19 Health, Safety and Risk

19.1 Overview

This section assesses the health and safety issues associated with the project's construction, operational and decommissioning phases. The health and safety of project employees and the public are assessed, and mitigation strategies are outlined where appropriate. The hazards are analysed to identify any significant residual risks to human health, safety or natural ecosystems.

19.2 Legislative Compliance

The legislative and regulatory requirements for the project and how compliance will be achieved are described in Table 19.1.

Table 19.1 Relevant Legislation, Guidelines and Australian Standards

Relevant Legislation	Legislative Requirements	Compliance
Coal Mining Safety and Health Act 1999	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.
Dangerous Goods Safety Management Act 2001	Sets standards for the transport and storage of substances and the systems to be adopted based on these substances.	Coal mines are exempt from this Act, but are regulated under the Coal Mining Safety and Health Act 1999 and Regulations.
Radiation Safety Act 1999	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.
Explosives Act 1999 and AS 2187 'Explosives—Storage, transport and use'.	The Act sets out the requirements for the handling, storage, transport and manufacture of explosives. The Australian Standard is called up by the Coal Mining Safety and Health Regulations 2001.	Undertake storage and handling of explosive materials/ substances in accordance with the requirements of the Explosives Act.
AS 1678.5.1.002-1998: 'Emergency procedure guide - Transport - Ammonium nitrate'	This standard details the requirements for transporting ammonium nitrate.	Suppliers transporting ammonium nitrate to the project will be required to comply.
Australian Standard AS 1940:2004: 'The storage and handling of flammable and combustible liquids'.	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 2436-1981: Guide to Noise Control on Construction, Maintenance and Demolition Sites	This standard details the measures to be implemented to manage noise on construction sites.	Noise mitigation measures to be applied in accordance with this standard.

19.3 Project Health and Safety Policy

BMA will implement the BHP Billiton Health, Safety, Environment and Community Management Standards that are currently in use at all BMA operations and provide the basis for effective management of employee and public health and safety.

BMA's commitment to health, safety, environment and community is demonstrated in the BHP Billiton's Sustainable Development Policy (Appendix R).

19.4 Dangerous Goods and Hazardous Substances

There are hazards for the project associated with the storage and handling of dangerous goods and hazardous substances for construction, mining and coal handling and processing. The project will use a number of dangerous goods, which are regulated by the Australian Code for the Transport of Dangerous Goods by Road and Rail. 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.

Table 19.2 lists the principal dangerous goods and other chemicals 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 19.2 , to provide a complete description of the chemical usage on site.

Table 19.2 Indicative List of Dangerous Goods and Hazardous Substances

Chemical Name/ Shipping Name	DG Class	Raw conc. (wt%)	Storage conc. (wt%)	UN Number	Packaging group	Purpose/ Use
Diesel fuel	3 (Class C1)*	N/A	N/A	1202	III	Fuel for mobile equipment
Lubrication oils (hydraulic oil)	3 (Class C2)**	N/A	N/A	N/A	N/A	Lubricate plant and equipment
Ammonium nitrate/fuel oil (ANFO)	1.1D	N/A	N/A	0082	N/A	Blasting explosive
Caustic soda (sodium hydroxide)	8	50	50	1823	II	Concrete degreasing agent
Flotation agents (MIBC- 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
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

Chemical Name/ Shipping Name	DG Class	Raw conc. (wt%)	Storage conc. (wt%)	UN Number	Packaging group	Purpose/ Use
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

* Class C1—a combustible liquid that has a flashpoint of 150°C or less.
** Class C2—a combustible liquid that has a flashpoint exceeding 150°C.

19.4.1 Construction Phase

Table 19.3 provides an indicative list of dangerous goods and hazardous substances and materials that may be used during construction. The table details the rate of use and maximum amount of the goods/substances likely to be stored at the project site during construction. The physical properties of these materials are presented in Table 19.2. 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. A MSDS register will be maintained on site during construction and operation.

Table 19.3 Indicative Usage Rates of Dangerous Goods and Hazardous Substances - Construction

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

19.4.2 Operational Phase

Table 19.4 provides an indicative list of dangerous goods and hazardous substances and materials that may be used during operation. The table details the rate of use and maximum amount of the goods/substances likely to be stored at the project site during operation. The physical properties of these materials are presented in Table 19.2. 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.

Table 19.4 Indicative Usage Rates of Dangerous Goods and Hazardous Substances – Operations

Chemical Name/ Shipping Name	Rate of Use	Indicative maximum inventory
Diesel fuel oil	35 ML/a	1,200,000 L
Lubrication oils (hydraulic oil)	1.6 ML/a	90,000 L
Ammonium nitrate/fuel oil (ANFO)	30,000 t/a	1,200 t
Sodium Hypochlorite	100 kg/a	2,000 L
Sodium Hydroxide	100 kg/a	1,000 L
Caustic soda (sodium hydroxide)	100 kg/a	2,000 L
Aluminium sulphate	500 kg/a	2,000 L
Citric acid	125 kg/a	500 L
Powdered activated carbon (PAC)	25 kg/a	200 kg
Powdered polymer (cationic polyacrylamide – TBC)	25 kg/a	200 kg dry
Lime (calcium oxide)	50 kg/a	500 kg
Ozone	N/A	Not stored on site – generated and consumed as part of the water treatment process
Lime (calcium oxide)	120 kg/a	20 kg
Caustic soda (sodium hydroxide)	480 kg/a	500 kg
Flotation agents (MIBC - 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/a	200 L
Acids (e.g. sulphuric)	720 L/a	500 L
Hypochlorite solution (liquid chlorine)	<5,000 L/a	500 L

As shown in Table 19.4, the greatest use of dangerous goods/hazardous substances will involve diesel fuel. The approved separation distances will be maintained during the storage of these materials/substances as defined in AS 1940: The storage and handling of flammable and combustible liquids.

The storage of explosives, detonators and boosters, will meet the requirements of AS 2187 - *Explosives—Storage, transport and use* and the additional requirements of Chapter 3, Part 4 - Explosives in the *Coal Mining Safety and Health Regulation 2001.*

Given the established management controls in place for dangerous goods and hazardous substances, there is low risk to employees, adjacent land users, general public and the environment. Any impacts

from potential incidents involving dangerous goods and hazardous substances are expected to be fully contained within the project site.

19.4.3 Concentration of Raw Materials

Dangerous goods and hazardous substances that are required at the project site will be acquired from approved manufacturers and suppliers. The raw concentration of goods/substances acquired for the project will comply with that stated in the relevant MSDS. The concentration of goods/substances stored on-site is unlikely to change during storage. Some goods/substances may be diluted prior to their use to concentrations recommended by the manufacturer, in order to attain optimum efficiency. It is unlikely that the concentration of any dangerous good or hazardous substance will be increased during storage.

19.5 Project Risk Assessment

19.5.1 Method

This section presents the assessment method and results for the hazards and risks associated with the project identified through the use of a Preliminary Hazard Analysis (PHA).

The PHA was carried out in accordance with Australian Standard AS 4360: Risk Management and New South Wales Hazardous Industry Planning Advisory Paper 6: Hazard Analysis (Consultation Draft) 2008. The PHA was carried out based on BMA experience with construction and operational projects for coal mines. 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 19.3 and Table 19.4
- 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 and operation phases. These included construction activities, energy supply, coal excavation and transport, and waste water management.
- The range of potentially hazardous incidents that might be associated with each of the activities/facilities identified at the project site.

The identification of hazards is aided through the application of a prompt list. The list (below) is based upon the possibility of a damaging energy occurring as a result of a loss of control of that energy:

- Animal
- Biological
- Chemical
- Electrical
- Falling objects
- Falls, slips and trips
- Fire & explosion
- Kinetic
- Manual handling
- Mechanical
- Noise
- Proximity
- Pressure
- Radiation
- Temperature
- Vibration
- UV
- Interface
- Sharp
- Vacuum
- Dust, fume, vapour
- Stressors
- Confined spaces

Having identified the range of hazards likely to occur at the project site, 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 As Low As Reasonably Practical.
- 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.

The probability rankings and consequence classes used in the risk assessment are presented in Table 19.5 and Table 19.6, respectively. These potential incident scenarios, including potential consequences and prevention, protection or mitigation measures are outlined for the construction, operation and decommissioning phases Table 19.8, Table 19.9 and Table 19.10, respectively.

19.5.2 Risk Analysis Criteria

The risk assessment matrix, which is shown in Table 19.7, is based on the model contained in AS 4360 Risk Management.

The highest risk incidents are judged to have the highest priority for consideration of additional risk reduction options. Low risk incidents are subject to the normal, ongoing improvement process and operational controls.

A likelihood of occurrence was assigned to each identified hazardous incident based on definitions shown in Table 19.5. 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 AS 4360 Risk Management. The risk levels denote residual risk.

The consequences assessed include both threats to the natural environment and to health and safety of the public based on definitions shown in Table 19.6. 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 AS 4360 Risk Management, while those for the threat to the natural environment are based on common environmental risk management consequence categories.

Table 19.5 Likelihood of Occurrence for Hazardous Incidents

Likelihood rank	Descriptor	Description
A	Almost certain	The event is expected to occur in most circumstances
B	Likely	The event will probably occur in most circumstances
C	Possible	The event could possibly occur at some time
D	Unlikely	The event could possibly occur at some time but is unlikely
E	Rare	The event may occur only in exceptional circumstances

Table 19.6 Consequence Classes for Public Safety and Environmental Impact

Consequence rank	Descriptor	Public health and safety	Environmental severity
1	Catastrophic	Fatality	Irreversible detrimental effect to off-site natural resource.
2	Major	Permanent disability	Prolonged but reversible detrimental effect to off-site natural resource.
3	Moderate	Hospital treatment	Short term detrimental effect to off-site natural resource with full recovery.
4	Minor	Medical treatment	Minor detrimental effect to on or off-site natural resource and promptly contained/cleaned.
5	Insignificant	First aid	On site release - no damage to natural resource.

The shading and numerical coding in the risk matrix at Table 19.7 refers to qualitative bands of risk level. Risk ranks from 1 to 8 are considered to be extreme, 9 to 16 high, 17 to 20 moderate and 21 to 25 low, in accordance with Appendix E of AS 4360 Risk Management.

Table 19.7 Risk Assessment Matrix

Consequence \ Likelihood	A	B	C	D	E
1	1	2	4	7	11
2	3	5	8	12	16
3	6	9	13	17	20
4	10	14	18	21	23
5	15	19	22	24	25

19.5.3 Hazard Identification and Assessment

In the following tables, C is consequence, L is likelihood and R is the risk ranking. The assessed risks are residual risks assuming that the proposal controls are in place.

Table 19.8 Risk Assessment Table – Construction Phase

Hazards	Proposed controls	Environment			Health and Safety		
		C	L	R	C	L	R
1. Dust from road and earthworks	1. Water trucks.	5	C	22	5	C	22
	2. Speed limits.						
2. Traffic incidents off site - movement of heavy equipment to site.	Traffic management plan including: Police escorts. Public notices about the timing and likelihood of delays.	4	D	21	3	D	17
3. Traffic incidents on site (mine, CHPP and water supply pipeline).	1. Traffic management plan.	4	D	21	3	D	17
	2. Safety inductions and competency based driving assessment for workers.						
	3. Speed controls.						
	4. Radio communications in vehicles.						
4. Construction activity hazards (mine, CHPP and associated infrastructure)	1. Fall from heights controls.	-	-	-	3	C	13
	2. Experienced supervision.						
	3. Safety management systems.						
	4. Equipment inspection and selection.						
	5. Formal design safety practices.						
	6. Welding safety practices.						
	7. Contractor and supplier selection.						
	8. Personal Protective Equipment (PPE)						
5. Excavation and trenching - Injury to persons from falling into or being buried by collapsing excavation	1. Develop Trenching SOP	-	-	-	2	D	12
	2. Inspections and Audits						
	3. Hazard awareness tools - JSA, Take 5						
6. Manual handling - injury caused by poor or incorrect manual handling	1. Ergonomic surveys	-	-	-	3	D	17
	2. Safe spine exercising regime						
	3. Supply sufficient mechanical aids on-site						

Hazards	Proposed controls	Environment			Health and Safety		
		C	L	R	C	L	R
7. Slump of sloped ground	1. Rollover Protective Structures (ROPS) fitted to equipment.	5	D	24	3	D	17
	2. Geotechnical investigation, design and controls.						
	3. Drainage controls.						
8. Leaks of oil, fuel or chemicals from vehicles onto construction earthworks (mine, CHPP and water supply pipeline)	1. Refuelling in designated areas fitted with spill containment.	4	C	18	3	E	20
	2. Storage and handling in accordance with AS1940 Section 5.8.						
	3. Material used in construction will be stored and used in an appropriate fashion to ensure containment.						
	4. Clean up, response procedures and training						
9. Pests (weeds) brought to site by earthmoving equipment (mine and water supply pipeline).	1. All vehicles must be washed down and inspected prior to arrival on site.	4	D	21	-	-	-
10. Runoff from disturbed areas.	Water Management Plan including: minimisation of disturbed areas control of runoff at source sediment basins recirculation of water in sediment basins	4	C	18	-	-	-
11. Excessive noise (e.g. earth moving equipment, generators)	1. Design and operate all equipment to comply with the *Environmental Protection (Noise) Policy 2008*.	5	C	22	5	C	22

Table 19.9 Risk Assessment Table – Operations Phase

Hazards	Proposed controls	Environment			Health and Safety		
		C	L	R	C	L	R
1. Dust from road and earthworks	1. Water trucks.	4	C	18	4	C	18
	2. Speed limits.						
2. Traffic incidents off site - movement of heavy equipment to site	1. Traffic management plan including: Police escorts. public notices about the timing and likelihood of delays 2. Grade separation of Peak Downs Highway and project haul roads.	4	D	21	3	D	17
3. Traffic incidents on site	1. Traffic management plan.	4	D	21	3	D	17
	2. Safety inductions for workers.						
	3. Speed controls.						
	4. Radio communications in vehicles.						
4. Drag line collisions / falls	1. Dragline GPS navigation system, mounted cameras.	-	-	-	3	D	17
	2. Experienced operators.						
	3. Operational procedures, no/go zones.						

Hazards	Proposed controls	Environment			Health and Safety		
		C	L	R	C	L	R
	4. Radio communications in drag line & plant.						
5. Operating the CHPP	1. Fall from heights controls.	-	-	-	3	D	17
	2. Experienced supervision.						
	3. Safety management systems.						
	4. Equipment inspection and selection.						
	5. Formal design safety practices.						
	6. Contractor and supplier selection.						
	7. PPE						
6. Slump of sloped ground	1. Roll Over Protective Structure (ROPS) fitted to equipment.	5	D	24	3	D	17
	2. Geotechnical investigation and design.						
	3. Drainage control.						
	4. Clearance from site boundary or protective berm or bund.						
7. Highwall rock falls	1. Separation of pedestrians from the face.	-	-	-	1	E	11
	Protective cabins – Falling Object Protective Structure (FOPS).						
8. Leaks of oil, fuel or chemicals from vehicles during site operations	1. Major equipment maintenance to be conducted in dedicated facilities.	4	C	18	-	-	-
	2. Refuelling in designated areas fitted with spill containment.						
	3. Storage and handling in accordance with AS1940 Section 5.8.						
	4. Material used in operations will be stored and used in an appropriate fashion to ensure containment.						
9. Blasting	1. Explosive materials handled and used in compliance with current Australian Standards (AS2187).	4	D	21	1	E	11
	2. Licensed contract personnel will only make explosive materials (ANFO) as and when required.						
	3. Explosives will only be handled and used by competent Contractor personnel.						
	4. Sources of ignition will be strictly controlled.						
	5. Blast design and procedures including separation from the blast zone.						
	6. Storage of detonators shall be in accordance with the Explosives Act, Part 4 Division 6.						
10. Bush Fire	1. Mine operation facilities and equipment will be inspected and tested for fire safety on a regular basis.	3	D	17	4	D	21
	2. Relevant site staff will complete fire safety training during induction and thereafter on an annual basis.						

Hazards	Proposed controls	Environment			Health and Safety		
		C	L	R	C	L	R
	3. The project site will have an approved fire alarm, detection, suppression and fighting system designed and installed in consultation with the relevant fire control authorities.						
	4. BMA will liaise with landowners and local authorities with respect to fire breaks and ongoing maintenance programs to minimise the risk of bush fire.						
11. Chemical release – liquid from leaks, ruptures, over-flows, spillage or pooling. Release to atmosphere or ground systems	1. All storage and handling facilities designed and operated to relevant Australian Standards.	4	D	21	4	D	21
	2. Clean storm water is directed away from potentially contaminated areas.						
	3. Site drainage system designed to allow retention of spills on site.						
	4. Hazard and Operability (HAZOP) reviews conducted during detailed design.						
	5. Personnel trained in appropriate storage and handling and incident response.						
	6. Monitoring of Sewage Treatment Plant (STP) to detect leaks or spills.						
	7. MSDS available on site						
	8. Procedure for introduction of new chemicals						
	9. Appropriate personal protective equipment and spill response/incident response equipment.						
	10. Chemical incidents included in Emergency Response Plan.						
	11. Preventative maintenance program.						
12. Excessive noise (e.g. mine equipment)	1. Design and operate all equipment to comply with the Environmental Protection (Noise) Policy 1997.	5	C	22	5	C	22
	2. Noise emission requirements included in vendor information for the evaluation process.						
	3. Personal Protective Equipment provided.						
13. Failure to provide emergency treatment and response	1. Communication system for operators working alone.	-	-	-	4	E	23
	2. Compliance with Emergency Response Plan and Procedures						
	3. BMA will have an emergency response capability; and will work with neighbouring operations to develop a co-operative arrangement for emergency response in this area. This would be developed in conjunction with mines rescue.						
14. Contact with high voltage electricity	1. Secured access.	-	-	-	1	E	11
	2. Qualified electricians.						
	3. Control of Energy (isolations) procedure.						
15. Spillage from water supply pipeline	1. Burial of the pipeline.	5	D	24	-	-	-
	2. Surveillance monitoring.						
	3. Leak detection.						

Table 19.10 Risk Assessment Table – Decommissioning Phase

Hazards	Proposed controls	Environment			Health and Safety		
		C	L	R	C	L	R
1. Final landform stability - erosion, slumping	1. Final landform to be designed for long term stability	5	C	22	5	C	22
	2. Land rehabilitated to prevent erosion and allow self sustaining vegetation communities						
2. Water quality - leaching, AMD, erosion	1. Mine plan to include selective placement of potentially acid generating material. 2. Mine site rehabilitation plan to be developed	4	D	21	-	-	-
3. Voids - falling risks, risks to community	1. Maximum slope of final landforms at 10%.	-	-	-	3	C	18
	2. Investigate possibility of restricting access to final voids - fences etc.						
	3. Mine plan to include in pit dumping as much as practical.						
	4. Clear signage to be erected showing risk from voids.						
	5. Voids to be managed in accordance with DERM guidelines.						
4. Decommissioning activity hazards (mine, CHPP and associated infrastructure)	1. Fall from heights controls.	-	-	-	3	D	17
	2. Experienced supervision.						
	3. Safety management systems.						
	4. Equipment inspection and selection.						
	5. Personal Protective Equipment (PPE						
5. Contaminated Land, community health risks	1. Rehabilitation of contaminated land within mine boundaries - fuel tanks, ROM stockpiles etc.	3	C	18	5	C	22
	2. Register contaminated land on the DERM's CLMR						
	3. Future land uses to address potential for contaminated land						

19.5.4 Risk Assessment – Conclusion

The information contained in Table 19.8,Table 19.9 and Table 19.10 indicates that the risk profile for the project is generally Low or Moderate with the exception of safety risks from the following hazards:

- Highwall rock fall
- Contact with high voltage electricity
- Blasting
- Construction activity hazards
- Excavation and trenching.

These hazards have been assessed as High risk. It should be noted that these are assessed as High since there is either significant energy involved or serious consequences. The controls available can only reduce the probability and not the consequence of these events. These risks are common to all open cut mining operations and are subject to the controls contained in the *Coal Mining Safety and Health Regulations 2001*. Blasting is covered specifically in Chapter 3, Part 4 of the Regulations, which also refer to AS 2187: Explosives—Storage, transport and use.

There are no Extreme risk scenarios identified. There are no risks identified as Extreme or High risks to offsite facilities, off site persons or the environment.

19.6 Impacts and Mitigation Measures

19.6.1 Emergency Response

Designated first aid and emergency rescue facilities and equipment will be available during the construction and operation 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. First aid response and provision will be included in the site induction training that will be provided to all employees.

The project site will have a fire brigade approved fire response/fighting system. All fire fighting facilities and equipment will be installed, serviced, maintained and inspected by a certified body.

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.

Induction training will include fire response techniques. The project site will have a fire truck or suitably equipped water truck or trailer that can support fire response requirements. Site fire fighting capabilities also will be addressed in an emergency response plan to be developed prior to construction and operation.

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 local office of Department of Community and Safety (DCS) and local ambulance and hospital services with respect to planning for Emergency Response. BMA and DCS through Queensland Ambulance Services (QAS) have an existing contractual arrangement covering other BMA coal mines in the area, which may be extended to this project. 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.

19.6.2 Public Health Risks and Controls

The nearest sensitive receivers to the project site are presented in Figure 19.1. A summary of the potential public health risks to these sensitive receivers is presented in Table 19.11 and discussed further in the subsections below.

Table 19.11 Summary of Risks to Public Health

Potential Health Impact	Risk to Nearby Receptors	Comment
Odour	Low	STP is a potential source of odours, however if properly managed it is not expected to have significant odour issues.
Particulates, & gas/vapours	Low	No major gas/vapour sources. No exceedance of air quality criteria under standard operating conditions for TSP, $PM_{2.5}$ and dust deposition at residential locations. Potential for PM_{10} levels to exceed the EPP (Air) objective of 50 μg/m3 for the 24-hour average concentration, at some sensitive receptor locations. Proposed mitigation measures comprise a combination of: Engineering controls Dust suppression measures Rehabilitation of exposed surfaces Operational procedures Measurement of ambient air quality.
Noise	Medium	Noise will not exceed occupational health and safety levels outside of the project site. Noise impacts predicted at a number of sensitive receivers, not all of which can be mitigated through operational/ engineering measures. Resumption of land or other arrangement required.
Pests	Low	No increase in pests due to construction or operations.
Waste	Low	Construction and operational waste streams are manageable through established methods.
Chemicals	Low	Construction and operational chemicals are manageable through established methods.
Groundwater quality	Low	Low potential for acid mine drainage. Groundwater flows will be towards the mine during and after operation. Very low likelihood of chemical and waste spills infiltrating to groundwater.
Surface water quality	Low	Low potential for acid mine drainage. Mine affected water will only be released in accordance with the mine's Environmental Authority. Very low likelihood of chemical or wastewater spills to waterways.
Traffic	Low	Grade separation of Peak Downs Highway from project site haul roads. Upgrades to Peak Downs Highway and intersections.

19.6.2.1 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 plant is not expected to generate significant odours that could impact on nearby sensitive receivers.

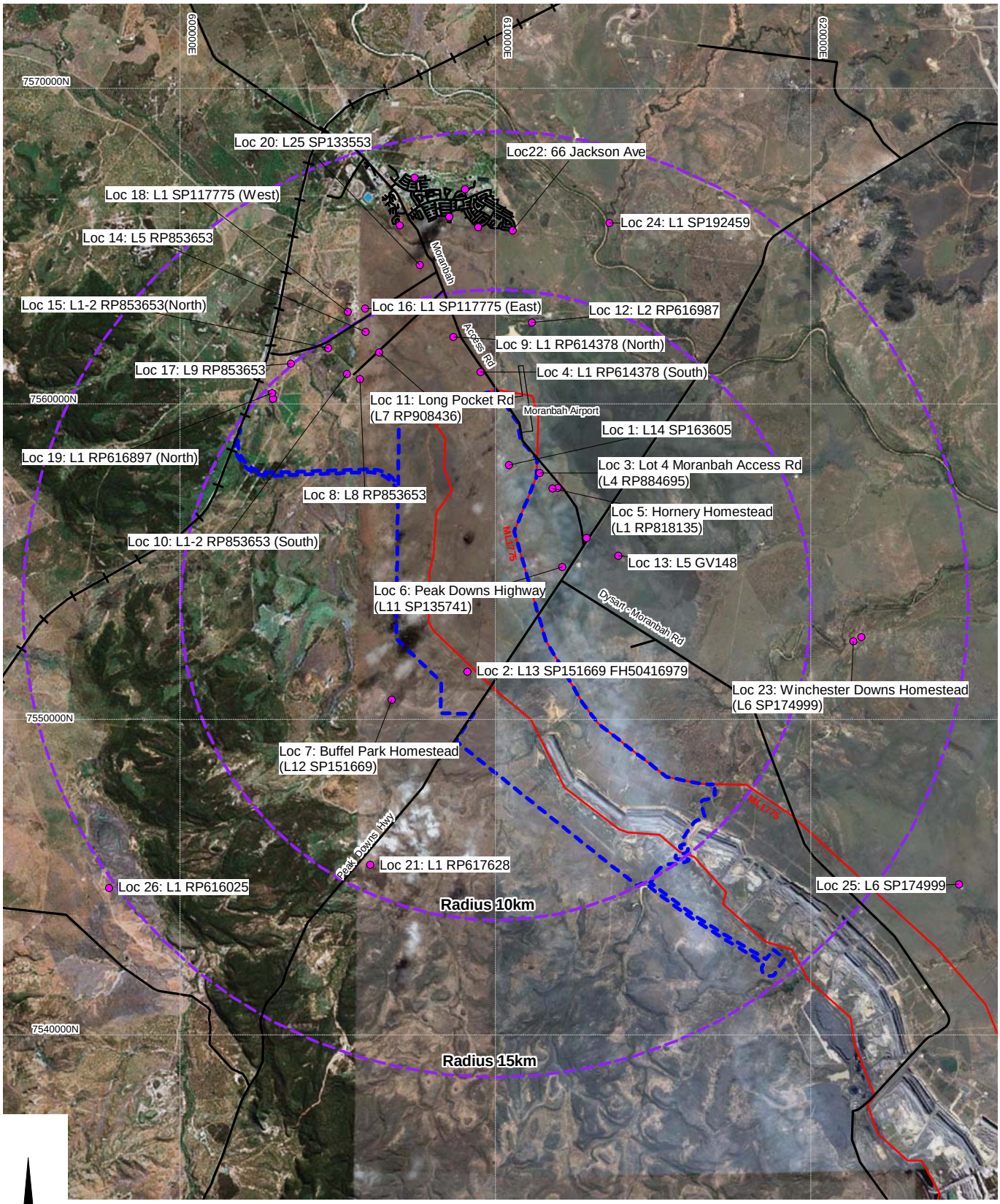
19.6.2.2 Particulates and Gases/Vapours

The project will implement particulate and gas/vapour exposure standards and procedures that will apply to dust, fibres, mist and fumes (i.e. particulates), and gas and vapour exposures in the workplace (with emphasis on inhalation as the prime route of exposure). The standards and procedures will cover, amongst other things, evaluation of particulate and gas/vapour hazards, and development of a control program to ensure that employees and contractors will not suffer adverse health effects from particulates or gas/vapours, either used or generated by the project. Where required, the dust control program will include engineering controls on conveyors and at coal transfer points in the CHPP, and use respiratory protection devices.

The health risks from particulates and gases/vapours are expected to be low. Dust from earthmoving machinery will be controlled by the use of water trucks. During the construction phase 10 water trucks are planned to be used.

The potential impacts and mitigation measures for air quality are further addressed in Section 10 of this EIS. Numerical modelling indicates that air quality impacts due to construction activities in Year 1 are below the EPP (Air) objectives for TSP, $PM_{2.5}$ and dust deposition at residential locations. Operational impacts in Year 2 and Year 20 also satisfy the EPP (Air) objectives for TSP, $PM_{2.5}$ and dust deposition during typical operating conditions. However, numerical modelling indicates the potential for PM_{10} levels to exceed the EPP (Air) objective of 50 $\mu g/m^3$ for the 24-hour average concentration, at some sensitive receptor locations in Year 1, 2 and 20. The potential impact to these residential locations is proposed to be mitigated through the following measures:

- Engineering controls
- Dust suppression measures
- Rehabilitation of exposed surfaces
- Operational procedures
- Measurement of ambient air quality.



Source: BMA Supplied Data (November 2007)
Note: Prepared by URS on behalf of Heggies Pty Ltd

Client: BHP Billiton Mitsubishi Alliance	Project: CAVAL RIDGE PROJECT ENVIRONMENTAL IMPACT STATEMENT	Title: **NEARBY SENSITIVE RECEPTORS**
URS	Drawn: VH | Approved: RS | Date: 08-05-2009	Figure: **19.1** Rev:A
	Job No: **4262 6158** .20200 | File No: 42626158-g-601.wor	**A4**

19.6.2.3 Noise

Workforce

All equipment (both fixed and mobile) will comply with the AS 2436: Guide to Noise Control on Construction, Maintenance and Demolition Sites in regard to design and operating noise levels.

The BHP Billiton HSEC Management Standards will apply to all phases of the project. The project will implement hearing conservation standards and procedures during construction and operation, to ensure that employees and contractors will not suffer adverse health effects from noise generated in the workplace. These standards and procedures will cover, amongst other things, the identification and evaluation of occupational noise hazards and development of noise control programs to minimise noise levels and protect employees and contractors from adverse exposure. Where required, the noise control programs will include use of hearing protection devices, particularly where employees are exposed to noise levels exceeding $LA_{eq,8h}$ 85dB(A).

Numerical modelling indicates that occupational health and safety levels for noise will not be exceeded beyond the project site boundaries.

Construction and Operational Noise

The potential impacts and mitigation measures for noise are further addressed in Section 12 of this EIS.

The closest sensitive receptors to the site are 23 residences located within a distance of approximately 5 km of the project site boundary. These residences comprise:

- 12 residences located within a distance of approximately 3 km of the project site boundary.
- 11 residences located within a distance of approximately 3 to 5 km of the project site boundary.

Moranbah, at its closest point, is located approximately 5 km to the north of the project site boundary. There are three other noise sensitive receptors located between 5 and 12 km of the site boundary that are remote from Moranbah. Locations of sensitive receptors in relation to the project site are shown in Figure 19.1.

The numerical modelling, as detailed in Section 12, considered the steady state (L_{90}), average (L_{eq}) and maximum (L_{max}) noise emissions from the new rail spur & loop, CHPP, overland conveyor and mobile mechanical plant used during mining operations. The results are summarised below in Table 19.12.

Table 19.12 Noise Exceedences

Noise Emissions	Sensitive Receivers where Noise Criteria Exceeded	
	Neutral Weather Conditions	**Worst Case Weather Conditions**
Steady state (L90),	Locations 2, 6 and 7.	Locations 2, 6 and 7. Location 7 increased by 6 dBA over neutral weather conditions.
Average (Leq)	Locations 1, 2, 3, 4, 5, 6, 7, 9 and 13.	Locations 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 13. Location 7 increased by 5 dBA over neutral weather conditions.
Maximum (Lmax)	Locations 1, 2 and 4.	Locations 1, 2 and 4.

A range of mitigation measures were investigated for those properties that exceeded the criteria. These mitigation measures were:

- Low and Super Low noise idlers for the overland conveyor
- Partial and full enclosure of the overland conveyor
- Bund walls of 10 m and 20 m height
- Upgraded silencing (e.g. high performance silencers) of mobile mine equipment
- Building façade upgrades (e.g. double glazing) – for internal maximum noise levels only
- Control of occupation of building - if BMA owned property.

Numerical modelling indicates that compliance is achievable at all except two of the identified sensitive receivers through the use of one or more of the above mitigation measures. The two receivers where compliance is not achievable are Location 4 (owned by neighbouring miner) and Location 7 (privately owned). At these locations, the possibility of resumption, or entering into an agreement with the property owner, will need to be discussed further.

Modelling indicated that there would be no exceedance of the recommended construction noise criterion during construction. Any potential impact during construction will be mitigated by restricting work hours.

19.6.2.4 Pests

The project is not expected to lead to an increase in the number of pests during construction or operations. Existing pests will be managed on-site, and procedures will be implemented to prevent the spread of pests.

19.6.2.5 Waste

Waste will be managed to avoid adverse impacts on the health of the mine workforce and minimise risk of impact 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.

The potential impacts and mitigation measures for waste are further addressed in Section 14 of this EIS. In summary, during the construction phase, food wastes, paper and recyclables will be generated in communal areas. Colour-coded, signed bins will be used to segregate and collect these wastes. Waste materials that are known to attract vermin will be stored and handled in a hygienic manner and in sealed bins. General wastes will be transported for disposal to the Moranbah landfill. Sewage will be treated at the onsite sewage treatment plant, with treated effluent to be discharged to the Process Water Dam for reuse in the operation. Waste sludge will be removed from site by licensed contractor.

A contractors construction environmental management plan will be developed and implemented during construction to contain and limit damage from accidental release of waste materials, such as oil spillages. It is expected that this construction environmental management plan will be consistent with the waste requirements of the EMP contained in Appendix Q.

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). These regulated wastes will be collected and disposed of by a licensed contractor.

A site operational environmental management plan will be developed and implemented during the operational phases, and will be consistent with the EMP contained in Appendix Q. The site operational environmental management plan will provide requirements for the storage, containment, disposal and spill response for potentially hazardous waste materials will minimise potential impacts associated with these materials/substances. The health risks presented by operational wastes are low.

19.6.2.6 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 19.3 and Table 19.4). 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 requirements of AS 1940: The storage and handling of combustible and flammable liquids. Chemical storage areas will be suitably bunded and constructed to minimise the potential for leaks to cause environmental harm. All chemicals will be stored, handled and used according to provisions in their MSDS. The residual health risk presented by these chemicals is low.

19.6.2.7 Groundwater Quality

The potential for impacts to groundwater quality is assessed in Section 7 of the EIS. In summary, the risk posed to groundwater quality is low, as there is a low potential for acid mine drainage (see Section 5 of the EIS) and the potential for spills of chemicals and wastes to infiltrate into groundwater will be minimised as outlined in Sections 19.6.2.5 and 19.6.2.6. The final voids will collect and accumulate water from groundwater ingress through the walls of the final void and from areas of backfill material, direct rainfall into the void and from overland surface flows from the slopes of the waste dumps draining into the void. Although water quality in the final void is expected to deteriorate (in terms of salinity) over time, this is not expected to impact the surrounding aquifers as the voids are expected to operate locally as a groundwater sink (i.e. groundwater flow will be toward the void), so that water within the void will not recharge the surrounding groundwater system unless water levels in the void rise above existing groundwater levels in the coal seams. Post-mining water quality within all aquifers surrounding the project site is expected to remain the same as pre-mining water quality.

19.6.2.8 Surface Water Quality

The potential for impacts to surface water quality is assessed in Section 6 of the 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 of the EIS) and there is a low likelihood for chemical spills or waste water to discharge into waterways. Mine water discharges to waterways will be restricted to emergency discharges during extreme rainfall/flood conditions, thus the discharges (if required) would be significantly diluted with flood waters. All sewage will be treated at the on-site sewage treatment plant, with treated effluent will be discharged to the Process Water Dam for reuse in operations.

19.6.2.9 Traffic Accidents

During construction phase the project will be accessed from the Peak Downs Highway, approximately 3.6 km south of the Peak Downs Highway/Winchester Road intersection. During the operation phase it will be accessed from an intersection 5.1 km south of the Peak Downs Highway/Winchester Road intersection. The Peak Downs Highway bisects the project site and to minimise the risk of collision by mine vehicles and highway traffic, the highway will be grade separated from the mine haul roads via an overpass.

The assessment of traffic impacts is presented in Section 13 of the EIS. The assessment reviewed the road crash history of the area (2001 – 2006), which found that 64% of crashes involved a single vehicle and that 84% of crashes occurred at mid-block locations. The crash statistics indicates that driver fatigue may be a significant contributing factor to the observed crashes, and is consistent with a rural road environment.

Traffic modelling undertaken for the EIS (see Section 13) indicates that the project is expected to have no significant impact to the Level of Service along Peak Downs Highway and Moranbah Access Road, with

the exception of the stretch of Peak Downs Highway between the project site access and Winchester Road. Along this stretch, the Level of Service is expected to decrease from around 2021, as a result of the project. The project is also estimated to result in an early increase in the Degree of Saturation at the intersection of Peak Downs Highway with Moranbah Access Road and Winchester Road. Accordingly, upgrade works are proposed including priority controlled accesses for mine operations and construction, and upgrades to the affected intersections.

Given the overall minor impact to traffic in the area and the proposed road upgrades, the risk of increased traffic accidents is considered low.

However, given the crash history for the area, driver fatigue is considered to remain a significant risk arising from the workforce commuting to the project from either Mackay or Moranbah. This issue will be addressed through the implementation of fatigue management measures such as bus services, awareness campaigns and rest policies.

19.6.3 Workforce Safety Risks and Controls

The key hazards to the workforce during the construction and operation phase are discussed below, along with appropriate prevention, detection and protection measures.

19.6.3.1 Equipment and Plant

Construction vehicles and equipment will be operated according to the manufacture's specifications and BHP Billiton Fatal Risk Control Standard (STA.025). All vehicles and equipment will be maintained and serviced on a regular basis. Records of maintenance and servicing will be retained on-site for the duration of the construction phase.

All plant will comply with the following:

- Any exposed moving or rotating machine components must be guarded or fenced
- Conduct continued testing of braking systems and the keeping of test records
- Provide safe access and egress
- Have a standard operating procedure
- Operators must be adequately trained.

BMA recognise that draglines have particular risks due to their size and weight, including:

- Limited visibility from the cab
- Collision with other plant and vehicles
- Tub slippage and sinkage.

BMA is in the process of developing a computerised dragline navigation system called Pegasys, which has been trialled at the Goonyella Riverside Mine. The Pegasys system has been developed in

association with Mineware Pty Ltd and includes installed cameras, GPS and inclinometers that improve operator visibility and measure tilting or slipping of the drag line. BMA is intent on incorporating a collision avoidance tool to identify, map and notify of any nearby plant and whether they are in the hazard area of the dragline. It is anticipated that the Pegasys system, once fully trialled, will be introduced to other BMA sites including Caval Ridge Mine.

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*). Machinery and equipment operators will be trained and carry the current licenses, where necessary. The safety risk presented by equipment/machinery operation is considered low.

19.6.3.2 Vehicle Collision and Driving Conditions

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 mine 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 Control Standard (STA.025).

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.

The potential for injury from vehicles on the construction site is confined to construction personnel and animals, and the risk is considered moderate.

During operations, vehicles on the site will include haul trucks, loaders, scrapers, graders, water trucks and light vehicles that operate on haul roads and access roads around the mine site and CHPP. Collisions have the potential to cause serious injury to operators. Mine traffic will occur 24 hours per day, with a significant amount of night driving likely to occur. Positive communication procedures will be developed to reduce the risk of vehicle interactions.

Training for drivers will be provided, 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.

Haul roads will be designed to comply with regulatory requirements and roads will be graded to an adequate and safe level of operation for heavy and light vehicles. Areas within the mine will have restricted access to ensure the separation of heavy and light vehicles. Watering of roads and access

areas will be undertaken regularly to suppress dust and improve visibility. However, the application of water to ramps will be closely monitored to prevent over watering leading to loss of traction. Adequate night lighting will be provided around the mine, CHPP and MIA to ensure night driving conditions are safe. The risk of injury is confined to mine personnel, and the risk is considered moderate.

19.6.3.3 Personnel Interaction with Machinery

Personnel may be at risk when interacting with construction machinery, CHPP machinery, dragline machinery, parts from vehicles and earth moving equipment, resulting in the potential for serious injury. The hazards from interaction with machinery may occur during the construction of the mine, CHPP, infrastructure and water supply pipeline due to the movement of heavy equipment. 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 and thus the risk to low levels.

19.6.3.4 Fuel Storage (Mobile and Static)

As a coal mine, the project is exempt from licensing under the *Dangerous Goods Safety Management Act 2001*; however the project is subject to the provisions of the *Coal Mining Safety and Health Act 1999* and *Coal Mining Safety and Health Regulation 2001*. 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 to avoid fire involving bulk fuel. Fire fighting facilities will be provided at fuel storage facilities.

All fuels will be stored and handled in accordance with the bunding requirements (Section 5.8 Bunds and Compounds) of AS 1940: The storage and handling of combustible and flammable liquids. Fuel storage areas will be suitably bunded and constructed to minimise the potential for leaks to cause environmental harm. All fuel will be stored, handled and used according to provisions in their MSDS. The health risk presented by these materials is relatively low.

During operations, the hazard associated with the storage of fuel arises from leaks and/or failures in the system. To minimise the hazards associated with fuel leaking during tanker unloading, the following measures will be in place:

- 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.
- An approved fire protection system will be installed around hydrocarbon storage areas.

The following measures will be taken to minimise the potential for the leakage of fuel or from storage tanks:

- Adequate bunding will be constructed to contain spill, in accordance with AS 1940 (Section 5.8 Bunds and Compounds).
- Tank level indicators will be installed on fuel tanks for monitoring of fuel levels
- 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 Steel tanks for flammable and combustible liquids to minimise the potential for failure of the diesel storage vessel.

19.6.3.5 Blasting and Misfires

Blasting creates a number of potential risks such as dust, noise, vibration, flyrock and air blast effects. Flyrock and airblast effects can cause serious personal injury if not properly controlled and therefore pose a high risk to workers. Mitigation measures include the use of appropriately trained and qualified personnel to undertake safe blast design, control of access (including temporary mine site road closure) and evacuation warnings before blasting. Personnel in the vicinity of a blast will wear PPE and all personnel will observe safe distances during blasting activities.

Proper stemming will be used in the preparation of charges and appropriate charge ratios will be used to limit the amount of fly rock produced by a blast. Blasting operations will be carried out by an explosive contractor, which has an established record of operation in the mining industry and adherence to the Australian Explosives Manufacturer Safety Committee (AEMSC) Code of Practice.

Blasting misfires include incomplete detonation of the blast. This may reduce or confine the blast impact, and may pose safety issues to personnel re-entering the area of blast misfires. The requirements of the *Coal Mining Safety and Health Regulations 2001* and AS 2187 Explosives - Storage, transport and use will be applied to reduce the incidence of misfires. The training and management of the blast crew will be required to ensure appropriate knowledge and skill by personnel involved in blasting activities. Safety procedures will be strictly adhered to on site to limit the probability of an incident occurring.

19.6.3.6 High Voltage Exposure

Incoming power will be supplied to the project via a 66 kV overhead line and will be routed to align as straight as possible whilst avoiding infrastructure or crossing haul roads. This power supply will provide power distribution for the CHPP, infrastructure facilities and the electric equipment.

Electricity use for mine lighting, dragline, the CHPP and electrical operation of infrastructure will require the use of potentially lethal levels of voltage and amperage.

Specialist electrical engineers will undertake the construction of the 66 kV power line, and mine site and CHPP power reticulation systems, using approved codes of practice and procedures. There will be specific and detailed standard operating procedures implemented to address the safety risks posed by high voltage exposure. The residual high risk can be managed by ensuring the preventative controls are well implemented and monitored.

19.6.3.7 Working at Height and Falling Objects

There will be instances where workers are required to work at height during the construction phase (e.g. mine site buildings and the CHPP). BMA will plan activities to eliminate the requirement to work at heights wherever practical. However, 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 that protects against objects falling from height includes steel capped boots and hard hats (both are worn at all times). The risk of falling persons will be controlled through eliminating the need for working at heights. However where required control will be through a permit system for working at heights, appropriate elevated work platforms, and the use of properly designed and maintained fall arrest equipment. All personnel using this equipment will be trained and competent to do so.

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.

During operations, operators are required to work at height at the CHPP, dragline and during maintenance or repair duties. Safe operating procedures for working at height will be used to control this risk. There is also the potential for rocks to fall from the highwall near worker locations. The risk of objects falling from significant height will be controlled through exclusion zones and PPE. Mandatory PPE on a mine site that protects against objects falling from normal heights includes steel capped boots and hard hats.

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.

19.6.3.8 Spontaneous Combustion at Coal Stockpile

ROM coal is planned to be stockpiled near the CHPP. However, temporary coal stockpiles may occur on site. Coal stockpiles can combust spontaneously, which may result in fires, smoke and environmental nuisance effects. 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 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.

19.6.3.9 Transportation

Licensed transporters operating in compliance with the Australian Code for the Transport of Dangerous Goods by Road and Rail will undertake the transport of dangerous goods to the construction site.

During operations, licensed transporters will undertake the transport of dangerous goods (ammonium nitrate) to site. The transport of ammonium nitrate will be undertaken in compliance with the requirements of AS 1678.5.1.002: Emergency procedure guide - Transport - Ammonium nitrate.

19.6.4 Security

The project site will be enclosed with suitable fencing. All areas with high risk of a security breach or unauthorised public access will be protected by a 1.8 m high chain wire fence topped with barbed wire, otherwise a 4-strand wire fencing standard will apply. 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 that the visitor will be permitted access.

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

- Safety helmet
- Steel cap boots
- Safety glasses
- High visibility clothing.

19.6.5 Explosives

A specialist explosives company will provide the ammonium nitrate, emulsion, detonators and boosters to be used during blasting operations. The contractor's personnel will be licensed and trained in the transport, handling, mixing and use of explosive materials. The explosives magazine will be approved under the *Explosive Act 1999* and *Explosives Regulation 2003* prior to construction. Blasting operations will comply with the *Explosive Act 1999* and the *Coal Mining Safety and Health Act 2001.*

The explosives magazine has been located in accordance with AS2187.1: Explosives—Storage, transport and use Part 1: Storage, Section 2 Design Requirements:

- Public risk
- Enhancing physical protection to the public by the use of natural ground features
- Vehicular access routes

- Security
- Other activities in the vicinity of the project site
- Protection from flood, fire, landslide, lightning or other natural incidents.

The mine will have, amongst other requirements, standard operating procedures as required under the *Coal Mining Health and Safety Regulation 2002* for the following:

- Transporting explosives on the mine site
- Inspecting and reporting on the safety of equipment used at the mine for transporting and delivering explosives (as required)
- Taking appropriate action to make equipment mentioned in paragraph (b) safe
- Accounting for explosives brought onto the mine
- Checking for, and isolating, explosives that have deteriorated (unlikely, as none will be stored)
- Minimising the risk of theft or misuse of explosives (unlikely, as none will be stored)
- Identifying and controlling hazards
  - During the charging and firing of explosives
  - In particular places, including, for example in a storage bin feeder in which an explosive is to be used to clear a blockage;
- Finding, recovering and detonating misfired explosives
- Keeping a record about misfired explosives.

19.7 Health and Safety Management System

The project will adopt a health and safety management system similar to those presently implemented throughout BMA's other coal mine operations. The system 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. The system will 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
- Monitoring, Audit and Review.

19.8 Future Risk Assessment

A HAZOP study will be carried out for the project prior to construction commencing. Operational risk assessments such as Failure Mode Effect Analysis and Job Safety Analysis will be carried out on mechanical and task based exposures.

19.9 Monitoring

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

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
- Re-training may be required.
- Health and environmental surveillance data will be monitored to identify common themes.

19.10 Emergency Planning

An Emergency Response Plan will be prepared for the construction and operation phases. 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
- Testing of plan under emergency-like conditions.

General guidance for preparing emergency plans will be obtained from the DCS. Table 19.13 contains suggested or generic elements and 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 19.13 Emergency Plan Elements for Mine-Site Related Emergencies

Event	Level of emergency	Emergency services required	Resources needed	Organisational aspects	Damage control actions
Fire on mine site	Local/Site	Local fire brigade, Police and ambulance on alert.	Fire fighting trucks and water tankers Plans and maps, site fire fighting team.	Evacuation of affected mine workers, Communications to fire brigades, Roll call.	Fire containment, Shutdown of affected operations, Evacuation from around fire sensitive areas such as the fuel tanks.
	External (if potential for impact outside mine boundaries)	Local fire brigade	-	Evacuation notice, Communications with fire brigades.	-
Vehicle collision	Local/Site	Ambulance, Police, Fire Crew	Rescue, fire fighting capability, spill control materials	People control, evacuation of immediate area	Damage control actions, stabilise situation, contain fuel/chemical spillages, control ignition sources
Falls and impact incidents	Local	Ambulance, Rescue	Site rescue equipment	Communication, evacuation of immediate area	Stabilise, isolate source of incident
Fuel/Chemical Spills	Local/Site	Ambulance, Police, Fire Crew	Rescue, fire fighting capability, spill control materials	People control, evacuation of immediate area	Damage control actions, stabilise situation, contain fuel/chemical spillages, control ignition sources

Event	Level of emergency	Emergency services required	Resources needed	Organisational aspects	Damage control actions
Spontaneous combustion	Site	Site fire fighting team	Dozer, fire truck and/or water truck	Communication, evacuation from area	Extinguish/cool heat source
Mechanical and electrical failure	Local / site External	Local maintenance Production staff	Replacement or standby equipment	Major failure requires external communication Internal communication to maintenance groups from production	Isolation and possible shutdown