

19 Health, Safety and Risk

19.1 Overview

This section assesses the health and safety issues associated with the Project's construction and operational 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

Table 19-1 identifies the relevant legislation and the regulatory requirements and describes how the Project will achieve compliance.

Table 19-1 Legislative Compliance

Relevant Legislation	Legislative Requirements	Compliance
<i>Explosives Act 1999</i> 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 <i>Coal Mining Safety and Health Regulations 2001</i> .	Undertake storage and handling of explosive materials/ substances in accordance with the requirements of the <i>Explosives Act</i> .
<i>Coal Mining Safety and Health Act 1999</i>	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.
<i>Dangerous Goods Safety Management Act 2001</i>	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 <i>Coal Mining Safety and Health Act 1999</i> and Regulations.
<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.

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 Sustainable Development Policy (**Appendix E.1**).

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 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 by name, classification, raw and storage concentration, UN number and packaging group.

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 oil	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
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
Solvents (eg 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.

Table 19-3 Indicative List of Dangerous Goods and Hazardous Substances – Construction

Chemical Name/ Shipping Name	Rate of Use	Indicative maximum inventory
Diesel fuel oil	1,500,000 L/a	100,000 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 List of Dangerous Goods and Hazardous Substances - Operations Phase

Chemical Name/ Shipping Name	Rate of Use	Indicative maximum inventory
Diesel fuel oil	20 ML/a	500,000 L
Lubrication oils (hydraulic oil)	100,000 L/a	30,000 L
Lime (calcium oxide)	10 kg/month	20 kg
Caustic soda (sodium hydroxide)	40 kg/month	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 (eg acetone)	40 L/month	200 L
Acids (eg sulphuric)	60 L/month	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 oil. The approved separation distances will be maintained during the storage of these materials/substances as defined in Australian Standard AS 1940:2004: 'The storage and handling of flammable and combustible liquids'. Also, the storage, handling and use of these goods/substances will be in accordance with current Australian Standards and industry codes of practice.

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 negligible 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 contained within the Project Site.

19.4.3 Concentration of Raw Materials in Operation Phase Storage Tanks

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 the appropriate “Guidelines for Hazard Analysis” and Australian Standard AS 4360:2004: ‘Risk Management’. 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, and refers to the Isaac Regional Disaster Plan¹ where appropriate. 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**; 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 and operation phases. These included construction activities (including the CHPP and water supply pipeline), energy supply, coal excavation and transport, and waste water management; and
- the range of potentially hazardous incidents that might be associated with each of the activities/facilities identified at the Project Site.

¹ Prior to the amalgamation of Nebo, Broadsound and Belyando Shire Councils into the Isaac Regional Council, each council had its own Shire Disaster Plan. The Isaac Regional Council is currently in the process of adopting a new Regional Disaster Plan, however at the time of writing this has not been implemented (L.Duck, Isaac Regional Council, Pers. Comm).

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

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'; and
- 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 in **Table 19-8** and **Table 19-9**.

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 4360:2004: '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 4360:2004: '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 4360-2004: '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 Losses

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 4360:1999 'Risk Management'.

Table 19-7 Risk Assessment Matrix

		Likelihood				
		A	B	C	D	E
Consequence	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 table, 'C' is consequence, 'L' is likelihood and 'R' is the risk ranking.

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.	1. Traffic management plan including: <ul style="list-style-type: none"> ■ 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 water supply pipeline)	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. Welding safety practices.						
	7. Contractor and supplier selection.						
	8. Personal Protective Equipment (PPE)						
5. Slump of sloped ground or collapse of temporary open trenches	1. Rollover Protective Structures (ROPS) fitted to equipment.	5	D	24	3	D	17
	2. Geotechnical investigation, design and controls.						
	3. Drainage controls.						
6. Leaks of oil, fuel or chemicals from vehicles	1. Refuelling in designated areas fitted with spill containment.	4	C	18	-	-	-

Hazards	Proposed controls	Environment			Health and Safety		
		C	L	R	C	L	R
onto construction earthworks (mine, CHPP and water supply pipeline)	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						
7. 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	-	-	-
8. Runoff from disturbed areas.	Water Management Plan including: <ul style="list-style-type: none"> ■ minimisation of disturbed areas ■ control of runoff at source ■ sediment dams ■ recirculation of water in sediment dams 	4	C	18	-	-	-

Table 19-9 Risk Assessment Table – Operations Phase

Hazards	Proposed controls	Environment			Health and Safety		
		C	P	R	C	P	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	2. Traffic management plan including: <ul style="list-style-type: none"> ■ police escorts. ■ public notices about the timing and likelihood of delays 	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. 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						
5. 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.						
6. Highwall rock falls	1. Separation of pedestrians from the face.	-	-	-	1	E	11
	2. Protective cabins – Falling Object Protective Structure (FOPS).						
7. 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.						
8. 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.						

Hazards	Proposed controls	Environment			Health and Safety		
		C	P	R	C	P	R
	4. Sources of ignition will be strictly controlled.						
	5. Blasting procedures including separation from the blast zone.						
	6. Storage of detonators shall be in accordance with the Explosives Act, Part 4 Division 6.						
9. 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.						
	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.						
10. Chemical release – liquid from leaks, ruptures, overflows, 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.						
11. Excessive noise (e.g. mine equipment, blasting)	1. Design and operate all equipment to comply with the <i>Environmental Protection (Noise) Policy 1997</i> .	5	C	22	5	C	22
	2. Noise emission requirements included in vendor information for the evaluation process.						
	3. Personal Protective Equipment provided.						
12. Failure to provide	1. Communication system for operators working alone.	-	-	-	4	E	23

Hazards	Proposed controls	Environment			Health and Safety		
		C	P	R	C	P	R
emergency treatment and response	2. Compliance with Emergency Response Plan and Procedures						
	1. 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.						
13. Contact with high voltage electricity	1. Secured access.	-	-	-	1	E	11
	2. Qualified electricians.						
	3. Control of Energy (isolations) procedure.						
14. Spillage from water supply pipeline	1. Burial of the pipeline.	5	D	24	-	-	-
	2. Surveillance monitoring.						
	3. Leak detection.						

19.5.4 Risk Assessment – Conclusion

The information contained in **Table 19-8** and **Table 19-9** indicates that the risk profile for the Project is generally “Low” or “Moderate” with the exception of safety risks from highwall rock fall, contact with high voltage electricity and blasting, which have been assessed as “High” risk. It should be noted that these are assessed as “High” since there is significant energy involved and the controls can only reduce the probability and not the consequence of the event. 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 identified “Extreme” or “High” risks to off site facilities, persons or the environment.

19.6 Construction and Operations Impacts and Controls

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 staff members.

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 aid 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 the Emergency Response Plan.

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

BMA will liaise with local State Emergency Services, Queensland Ambulance Services (QAS) and local ambulance and hospital services with respect to planning for Emergency Response. BMA and QAS have an existing contractual arrangement covering other BMA coal mines in the area, which may be extended to the Project. The 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.

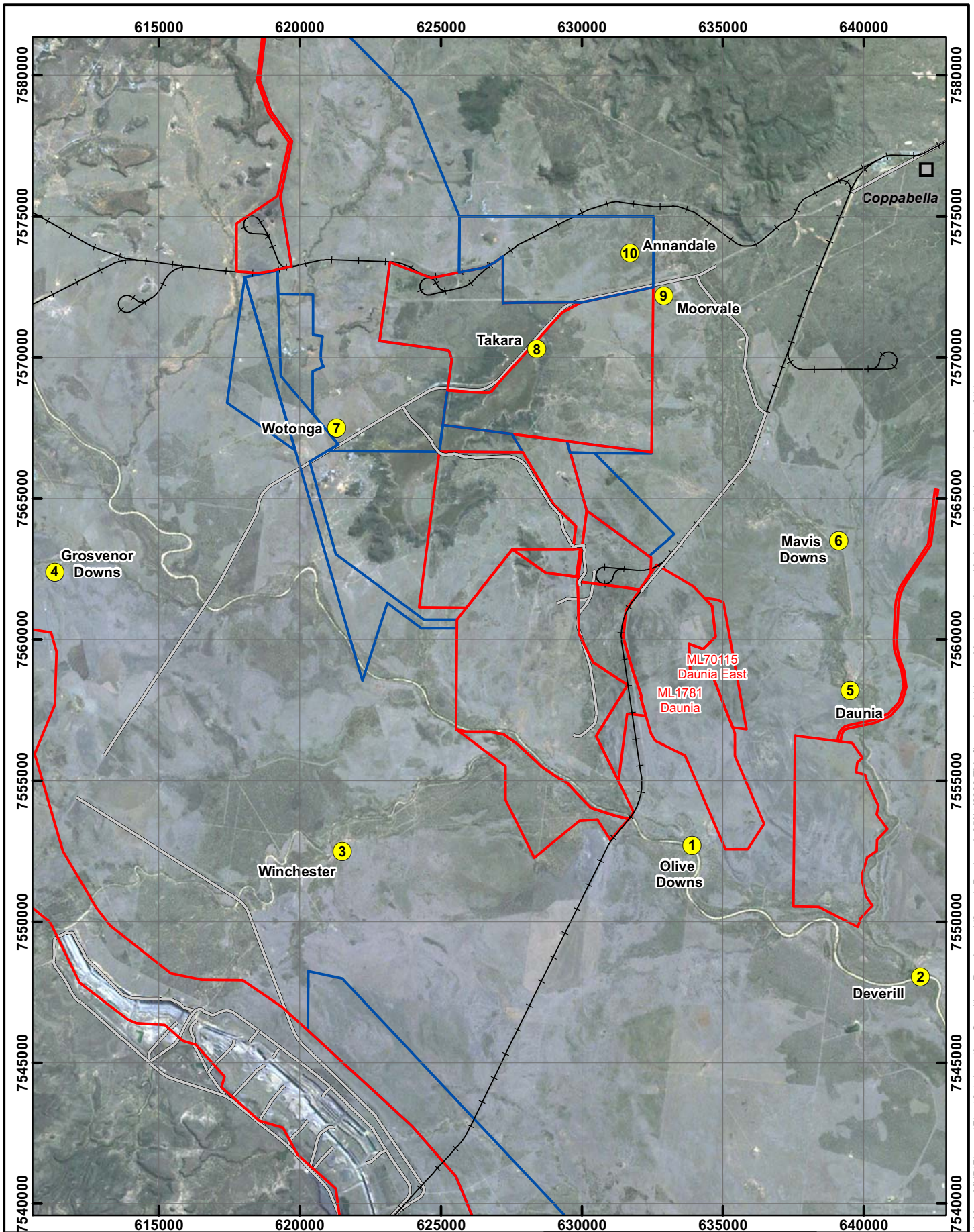
The paramedics are also involved in health promotion and safety training for BMA workers.

19.6.2 Health Risks and Controls

The nearest sensitive receivers to the Project Site are pastoral homesteads, as presented in **Figure 19-1**. A summary of the potential public health risks to these sensitive receivers is presented in **Table 19-10** and discussed further, where relevant, in the subsections below.

Table 19-10 Summary of Risks to Public Health

Potential Health Impact	Risk to Nearby Sensitive Receivers	Comment
Food hygiene	Low	
Odour	Low	No major odour sources.
Particulates & gases/vapours	Low	No major gas/vapour sources. Particulate matter levels at nearby sensitive receivers will be within Government air quality criteria. Nuisance dust will be experienced at Olive Downs around years 15 to 20 of operation.
Noise	Low	Noise will not exceed occupational health and safety levels outside of the Project Site. Nuisance noise will be experienced at Olive Downs around years 15 to 20 of operation.
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 water discharges restricted to flood conditions. Very low likelihood of chemical or wastewater spills to waterways.
Traffic	Low	Majority of traffic along existing Poitrel/Millennium access road.



LEGEND






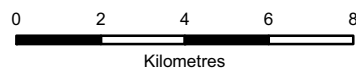
-  Sensitive Receiver
-  Road
-  Existing Railway
-  Mining Lease
-  Mineral Development Licence



FIGURE 19-1
DAUNIA COAL MINE EIS
 LOCATION OF
 SENSITIVE RECEIVERS



Scale 1:180,000 on A4
 Projection: Australian Map Grid - Zone 55 (AGD84)



19.6.2.1 Food Hygiene

Project operations involving the provision and supply of food, such as meal rooms, will operate in accordance with the requirements of current food and hygiene legislation. If a catering contractor is used from time to time, this contractor will hold the relevant licence under the *Food Act 2006*.

19.6.2.2 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.

19.6.2.3 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 watering. The potential impacts and mitigation measures for air quality are further addressed in **Section 10** of this EIS. Numerical modelling indicates that air quality criteria will not be exceeded at nearby sensitive receivers, however nuisance dust deposition will be experienced at the Olive Downs homestead during years 15 to 20 of the Project's operation.

19.6.2.4 Noise

All equipment (both fixed and mobile) will comply with the relevant Australian Standard in regard to design and operating noise levels.

The BHP Billiton Health, Safety, Environment and Community (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.

The potential impacts and mitigation measures for noise are further addressed in **Section 12** of this EIS. Numerical modelling indicates that occupational health and safety levels for noise will not be exceeded beyond the Project Site, however nuisance noise may occur at the Olive Downs homestead during years 15 to 20 of the Project's operation.

19.6.2.5 Pests

The Project is not expected to lead to an increase in the number of pests during construction or operations.

19.6.2.6 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. The bins will be located throughout offices and canteen areas to achieve maximum economic waste recovery. Waste materials that are known to attract vermin will be stored and handled in a hygienic manner. General wastes will be transported for disposal to the Nebo or Moranbah landfill. Sewage will be pumped to the sewage treatment plant at the Poitrel Mine for treatment and on-site evaporation.

Standard procedures will be in place during construction to contain and limit damage from accidental release of waste materials, such as oil spillages.

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). Waste materials that are known to attract vermin will be stored, handled in a responsible manner and removed from site by a licensed waste management firm.

Standard procedures 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.

19.6.2.7 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 1940:2004: '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 health risk presented by these chemicals is relatively low.

19.6.2.8 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 19.6.2.6** and **19.6.2.7**. Although a small lake is expected to form within the rehabilitated final void and is likely to increase in salinity over time, groundwater will continue to flow towards the final void and thus the saline water will not move off-site to nearby sensitive receivers.

19.6.2.9 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. Chemical spills will be minimised as outlined in **Section 19.6.2.7**. All sewage will be treated at the Poitrel Mine sewage treatment plant, with treated effluent disposed of on-site via evaporation. No sewage effluent will be discharged to waterways.

19.6.2.10 Traffic Accidents

The Project will use the existing Poitrel/Millennium access road from the Peak Downs Highway. Use of Dauna Road will be limited to minor use during the construction phase, with most construction vehicles to use the Poitrel/Millennium access road. There is thus no significant increase in the likelihood of traffic accidents occurring along Daunia Road.

The Project will result in modest increases to the traffic along Peak Downs Highway, with no reduction in the Level of Service along the highway or other roads in the area, as presented in **Section 13** of the EIS. There is thus no significant increase in the likelihood of traffic accidents occurring in the area.

19.6.3 Safety Risks and Controls

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

19.6.3.1 Equipment

Construction vehicles and equipment will be operated according to the manufacturer's specifications. 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.

During operations, mining 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 (four-wheel drives) that operate on roads and access roads around the site. Collisions between these 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.

Watering of roads and access areas will be undertaken regularly to suppress dust and improve 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 (four-wheel drives) 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.

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 the 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. Adequate night lighting will be provided around the mine, CHPP and industrial area 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, 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 oil. 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 1940:2004: '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 chemicals is relatively low.

During operations, the hazard associated with the storage of fuel oil arises from leaks and/or failures in the system. To minimise the hazards associated with fuel oil 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 oil 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.

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

- adequate bunding will be constructed to contain spill, in accordance with AS 1940:2004 (Section 5.8 Bunds and Compounds);
- tank level indicators will be installed on fuel oil tanks for monitoring of fuel oil levels;
- maintenance of fuel oil tanks will be undertaken, to ensure safe and effective operation of all components; and
- 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.

19.6.3.5 Blasting and Misfires

Blasting creates a number of potential risks such as dust, noise, vibration and 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 – 1988: '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

Power supply to the Project will be via a new 66 kV overhead power line sourcing power from the Millennium Project and Poitrel Mine power supply. This power supply will provide power distribution for the CHPP, infrastructure facilities and the electric equipment.

Electricity use for mine lighting, 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 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 Personal Protective Equipment (PPE) on a construction site that protects against objects falling from height includes steel capped boots and hard hats (both are worn at all times). Fall of persons will be controlled through 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 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. 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

Run of Mine (ROM) coal is planned to be stockpiled near the CHPP. However, temporary coal stockpiles may occur on site. Coal stockpiles may 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 1678.5.1.002-1998: '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 mandatory PPE:

- safety helmet;
- steel cap boots;
- safety glasses; and
- 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 location of the explosives magazine will take into consideration, in accordance with AS2187.1-1998: 'Explosives—Storage, transport and use Part 1: Storage, Section 2 Design Requirements':

- 1) public risk;
- 2) enhancing physical protection to the public by the use of natural ground features;
- 3) vehicular access routes;
- 4) security;
- 5) other activities in the vicinity of the Project Site; and
- 6) 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:

- (a) transporting explosives on the mine site;
- (b) inspecting and reporting on the safety of equipment used at the mine for transporting and delivering explosives (as required);
- (c) taking appropriate action to make equipment mentioned in paragraph (b) safe;
- (d) accounting for explosives brought onto the mine;
- (e) checking for, and isolating, explosives that have deteriorated (unlikely, as none will be stored);
- (f) minimising the risk of theft or misuse of explosives (unlikely, as none will be stored);
- (g) identifying and controlling hazards;
 - (i) during the charging and firing of explosives; and
 - (ii) in particular places, including, for example in a storage bin feeder in which an explosive is to be used to clear a blockage;
- (h) finding, recovering and detonating misfired explosives; and
- (i) 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 comprise many of the 'defence in depth' layers but 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; and
- Monitoring, Audit and Review.

19.8 Future Risk Assessment

A hazard and operability (HAZOP) study will be carried out for the Project prior to construction commencing. Operations risk assessment 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 and safety measures are being implemented and are effective. Monitoring will involve the compilation and assessment of data relating to health and safety 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; and
- re-training may be required.

Health surveillance data will be monitored to identify common themes.

19.10 Emergency Planning

An Emergency Response Plan will be prepared for construction and operations. 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 Queensland Ambulance Service and the Department of Emergency Services. **Table 19-11** contains suggested or generic elements and response procedures.

The Isaac Regional Council Counter Disaster Plan² 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 State Emergency Service, Ambulance Service and Fire Brigade. 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 19-11 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	Fire containment
	Potential external alert	Local fire brigade		Roll call	Shutdown of affected operations
				Evacuation notice Communications to fire brigades	Evacuation from around fire sensitive areas such as the fuel oil tanks.
Vehicle collision	Local/Site	Ambulance, Police, Fire Crew	Rescue, fire fighting capability, fuel containment materials	People control, evacuation of immediate area	Damage control actions, stabilise situation, contain fuel spillages, control ignition sources
Falls and impact incidents	Local	Ambulance, Rescue	Site rescue equipment	Communication, evacuation of immediate area	Stabilise, isolate source of incident
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

² See footnote 1.