	28
Medical treatment (1 Jan 06 to 31 Dec 10)	5	28
Minor injury (1 Jan 06 to 31 Dec 10)	3	16
Property damage (1 Jan 06 to 31 Dec 10)	5	28
TOTAL	18	100

No pronounced temporal patterns were observed in the crash data, therefore the crash history cannot be readily attributed to mine roster start and end times and days. Further, there was no significant crash ‘clusters’ reported north of Moranbah. The crash data, therefore, does not suggest that there are any current significant safety concerns north of Moranbah.

Traffic modelling undertaken for the EIS indicates that the existing forms of the Goonyella Road/Curtin Street, Goonyella Road/Moranbah Access Road/Mills Avenue and Peak Downs Highway/Moranbah Access Road intersections are likely to operate outside generally accepted performance thresholds irrespective of the RHM underground expansion option and associated GRM incremental expansion proceeding.

It is considered that these intersections will warrant upgrading (based on traffic growth projections) regardless of the timing for the RHM underground expansion option and associated GRM incremental expansion. It is therefore reasonable for the proponent to make a proportionate contribution towards upgrade costs (i.e. not fully funded) once the project owners have determined that the project will proceed and have determined the final staging for execution.

20.7 Future Risk Assessment

A hazard and operability (HAZOP) study or similar will be carried out for the project prior to construction commencing and again prior to the commencement of operations. This will feed directly into the development of the site safety management plan and procedures, as well as into safety in design processes.

Operational risk assessments such as fatal risk assessments, failure mode effect analysis and job safety analysis will be carried out on mechanical and task based exposures.

20.8 Continuous Monitoring

Monitoring will be undertaken to assess whether the project’s health, safety, risk management and environment measures are being implemented and are effective. Monitoring will involve the compilation and assessment of data relating to health, safety, risk management and environment issues, such as reported near misses, accident reports and any health surveillance data (e.g. sickness data).

20.9 Emergency Management

20.9.1 Emergency Management Plan

The Broadmeadow extension will be integrated into the existing site management procedures and compliance regime associated with the existing BRM operations.

An emergency management plan will be prepared, as required for underground coal mines in the CSMH Act, for the construction and operation phases of the RHM underground expansion option. The plan will be prepared in consultation with relevant emergency service providers including the QFRS, Queensland Police Service (QPS) and Queensland Ambulance Service (QAS).

Emergency planning will be based on the following components:

- an analysis of the key incidents likely to take place for each operational area;
- an assessment of the degree of impact likely to occur;
- an assessment of what constitutes an emergency for the particular operation;
- an on-site plan to handle incidents;
- an off-site plan with reference to emergency services needed;
- communication, emergency responsibilities, control centre establishment;
- post emergency procedures, including recovery, debriefing and review of plan; and
- testing of plan under emergency-like conditions.

General guidance for preparing emergency plans will be obtained from the DCS and BHP Billiton GLDs. **Table 20-13** contains generic mine related emergencies and suggests response procedures.

The Isaac Regional Council Counter Disaster Plan and the mines rescue service will be considered when preparing the emergency response plan in accordance with the BMA Emergency Management System. Consultation will also occur with the DCS. The Isaac Regional Council will also be advised of changes as a result of the project that could affect the Regional and Mackay District Plans.

Table 20-13 Emergency Plan Elements for Mine-Site Related Emergencies

Event	Level of Emergency	External Emergency Services Required	Resources Needed	Organisational Aspects	Damage Control Actions
Fire on mine site	Site	QPS and QAS on alert.	Fire fighting trucks and water tankers; Plans and maps; Site fire fighting team; Fire systems – static.	Evacuation of affected mine workers; Communications to fire brigades; Roll call.	<ul style="list-style-type: none"> • Fire containment; • Shutdown of affected operations; and • Evacuation from around fire sensitive areas such as the fuel tanks.
	External (if potential for impact outside mine boundaries)	Rural fire brigade	-	Evacuation notice; Communications with fire brigades.	-
Vehicle collision	Site	QAS, QPS and QFRS	Rescue; Fire fighting capability; Spill control materials.	People control; Evacuation of immediate area.	<ul style="list-style-type: none"> • Damage control actions; • Stabilise situation; Contain fuel/chemical spillages; and • Control ignition sources.
Falls and impact incidents	Site	QAS, mines rescue	Site rescue equipment	Communication; Evacuation of immediate area.	Stabilise, isolate source of incident.

Event	Level of Emergency	External Emergency Services Required	Resources Needed	Organisational Aspects	Damage Control Actions
Fuel/Chemical Spills	Site	QAS, police, fire crew	Rescue; Fire fighting capability; Spill control materials.	People control; Evacuation of immediate area.	<ul style="list-style-type: none"> • Damage control actions; • Stabilise situation; Contain fuel/chemical spillages; and • Control ignition sources.
Spontaneous combustion	Site	Site fire fighting team	Dozer, fire truck and/or water truck	Communication; Evacuation from area.	Extinguish/cool heat source.

20.9.2 Incident Reporting and Investigation

BMA has in place an incident recording and investigation system which will extend to the proposed RHM.

Accident and near miss data will be monitored to identify where:

- common themes occur;
- PPE is being incorrectly used/abused;
- corrective actions have not been strictly implemented;
- corrective actions are ineffective;
- procedures/practices need to be reviewed; and/or
- increased frequency of re-training may be required.

Accidents and near miss incident reporting will be investigated and results analysed so as to prevent recurrence, evaluate effectiveness of risk controls, training, and preventative actions.

Based on the requirements for mine records as detailed in the CSMH Act, the mine will maintain a mine record that includes health and safety related studies including:

- all reports of, and findings and recommendations resulting from inspections, investigations and audits carried out at the mine;
- a record of all remedial actions;
- a record of and reports pertaining to all serious accidents and high potential incidents that have happened at the mine; and
- records of training and assessments given to, and undertaken by, the project worker.