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HEALTH & SAFETY

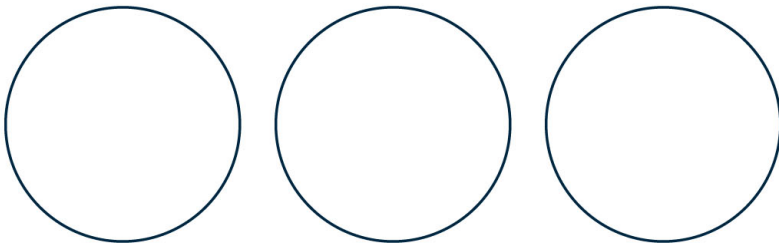


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20 HEALTH & SAFETY

This section describes the health and safety controls which will be implemented during the construction and operation of the Ensham Central Project.

20.1 INTRODUCTION

The proponent currently implements an extensive Health and Safety Management System (HSMS) for the existing Ensham Mine. This system specifies a broad range of site safety procedures, operating procedures and specific management plans which together achieve a system of health and safety management in accordance with all relevant legislation and corporate policies.

This section identifies the potential health and safety issues for construction and operation of the project and considers the risk of these to human and environmental health and safety, with regard to the existing HSMS.

20.2 ENSHAM HEALTH & SAFETY MANAGEMENT SYSTEM

The Coal Mining Safety and Health Act 1999 requires mines to implement a safety and health system which incorporates risk management elements and practises, to ensure the safety and health of persons who may be affected by the coal mining operations. Section 62 of the Act states that this must be an auditable, documented system which forms part of an overall management system that includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining a safety and health policy.

The objectives of the proponent's HSMS for the Ensham Mine, are as follows:

- to protect the health and safety of all mine personnel, contractors and visitors;
- to ensure compliance with the relevant legislation; and
- to protect the environment.

This HSMS is externally audited on an annual basis to confirm compliance with Australian Standard AS/NZS4801 - 2001, *Occupational health and safety management systems – specification for guidance for use*. The HSMS will be extended, in accordance with all relevant legislative safety and health requirements, to address the additional health and safety requirements of the project including the construction and operation of underground mining operations and coal handling and processing plant facilities.

20.3 LEGISLATIVE REQUIREMENTS

The legislation relevant to health and safety issues associated with construction and operation of the project, and the corresponding requirements of each item of legislation, are listed below:

- The *Building Act 1975*

This Act and associated regulations refer to the laws for the erection of buildings and other structures.

- *The Coal Mining Safety and Health Act 1999*
This Act and associated regulations, including the *Coal Mining Safety and Health Regulation 2001*, state the obligations for mine operators, site senior executives, designers, contractors, manufacturers and others on a coal mine in Queensland. They also address the management of risk and the legislative requirements for a safety and health system.
- *The Explosives Act 1999*
This Act and associated regulations state the requirements for handling, storage, transport and manufacture of explosives.
- *The Dangerous Goods Safety Management Act 2001*
This Act and associated regulations state the requirements for the safe management of the storage and handling of hazardous materials in Queensland, and the management of major hazard facilities and emergencies involving hazardous materials. It refers to the *Australian Dangerous Goods Code*.
- *The Radiation Safety Act 1999*
This Act and associated regulation states the requirements for the control of radioactive sources, including licensing, use, storage, relocation and disposal of radiation sources. Its objective is to protect people from the health risks associated with exposure to radiation.
- *The Food Act 1981*
This Act states the requirements for the handling and sale of food to ensure safety and suitability.
- Australian Standard AS1692 - 1989: *Tanks for flammable and combustible liquids*
This Australian standard specifies the requirements for the design and construction of tanks for the storage of flammable and combustible liquids.
- Australian Standard AS1940 - 2004: *The storage and handling of flammable and combustible liquids*
This Australian standard sets out the requirements and recommendations for the safe storage and handling of flammable and combustible liquids including minimum acceptable safety requirements for storage facilities, operating procedures, emergency planning and fire protection.
- Australian Standard AS2187 - 1998: *Explosives - Storage, transport and use*
This Australian standard provides the acceptable requirements for storage, transport and use of explosives and detonators to ensure security and safety.
- Australian / New Zealand Standard AS/NZS4360 - 2004: *Risk management*
This standard describes the elements of risk management processes including the process of risk identification, analysis, evaluation and treatment.
- Australian / New Zealand Standard AS/NZS4801 - 2001: *Occupational health and safety management systems – specification for guidance for use*
This standard specifies requirements for an occupational health and safety management system (OHSMS) to enable an organisation to formulate a policy and objectives, taking into account legislative requirements and information about hazards or risks. It applies to hazards or risks over which the organisation may exercise control.
- *The Australia New Zealand Food Standards Code 2005*
This code states the standards for food in Australia including processing for particular classes of food hygiene and primary production.

- The *Australian Dangerous Goods Code (6th edition)* prepared by the National Road Transport Commission in conjunction with the Advisory Committee on the Transport of Dangerous Goods

This code sets out the technical requirements and guidelines for the transport of dangerous goods by road and rail and is implemented by Queensland government legislation.

The process to achieve compliance with the above legislation is outlined in the following sections.

20.4 DANGEROUS GOODS MANAGEMENT

The project will use hazardous substances, including fuel, oil and explosives. The transport, storage and use of such substances will be undertaken in accordance with the *Dangerous Goods Safety Management Act 2001*, Australian Standard AS1940 - 2004: *The storage and handling of flammable and combustible liquids*, and the *Australian Dangerous Goods Code (6th Edition)*.

Dangerous goods required for the project will be stored in the existing storage warehouse at the industrial area of the Ensham Mine. An indicative list of all dangerous goods which may be stored and used on site during construction and operation of the project is given in Table 20-1. This includes the chemical name, concentration, UN number, packaging group and correct shipping name.

Table 20-1
Indicative List of Dangerous Goods

Chemical Name /Shipping Name	DG Class	Raw Conc. (wt%)	Storage Conc. (wt%)	UN Number	Packaging Group	Purpose / Use	Indicative Maximum Inventory
Diesel fuel oil	3 (Class C1)*	n/a	n/a	1202	III	Fuel for mobile equipment	500,000 L
Lubrication oil (hydraulic oils)	3 (Class C2)**	n/a	n/a	n/a	n/a	Lubricate for plant and equipment	80,000 L
Lime (calcium oxide)	8	93	93	1910	III	Potable water treatment	16 kg
Caustic soda (sodium hydroxide)	8	50	50	1823	II	Concrete degreasing agent	500 kg
Solvents (e.g. acetone)	3	99.5	99.5	1090	II	Workshop degreasing agent	300 L
Hypochlorite solution (chlorine)	8	10-15%	10-15%	1791	II or III	Potable water treatment	500 L
Sulphuric acid	8	15-51%	15-51%	2796	II	Batteries	500 L
Paints	3	n/a	n/a	1263	III	Paint	2 ML

* 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

Other dangerous goods which may be required for the project in minor quantities will be identified prior to their arrival on site and appropriate measures implemented to manage their safe storage and use in accordance with AS1940. Fuel will be stored at one of two existing fuel storage facilities located behind the warehouse at the existing industrial area and the Yongala mine, or at a

new facility currently under construction on the southern side of the Nogo River. Explosives will be provided by certified explosives contractors.

During both construction and operation phases of the project, material safety data sheet (MSDS) information will be made available and communicated to all site personnel involved in the storage, handling, use and disposal of dangerous and hazardous substances and materials.

The transportation, handling, storage and use of explosives will be subject to a comprehensive risk assessment and strict controls. Explosives contractors and mining personnel will be required to observe the requirements of Australian Standard AS2187-1998: *Explosives - Storage, transport and use*, other applicable Australian Standards and government legislation, and the Ensham HSMS procedures.

20.5 HEALTH CONTROLS

20.5.1 Introduction

The key potential health hazards of the project have been identified and assessed. Detailed descriptions of the proposed controls for these hazards are outlined below. Specific and detailed risk assessments will be conducted on all of these hazards prior to commencement of operation of the project.

20.5.2 Air Quality

Dust may be generated during construction and operation of the project. The impact of dust on the surrounding land users, and the management measures proposed for the mitigation of this are addressed in Section 13 - Air Quality. The impact of dust has been assessed with reference to established goals relating to human health issues and residential amenity.

Proposed measures to mitigate off site dust also address the reduction of dust on site. These methods significantly reduce the incidence of dust in the air and reduce the risk of dust inhalation by mine employees and visitors. Dust exposure levels will continue to be monitored in accordance with the existing HSMS to ensure compliance with health exposure standards.

If necessary, in extremely dusty areas where dust reduction is not practicable, the area will be signposted as a "respiratory protection area" and mine employees will be required to wear respiratory protection devices which are issued as part of all employees' standard personal protection equipment. Training will include site induction and dust awareness training programs to complement the above controls.

Exposure standards for any other vapours that may be produced through work related practices will also be implemented to ensure that mine personnel will not be exposed to adverse health effects. Respiratory devices will be utilised where required.

20.5.3 Noise

Section 14 – Noise addresses the impact of project-generated noise on surrounding land users. The impact on surrounding land users of noise which may be generated by the project, and the management measures proposed for the mitigation of this, are addressed in Section 14 - Noise. The impact of noise has been assessed with reference to established criteria relating to human health issues and residential amenity.

Existing HSMS procedures will continue to be implemented to ensure that noise levels generated by the project do not create adverse health conditions for site personnel. These procedures

include the identification and assessment of occupational noise hazards, and the development of noise management programs to protect site personnel and visitors from adverse exposure.

Site safety training will include noise awareness training programs to complement other controls already presented. Areas where noise control using engineering or administrative controls is not practicable will be designated as "hearing protection areas" in accordance with Australian Standard AS1319 *Safety signs for the industrial environment* and mine employees will be required to wear hearing protection devices. Noise surveys will be carried out annually to identify areas that may have changed in terms of noise levels and the need for controls and protection.

20.5.4 Odour

Potential causes of odour at the project are the on site waste disposal areas and the underground mine ventilation shaft. Any potential impact of ventilation shaft odour on the surrounding land users, and the management measures proposed for the mitigation of this are addressed in Section 13 – Air Quality.

Waste management is addressed in Section 8 – Waste and Land Contamination. The existing Ensham waste management program provides for removal of most waste off site. There is no on site landfill at this time.

20.5.5 Chemicals

Chemicals currently used at the Ensham Mine include fuels, detergents, lubricants and oils, solvents, acids, degreasers and domestic cleaning agents. Construction and operation of the project will require the use of additional chemicals including grouts, resins and flocculants. An indicative list of dangerous goods is provided in Table 20-1. All chemicals will be managed in accordance with the MSDS applicable to it and the existing hazardous material management system for the Ensham Mine which incorporates the "Chemalert" chemical management system. Storage areas for both bulk chemicals and minor quantity chemicals will be suitably located and bunded to minimise the risk of chemical spills and potential environmental harm. Hydrocarbons will be handled in accordance with AS1940 - 2004: *The storage and handling of flammable and combustible liquids*.

The existing Ensham Mine HSMS will continue to be implemented for the project, including operating procedures for the refilling and maintenance of fuel storage tanks and mine vehicles. Training includes site induction and chemical awareness training programs. In the event of any spills, the existing Ensham Mine Spill Management Plan states the procedures to be followed for the containment, clean-up and investigation of any spills, in order to maximise the safety of employees and visitors, and minimise the environmental impact.

20.5.6 Food Hygiene

Currently the majority of Ensham Mine employees work a seven day shift during which they are accommodated in on site camps. A new camp will be constructed on site to accommodate the additional workforce associated with the project. The provision and supply of food, potable water and accommodation facilities as part of these camps will continue to be undertaken by licensed contractors operating in accordance with relevant food and hygiene legislation, including the *Australia New Zealand Food Standards Code 2005*, the *Queensland Food Production (Safety) Act 2000*, and the *Food Act 1981*.

20.5.7 Potable Water Supply

Potable water is currently required at the accommodation camp and ancillary infrastructure areas of the Ensham Mine. This water is sourced from the Nogoia River in accordance with the proponent's existing water allocation. It is then treated at the on site water treatment plant located behind the existing Ensham accommodation camp to bring it to a potable water standard. Potable water quality is monitored on a regular basis.

The capacity of this water treatment plant will be increased in accordance with the estimated potable water requirements for the project. Water quality will continue to be monitored to ensure compliance with drinking water standards.

20.5.8 Waste Management

Waste management for the project is discussed in Section 8 - Waste and Land Contamination. Waste is currently managed in accordance with the existing Waste Management Program and in compliance with the relevant Queensland environmental protection legislation and the conditions of the proponent's Environmental Authority.

All waste generated by the project will be collected, handled and stored to protect mine personnel and community health, and to prevent nuisance. Refuse bins will be covered to contain odour, reduce leachate and prevent vermin. General refuse will be removed from site on a weekly basis.

20.5.9 Pests

Waste disposal bins are currently located on site to facilitate the collection of rubbish in a clean, safe and hygienic manner, prior to removal from site by licensed contractors. Waste which is known to attract vermin is stored and handled in an appropriate manner. This system will be continued and expanded as necessary during construction and operation of the project.

Water which ponds in open pit or infrastructure areas of the project will be pumped to on site storage areas in accordance with the water management system for the Ensham Mine. Regular circulation of stored water will prevent the occurrence of stagnant areas. No increase in breeding of pest insects is expected due to the project.

20.6 SAFETY CONTROLS

20.6.1 Introduction

The key safety hazards for the project have been identified and assessed and a detailed discussion of the proposed controls is outlined below. Specific and detailed risk assessments will be conducted on all of these hazards before construction of the project commences.

20.6.2 Equipment

All vehicles and equipment will continue to be maintained and serviced regularly and records of maintenance and service will be retained on site. Machinery and equipment will be operated only by trained personnel in possession of a current license.

Any equipment containing radionuclide material, including industrial gauges and soil moisture density gauges, will be held under licence issued in accordance with the *Radiation Safety Act 1999*.

20.6.3 Vehicle Accidents

Vehicles currently used at the Ensham Mine include haul trucks, loaders, scrapers, graders, dump trucks, water trucks and light vehicles (4-wheel drives). Additional vehicles will be employed to serve the underground mining operators.

Vehicles used in the open cut mining operations operate on a system of haul roads and access roads around the mine site which will continue to exist and be expanded during implementation of the project. Collisions between these vehicles have the potential to cause serious injury to mine personnel. Road conditions on a mine site also present additional hazards due to the presence of structures such as berms and roadside drains. To minimise this risk, a number of key controls will be put in place. Roads will be suitably designed in accordance with the nature and volume of traffic utilising the roads, and environmental factors such as weather conditions and topography. Roads will be graded to provide a safe level of operation for site vehicles. Safety rills will be constructed and maintained to protect persons and equipment from driving over embankments. Berms will be inspected on a regular basis by supervisors and operators to ensure structural integrity.

Road rules and standard vehicle safety fittings such as flags and reversing alarms currently reduce the likelihood of collision. Existing operating procedures for dust control, driving safety, site induction and driver training will continue to be implemented to ensure vehicles are driven in a safe manner and that site driving rules and etiquette are understood. Roads will continue to be speed limited and watered to suppress dust to ensure adequate visibility. Additional lighting will be installed as necessary to ensure that night driving and operating conditions are safe. Vehicle inspection checks will continue to be undertaken as part of the regular maintenance program.

The movement of vehicles used in underground mining operations will be restricted to the underground mine or dedicated access roads located between the underground mine surface facilities and mine portal entrance. Underground mine vehicles will not have any interaction with other mine traffic.

20.6.4 Physical Interaction with Machinery

Mine personnel may be at risk of interacting with moving machinery parts such as crushers and vehicles when undertaking maintenance or repairs. To minimise this risk the existing HSMS includes a "Control of Energy" operating procedure which requires that all energy sources on site are controlled. This procedure incorporates a danger tag safety system to reduce the likelihood of exposure to inadvertent releases of all forms of energy, by providing personal protection against accidental start-up of equipment or apparatus. Existing site induction and training programs will continue to be implemented to introduce and reinforce these procedural requirements.

20.6.5 Explosives

Explosives currently used at the Ensham Mine include ammonium nitrate, emulsion, detonators and boosters for blasting operations. Explosives are stored on site in one of two dedicated magazines located in a designated explosive storage area. This area is located to reduce the potential risk to mine personnel and vehicles and to minimise the risk of impact due to natural events such as landside, fire, flood and lightning strikes. It is located a minimum of 6 km from the administration building and access is restricted to authorised persons only.

All explosives required for the project will be managed in accordance with the existing operating procedures for the transportation, loading and firing of explosives on site, the maintenance of an explosives inventory and the following regulations:

- The *Explosives Act 1999*;
- Australian Standard AS2187 - 1998: *Explosives – storage, transport and use*;

- Australian Standard AS2187.1 - 1998: *Storage*; and
- Australian Standard AS2187.2 - 1998: *Use of explosives*.

Explosives will be handled only by licensed explosive contractors trained in the transport, handling, mixing and firing of explosive materials.

An additional explosives storage facility may be required for the project to service the underground mining operations. The design, construction and operation of this, if required, will be in accordance with existing procedures and relevant legislation.

20.6.6 Blasting

Blasting at Ensham Mine is conducted in accordance with the *Explosives Act 1999*, the *Coal Mining Safety and Health Act 2001*, and existing operating procedures which ensure compliance with this legislation.

The potential risks of blasting include air blast overpressure, ground vibration, fly rock and dust effects, and incomplete detonation. Mitigation measures currently used on site to reduce the risk of these hazards include the use of appropriately trained and qualified personnel to undertake blasting, control of access to the blast area (including temporary road closure), evacuation warnings prior to blasting (to ensure that persons are at a suitable safe distance from the shot) and appropriate safety personal protective equipment (PPE) to be worn by all personnel in the vicinity of the blast.

The existing HSMS procedures will continue to apply to blasting activities undertaken for the project. Appropriate charge ratios and proper stemming will be used in the preparation of all blast charges to limit the amount of fly rock produced by a blast. Blasting and the loading of explosives will be undertaken only by experienced and appropriately trained explosives contractors. The firing of explosives will be undertaken by a trained and licensed shot firer. Incomplete detonation events will be managed by suitably qualified personnel in accordance with the existing operating procedure for blasting.

The impacts of blasting associated with the project at neighbouring residences are addressed in Section 15 – Blasting.

20.6.7 Fuel Storage and Handling

In accordance with the *Building Act 1975* the proponent holds a current permit for the storage of flammable and combustible liquids on site at the Ensham Mine. Diesel fuel is currently stored on site in bulk storage tanks and used for refuelling of mine vehicles in accordance with existing operating procedures. Diesel presents a relatively low combustion risk.

The following controls will continue to be implemented to reduce the health, safety and environmental risks of the storage of flammable and combustible liquids:

- Bulk fuel storage and refueling facilities will be designed and built in accordance with Australian Standard AS1940-2004 - *The storage and handling of flammable and combustible liquids*;
- The risk of storage tank failure will be minimized by design in accordance with AS1692-1989 - *Tanks for flammable and combustible liquids*;
- All equipment and vehicle operators will be trained in the safe operation of the equipment and the relevant emergency response procedures in the event of an incident;
- Suitable bunds will be constructed and maintained around fuel and oil storage facilities in accordance with AS1940 to prevent persons and equipment from driving into liquid storages;

- Regular equipment inspection programs will be undertaken to ensure the structural integrity of fuel tanks and bunds;
- Standard operating procedures governing “control of energy” will be implemented when undertaking facility maintenance;
- Fire fighting facilities and fire suppression systems will be installed and maintained at all fuel storage and refueling locations and all appropriate staff will be trained in the operation of these facilities; and
- Strict control of ignition sources will be maintained.

Fuel tankers are generally able to access bulk storage facilities without crossing highly trafficked areas of the mine site. However, in the event these vehicles need to use roads actively used by heavy mining vehicles, appropriate escort will be provided.

20.6.8 Exposure to High Voltage

Electricity is currently supplied to the Yongala substation at the Ensham Mine via a 66 kV high voltage power line from the Lilyvale substation. From here it is reticulated within the mine to supply power to draglines, infrastructure area buildings, accommodation camps, lighting and the washplant. The existing power supply has sufficient capacity to support the open cut and underground operations of the project, the proposed coal handling and processing plant and expanded site infrastructure and additional camp facilities.

Existing operating procedures for working with high voltage, including induction and training programs and isolating and tagging procedures, will continue to be implemented for the project. Only appropriately trained personnel are permitted to isolate and access high voltage equipment.

20.6.9 Working at Heights

During construction and operation of the project mine employees and contractors will be required to work at heights to assemble, install, maintain and repair equipment. Where possible, activities will be planned to eliminate the need to work at heights. However, where unavoidable, existing safety and operating procedures will be followed.

These procedures specify mandatory personal protection equipment which must be worn at all times. The risk of fall of persons will be controlled through the use of platforms, lifts and fall arrestor systems where appropriate. All scaffolds and access steps must have safety rails and all employees working in sully boxes, man boxes and scissor lifts must wear harnesses and be appropriately trained.

The risk of injury from objects falling from significant height will be controlled by the use of exclusion zones with areas below the work area barricaded to prevent access.

20.6.10 Working in Hazardous Locations

During construction and operation of the project employees may need to perform hot work or undertake work in confined spaces or other hazardous locations. The existing operating procedures for working in hazardous locations will be extended as necessary for the project.

20.6.11 Spontaneous Combustion

Coals stored in stockpiles, or present in mine pits and overburden emplacement areas, is at risk of spontaneous combustion, resulting in the potential for fire and smoke. Current experience at the Ensham Mine indicates that spontaneous combustion occurs very rarely. Management systems

are in place to reduce the risk of occurrence, and describe the procedures to be implemented if spontaneous combustion does occur.

Preventative measures include regular monitoring and compaction of stockpiles and management of stockpiles to reduce the residency time of coal. If a spontaneous combustion event does occur remedial action will be taken. Remedial action will focus on the dissipation of heat, includes digging out of localised hot spots, spreading and track rolling of coal and recirculation of coal in the stockpiles. These existing procedures will continue to be implemented and modified as necessary, during construction and operation of the project.

20.7 PUBLIC ROADS

Equipment and materials which will be delivered to Ensham Mine during construction of the project include mining equipment, building supplies, fuel, concrete, gravel, structural steel, and mechanical plant and equipment. Materials which will be delivered during operation include fuel, explosives, spare parts, camp and office supplies and consumables.

Where possible, construction materials will be sourced locally and road materials will be sourced on site. Structural steel will come from coastal ports or interstate. Mining equipment is likely to be imported and transported to the site by road from Gladstone or Brisbane on standard or over-dimensional vehicles. Where the transport of large items of mining or coal handling equipment is necessary, this will be done under permit and with appropriate safety escorts. In this event the Department of Main Roads and local shire councils will be consulted prior to the movement of any oversize indivisible loads, in order to minimise disruption to other road users.

The traffic impacts of the project are addressed in Section 9 - Transport. There will be a small increase in the total traffic volumes predicted to occur in the vicinity of the project however this will pose negligible risk to road users and transport infrastructure including bridge structures. The existing Capricorn Highway / Duckponds Road intersection will be upgraded prior to commencement of the project in order to improve the level of service and general safety of the intersection. Proposed works associated with this upgrade are described in Section 9.2.5 of this EIS.

20.8 FLOOD

Construction and operation of the project will require the provision of two new flood levees on the northern and southern banks of the Nogoia River in the vicinity of the open cut pits B and C. These levees will both protect the mine pits from flooding, and protect the Nogoia River from the risk of contamination by water affected by mining operations. The location and heights of the proposed levees have been determined based on extensive flood modelling undertaken as part of this study. Further details of this flood study are provided in Section 12 – Surface Water.

An assessment of the risks associated with mining in the Nogoia River floodplain has been undertaken as part of project planning. Details of this are provided in Section 12 – Surface Water.

20.9 BUSHFIRE

The vulnerability of the area to bushfires is assessed in Section 5 – Climate. The area of the Ensham Mining Lease and Mining Lease Application area is generally classified by the Rural Fire Brigade as being of low bushfire hazard, with a minority (less than 15%) classified as being of medium bushfire hazard.

The risk of bushfire outbreak is currently minimised by the absence of large stands of trees and the maintenance of firebreaks around all powerlines, mine pits, infrastructure and industrial areas and roads. Water points are located throughout the mine, and a comprehensive fire prevention and suppression system, including the use of on site water trucks, is in place. Existing systems will continue to be employed for the project.

20.10 SECURITY

The Ensham Mine property is fully enclosed by a four strand barbed wire fence and no public access is permitted to or through the mine.

There are two points of road access to the mine; from the south via Duckponds Road, and from the north via Wyuna Road. The location of these roads are shown in Figure 9-1. The Duckponds Road entry has a continuously manned gatehouse located within the proponent's property. Admission to the mine area beyond this gatehouse is via a strictly controlled access security system. The Wyuna Road entry is locked and used only by authorised mine employees.

Visitor entry to the mine is permitted in accordance with standard operating procedures which are implemented to ensure that visitors are authorised and registered, have undergone adequate safety induction in accordance with the type of work to be undertaken whilst on site, and are suitably attired with the appropriate level of personal protection equipment.

The existing security arrangements will continue to be employed during construction and operation of the project, with amendment as necessary in accordance with the proposed mining operations. The existing Duckponds Road gatehouse is the main point of entry to the mine.

20.11 EMERGENCY RESPONSE AND PLANNING

20.11.1 Emergency Response

Emergency response procedures are currently implemented at the Ensham Mine in accordance with the existing HSMS. These procedures address the identification and minimisation of risk associated with potential emergency situations, aided rescue and self-escape of persons in the event of an emergency, emergency exercises and testing, and auditing and review of the emergency management system. These procedures will be extended as necessary during the construction and operation phases of the project.

All site personnel are trained in basic first aid and selected personnel are trained in more advanced resuscitation techniques. First aid stations and emergency response kits are located throughout the Ensham Mine. A first aid and medical centre, including ambulance station, is located in the main administration building. The ambulance has direct access to the mine site and all service area buildings and facilities.

In the event of an emergency, backup ambulance support may be provided from Emerald and/or Blackwater. The proponent liaises with local State Emergency Services, ambulance and hospital services when planning for emergency response. Ambulances and other emergency vehicles will access the project via Duckponds Road. The location of Duckponds Road is shown on Figure 9-1.

The existing emergency response procedures will continue to be implemented for the project, including the provision of emergency response kits and first aid stations in all new open pit areas and the new underground mine facility.

20.11.2 Fire Fighting

All buildings are fitted with approved fire fighting equipment including fire hose reels and hand held extinguishers and all exits and fire fighting equipment locations are suitably signed. Fire detection systems are located in all accommodation buildings. Fire detection and suppression systems are located in all draglines, coal reclaim tunnels, plant and electrical control rooms and transformers. A dedicated fire water ring main and hydrant system serves the administration building and accommodation camps.

The Ensham Mine's current mobile fire fighting equipment includes water trucks fitted with water cannons and high pressure hoses, and fire fighting trailers. All site personnel are trained in basic fire fighting procedures with hand held extinguishers. Selected personnel are trained in more advanced fire control techniques. Fire drills are undertaken regularly.

The fire fighting facilities are approved by the local Queensland Rural Fire Brigade service and all fire fighting facilities and equipment are installed, serviced, maintained and inspected by an approved certified body. The existing systems will continue to be implemented and extended as necessary to serve the project.

20.11.3 Emergency Planning

The existing Ensham Mine Emergency Management System will be revised as necessary to incorporate the construction and operation stages of the project. The system is based on the following principles:

- use of the risk assessment and risk management process to manage emergencies;
- safety of personnel is foremost at all times;
- formulation and review of emergency management plans;
- simple but effective emergency response plans;
- ongoing training of emergency control personnel; and
- ongoing training of all personnel in emergency response procedures.

The Counter Disaster Management Plans for the Emerald and Peak Downs Shires will be considered when modifying the Ensham Mine's Emergency Response Plan. These local councils and the local Department of Emergency Services will also be advised of changes which may affect them as a result of the project.

20.11.4 Monitoring

Monitoring is currently undertaken at Ensham Mine to assess whether the existing HSMS is being implemented effectively. Monitoring involves compilation and assessment of data relating to health and safety issues, such as reported near misses, accident reports and health surveillance data. This monitoring and review system will be extended to include the construction and operation of the project.

Health surveillance data will be monitored to identify common themes. Accident and near miss data will be monitored to identify the following:

- procedures or work practices which may need review;
- additional training or retraining which may be required;
- whether personal protection equipment is being incorrectly used; and
- corrective actions which are ineffective or not being effectively implemented.

20.12 PROJECT HAZARDS AND RISK ASSESSMENT

20.12.1 Existing Risk Assessment Procedure

As part of the existing HSMS, the proponent currently implements a risk assessment procedure for operation of the Ensham Mine. This procedure has been developed in accordance with Australian Standard AS/NZS4360 - 2004: *Risk management*. It incorporates a risk assessment matrix which provides a method for determining the risk associated with a hazard, based upon both the probability and consequence of the hazard. This risk assessment matrix is shown in Table 20-2.

Table 20-2
Risk Assessment Matrix

Consequence	Environmental	Safety	Financial	Delays
1	No detrimental impact on the environment is measurable or envisaged.	First Aid required	< \$100,000	< 1 month delay
2	An event which could have temporary and minor effects on the environment, such as a non-reportable environmental incident (eg. a minor oil spill).	Minor injury	\$100,000 - 1 Million	1-3 months
3	An event which could create substantial temporary or minor permanent damage to the environment, such as a reportable incident not likely to result in prosecution (eg. a minor water discharge).	Serious injury	\$1 - 5 Million	3-6 months delay
4	An event which could have a substantial and permanent consequence to the environment such as an environmental incident which would result in prosecution, adverse local publicity and community complaints.	Multiple serious injury	\$5 - 20 Million	6-12 months delay
5	A major event which could cause severe damage to the environment with actual or potential loss of credibility with key stakeholders, environmental liability, regulatory intervention, national publicity / complaints, or could close the operation prematurely.	Fatality	> \$20 million	>12 months delay

The risk level is a numerical representation of the combined likelihood and consequence of an event. For this project the risk assessment process has assigned both a qualitative measure of this risk, ranging from "Low" to "Extreme", and a quantitative measure of risk, ranging from 1 to 25 respectively. These are indicated in Table 20-3.

**Table 20-3
Risk Assessment Matrix**

Likelihood	Consequence (Ranking for Environmental Disturbance, Safety, Financial Loss and Project Delay)				
	1	2	3	4	5
A Many times per year	Low 11	Medium 16	High 20	Extreme 23	Extreme 25
B Once or twice per year	Low 7	Medium 12	High 17	High 21	Extreme 24
C Once in 5 years	Low 4	Low 8	Medium 13	High 18	High 22
D Once in 20 years	Low 2	Low 5	Medium 9	Medium 14	High 19
E Once in 100 years	Low 1	Low 3	Low 6	Medium 10	Medium 15

20.12.2 Hazard Identification and Assessment

As part of the preliminary risk assessment process for the project, potential hazards which may be encountered during construction or operation of the project have been identified and are summarised in Table 20-4 and Table 20-5 respectively. The risk level of each was then determined by evaluating the probability and consequence of occurrence of each hazard and plotting these on the risk assessment matrix given in Table 20-3.

The probability and consequence rating assume successful implementation of the health and safety controls discussed in Sections 20.5 and 20.6 respectively, and are denoted in the table by "P" and "C" respectively. The risk level is denoted by "R".

Hazards may have health and safety or environmental consequences or both. Where applicable, risk scores for both consequences have been recorded. Hazards at highest risk have the highest priority for consideration of additional risk reduction options. Low risk incidents are subject to the existing, ongoing improvement processes and operational controls.

Existing risk assessments and standard operating procedures for the Ensham Mine will be expanded as necessary during the design process to address the additional hazards for the project. In order to facilitate development of a comprehensive risk register and detailed risk assessments, a rigorous evaluation of hazards associated with both the underground mine, washplant and expansion of the existing approved open cut mining operations will be undertaken prior to the commencement of both the construction and operational phases of the project. This assessment will form part of the Hazard and Operability Study (HAZOP) process. The risk register will be a working document subject to ongoing review as part of the continuous improvement process.

20.12.3 External Risks

External risks of the project include the risk of flooding, bushfire, landslide and earthquake. The risks associated with flooding are assessed in Section 20.8 and have been addressed comprehensively in Section 12 – Surface Water and *Appendix D – Surface Water Study* of this EIS.

This risk of bushfire is discussed in Section 20.9. The risk of landslide is not a credible risk for the project due to the geology and gently undulating topography of the area.

The risk of earthquake will be mitigated by design of all mine flood protection levees and tailings dams by certified engineers and in accordance with relevant legislation and design codes.

The likelihood, consequence and level of risk associated with external risks from natural events have also been addressed in the risk assessment in Table 20-5 where applicable.

20.12.4 Conclusions from Preliminary Risk Assessment

Based on the assessment outlined in Table 20-4 and Table 20-5 it can be concluded that the risk profile for the project is low or medium for both environmental factors and health and safety factors. Risk management measures which currently exist will be extended to all construction and operational activities associated with the project, to dramatically reduce the likelihood and consequence of health and safety and environmental hazards, thereby eliminating any extreme or high risk hazards.

An assessment of the specific risks associated with mining in the floodplain of the Nogoia River was also undertaken as part of this EIS. The details of this risk assessment, including the methodology and the subsequent risk assessment matrix, are provided in Section 12 – Surface Water. With implementation of the proposed project controls, the potential risks of floodplain mining hazards were assessed as “low”.

**Table 20-4
Preliminary Risk Assessment Table – Construction Phase**

Hazards	Proposed Controls	Environment			Health & Safety		
		C	P	R	C	P	R
1. Dust from road and earthworks	<ul style="list-style-type: none"> Water trucks Speed limits 	1	B	L (7)	1	B	L (7)
2. Traffic incidents off site (due to movement of heavy equipment to site)	<ul style="list-style-type: none"> Public notices about the timing and likelihood of possible delays Police escorts Coordination with Department of Main Roads 	2	D	L (5)	3	D	M (9)
3. Traffic incidents on site	<ul style="list-style-type: none"> Safety inductions for employees Operator driving training programs Speed controls Equipment maintenance and inspection Radio communications in vehicles 	2	D	L (5)	3	D	M (9)
4. Construction activity hazards	<ul style="list-style-type: none"> Fall from heights controls Experienced supervision Health & Safety management systems Equipment inspection and selection Formal design safety practices Welding safety practices Contractor and supplier selection Personal Protective Equipment (PPE) 				3	D	M (9)
5. Slump of sloped ground	<ul style="list-style-type: none"> Rollover protective structures fitted to equipment Geotechnical investigation and design Drainage controls Clearance from site boundary or protective berm or bund 	1	D	L (2)	3	D	M (9)
6. Leaks of oil, fuel or chemicals from vehicles onto construction earthworks	<ul style="list-style-type: none"> Designated unloading and vehicle refuelling areas fitted with spill containment Storage and handling in accordance with AS1940 Material used in construction will be stored and used appropriately to ensure containment Clean up response procedures and training 	2	C	L (8)			
7. Pests (weeds) brought to site by earthmoving equipment	<ul style="list-style-type: none"> Wash down and inspection of vehicles prior to arrival on site 	2	C	L (8)			
8. Underground mine hazards	<ul style="list-style-type: none"> Compliance with the <i>Coal Mining Safety and Health Act</i> 	2	E	L (3)	5	E	M (15)
9. Runoff from areas disturbed by washplant construction	<ul style="list-style-type: none"> Use of a closed loop water management system to contain contaminated water 	2	C	L (8)			

**Table 20-5
Preliminary Risk Assessment Table – Operations Phase**

Hazards	Proposed Controls	Environment			Health & Safety		
		C	P	R	C	P	R
1. Dust from road and earthworks	<ul style="list-style-type: none"> Water trucks Speed limits 	1	B	L (7)	1	B	L (7)
2. Traffic incidents on site	<ul style="list-style-type: none"> Safety inductions for employees Operator driver training programs Speed controls Equipment maintenance and inspection Radio communications in vehicles 	2	D	L (5)	3	D	M (9)
3. Slump of sloped ground	<ul style="list-style-type: none"> Rollover protective structures fitted to equipment Geotechnical investigation and design Drainage controls Clearance from site boundary or protective berm or bund 	1	D	L (2)	3	D	M (9)
4. High wall rock falls	<ul style="list-style-type: none"> Geotechnical and blast design Established safe working distances from the high wall Protective cabins to meet safety standards 				4	E	M (10)
5. Leaks of oil, fuel or chemicals from vehicles during site operations	<ul style="list-style-type: none"> Dedicated facilities for major equipment maintenance Designated unloading and vehicle refuelling areas fitted with spill containment Storage and handling in accordance with AS1940 Material used in operation will be stored and used appropriately to ensure containment Clean water to be directed away from contaminated water sources (e.g. from wash down areas) Clean up response procedures and training Equipment maintenance and inspection 	2	C	L (8)			
6. Blasting	<ul style="list-style-type: none"> Explosive materials to be handled and used in compliance with current Australian Standards (AS2187) Explosive materials handled only by licensed personnel Induction and training of all staff on safety procedures during blasting Strict control of ignition sources Blasting procedures including separation from the blast zone Storage of detonators in accordance with the 	2	D	L (5)	4	E	M (10)

Hazards	Proposed Controls	Environment			Health & Safety		
		C	P	R	C	P	R
	<i>Explosives Act, Part 4 Division 6</i>						
7. Bush fire	<ul style="list-style-type: none"> Mine operation facilities and equipment will be inspected and tested for fire safety on a regular basis Relevant site staff will complete fire safety training during induction and thereafter on an annual basis The site will have an approved fire alarm, detection, suppression and fighting system designed and installed in consultation with the relevant fire control authorities 	3	D	M (9)	2	D	L (5)
8. Fire in mine infrastructure or coal handling areas	<ul style="list-style-type: none"> Water trucks Protective cabin on earth moving machinery Suppression systems to be designed to Australian Standards Maintenance of systems to be included in the project requirements Plant designed to limit ignition sources including non-smoking requirements Emergency Response Plan Fire safety training 	2	D	L (5)	1	D	M (19)
9. Chemical release – liquid from leaks, ruptures, over-flows, spillages or pooling. Release to atmosphere or ground systems.	<ul style="list-style-type: none"> All storage and handling facilities designed and operated to relevant Australian Standards Clean storm water is directed away from potentially contaminated areas Site drainage system designed to allow retention of spills on site Hazard and Operability (HAZOP) reviews conducted during detailed design Personnel trained in appropriate storage and handling and incident response Monitoring of wastewater storages to detect leaks or spills Material safety data sheets available on site Procedure for introduction of new chemicals Appropriate personal protective equipment and spill response/incident response equipment Chemical incidents included in Emergency Response Plan Preventative maintenance program 	2	D	L (5)	2	D	L (5)
10. Excessive noise (blasting, coal preparation plant, mine equipment)	<ul style="list-style-type: none"> Personal protective equipment to be worn as appropriate Maintenance of all plant and equipment Implementation of complaints protocol to address any noise complaints 	1	C	L (4)	1	C	L (4)

Hazards	Proposed Controls	Environment			Health & Safety		
		C	P	R	C	P	R
11. Underground mine hazards	<ul style="list-style-type: none"> Compliance with the <i>Coal Mining Safety and Health Act</i> 	2	E	L (3)	5	E	M (15)
12. Tailings spill	<ul style="list-style-type: none"> Design of pipes and dam to appropriate standards Regular inspections and maintenance Bunding to divert tailings to containment structures 	2	D	L (5)			
13. Contact with high voltage electricity	<ul style="list-style-type: none"> Secured access Qualified electricians Control of Energy (isolations) procedure Equipment maintenance 				4	E	M (10)