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19. HAZARD AND RISK

19.1. OVERVIEW

Potential hazards and risks to people, property and the environment associated with the construction, operation and decommissioning of the South Galilee Coal Project (SGCP) will be discussed in this Section.

The values of people and property in the context of the SGCP and the surrounding areas are identified and discussed. Both natural and anthropogenic hazards are considered. Hazardous materials used, transported or stored during the life of the SGCP as well as the potential for adverse effects to members of the community and surrounding property owners are considered through a risk assessment.

This Section also nominates and describes the relevant standards and how indicators will be achieved for hazard and risk management and how the achievement of the objectives will be monitored, audited and managed.

The proposed risk management measures to be implemented aim to significantly reduce the likelihood and consequence of hazards and ultimately seek to eliminate any potentially extreme or high risks to people and property.

This Section addresses hazards and risk to people and property and excludes those to the environment, although environmental hazards and risks have been considered as part of the broader risk assessment. Hazards to the environment are identified in each relevant Environmental Impact Statement (EIS) section along with mitigation measures where required. In the context of this assessment, hazards are defined as a situation or an object with the potential to cause harm to people or property. Risk can be defined as the likelihood and severity of harm occurring from an identified hazard.

The assessment of the hazards and risks associated with the SGCP was carried out in accordance with *The Australia/New Zealand Standard (AS/NZS) ISO 31000:2009 Risk Management Principles and Guidelines*. The assessment focuses on potential harm to property and people. This includes on-site personnel, contractors, visitors and people who live and/or work in close proximity to the SGCP. The assessment considers the surrounding landholders, their properties and their ability to maintain productive agricultural operations whilst protecting the people who work at the SGCP. The assessment also considers strategies to manage fires, health, emergency management the value of maintaining safe access on and off the site as well as to the surrounding land holdings.

The Proponent will implement its Corporate Environment Policy (refer to **Appendix T—Corporate Environment Policy**) in order to reduce the hazard and risk associated with the SGCP.

In general, the Proponent's approach to safety management has been structured on the management system model outlined in *AS/NZS 4801:2001 Occupational Health and Safety Management Systems- Specification with Guidance for Use*.

19.2. LEGISLATION AND GUIDANCE

A number of legislative frameworks apply to the management and mitigation of hazards and risks at a Queensland coal mining operation such as the SGCP. These legislative requirements largely consider the safe use, storage, handling and transport of potentially hazardous substances and materials. There are also a number of Australian Standards that outline best practice guidance for the safe management of hazardous substances and materials and the management of risk.

The legislation and standards relevant to the management and mitigation of hazards and risks to people and property at and surrounding the SGCP includes:

- *Coal Mining Safety and Health Act 1999*; this Act aims to protect the safety and health of persons at coal mines as well as persons who may be affected by coal mining operations. It requires that the risk of injury or illness to any person resulting from coal mining operations be at an acceptable level and aims to provide a way of monitoring the effectiveness and administration of provisions relating to health and safety.
- *Coal Mining Health and Safety Regulation 2001*; this Regulation provides a regulatory framework to ensure that the management of safety and health at Queensland coal mines incorporates, risk identification and assessment, hazard analysis, hazard management and control as well as reporting and recording important safety and health information data.
- *Explosives Act 1999*; this Act provides the legislative requirements for the safe handling, storage, transport and manufacturing of explosives.
- *Explosives Regulation 2003*; this Regulation provides specific limits and requirements for the safe handling, storage, transport and manufacturing of explosives.
- *AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines*; this standard provides a generic guide for managing risk and specifies the elements of the risk management process. As this is a generic guidance document, the particular characteristics of the SGCP form a key component in the application of the Standard and the assessment of hazards and risks associated with the SGCP.
- *AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids*; this standard sets out the requirements and recommendations for the safe storage handling of flammable liquids and dangerous goods Class 3, as classified in the *United Nations (UN) Recommendations for the Transport of Dangerous Goods*. The Standard also provides requirements and recommendations for the storage and handling of combustible liquids and provides minimum acceptable safety requirements for storage facilities, operating procedures, emergency planning and fire protection. It provides technical guidance that may assist in the storage and handling of flammable and combustible liquids.

- *AS 2187.1/1-2000 Explosives– Storage, Transport and Use – Storage*; this standard establishes requirements and precautions for the storage of explosives, including pyrotechniques as defined in *AS 2187.2:1998* and for the location, design, construction and maintenance of magazines.
- *AS 2187.2:2006 Explosives – Storage and Use – Use of Explosives*; This standard provides the requirements and precautions for the use of factory-made, commercially available explosives and certain explosives mixed or assembled at sites.

19.3. POTENTIAL HAZARDS AND RISKS

19.3.1. Risk Assessment Methodology

An integrated approach to risk management will be implemented at the SGCP, recognising the hazards at all points in the operation and providing control measures to minimise risk. Further details on the risk assessment approach for the SGCP is provided in **Section 19.6.2**.

19.3.2. Preliminary Risk Assessment

In order to identify the hazards and appropriately assess the risks associated with the SGCP, a Preliminary Risk Assessment (PRA) was undertaken with close consideration of *AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines*.

The PRA was developed during a workshop conducted on 27 January 2011. The workshop was used to identify hazards and their associated risks with the SGCP and potential control measures.

The workshop risk assessments involved the assessment of:

- all relevant major hazards, both technological and natural
- potential accidents, spillages and abnormal events
- hazards to surrounding land users
- hazardous substances to be used, stored, processed, produced or transported (refer to **Section 19.4.1**)
- processes, type of machinery and equipment used.

The risks and the associated hazards were scored in accordance with the Risk Assessment Matrix provided in **Table 19-1**. These scores were then assessed against the Risk Ranking Criteria provided in

Table 19-2 to determine the risk rating.

The hazards, associated risks and the mitigation measures for the construction, operational and decommissioning phases of the SGCP are outlined in the PRA. The PRA

for the SGCP in both construction and operations is shown in **Table 19-3**. The PRA for the Decommissioning Phase is shown in **Table 19-4**.

Table 19-1 SGCP Risk Assessment Matrix

Consequences (5 = Catastrophic, 1 = Minor)	5	C	B	B	A	A
	4	C	C	B	B	A
	3	D	C	B	B	B
	2	D	D	C	C	B
	1	D	D	C	C	B
		Rare (R)	Unlikely (U)	Possible (P)	Likely (L)	Almost certain (Ac)
Likelihood						

From the Risk Assessment Matrix, risks are assigned a risk ranking that is used to determine their priority for management. The risk rankings are:

A	Extreme Risks
B	High Risk
C	Moderate Risk
D	Low Risk

Table 19-2 SGCP Risk Rating Criteria from Workshop

Risk Rating Criteria					
Consequence Criteria					
Loss Type	1.Minor	2. Significant	3. Serious	4. Major	5. Catastrophic
Safety	First aid injury, exposure to minor health risk.	Medical treatment injury, Restricted work case, exposure to major health case.	Lost time injury, reversible health impact.	Single fatality, permanent injury/disability, irreversible/ultimately fatal health impact.	Multiple fatalities, ultimately fatal health impact.
Material/Property	Minor damage to plant or system.	Impact on budget and program.	Significant damage to plant or system.	Extensive damage to plant or system.	Virtual complete loss of plant or system.
\$ AUS	<\$10 K	\$10 K-100 K	\$100 K-1 M	\$1-10 M	>\$10 M
Environment	Minor impact-contained on-site and easily reversible- No DEHP notification.	Transient release: Reversible Impact- the DEHP to be notified.	Moderate impact- full off-site release. Difficult to reverse- the DEHP action.	Major environmental event. Medium to long-term widespread impact.	Catastrophic event, long-term or permanent widespread impact.
Community/ Reputation	Slight impact/ local public awareness.	Limited impact/ local public concern.	Considerable impact/ regional public concern.	Major or national impact/ national public concern.	International impact/ international public concern.

Table 19-2 SGCP Risk Rating Criteria from Workshop (cont)

Likelihood Criteria Risk Rating Matrix (calculate risk level by matching likelihood and consequence criteria)					
A Almost certain- common/frequent occurrence (once a year or more).	11 (Moderate)	16 (High)	20 (High)	23 (Extreme)	25 (Extreme)
B Likely- could probably occur and has occurred (less than once a year).	7 (Moderate)	12 (Moderate)	17 (High)	21 (Extreme)	24 (Extreme)
C Possible- might occur at some time (once in 5 years or less).	4 (Low)	8 (Moderate)	13 (High)	18(High)	22 (Extreme)
D Unlikely- Not likely to occur (once in 10 years or less).	2 (Low)	5 (Low)	9 (Moderate)	14(High)	19 (High)
E Rare- May only occur in exceptional circumstances (once in 100 years).	1 (Low)	3 (Low)	6 (Moderate)	10 (Moderate)	15 (High)
Risk Evaluation- Tolerability Criteria					
Level	Tolerability	Actions- timeframe		Authority	
Extreme	Intolerable	Cease exposure immediately- Notify management. Conduct formal risk assessment. Hard controls required.		Senior Management	
High	Make ALARP	Make ALARP prior to work- Inform relevant manager. Develop safety/risk management plan. Monitor and manage change.		Relevant Manager	
Moderate	Make ALARP	Verify risk is ALARP- Tell supervisor. Reduce risk by using the hierarchy of control and routine procedures. Monitor and manage change.		Supervisor/Leader	
Low	Tolerable	Risk generally acceptable- Reduce if practicable and manage through routine system of work implemented by work team.		Leader of process	
<p>ALARP- As LowAs Reasonably Practical- level of risk which is as low as can be achieved without expenditure of a cost (money, time, trouble) that is <i>Grossly Disproportionate</i> to the benefit gained (<i>Gross disproportionately adopted on the dictum of Lord Asquith: 1949 as referenced in AS/NZ 4360</i>).</p> <p>Where risk cannot be reduced to ALARP in short-term, tolerability is case by case on management's approval of short-term toleration until further controls can be applied to make the ALARP.</p> <p>Risk evaluation should establish the overall risk associated with multiple risk issues. Minor issues, whilst not significant alone, may combine and result in an overall cumulatively higher risk.</p>					

Table 19-3 Preliminary Risk Assessment for SGCP Construction and Operations

Element	Description	Risk	Controls	Likelihood	Consequence	Rating
Mine	Strata failure	Fatalities, injuries and incidents arising from a strata failure event in an underground or surface environment	Documented strata failure risk assessments. Appropriate factors of safety in mine design; assessment and mapping of changing geotechnical and or geological conditions; support rules or surface slope stability rules	Possible	Catastrophic	High
Mine	Fire and explosion	Fatalities, injuries and incidents caused by an unplanned or uncontrolled fire or explosion	Fire and explosion related risk assessment. Management of flammable gasses, coal dust, frictional ignition and spontaneous combustion	Possible	Catastrophic	High
Mine	Mobile equipment	Fatalities, injuries and incidents arising from activities involving mobile plant and equipment	Set operational and environmental conditions under which mobile plant and equipment may be used, design and maintain roadways with minimum dimensions and conditions; ensure personnel operating mobile equipment are competent and authorised	Possible	Major	High
Emergency	Inappropriate emergency response	Fatalities, injuries and incidents could result if the response to an emergency situation is not appropriate	Emergency response management plan containing: Responses to, and containment of emergency situations; emergency response procedures; provision of adequate emergency equipment etc.	Possible	Catastrophic	High
Mine	Inrush and outburst	Fatalities, injuries and incidents arising from water gasses and material flowing into an underground or open-cut mine or an outburst event of coal and gas in an underground mine	Develop an Inrush Management Plan – maintain original and updated plans showing potential inrush sources; geotechnical assessments; establishment of inrush control zones; permit to mine approval processes. Outburst management – identification of geological conditions and indicators of potential outburst; pre-drilling to identify gas concentration; provision of gas drainage	Possible	Catastrophic	High
Mine	Explosives and shotfiring	Fatalities, injuries and incidents from the use of explosives, detonators and shotfiring equipment	Purchase only approved explosives, detonators and shotfiring equipment; maintain a site security plan to prevent unauthorised access to explosives; store explosives and detonators in a safe and secure location	Possible	Major	High
Mine and Processing Area	Inadequate energy isolation	Fatalities, injuries and incidents arising from activities involving inadequate isolation of energy sources	Develop an energy isolation procedure and permit system with emphasis on identification and dissipation of relevant energy sources; isolating and securing and verification of the isolation	Possible	Major	High

Table 19-3 Preliminary Risk Assessment for SGCP Construction and Operations (cont)

Element	Description	Risk	Controls	Likelihood	Consequence	Rating
Mine and Processing Area	Working at heights	Arising from working at heights	Identifying activities involving working at height underground and on the surface, and where practicable, implement engineering or other appropriate controls to eliminate or minimise the risk/s; Use of fall restraint or arrest equipment; the installation of a fixed access platform, and/or, provision of an elevated work platform, man basket, scissor lift or scaffold, where practicable.	Possible	Major	High
Mine and Processing Area	Lifting and crange	Fatalities, injuries and incidents arising from lifting and crange activities	Develop a Lifting and Crange Procedure and Permit System that requires that people do not enter an area under a suspended load; at the lift area must be delineated, restricted, and appropriately signposted; Crane/lifting equipment must have at least 20 metres (m) clearance from powerlines.	Possible	Major	High
Mine and Processing Area	Working in confined space	Fatalities, injuries and incidents arising from working in confined space	Develop a confined space Procedure and Permit System that ensures that confined spaces are identified and signposted; a confined space register is developed and a documented pre-entry risk assessment must be carried out.	Possible	Major	High
Mine and Processing Area	Tyre and rim management	Fatalities, injuries and incidents arising from working with or near large tyres rims and wheel assemblies	Procedures for lifting, fitting, removing, testing, repairing and changing tyres. Develop a process to identify and assess the risk potential associated with working tyres and rims.	Possible	Major	High
Mine and Processing Area	Electrical Safety	Fatalities, injuries and incidents arising from contact with energised electrical conductors or exposure to faulty electrical systems.	Conduct and document a risk assessment to identify electrical related hazards. Electrical work must be conducted by competent/authorised personnel. Electrical Installations must comply with electrical legislation.	Possible	Major	High
Health Safety & Community	Dust Impacts – workers and town	Dust from site: dry beneficiation, draglines, stockpiles, TSF	Dust suppression strategies (i.e. watering, sprays. Include plant in a building with negative pressure).	Possible	Major	High

Table 19-3 Preliminary Risk Assessment for SGCP Construction and Operations (cont)

Element	Description	Risk	Controls	Likelihood	Consequence	Rating
Environmental	Pit inundation	Pit floods due to lack of levee bank	Carry out modelling to ensure that pit walls are protected for allocated flood event	Unlikely	Serious	Moderate
Environmental	Uncontrolled releases	Licence breaches possible fine	Water management system, adequate storage and monitoring program	Unlikely	Serious	Moderate
Off-site	Traffic incidents off-site	Incidents during moving heavy equipment and materials to site	Implement a traffic management plan that includes requirements for police escorts; effective load tie down and fit for purpose transport equipment.	Unlikely	Serious	Moderate
On-site	Traffic incidents on-site	Incidents during operations	Implement a traffic management plan that includes speed limits, safety inductions; driver training; equipment maintenance and rules for no-go zone	Unlikely	Serious	Moderate

Table 19-4 Preliminary Risk Assessment - Decommissioning Phase

Element	Description	Risk	Controls	Likelihood	Consequence	Rating
Emergency	Inappropriate emergency response	Fatalities, injuries and incidents could result if the response to an emergency situation is not appropriate	Emergency response management plan containing: Responses to, and containment of emergency situations; emergency response procedures; provision of adequate emergency equipment etc.	Possible	Catastrophic	High
Mine and Processing Area	Inadequate energy isolation	Fatalities, injuries and incidents arising from activities involving inadequate isolation of energy sources	Develop an energy isolation procedure and permit system with emphasis on identification and dissipation of relevant energy sources; isolating and securing and verification of the isolation	Possible	Major	High
Mine and Processing Area	Working at heights	Fatalities, injuries and incidents arising from working at heights	Identifying activities involving working at height underground and on the surface, and where practicable, implement engineering or other appropriate controls to eliminate or minimise the risk/s; Use of fall restraint or arrest equipment; the installation of a fixed access platform, and/or, provision of an elevated work platform, man basket, scissor lift or scaffold, where practicable.	Possible	Major	High
Mine and Processing Area	Lifting and crange	Fatalities, injuries and incidents arising from lifting and crange activities	Develop a Lifting and Crange Procedure and Permit System that requires that people do not enter an area under a suspended load; at the lift area must be delineated, restricted, and appropriately signposted; Crane/lifting equipment must have at least 20 (m) clearance from powerlines.	Possible	Major	High
Mine and Processing Area	Working in confined space	Fatalities, injuries and incidents arising from working in confined space	Develop a confined space Procedure and Permit System that ensures that confined spaces are identified and signposted; a confined space register is developed and a documented pre-entry risk assessment must be carried out.	Possible	Major	High
Mine and Processing Area	Electrical Safety	Fatalities, injuries and incidents arising from contact with energised electrical conductors or exposure to faulty electrical systems.	Conduct and document a risk assessment to identify electrical related hazards. Electrical work must be conducted by competent/authorised personnel. Electrical Installations must comply with electrical legislation.	Possible	Major	High
Off-site	Traffic incidents off-site	Incidents during moving heavy equipment and materials to site	Implement a traffic management plan that includes requirements for police escorts; effective load tie down and fit for purpose transport equipment.	Unlikely	Serious	Moderate

Table 19-4 Preliminary Risk Assessment - Decommissioning Phase (cont)

Element	Description	Risk	Controls	Likelihood	Consequence	Rating
On-site	Traffic incidents on-site	Incidents during operations	Implement a traffic management plan that includes speed limits, safety inductions; driver training; equipment maintenance and rules for no-go zone	Unlikely	Serious	Moderate
Community	Unauthorised access	Unauthorised access to the mine site and dangerous structures and landforms such as highwalls and shafts	Fence the perimeter to restrict access Fence particular structures i.e. highwalls and shafts.	Unlikely	Serious	Moderate
Closure	Rehabilitation and decommissioning	Poorly designed rehabilitation activities and decommissioning can result in erosion and sedimentation and rehabilitation failure. Mine closure can be delayed, increasing liability	Carry out rehabilitation trials; develop landform with minimal erosion susceptible slopes, develop and maintain a closure plan	Unlikely	Serious	Moderate

19.4. PROJECT SPECIFIC RISKS

19.4.1. Transport, Storage and Use of Dangerous Goods and Hazardous Substances

There are hazards for the SGCP associated with the storage and handling of dangerous goods and hazardous substances for construction, mining and coal handling and processing. Activities associated with the SGCP will utilise a number of hazardous substances during the construction and operation phases, such as fuel and oil, that are listed in the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (7th Edition) (ADG Code).

Table 19-5 lists the principal dangerous goods, by product name, hazardous goods class, raw and operation storage concentration, UN number, packaging group, indicative rate of usage and purpose/use. The addition of any supplementary dangerous goods that may be required for the SGCP 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 the requirements of the relevant Australian Standards.

Table 19-5 Indicative List of Dangerous Goods and Hazardous Substances

Product Name/Shipping Name and Indicative Inventory	Hazardous Goods Class	Raw Conc (weight %)	Storage Conc (weight %)	United Nations (UN) Number	Packaging Group	Purpose/ Use
Diesel Fuel (AR ~19,324 kL per annum) (PR ~31,649 kL per annum)	3 (Class C1)*	N/A	N/A	1202	III	Fuel for mobile equipment
Lubrication Oils (AR ~675 kL per annum) (PR ~1110 kL per annum)	3 (Class C2)**	N/A	N/A	N/A	N/A	Lubricate plant & Equipment
Solvents (AR ~34 kL per annum)	3	99.5	99.5	1090	II	Workshop degreasing agent
Paints (AR ~365 L per annum)	3	N/A	N/A	1263	III	Paint
Caustic Soda (sodium hydroxide) (AR ~365 L per annum)	8	50	50	1823	II	Concrete degreasing agent
ANFO (AR ~6,500 tonnes per annum) (PR ~10,000 tonnes per annum)	1 (Class 1.D)			0082	N/A	Mining explosive

Table 19-5 Indicative List of Dangerous Goods and Hazardous Substances (cont)

Product Name/Shipping Name and Indicative Inventory	Hazardous Goods Class	Raw Conc (weight %)	Storage Conc (weight %)	United Nations (UN) Number	Packaging Group	Purpose/ Use
HANFO (AR ~1,800 tonnes per annum) (PR ~2,800 tonnes per annum)	1 (Class 1.D)	10-40 %		0241	N/A	Bulk blasting agent
Emulsion Explosives (AR ~900 tonnes per annum) (PR ~1,500 tonnes per annum)	1.5D			0332	11	Blasting operations
Flocculants (AR ~101 tonnes per annum)	N/A	40-99.5 %	10-40	N/A	N/A	Coal handling and preparation plant
Sodium Hypochlorite (AR ~4.2 kL per annum)	8	10 – 15 %	10 – 15 %	1791	II or III	Potable water treatment, sewage effluent treatment

Note: * 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.
 AR- Annual Rate usage
 PR- Peak Rate usage

All hazardous materials on-site will be managed in accordance with the relevant Australian Standards, including:

- *AS/NZS 4452:1997 The Storage and Handling of Toxic Substances*
- *AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids*
- *AS 3780:2008 The Storage and Handling of Corrosive Substances*
- *AS 2187.1:1998/1-2000 Explosives – Storage, Transport and Use - Storage*
- *AS 2187.2:2006 Explosives – Storage and Use - Use of Explosives.*

Given the correct controls on these materials, there is negligible risk to nearby land users or to the surrounding social and natural environments. Material Safety Data Sheet (MSDS) for all chemicals to be used will be available at appropriate locations such as chemicals storage facilities and the Coal Handling and Preparation Plant (CHPP). Spill prevention and spill response strategies will be implemented.

19.4.1.1. Construction Phase

Unauthorised access to the mine site could result in:

- risks of falling, drowning, engulfment, and contact with vehicles, equipment and machinery as well as exposure to blasting
- transport of personnel, equipment and materials to site
- interaction with equipment and machinery

- increased traffic, both on and off the site
- transportation, storage and use of dangerous goods
- equipment maintenance.

19.4.1.2. Operational Phase

The key hazards during the operational phase are associated with mining and the operations and are likely to be fatal if control protocols are not in place. Controls will apply to both employees and contractors.

19.4.1.2.1. Strata Failure

Strata failure relates to objects falling from an unsupported roof in an underground environment. Unless the objects are small they have the ability to inflict serious injury or result in death.

An underground strata failure management plan will require the following:

- development of controls, including roof bolts, following the assessment of the stability of roadways and work areas
- development of support measures providing stability including maximum roadway width and minimum dimensions of coal pillars
- maximum distances that roadways can be advanced before support is installed
- additional support required when carrying out work in areas above normal operating height dimensions
- adequate controls to manage surface subsidence
- installation of strata monitoring devices based on risk
- frequency and method of testing rock bolts, cables and other support elements for effectiveness
- inspections of active workplaces, strata support and shafts decline etc.

A surface strata failure management plan will require the following:

- controls to manage the stability of high and low walls, overburden dumps and benches
- controls to be established to stabilise stockpiles if necessary
- provision of benches and berms so that any falling material will not expose personnel or equipment to undue risk
- provision of adequate controls (eg. windrows) to prevent personnel and equipment being exposed to edge failure
- controls to manage the impacts of subsidence from underground mining activities.

19.4.1.2.2. *Fire and Explosion*

Explosions in underground mines and surface processing facilities are caused by accumulations of flammable gas and/or combustible dust mixed with air in the presence of an ignition source like electrical arcing, frictional ignition or spontaneous combustion and can be fatal. Drilling to date has not identified methane gas in the SGCP.

Explosions can be prevented by minimising methane concentrations through methane drainage and ventilation, by adding sufficient inert rock dust to smother the coal dust and by eliminating ignition sources.

The flammable gas should be managed by real time gas monitoring, an inspection regime of gas levels, installation of gas monitors on coal cutting machinery and installation of ventilation and electrical equipment that operates safely in a hazardous zone.

Coal dust must be managed by:

- using water sprays during cutting and transport of coal
- apply stone dust or other explosion inhibitors on applicable walls, floors and roof areas or working faces
- examining sampling and testing roadway dust.

Frictional ignition will be minimised by using drums and picks on cutting machines with minimal potential to cause friction, using water sprays to suppress sparking, ventilation around cutting areas to reduce methane build-up and maintaining appropriate gas fire extinguishing equipment.

19.4.1.2.3. *Mobile Equipment*

Safety incidents related to collisions and near misses between vehicles and people can occur in underground and open-cut mines and can cause fatalities and major long-term injuries.

Interactions with mobile equipment will be mitigated by:

- identifying the conditions (operational and environmental) under which the mobile plant and equipment may be used
- only using mobile plant and equipment within their approved design parameters
- proper design and maintenance of roadways, including minimum dimensions and conditions
- nominating maximum loads that may be carried or towed by the mobile plant and equipment
- nominating maximum speeds at which the mobile plant and equipment may operate

- ensuring personnel involved in the operation of mobile plant and equipment have competency and authorisation requirements
- operators to carry out brake testing, pre-shift inspection and defect reporting to demonstrate that the mobile plant and equipment is safe for use.

In particular in the open-cut the design of haul roads is critical as is clear communication between operators and the establishment of clear movement rules.

Interactions with mobile mining equipment pose no hazard to the public or external communities.

19.4.1.2.4. *Inappropriate Emergency Response*

A deficient emergency response plan or response is likely to result in fatalities or serious injuries in the event of a serious incident.

An Emergency Response Plan will be developed and will include:

- response(s) to, and containment of, identified emergency situations
- processes to minimise further injury, damage, or loss to rescuers or others
- emergency response procedures, including first aid, medical treatment, fire fighting and rescue
- provision of adequate emergency equipment, including escape and rescue apparatus and appropriate transport and response vehicles
- effective and robust communication devices and procedures for initial notification of personnel of the emergency situation and for ongoing two-way communication during emergency situations
- safe evacuation from all workplaces or other occupied spaces
- control of site access and restricting re-entry to the affected areas
- clearly defined procedures for the reporting of emergencies, and/or, for initiating an emergency response
- communication with and involvement of external emergency agencies
- provision and maintenance of a suitably equipped emergency control centre
- requirements for the conduct of annual simulated exercises to test the effectiveness of the operations emergency response and evacuation capabilities.

An emergency response will involve those members of the community working for external emergency agencies where injuries and fatalities may occur during the response.

19.4.1.2.5. Inrush and Outburst

An inrush hazard involves the existence of significant quantities of water or other fluid material, any material that flows when wet or flammable or noxious gases. All inrush hazards under pressure have the potential to swiftly flow or release into or within an underground coal mine. The source can be the mine in question or an adjacent mine

Management of potential inrush must include:

- reviewing (and verify for accuracy) original and updated plans, files or other records (including those held by statutory authorities to identify any potential inrush sources that may exist either adjacent to, or in the near vicinity of the underground and surface mine workings (eg. current, proposed or disused mine workings, surface waters, stockpiles, reclaim tunnels or aquifers, etc.)
- a geotechnical assessment to determine the nature and magnitude of potential inrush sources
- inrush control zones (ie. stand-off distances or solid barriers) being established between any mine workings and each of the potential inrush sources and be clearly identified on a plan
- the maintenance of a barrier (inrush control zone) with a minimum separation distance of 50 m in all directions when the potential inrush source cannot be eliminated
- a Permit to mine for any mining proposal within the inrush control zone
- a communication plan informing workers in the inrush control zones of the hazards, risks and controls and provide copies of relevant plans and permits must be provided.

An outburst event of gas or coal in an underground mine can cause fatalities or serious injury. Management of potential outburst events include:

- identification of geological conditions and indicators of potential outburst
- pre-drilling to identify the gas type, concentration, pressures and desorption characteristics of the coal
- provision of gas drainage to minimise the potential for an outburst related event
- development of Trigger Action Response Plans (TARPs) that define risk based response to manage or react to changes of outburst indicators

- requirement that no mining can occur in an outburst prone area without approval under a permit to mine process
- requirement that gas concentration levels must be at a pre-determined acceptable level before a permit to mine can be issued
- appropriate rescue and evacuation equipment must be identified and readily available.

Inrush and outburst events will not impact on the public.

19.4.1.2.6. *Explosives and Shottfiring*

Explosives predominantly ammonium nitrate and fuel oil (ANFO) are used in the open-cut to break up the overburden prior to removal. If transported, handled or stored incorrectly an incident resulting in possible fatalities and serious injuries on-site and occasionally off-site is possible.

Explosives would be managed by:

- only purchasing explosives and detonators, and provide shottfiring equipment, that is of an approved type
- having a site security plan to prevent unauthorised access or use of the explosives and detonators that are transported to and stored on site
- storing explosives and detonators in a safe and secure location, and in a licenced or approved magazine with separate storage for explosives and detonators
- having an inventory system that records the delivery, issue and return of stock movements with only authorised person(s) to issue or receive explosives and detonators
- providing vehicles or other methods to safely convey explosives and detonators on site with only authorised person(s) permitted to travel in the vehicle with explosives
- appointing a suitably qualified person to design blasts
- design blasts to minimise the risk of fly rock and potential injury to persons and/or damage to structures and property.

Blasting can pose a number of potential risks. Most notably fly rock, dust, noise and vibration. Further discussion of these aspects is provided in **Section 12—Noise and Vibration**.

A number of mitigation measures will be put in place, including limited access to the blast areas and ensuring that the blasts are undertaken by suitable qualified personnel with appropriate knowledge and training. Transportation of initiating explosives to site will be carried out by a licensed transporter that operates in accordance with the *Australian Dangerous Goods Code*. The storage of explosives, detonators and boosters will comply with the requirements of *AS 2187 Explosives- Storage, Transports and Use* and the additional requirements relating to explosives in the *Coal Mining Safety and Health Regulation 2001*.

Explosives are to be stored on-site in a storage facility separate from other significant activities on the mine and protected from natural incidents such as floods, fire and lightening.

19.4.1.2.7. *Inadequate Energy Isolation*

A fatal or serious incident can take place if a worker enters and works on machinery or plant where the source of energy has not been turned off.

SGCP will ensure that an Energy Isolation Procedure is developed, implemented and maintained with particular emphasis on:

- identification and dissipation of relevant energy sources
- isolating and securing
- verification of the isolation, i.e. test for dead
- restoration.

Isolation events will not impact on the public.

19.4.1.2.8. *Working at Heights*

Working at heights without adequate planning and safety controls can lead to a fatal or serious incident.

A Working at Height Procedure and Permit System will be developed, implemented and maintained. It will concentrate on identifying engineering controls, fall restraints, installation of platforms and working with at least two people at all times.

Working at heights incidents will not impact on the public.

19.4.1.2.9. *Lifting and Cranage*

Fatal or serious incidents can occur during lifting activities particularly if persons enter the area under a suspended load.

A Lifting and Cranage Procedure and Permit System will be developed, implemented and maintained. The procedure will focus on delineating the lift area, ensuring that there is clearance from power lines, the operator is competent and always at the controls, only safe working loads are lifted and loads are inspected prior to lifting.

Lifting and cranage incidents on the mine site will not impact on the public.

19.4.1.2.10. *Confined Spaces*

Fatalities, injuries and incidents can occur when personnel enter or work in a confined space or a workplace where irrespirable or noxious atmosphere may exist.

A Confined Space Procedure and Permit System will be developed, implemented and maintained. The procedure will focus on:

- the identification and signposting of confined spaces that exist within the operation
- the development of a Confined Space Register
- a documented pre-entry risk assessment, atmospheric testing and clearly defined conditions of entry.

Confined space incidents on the mine site will not impact on the public.

19.4.1.2.11. *Tyre and Rim Management*

Fatalities and incidents can occur when personnel are working with or near tyres, rims or wheel assemblies fitted to mobile earthmoving equipment and workshop plant.

The Tyre and Rim Management Plan will ensure that procedures are in place to lift, fit, remove, test, repair, maintain and change tyres and rims on mobile earthmoving equipment and workshop plant and equipment.

Tyre and rim incidents on the mine site will not impact on the public.

19.4.1.2.12. *Electrical Safety*

Contact with energised electrical conductors or exposure to faulty electrical systems can cause secondary hazards such as arc blast, fire or ignition of explosives leading to potential fatalities and/or serious injuries. Procedures to minimise the risk will ensure that competent personnel carry out electrical work. Electrical installations will comply with legislation and appropriate Personal Protective Equipment (PPE) will be identified and used.

Electrical safety incidents on the mine site will not impact on the public.

19.4.1.2.13. *Pit Inundation*

Water can flow into an open-cut void during periods of high rainfall and subsequent flooding impacting on production. Pit inundation can be minimised by diverting creeks, constructing levee banks on creeks and rivers near pits and bunding high walls and ramps. However, 1 in 3000 year flood modelling with incorporated flood protection measures demonstrated that pit inundation would not occur.

19.4.1.2.14. *Wastewater and Sewage*

If mine and process water discharges to waterways are required they will be restricted to emergency discharges only during extreme rainfall and flood conditions. Any such discharges will be significantly diluted with flood waters to meet the conditions set in the Environmental Authority.

The impact of chemical spills will be minimised as outlined in this Section, while sewage wastewater will be treated by a package or modular wastewater treatment plant system. The sewage treatment plant will have appropriate capacity and treat wastewater to a Class B quality standard and discharged into the sediment dam.

A dangerous goods and hazardous substances management plan will be developed to protect the health and safety of individuals involved in both incidents on-site and off-site.

The plan will address the following:

- an outline of any dangerous goods stores associated with the plant operations, including fuel storage and emergency response plans
- detailed maps showing the plant outline, potential hazardous material stores, incident control points, firefighting equipment
- the procedures that will be followed and the measures that will be taken, including matters such as sounding alarms and evacuating people
- training procedures for the execution of the emergency management plan
- responsibility of individuals in the implementation of the emergency management plan
- which emergency services and other relevant people will be given a copy of the emergency response plan.

19.4.1.2.15. *Hazardous Substances*

The SGCP is likely to require hazardous substances for use on-site, whose transportation is regulated by the ADG Code.

Licensed transporters operating in compliance with the ADG Code will undertake the transport of dangerous goods to the transport site.

The SGCP will adhere to planning and maintenance guidelines for fuel systems and construction of explosive storage facilities. With correct controls in place for dangerous goods and hazardous substances, there will be negligible risk to employees, adjacent land users, general public, property and the environment.

Any impact from a potential incident involving dangerous goods and hazardous substances is expected to be contained within the site. Emergency response procedures will be extended to include activities and infrastructure associated with the SGCP.

19.4.1.2.16. *Fuel*

In terms of volume required, the use of diesel fuel oil presents the most significant use of dangerous goods or hazardous substances at the SGCP.

Fuel tankers will visit the site to refill bulk storage tanks and refuel mining vehicles. Fuel stored on the site is predominantly diesel that presents a low risk of uncontrolled combustion and a moderate environmental risk of potential spillage.

To minimise the hazards associated with diesel leaking during tanker unloading, the following controls will be implemented to reduce risks to the health and safety of site personnel and potential adverse impacts to the environment:

- bunding will comply with *AS1940 The storage and handling of flammable and combustible liquids*
- equipment inspection and testing programs undertaken to ensure reliable performance of fuel tanks and bunds
- training provided in the safe operation and knowledge of emergency response procedures in the event of diesel leakage
- spill containment equipment will be built to contain any spillage
- clean storm water to be diverted away from bunded fuel storage areas
- construction of sumps to collect spillage and allow recovery
- ignition sources will be monitored and managed to avoid fire
- standard operating procedures will be developed for operators
- spill kits will be available at all fill and transfer points
- appropriate fire fighting facilities and suppression systems will be installed, maintained and available to extinguish fires
- an approved fire protection system is to be installed and maintained around hydrocarbon storage areas.

19.4.1.2.17. *Chemicals*

Based on the chemical handling and storage management practices to be implemented at the SGCP, the residual health risk and environmental harm presented by these chemicals is expected to be low (refer to **Table 19-5**). All chemicals will be stored according to *AS1940* and managed in accordance with the hazardous material management system developed for the mine, incorporating the provision and use of the respective MSDS.

19.4.1.2.18. *Spontaneous Combustion of Coal*

Empirical testing carried out on the coal samples to date determined that the coal seam has a low to moderate propensity for spontaneous combustion. As the mine progresses, additional sampling will be conducted to validate the propensity of the coal to combust. Appropriate mitigation measures will be implemented as required.

19.4.2. Traffic

Numerous types of vehicles and heavy machinery will be operating at the SGCP including dump trucks, water trucks, excavators, bulldozers, graders and four-wheel drive vehicles during all phases of the mine. Due to the size of the heavy machinery operating on the site, serious injury or accidents may cause harm to both equipment and personnel.

The SGCP will provide safety inductions for any personnel operating machinery or light vehicles on-site. Personnel and contractors will be required to have the appropriate level of training and licenses. All equipment at the site will be equipped with two-way radios for communication and appropriate traffic signage. Designated driving procedures will be used to minimise the risk of accidents occurring.

19.4.3. Rail Corridor

The Galilee Basin is not currently connected to a major coal haulage railway system however other regional mining proponents have proposed to build a 500 kilometre (km) railway corridor from the Galilee Basin to Abbot Point. The SGCP will require the construction of a rail spur line to the proposed common user railway.

Table 19-6 presents a qualitative risk assessment carried out for the transportation of coal from the SGCP. When the SGCP is producing up to 17 million tonnes per annum (Mtpa) run-of-mine coal, the number of coal trains will be 14 per week.

At level crossings on minor roads, boom gates, signal lights and signage will be installed to ensure the risk of collision is reduced.

Table 19-6 Qualitative Assessment of Risk for Potential Rail Related Incidents

Potential Rail Incident	Public Risk	Environmental/ Property Risk	On-site Risk	C	L	R
Collision at level crossing	Yes	Yes	No	6	R	B
Train derailment	Yes	Yes	Yes	6	R	B
Unrestricted pedestrian crossing	Yes	No	Yes	6	R	B

The residual risk of train derailment is high and the consequence of such an event can be catastrophic, even though the likelihood of this event occurring is rare. The increase in rail traffic has been assessed as moderate and any increase in hazard will be adequately controlled. Train derailments occur for a number of reasons including:

- compromised ballast stability
- heavy items on train lines
- rail line tampering.

Ballast stability can be compromised over time or by situations where strong water flows deteriorate the packing of the ballast. Regular inspection and maintenance by qualified personnel can reduce this risk.

Heavy items on the tracks such as fallen trees or tree limbs can be avoided by vegetation maintenance along the railway line to ensure that unstable trees and overhanging limbs are addressed before they present an unacceptable risk. The risk of rail line tampering is considered very low as it requires a significant effort.

19.4.4. Climate Change

The impacts of climate change on the Central Queensland region show projections of declining rainfalls, increased temperature and evaporation, in conjunction with more extreme climatic events such as increased tropical cyclones. Global climate modelling for the year 2030 forecasts the annual mean temperature to have increased by 1 °C. Annual rainfall is projected to decrease by 3-6 % and evaporation is projected to increase by 3-4 % (CSIRO, 2007).

The information gathered about climate change within the Central Queensland region defines an increase in vulnerability for the SGCP, which may affect the construction, operational and decommissioning phases. However, some changes to hazards associated with climate change impacts are thought to be negligible such as bushfire hazards which may generally be outweighed by changes caused by human activity in the short-term (State Planning Policy (SPP 1/03)).

For information addressing risks from climate change and adaption strategies refer to **Section 6—Climate, Natural Hazards and Climate Change**.

19.4.5. Natural Hazards

A natural hazard is a naturally occurring situation or condition with the potential for loss or harm to the community or environment (SPP 1/03). The occurrence of natural hazards may also cause or exacerbate the effects of project-related hazards on the environment or community. Natural hazards are discussed in detail within **Section 6—Climate, Natural Hazards and Climate Change** and mitigation strategies are outlined.

Levees will be constructed progressively throughout the life of the SGCP as required to minimise impacts of flooding on mining activities and reduce the risk of potential release of contaminants to the environment.

19.4.6. Fire

The Proponent will develop a Fire Management Plan (FMP) prior to the construction phase of the SGCP which will provide management approaches to protect human life and assets and to minimise the physical and environmental impacts of fires. The identification of fire risks will be achieved by the initiation of a detailed risk assessment.

The FMP will include the following:

- a list of all the fire risks and an evaluation of the fire fighting requirements for the SGCP
- procedures to follow in the case of a fire

- fire management systems to ensure the retention of fire water and other fire suppressants
- training levels of staff who will be tasked with emergency management activities
- a list of all fire fighting equipment provided for the SGCP
- location of all fire equipment and incident control points at the SGCP
- evacuation procedures
- building fire safety measures for any construction and permanent accommodation
- MSDS
- location and quantities of dangerous goods and hazardous substances
- isolation procedures for electricity
- drainage plans for the SGCP.

19.4.7. Bushfire

Prior to the commencement of construction activities, the Proponent will prepare a Bushfire Management Plan (BMP) which will provide a strategic approach to bushfire management at the SGCP. The three main objectives of the BMP are as follows:

- to protect life and assets within the SGCP and neighbouring properties from the threat of bush fires
- to conserve and minimise impacts on natural ecosystems
- to ensure effective and cooperative arrangements for fire management between the various stakeholders and neighbouring properties.

For bushfire emergencies at the SGCP the local rural fire brigade will be relied upon for a coordinated response with suitably qualified staff and equipment from the SGCP.

As part of the BMP, a bushfire hazard assessment will be completed and shall include the following:

- an assessment of the nature and severity of the bushfire hazard affecting the site with the key factors to be considered being vegetation type, slope and aspect
- site specific factors that are important in devising suitable bushfire mitigation strategies which may include matters such as likely direction of bushfire attack, environmental values that may limit mitigation options, location of evacuation routes and/or safety zones

- an assessment of the specific risk factors associated with the development proposal, including matters such as the nature of activities and materials to be conducted/stored on the site, numbers and types of persons likely to be present, particular warning and/or evacuation requirements
- recommended specific mitigation actions for the proposed development including:
 - road and lot layout and land use allocations
 - firebreaks and buffers
 - building locations or building envelopes
 - landscaping treatments
 - warning and evacuation procedures and routes
 - fire fighting requirements including infrastructure
 - any other specific measures such as external sprinkler systems and alarms
 - purchaser/resident education and awareness programs
 - ongoing maintenance and response awareness programs.

The BMP will be written to address the content requirements of the SPP 1/03.

19.5. EMERGENCY MANAGEMENT AND RESPONSE PLAN

The Emergency Management and Response Plan (EMRP) provides step-by-step guidance for the management of any emergency such as fire, flood, landslide, dam collapse, fuel spill, explosion or radiation, which can impact on the SGCP and its employees. An EMRP will be developed by the SGCP prior to the construction phase of the project.

The Emergency Management and Response Plan covering the SGCP will incorporate 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/emergencies
- a plan covering off-site emergency services

- communication, emergency responsibilities, control centre establishment
- post emergency procedures, including recovery, debriefing and review of plan
- emergency plan training and testing sessions.

Regular hazard audits will be conducted to provide input into the Emergency Management Plan. Guidelines for preparing Emergency Management Plans are available from the Queensland Government Department of Emergency Services and will be considered when preparing the EMRP for the SGCP. The *State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* (SPP 1/03) will also be referred to when preparing the EMRP. As a minimum, the elements and response procedures described in **Table 19-7** will be incorporated into EMRP procedures. The SGCP will continue to consult with Emergency Management Queensland (EMQ) with respect to planning for emergency response.

Table 19-7 Emergency Management and Response Plan Elements and Response Planning for Mine Site Related Emergencies

Event	Level of Emergency	Emergency Services Require	Resources Needed	Organisational Aspects	Damage Control Actions
Vehicle collision	Local and site	Queensland Ambulance Service Queensland Police Queensland Fire and Rescue	Rescue Fire fighting capability Fuel containment measures	People Control Evacuation of immediate and nearby area	Damage control actions Stabilise and manage situation Contains fuel spillages Control ignition sources
Falls and impacts incidents	Local	Queensland Ambulance Service Queensland Fire and Rescue Service	Rescue Fire Fighting capability Fuel containment measures	Communication Evacuation of immediate area	Stabilise Isolate source of incident
Spontaneous combustion	Site	Site fire fighting team	Fire truck and water truck	Communication. Evacuation from area	Extinguish/cool heat source
Mechanical and electrical failure	Local, site and external	Local maintenance Production staff	Replacement or utilisation of standby equipment	Major failure requires external communication Internal communication to maintain groups	Isolation and possible shutdown for repair work
Fire on mine site	Local, site and potential external alert	Queensland Fire and Rescue Queensland Police Queensland Ambulance on alert	Fire fighting trucks and water tankers Plans and maps Site fire fighting team	Evacuation of affected mine personnel Communication, roll call Evacuation notice	Fire Control Shutdown of affected operations Evacuation from around fire sensitive areas such as fuel storage tanks and vehicles

Table 19-7 Emergency Management and Response Plan Elements and Response Planning for Mine Site Related Emergencies (cont)

Event	Level of Emergency	Emergency Services Require	Resources Needed	Organisational Aspects	Damage Control Actions
Spillage of hazardous materials	Local, site and potential alert	Queensland Fire and Rescue Services	Hazardous material containment measures	People control	Isolate source of incident Shutdown of affected operations. Evacuation from around fire sensitive areas such as fuel storage tanks and vehicles
Injury to mine personnel	Site	First aid kit Queensland Ambulance Service (if life threatening)	Rescue Medical Supplies	People control Communication	Identify extent of injury Respond and assist where possible until medical personnel arrive at the scene

The EMRP will be incorporated in a comprehensive on-site training strategy for staff, including:

- spill management, the identification and containment of the incident (e.g. firefighting, spill control and containment)
- management of emissions to land, air and water therefore minimising the potential for environmental harm
- incident reporting and notification, including internal and external communications (e.g. radio and telephone procedures)
- mobilisation and deployment activities of staff (e.g. firefighting and casualty management).

The objective of these plans will be to outline the first response procedure for protecting the health and safety of individuals involved and will cover both on-site and off-site incidents. The plan will also establish the procedure for containment, clean-up and rehabilitation of hazardous substance spills and identify the equipment needed for the response.

The critical elements of the emergency management plan such as evacuation, emergency power and remote alarm systems are to be tested regularly.

Fire drills will be undertaken on a regular basis. The SGCP site will have a team of employees trained in fire fighting to Coal Competency Standard and hold senior first aid certification. All fire fighting facilities and equipment will be installed, serviced, maintained and inspected by a certified body. The site will have a suitably equipped water truck that can support fire response requirements. Regular audits are conducted on the fire protection standards by external parties.

Stores, workshops and offices will be fitted with approved and certified smoke detectors. The SGCP will be constructed to meet industry and fire protection standards.

First aid, fire fighting equipment and exit locations will be suitably signed. All work areas will be within the required distance to reach emergency exits.

Designated first aid and emergency rescue facilities and equipment will be available during construction and operation phases. Appropriately trained attendants will be on-site throughout the life of the SGCP to provide first aid and respond to site emergencies. First aid response and mine operating instructions are currently included in the workplace induction training that is provided to all staff members.

Surrounding neighbours will also be notified in emergency situations, where appropriate.

All SGCP employees will be inducted prior to working on the site and all contractors will undergo a contractor induction prior to commencing work. Mine site personnel and contractors are to be trained in basic first aid, emergency response techniques and the Safety and Health Management System (S&HMS) as part of the Queensland Coal Board generic induction and the SGCP site specific inductions. All visitors will be escorted by mine site personnel. The induction program, which will be competency based, will cover procedures in the S&HMS for personnel to do their duties. Refresher training will be undertaken and is to be a continuing process aimed at informing all employees, including contractors, of their duties associated with the S&HMS and procedures.

The EMRP will be reviewed regularly to include results from operational hazard and regular hazard audits, and after any significant emergency situation that occurs. The plan shall be reviewed by a cross-section of internal and external stakeholders.

19.6. RISK MANAGEMENT PLAN

In accordance with *The Coal Mining Safety and Health Act 1999* the SGCP is required to prepare and implement a Risk Management Plan (RMP) that integrates elements of risk management and practices to ensure the safety of employees and contractors. The objective of the RMP is to protect the safety and health of all site workers, contractors and visitors and ensure compliance with relevant legislation.

As required by the ToR, the RMP is presented below. The RMP is based on the *AZ/NZS ISO 31000:2009*.

The risk management system will enable the SGCP to:

- increase the likelihood of achieving objectives
- encourage proactive management
- be aware of the need to identify and treat risk throughout the organization
- improve the identification of opportunities and threats
- comply with relevant legal and regulatory requirements and international norms

- improve financial reporting
- improve governance
- improve stakeholder confidence and trust
- establish a reliable basis for decision making and planning
- improve controls
- effectively allocate and use resources for risk treatment
- improve operational effectiveness and efficiency
- enhance health and safety performance, as well as environmental protection
- improve loss prevention and incident management
- minimise losses
- improve organisational learning
- improve organisational resilience.

19.6.1. The Framework for Managing Risk

19.6.1.1. Design the Risk Management Framework

The risk management framework will provide the foundations and arrangements to manage risk throughout the SGCP. The introduction of a RMP requires strong commitment by management to ensure the following:

19.6.1.2. An Understanding of How SGCP sits within its External and Internal Context

By establishing the context, the SGCP will articulate its objectives and defines the external and internal parameters to be taken into account when managing risk, and sets the scope and risk criteria for the remaining process. Externally this will include the social, regulatory, financial and competitive environments, and drivers impacting on the objectives of the organisation relationships with external stakeholders.

Internally, the SGCP will assess the organisational structure, policies and objectives, capabilities in terms of resources and knowledge, information systems, standards and guidelines and relationships with internal stakeholders.

19.6.1.3. Risk Management Policy

The SGCP will develop a Risk Management policy that will address:

- reasons why SGCP will manage risk
- SGCP's risk related objectives
- accountabilities and responsibilities for managing risk

- a commitment for making resources available
- ensuring risk management performance is measured and reported
- a commitment to review and improve the risk management policy.

19.6.1.4. Accountability

The SGCP will ensure that there is accountability, authority and appropriate competence for managing risk, as well as adequacy of controls. This will be facilitated by identifying personnel that have the accountability and authority to manage risk, identifying personnel responsible to develop and maintain the framework and establish performance measurement and reporting processes.

19.6.1.5. Integration

The management of risk will be integrated with all SGCPs practices and processes and should become part of, and not separate from, these processes. In particular, risk management will be embedded into policy development, business and strategic planning and review, and change management processes.

19.6.1.6. Resources

The SGCP will allocate appropriate resources to the development and maintenance of the risk management framework. Consideration will be given to:

- people, skills, experience and competence
- resources needed for each step of the risk management process
- the organisation's risk processes, methods and tools
- documented processes and procedures
- information and knowledge management systems
- training programmes.

19.6.1.7. Internal Communication and Reporting

The SGCP will establish internal communication and reporting mechanisms to encourage accountability and ownership of risk. The mechanisms will ensure that key components of the risk management framework, and subsequent modifications, are communicated appropriately, there is adequate internal reporting and there are processes for consultation with internal stakeholders.

19.6.1.8. External Communication and Reporting

The SGCP will develop and implement a plan to communicate with external stakeholders. It will contain procedures to:

- engage appropriate external stakeholders and ensure an effective exchange of information
- ensure external reporting to comply with legal, regulatory, and governance requirements
- provide feedback and reporting on communication and consultation
- ensure there is communication to build confidence in the SGCP
- guide communication with stakeholders in the event of a crisis or contingency.

19.6.1.9. Legal and Regulatory Compliance

The risk management framework will ensure that SGCP personnel are made aware of state and federal related requirements and that the site is audited regularly to ensure compliance.

19.6.1.10. Implement the Risk Management Framework

When implementing the risk management framework the SGCP will:

- define the appropriate timing and strategy for implementing the framework
- apply the risk management policy and process to the SGCP's processes
- comply with legal and regulatory requirements
- ensure that decision making, including the development and setting of objectives, is aligned with the outcomes of risk management processes
- hold information and training sessions
- communicate and consult with stakeholders to ensure that the risk management framework remains appropriate.

19.6.1.11. Monitoring, Reviewing and Improving the Framework

The SGCP will monitor and review the performance of the management framework by:

- measuring the risk management performance against indicators
- periodically measure progress against, and deviation from, the risk management plan
- periodically review whether the risk management framework, policy and plan are still appropriate

- report on risk, progress with the risk management plan and how well the risk management policy is being followed
- review the effectiveness of the risk management framework.

Based on the results of monitoring and reviews, strategies will be put in place to improve the framework.

19.6.2. Risk Management Process

The risk management process must be integrated into site management, embedded in the culture of the mine and designed within the business processes of the SGCP. The process comprises a number of components that are listed below.

19.6.2.1. Communication and Consultation

Communication and consultation with external and internal stakeholders will take place during all stages of the risk management process and should start early in the project life. Communication and consultation will ensure that those accountable for implementing the risk management process and stakeholders understand the basis on which decisions are made, and the reasons why particular actions are required.

A consultative approach will ensure that the interests of stakeholders are understood and considered:

- risks are adequately identified
- different areas of expertise are brought together when analysing risks
- different views are appropriately considered when defining risk criteria and in evaluating risks
- endorsement and support is secured for a mitigation plan.

19.6.2.2. Establishing the Context

When establishing the context of the process, they need to be discussed in greater detail.

The SGCP's objectives, strategies, scope and parameters of activities should be established. The context will involve:

- defining the goals and objectives of the risk management activities
- defining responsibilities for and within the risk management process
- defining the scope, as well as the depth and breadth of the risk management activities to be carried out
- including specific inclusions and exclusions

- defining the activity, process, function, project, product, service or asset in terms of time and location
- defining the relationships between a particular project, process or activity and other projects, processes or activities of the organisation
- defining the risk assessment methodologies
- defining the way performance and effectiveness is evaluated in the management of risk
- identifying and specifying the decisions that have to be made
- identifying, scoping or framing studies needed, their extent and objectives, and the resources required for such studies.

19.6.2.3. Defining Risk Criteria

The SGCP should define criteria to be used to evaluate the significance of risk. The criteria should reflect the organisation's values, objectives and resources.

When defining criteria, factors to be considered include:

- the nature and types of causes and consequences that can occur and how they will be measured
- the timeframe(s) of the likelihood and/or consequence(s)
- how the level of risk is to be determined
- the views of stakeholders
- the level at which risk becomes acceptable or tolerable.

19.6.2.4. Assessing Risk

The SGCP will assess risk by identifying, analysing and evaluating potential risks.

The SGCP will identify sources of risk, their areas of impact, events (including changes in circumstances), their causes and their potential consequences. The knock-on effects of particular consequences, including cascade and cumulative effects will be examined during the risk identification process.

During the analysis of risks, the SGCP will consider:

- the causes and sources of risk
- their positive and negative consequences
- the likelihood that those consequences can occur and decide whether risks need to be treated and the most appropriate risk treatment strategies and methods.

Risk evaluation involves comparing the level of risk found during the analysis process with risk criteria established when the context was considered. Once the analysis is completed the SGCP will decide, which risks need treatment and the priority for treatment implementation.

19.6.2.5. Treating Risk

When treating risks the following process will be applied:

- selecting an option for modifying risk and implementing it
- assessing the risk treatment
- deciding whether the residual risk levels are tolerable
- if not tolerable, generating a new risk treatment
- assessing the effectiveness of that treatment.

Selecting the most appropriate risk treatment option will involve balancing the costs and efforts of implementation against the benefits derived, with regard to legal, regulatory, and other requirements such as social responsibility and the protection of the natural environment.

Treatment plans will be prepared and implemented. The plans will document how treatment options will be implemented. The plans will include proposed actions, accountabilities, performance measures and reporting and monitoring requirements. The plans will identify the priority order in which individual risk treatments should be implemented.

19.6.2.6. Monitoring, Review and Recording

The SGCP will monitor and review the risk management process on-site. The monitoring and review process will encompass all aspects of the risk management process to:

- ensure that controls are effective and efficient in both design and operation
- obtain further information to improve risk assessment
- analyse and learn lessons from events (including near-misses), changes, trends, successes and failures
- detect changes in the external and internal context, including changes to risk criteria and the risk itself which can require revision of risk treatments and priorities
- identify emerging risks.

All risk management activities will be documented to assist in improvement of methods as well as for regulatory, legal and operational needs.

The RMP will address the risks and hazards identified in **Table 19-3** and **Table 19-4** and will undergo regular review to ensure that currency is maintained through the life of the SGCP.

19.7. PRELIMINARY RISK ASSESSMENT – CONCLUSION

Based on the assessment outlined in **Table 19-3** and **Table 19-4**, it can be concluded that the risk profile for the SGCP is 'Rare' to 'Unlikely' with only three 'Likely' and no 'Almost Certain' risk scenarios identified for environmental, property and human health factors.

The nearest sensitive receptors and/or land uses to the SGCP site are pastoral homesteads. The potential impacts and risks to these areas are predicted to be low. There will also be no State liability for private infrastructure and visitors on public land.

Should the mitigation measures detailed in the proceeding sections be followed, it is considered that no residual risk will remain that exceeds generally accepted levels.

Based on final detailed design and operating plans, a rigorous, more specific evaluation of hazards associated with the SGCP will be undertaken prior to the commencement of both the construction and operational phases.

New and alternative hazard control measures will be evaluated, tested and measured as part of the continuous improvement strategies required in the S&HMS.

19.8. HEALTH AND SAFETY

This Section describes the existing community values for public health and safety and relevant issues associated with the construction, operation and decommissioning phases of the SGCP. The necessary mitigation strategies to minimise risk to the health and safety of SGCP employees, contractors, visitors and the community are outlined and assessed where appropriate.

19.8.1. Legislation

Table 19-8 identifies the relevant legislation and the regulatory requirements that apply to the SGCP and briefly describes how compliance will be achieved.

Table 19-8 Health and Safety Legislative Requirements and Compliance

Relevant Legislation	Legislative Requirements	Compliance
<i>Workplace Health and Safety Act 1995</i> <i>Workplace Health and Safety Regulation 2008</i>	To prevent a person's death, injury or illness being caused by the workplace, or activities.	Include safety aspects in design for construction and operations.
<i>Coal Mining Safety and Health Act 1999 (CMSH Act)</i> <i>Coal Mining Safety and Health Regulation 2001 (CMSH Regulations)</i>	To ensure the safety and health of all persons (employees, contractors or visitors) involved in activities at the workplace.	S&HMS will be based on a risk management approach and meet the requirements of the <i>CMSH Act and Regulations</i> .

Table 19-8 Health and Safety Legislative Requirements and Compliance (cont)

Relevant Legislation	Legislative Requirements	Compliance
<i>Explosives Act 1999 and Explosives Regulation 2003</i>	To ensure the safe utilisation, handling, storage, transport and disposal of explosives during all stages of the SGCP so as not to endanger persons, property or the environment.	The use and handling of explosive materials/substances will be in compliance with the <i>Explosives Act</i> . Health and Safety Management Plans for use by SGCP personnel and/or contractors who facilitate blasting works in the open-cut operation.
<i>Building Fire Safety Regulation 2008</i>	Safe operation of all buildings so as not to endanger persons, property or the environment.	A permit will be required to store flammable and combustible liquids. Design, construction and maintenance of all temporary and permanent buildings and structures will meet fire safety compliance.
<i>Electricity Safety Act 2002 Electrical Safety Regulation 2002</i>	Ensure safe utilisation, instalment and use of electricity so as not to endanger persons, property or the environment.	Electrical safety will be included in design and a Safety Management System for construction and operational phases.
<i>Radiation Safety Act 1999 Radiation Safety Regulation 2010</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.
<i>Transport Operations (Road Use Management) Act 1995 and associated regulations for dangerous goods and other relevant aspects</i>	Provide for the effective and efficient management of vehicle and road use associated with all components and stages of the SGCP.	S&HMS for transport during the construction, operational and decommissioning phases.
<i>Health Act 1937 Health Regulation 1996 Health (Drugs and Poisons) Regulation 1996</i>	Ensure a safe and healthy environment so as not to endanger person, property or the environment	Risk Management System identifying health issues will be incorporated in the S&HMS
<i>Workers' Compensation and Rehabilitation Act 2003 and Regulation 2003</i>	Ensuring and promoting improved health and safety performance Provision of compensation where required	Risk Management System incorporated in the S&HMS Appropriate insurance coverage
<i>Food Act 2006 Food Regulation 2006</i>	Ensuring safety in the provision and supply of food at the village	Compliance safety audit required to ensure compliance with Food Standards Code and operator's food safety program at the village
<i>Petroleum and Gas (Production and Safety) Act 2004</i>	Provides for, amongst other things, the regulation and promotion of the safety of persons in relation to operating plant	Risk Management System incorporated in the S&HMS

Legislative considerations for the SGCP relating to hazard and risk are discussed in more detail above in **Section 19.2**.

19.8.2. Existing Values

This Section identifies the existing community and workforce values for health and safety that could potentially be adversely affected by the SGCP. The values are discussed in the context of off-site and on-site sensitive receptors. These values were identified through consultation with community groups through the Social Impact Assessment (SIA) and community consultation programs associated with the SGCP. The general principles of human health and well-being have also been considered.

The values to be protected include the health, well-being and general safety of the surrounding community, employees, contractors and visitors who live and work in close proximity to the SGCP.

19.8.2.1. Community Values

The general environmental values from a health and safety perspective of the homestead and proposed accommodation facility residents include being able to sleep, rest and work in an environment without increased:

- nuisance dust, gaseous irritants and odour
- nuisance noise, vibration and light
- disease vectors
- waste materials and rubbish
- water supply contaminants
- traffic hazards.

There are no areas, populations or resources that are particularly sensitive to environmental health factors in close proximity to the proposed mining and processing areas. These include forests, water reserves, State and local Government controlled roads, schools, recreation areas, hospitals or aged care facilities. Considering this, the potential for additional impacts other than on the homesteads and proposed accommodation facility residents will be low.

19.8.2.2. Workforce Values

The general health and safety values of site personnel are similar to those of off site sensitive receptors. However, these are focused on the maintenance of a health and safety conscious work environment. All employees, contractors and visitors on the SGCP site value a work environment that mirrors those values identified in **Section 19.8.2.** Where the nature of the work involves interaction with potential risks to health and safety, appropriate PPE and safety management systems are expected and valued by those working on-site.

A discussion of the risks to the health and safety of employees, contractors, visitors and the wider community, and the control measures to be adopted through the construction, operational and decommissioning phases of the SGCP is provided in **Section 19.8.3** and **19.8.5.**

19.8.3. Construction and Operations

19.8.3.1. Health and Safety Risks and Control Measures

The location of relevant off-site sensitive receptors is provided in **Figure 19-1**. A summary of the potential health and safety risks to both the on-site workforce and off-site sensitive receptors is provided in **Table 19-8** and discussed further, where relevant, in the subsections below.

19.8.3.2. Food Hygiene

Areas involved with the provision and supply of food, such as meal rooms, will operate in compliance with current food and hygiene legislation, including the *Food Act 2006* and the *Food Regulation 2006*. Appropriate food handling and storage facilities will be provided to minimise risk to human health.

19.8.3.3. Odour

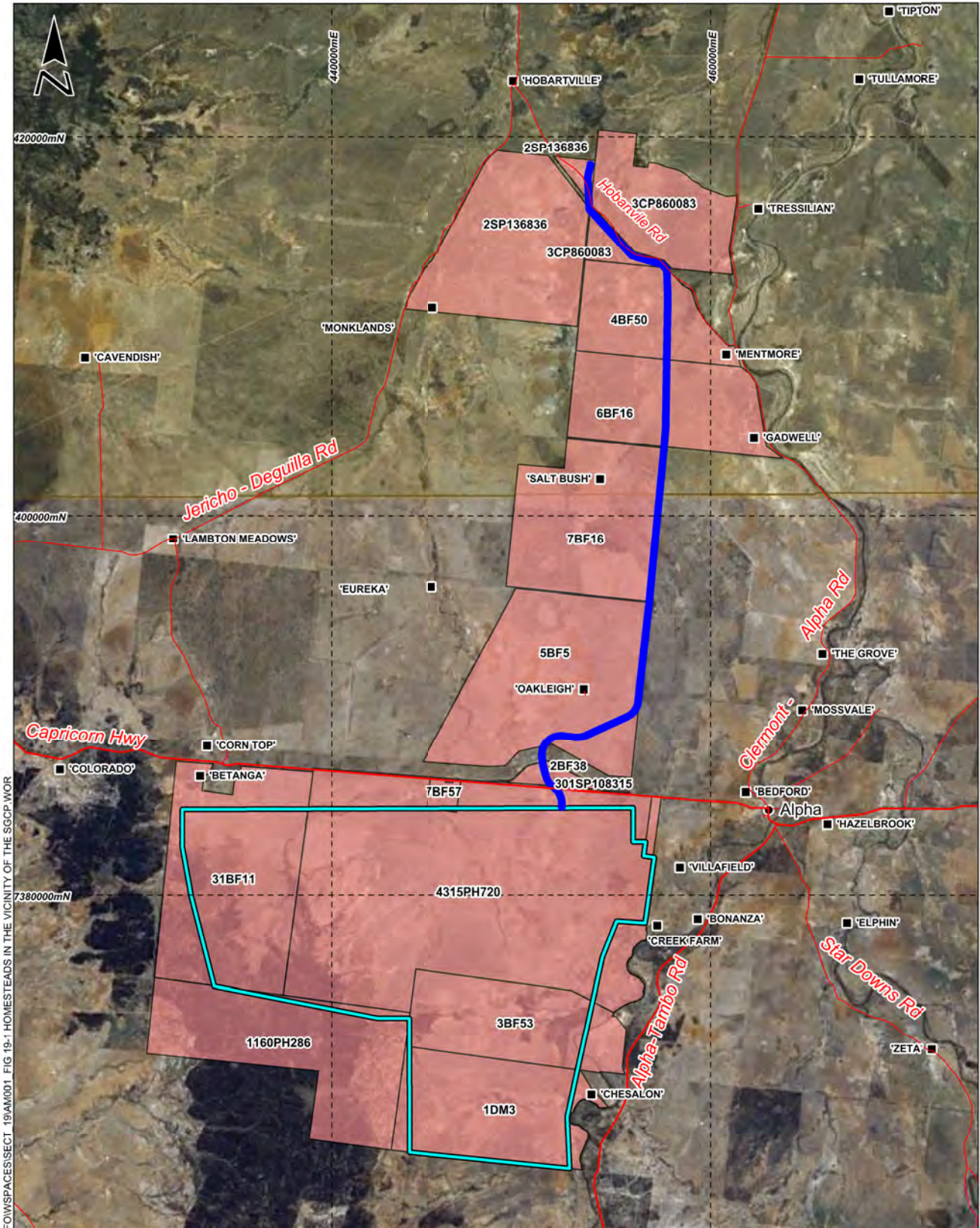
The SGCP is not expected to produce any odour that may be detrimental to the health and safety of employees, visitors or the general public. The risk of odour impacts during the construction and operation phases is considered to be low.

19.8.3.4. Particulates and Gases/Vapours

The SGCP will implement particulate and gas/vapour exposure standards and procedures. This applies to dust, fibres, mist, fumes (i.e. particulates), gas and vapour exposure in the workplace. The standards and procedures cover, amongst other things, evaluation of particulate and gas/vapour hazards, and development of a control program to ensure that employees and contractors do not suffer adverse health effects in the work environment from particulates or gas/vapours.

Where required, the dust control program will include engineering controls (e.g. air conditioning filters, dust suppression systems, vacuum cleaners and fume extraction systems) on conveyors and at coal transfer points in the CHPP and use of respiratory protection devices where required.

The health risks are expected to be low as dust output is expected to be within acceptable limits. Dust from heavy equipment will be controlled by dust suppression measures such as watering of roads and work areas. Numerical modelling indicates that air quality criteria will not be exceeded at nearby sensitive receptors, however an increase in dust deposition will be experienced at the homesteads surrounding the SGCP during operation. Any complaints regarding dust will be further investigated with mitigation measures implemented to rectify the cause of the complaint. The potential impacts and mitigation measures for air quality are further addressed in **Section 10—Air Quality**.



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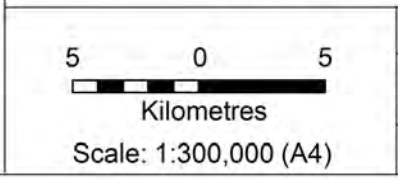
- LEGEND**
- MLA70453
 - Directly affected property
 - SGCP infrastructure corridor
 - Roads
 - Population centre
 - Homestead

Data Source:
Cadastral (Barcaldine May2010)-DERM. Topo (250k raster)-Geoscience Australia.

Alpha Coal Pty Ltd

South Galilee Coal Project

Homesteads in the Vicinity of the SGCP



24/08/2012

Proj. : MGA Z55
Datum: GDA 1994

FIGURE 19-1

Table 19-9 Summary of Risks to On-Site Workforce and Off-Site Sensitive Receptors

Potential Health Impact	Risk	Comment
Food Hygiene	Low	Food brought to site is generally prepared by individuals for their consumption. Appropriate food storage facilities will be provided at site to ensure food hygiene standards are met.
Odour	Low	No major odour sources are anticipated as part of the SGCP.
Particulates and gases/vapours	Moderate	Based on modelling, particulate matter levels at nearby sensitive receptors will be within Government air quality criteria.
Heat	Low	Appropriate protection measures such as clothing and rehydration fluids will be provided to mitigate against heat stress and exhaustion. Awareness will also be provided through the site induction program.
Noise and Vibration	Low	Where noise levels exceed occupational health and safety criteria, the implementation of design strategies to minimise noise at source and provide appropriate PPE to minimise the potential for adverse health impacts. Off-site health and safety impacts associated with the SGCP noise and vibration emissions are not anticipated.
Chemical Contamination	Moderate	Chemicals and substances used throughout the construction and operational phases will be used, stored and managed through established site health and safety methods and in accordance with relevant standards.
Potable Water Supply	Low	Appropriately scheduled water testing is undertaken to determine and rectify any potential impacts from on-site potable water to the mine personnel. Impacts on off-site potable water supplies due to the SGCP are not likely to occur.
Use of Process Water	Low	A water management system managing all mine affected water is implemented across the site with regular water quality monitoring.
Pest Management and Disease Vectors	Low	No increase in pests due to construction or operations is anticipated. It is not expected that there will be any issues regarding the transmission of bacteria or insect breeding e.g. mosquitoes and biting midges. Feral animals and rodents are not a significant threat to human health and safety at the site. A Weed and Pest Animal Management Plan will be implemented over the life of the SGCP.
Wildlife	Low	Vehicle collisions with wildlife may potentially occur whilst on site and along the roads surrounding the mining lease. Whilst traffic will increase as a result of SGCP construction and operations a significant increase in vehicle collisions with wildlife is not expected. The potential interaction with snakes will however be a consideration during activities at the mine.
Waste	Low	Construction and operational chemicals are manageable through established methods. These methods will comply with applicable standards. SGCP wastes are to be appropriately managed through on-site recycling or disposal and off-site disposal by a waste management contractor.
Groundwater Quality	Low	The SGCP wastes display a low potential for acid mine drainage. Groundwater flows will be towards the mine void during and after operation. Very low likelihood of chemical and waste spills infiltrating to groundwater.
Surface Water Quality	Low	Mine water discharges will be restricted to flood occurrences only and under strict Environmental Authority release conditions. Very low likelihood of chemical or wastewater spills to waterways.
Traffic Accidents	High	Whilst an increase in traffic is anticipated as a result of the SGCP, the existing transport infrastructure is expected to be adequate for the proposed volumes. However, traffic accidents form a large component of mining related accidents and, as such, mobile equipment safety and the potential for interaction with personnel remains a high priority.
Blasting	Moderate	Whilst an increase in blasting is anticipated as a result of the SGCP, the existing procedures are expected to be adequate in controlling potential impacts.

19.8.3.5. Heat

The effects of heat will be managed by provision of suitable working environments, equipment and protective clothing. Mine personnel will be made aware of the signs and symptoms of overexposure to heat and the effects thereof, including dehydration. The existing management measures at the site will be applied to all working areas of the SGCP in this respect.

19.8.3.6. Noise and Vibration

All equipment (both fixed and mobile) will comply with the *AS 1259.1.2 Occupational Noise* and the *Queensland CSMH Act* in regard to design and operating noise levels. It is the duty of the supplier to ensure equipment is compliant with safe levels of vibration and must provide documented proof of compliance (i.e. test results).

The SGCP 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 cover, amongst other things, the identification and evaluation of occupational noise hazards and development of noise monitoring control programs to minimise noise levels and protect employees and contractors from adverse exposure. Where required, the use of suitable hearing protection equipment shall be provided and will be worn by all personnel while in the hearing protection area.

The ambient noise environment is reflective of a remote and relatively undisturbed area. The noise levels do not exceed the noise limits for 'beneficial assets' contained in the *Environmental Protection (Noise) Policy 2008 (EPP (Noise))* at the closest residences. The potential impacts and mitigation measures for noise are further addressed in **Section 12—Noise and Vibration**.

19.8.3.7. Chemicals

As detailed in **Section 19.4**, fuel (predominantly diesel), detergents, lubricants, oils, solvents, degreasers and domestic cleaning agents will form the majority of chemicals required at the SGCP site.

All chemicals, including persistent organic chemicals, will be managed in accordance with the existing hazardous material management system developed for the mine, incorporating the provision and use of the respective MSDS. MSDSs are kept in a register, with copies readily available to operators in appropriate locations around the site. Training will also include site induction and chemical awareness training programs. Before new chemicals are introduced to site, a risk-based process will be used to determine appropriate control measures to decide if admission is accepted or not.

Hydrocarbons will be stored and handled in accordance with *AS 1940:2004, The Storage and Handling of Flammable and Combustible Liquids*. Bulk storage areas will require tanks to be suitably located and bunded to minimise the risk of chemical spills and potential harm to employees and contractors. Inspections of all new storage facilities will be included in the regular S&HMS premises inspection.

The residual health risk presented by these chemicals is expected to be low.

19.8.3.8. Potable Water Supply

Potable water quality will be regularly tested. The risk of health related impacts associated with the SGCP potable water supply is expected to be low.

19.8.3.9. Use of Process Water

Process water will be recycled through the CHPP and will also be used for the watering of haul roads. A water management system encompassing all mine affected water will be implemented with regular monitoring of water quality to ensure any potential health and safety impacts are understood. Further discussion of the proposed water management system is provided in **Section 9—Water Resources**.

19.8.3.10. Pest Management and Disease Vectors

If significant areas of weed infestation or other declared pest species (either flora or fauna) are identified and pose a significant risk to mine personnel, visitors, surrounding landholders, the environment or the operation, appropriate eradication and management measures will be taken. The SGCP is not expected to increase the number of pests during construction or operations.

It is not expected that the water management system that aims to maximise water recirculation between dams and processing areas will result in any health issues such as the transmission of bacteria or insect breeding (e.g. mosquitoes and biting midges). Overall, the risk of impact is considered to be low.

19.8.3.11. Wildlife

In terms of health and safety, snake bites pose the highest health risk from wildlife. Mine personnel are made aware of the risk of snakes through the site induction process and are provided with appropriate training for treatment of snake bites. The potential risk to human health from wildlife hazards such as snake bites is assessed as low.

Due to the forecasted amount of traffic that will be using the haul/access road, it is unlikely that wildlife will inhabit active work areas. Consequently, the frequency of exposure to these hazards will be low.

19.8.3.12. Waste

Waste will be generated during all phases of the SGCP. Waste will be managed to avoid adverse impacts on the health of mine personnel and minimise risk of impact on the environment. Waste management has been considered in detail in **Section 13—Waste**.

Small amounts of waste will be generated during the construction or upgrade of any existing mine site infrastructure and will include scrap metal, wood, concrete, general waste, recyclable waste and some hazardous waste from the operation and maintenance of equipment and machinery.

During the operations phase, food scraps and recyclables (paper and cardboard) will be generated in populated areas. A series of clearly labelled bins will be strategically placed throughout the operation to segregate and collect the waste materials generated on-site. Waste materials that are known to attract pests and vermin will be stored and handled in a responsible manner to limit access and attraction of these pests. General waste, such as food wrappers and scraps and plastic cups will be transported off-site by a licensed contractor for disposal at a licensed general waste facility.

Small quantities of hazardous (regulated) wastes are expected to be produced during the operational activities such as hydrocarbons and hydrocarbon contaminated products (grease, oil filters and batteries, amongst others). These wastes will be stored in accordance with *AS 1940*, collected from site and disposed of in accordance with applicable regulations by a licensed waste management firm.

Clinical waste such as drug and alcohol testing kits and sanitary waste will be disposed of in accordance with the *Waste Reduction and Recycling Act 2011*. Appropriate safety glasses and gloves will be worn while handling waste, which will be kept in a secure location away from populated areas such as crib rooms.

Standard procedures for the storage, containment, disposal and spill response for potentially hazardous waste materials will minimise potential impacts associated with these materials/substances. Based on implementation of the above controls, the risk of waste related impacts is expected to be low.

The proposed waste storage and disposal strategies at the site are considered appropriate such that no impacts on off-site sensitive receptors from the SGCP are anticipated.

19.8.3.13. Groundwater Quality

The potential for impacts on groundwater quality is assessed in **Section 9—Water Resources**. In summary, the risk posed to groundwater quality is low, as there is low potential for hazardous seepage (refer to **Section 13—Waste**). The potential of chemical spills and wastes to infiltrate into groundwater will be minimised, as outlined in **Section 13—Waste**.

19.8.3.14. Surface Water Quality

The potential for health impacts associated with surface water quality is considered to be low. Depending on the location, sewage will be treated and contained, either by a septic and associated absorption trench system, or by a sewage treatment plant, in which case the treated effluent will be disposed of by pond storage, evaporation or irrigation. Mobile crib rooms contain their own sewage treatment system. In the event that waste bio-solids or sludge is generated, a licensed waste contractor will be employed to remove the waste material and transport the waste to a licensed landfill. No sewage effluent will be discharged to waterways, therefore minimising the potential for the spread of bacteria. Further discussion is provided in **Section 13—Waste**.

19.8.3.15. Traffic Accidents

The SGCP will result in modest increases to the traffic along the Capricorn Highway, with no reduction in the level of service along the highway. There are some minor impacts to other roads in the area, as assessed in **Section 14—Transport**, however, the traffic levels will remain low. It is therefore considered that the risk of an increased frequency of traffic accidents associated with the SGCP is low.

19.8.4. Construction and Operational Health and Safety Management

Health and safety management systems and procedures are to be developed and implemented at the site.

19.8.4.1. Inductions

All staff and visitors that enter the SGCP site will be required to complete a site induction. The induction covers environmental, cultural, health and safety aspects and rules that must be adhered to on-site. Induction requirements may differ, depending on the proposed activities being conducted by the staff member or visitor and the areas of the mine accessed.

All visitors, contractors and subcontractors will be required to sign in and out at the SGCP site security office. Alternative sign in and out procedures are used for remote workers. These procedures will continue throughout the duration of the SGCP and will apply to all areas of SGCP activity.

19.8.4.2. Fitness for Work Assessments

The *Fitness for Work Standard* (the Standard) and associated procedures are implemented to address the risk posed by fatigue and the abuse of alcohol and other drugs to the safety and work performance of SGCP employees, site contractors and visitors. The implementation of the Standard is in line with other mining operations in Australia.

Ultimately, it is the responsibility of all individuals to ensure their own safety and health at work and to avoid adversely affecting the health and safety of any other person.

19.8.4.3. Vehicle Management and Hazards on the Road

An extensive fleet of equipment is proposed to operate during the life of the SGCP and will include haul trucks, shovels, excavators, bulldozers, scrapers, rollers and light vehicles (including four-wheel drive vehicles). Mobile equipment and vehicles will operate not only within the pit but also on haul roads and internal road networks. Light vehicles will also use access roads servicing the SGCP site. The mine access road will be designed in accordance with the *CMSH Act* requirements.

Contractors and mine personnel are required to be trained, assessed and authorised prior to operating vehicles on-site. Issue of authorisation for drivers of light vehicles interacting with heavy equipment will be restricted. Standard Operating Procedures (SOPs) regarding driver safety (including speed limits) and dust control will continue to be implemented. Speed limits around the site will be communicated by appropriate signage. Watering of roads and access areas will be undertaken to suppress dust where required, in order to maintain driver visibility. Adequate lighting will also be installed on-site to ensure that night driving and operating conditions are safe. Vehicle inspection checks will be undertaken as part of the routine maintenance program. All vehicles will be required to carry two-way radios.

19.8.4.4. Physical Interaction with Machinery

Personnel may be at risk of injury to themselves or others through interaction with moving machinery and vehicles. Hazards in this category may occur during the construction of infrastructure, movement of heavy equipment, maintenance programs or repair work.

Where practicable, segregation of pedestrians from light and heavy vehicles, and light vehicles from heavy vehicles, will be achieved to reduce the likelihood and exposure to the risk of collision. All vehicles will be maintained and regularly serviced so they are operating in accordance with their design. SOPs regarding the control of energised equipment and machinery will be implemented incorporating lock-out/tag-out safety systems to reduce the likelihood of exposure to sudden releases of energy.

19.8.4.5. Fuel Storage and Handling (Fixed and Mobile)

The SGCP will be exempt from licensing under the *Dangerous Goods Safety Management Act 2001*. However, it is subject to the provisions of the *CMSH Act and CMSH Regulation 2001*. On-site fuel storage will be predominantly diesel, presenting a low risk of uncontrolled combustion occurring and a moderate environmental risk from potential spillage. Fuel tankers will visit the site on a regular basis to refill bulk storage tanks. The amount of diesel fuel stored on-site will increase with the throughput increase in the CHPP and the increased number of mobile plant.

All hydrocarbons will be stored in accordance with *AS 1940* and storage will be audited against the Standard on a regular basis. Implementation of *AS 1940* reduces risk to a low level.

To minimise the hazards associated with diesel leaking during tanker unloading, the following controls will be implemented to reduce risks to health and safety of site personnel and potential adverse impacts to the environment:

- equipment inspection and testing programs will be undertaken to maintain reliable performance of fuel tanks and bunds
- operator training will be provided in the safe operation of the equipment and knowledge of emergency response procedures in the event of diesel leakage
- spill containment equipment (e.g. bunds) will be maintained and available to manage any spillage of liquids

- clean storm water is diverted away from the bunded fuel storage areas
- sumps will be constructed to collect any spillage and allow recovery
- ignition sources will be strictly monitored and managed to avoid fire
- appropriate fire fighting facilities and suppression systems will be installed, maintained and available to extinguish fires
- an approved fire protection system is to be installed and maintained around hydrocarbon storage areas.

19.8.4.6. Power Infrastructure and High Voltage Exposure

Power lines will be constructed to accommodate power supply. A high voltage reticulation system will also be constructed within the mining lease. The task will be undertaken by qualified contractors who will employ the appropriate procedures and standards.

19.8.4.7. Working at Heights and Falling Objects

There will be times during all phases of the SGCP when workers are required to work at heights with the potential to cause injury or death, should a fall occur.

The Proponent will plan activities to maximise work at ground level and where practical, minimise the requirement to work at height. However, where working at heights is unavoidable, SOPs will be used to control this risk. A safe working area eliminates the possibility of a fall, or falling objects, by using fixed platforms and safety harnesses.

Mandatory PPE must be worn at all times including safety glasses, metatarsal protected steel cap boots, long pants, long-sleeve shirts and hard hats, which provide some protection against objects falling from height.

In-pit specific procedures will limit the exposure to rocks falling from the highwall and interacting with potential worker locations. The area below these highwalls will be managed appropriately to reduce access from other personnel in the work area.

19.8.4.8. Explosive Handling, Blasting and Misfires

When required and depending on the location, blasting can pose a number of potential risks, most notably dust, noise (overpressure) and vibration.

All blasting activities are to be strictly regulated, authorised by the Senior Site Executive and are undertaken under mine site operating procedures. These procedures cover such activities as transport, loading and firing of explosives, and the management of explosive misfires.

Mitigation measures are to be put into place at the mine site, including control of access to blast areas and ensuring that the blasts are undertaken by suitably qualified personnel with appropriate knowledge and skill.

Transportation of dangerous goods to site will be carried out by a licensed transporter, who operates in accordance with the ADG Code. Approved transport routes will be utilised for the movement of hazardous goods.

Explosives are stored on-site and are used in accordance to the relevant Queensland legislation (refer to **Table 19-7**) and AS2187.2:2006. Relevant staff are trained in the storage and handling of these products.

Explosives will be stored on-site in magazines that are isolated and protected from other activities on the site and any natural incidents such as flood, fire and lightning.

19.8.4.9. Transportation

Licensed transporters operating in compliance with the Commonwealth *National Transport Commission (Model Legislation- Transport of Dangerous Goods by Road or Rail) Regulations 2007* will undertake the transport of dangerous goods to the site, including the transport of ammonium nitrate. 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*.

19.8.4.10. Spontaneous Combustion

Spontaneous combustion fires in coal stockpiles usually begin as 'hot spots' deep within the pile of coal. The hot spots appear when coal oxidises. Heat generated by the oxidation then initiates a fire.

Empirical testing carried out on coal samples determined that the coal seam has a low to moderate propensity to spontaneously combust. As the mine progresses, additional sampling will be conducted to validate the propensity of the coal to combust.

There is a low to moderate risk of spontaneous combustion occurrence in overburden and on coal stockpiles that could result in some smoke emission, however this is regarded as a low environmental nuisance risk given the large separation distances to adjacent landowners and relatively low volume of smoke (smoldering) generated.

The following control measures are in place to prevent, identify and control spontaneous combustion in coal and overburden stockpiles:

- capping combusting material to prevent oxygen ingress
- visual inspections will be carried out during operations
- minimisation of holding times where practicable
- induction and regular refresher training for on-site personnel to identify signs of spontaneous combustion and procedures in the event of a stockpile fire.

There will be adequately trained staff, equipment and materials to suppress and/or manage any spontaneous combustion events on-site.

19.8.4.11. Conveyors

Maintenance and working around conveyors is to be covered by site SOPs and will be included in induction training where required.

19.8.4.12. Security and Personal Protective Equipment

Prior to being given access to the site, visitors will be required to complete mandatory registration and an environmental, operational, health and safety induction. Blood alcohol content testing and random testing for drugs will also be carried out. The scope of induction will reflect the type of work to be undertaken whilst on the SGCP site.

Mine employees, contractors and visitors will be supplied with the relevant and appropriate PPE for the tasks to be conducted on site. Visitors will be authorised, registered and suitably attired with the following mandatory PPE:

- safety helmet
- metatarsal protected steel cap boots
- safety glasses
- high visibility clothing.

These items are required to be worn during particular activities and in designated areas, as indicated by safety signage. By wearing the appropriate PPE and adhering to safety procedures and systems, the residual health and safety risks to personnel and visitors are expected to be low.

19.8.5. Decommissioning and Rehabilitation

The potential risks associated with decommissioning the operations at the end of mine life are similar to those associated with the construction and operational phases, in terms of heavy vehicle movements, waste and chemical management and potentially hazardous working environments. The closure plan for the SGCP will address the following in accordance with the Plan of Operations (POO) and will consider the implications for health and safety as part of this work:

- stakeholder involvement
- landform stability (e.g. waste rock emplacements)
- land use limitations
- water management
- infrastructure management (e.g. removal of equipment, demolition of structures and removal of redundant material from site)
- surrounding and impacted community.

The rehabilitation strategies planned for the SGCP will involve decommissioning and rehabilitation in a manner that prevents environmental harm and risk to human health.

Any dangerous goods or chemicals will be removed from site and any contaminated areas will be managed and rehabilitated.

Controls to protect the community include warning signs, fencing of hazardous areas and safety rills to prevent travel over embankments. The risk to community safety will be low, given that the area is located on privately owned property.

Mine closure planning for the SGCP will be undertaken once final infrastructure and final landform plans have been approved, and as required by relevant Government departments. The closure strategy will provide for the site to be left in a sustainable condition without the risk of causing harm to the community or the environment.

19.8.6. Cumulative Health and Safety Risks

The majority of health and safety risks for the SGCP are contained on the mine lease with very little impact to surrounding land users.

The SGCP will marginally increase the demand capacity of health facilities, however no deterioration in the general level of health services within the surrounding area as a result of the SGCP should occur. Community and social impacts including impacts to health facilities and services are detailed in **Section 17—Social**.

19.8.7. Potential Impacts and Mitigation Measures

19.8.7.1. Potential Impacts

Potential impacts on both off-site sensitive receptors and on-site personnel have been identified and considered in the context of activities associated with the construction, operation and decommissioning phases of the SGCP. Potential impacts on off-site sensitive receptors are largely associated with air quality, noise emission and potential traffic incidents. The potential on-site impacts are more closely associated with the operation.

Potential cumulative health and safety risks on nearby sensitive receptors and the wider community including from dust, water, noise, vibration, traffic and transport are detailed in the specific sections within this EIS. From these sections, the cumulative health and safety risk for the SGCP is summarised in **Table 19-10**.

The cumulative impacts of the SGCP on health and safety of the community are expected to be well within acceptable limits as a result of the management and mitigation measures proposed. Overall, the impacts can be classified as minor at a local level and negligible to non-detectable on a regional, state or national level.

Table 19-10 SGCP Cumulative Assessment of Health and Safety Risks on the Wider Community

Potential Risk	Other Sources	SGCP's Contribution	Cumulative Impact on Health
Dust from SGCP	Surrounding mines Agricultural activities Trains Traffic Natural sources e.g. dust storms	Clearing ahead of mining, dust from mining activities.	Modelling identifies that dust levels at all sensitive receptors are likely to be within acceptable limits
Water quality impacted	Surrounding mines Agricultural activities Other infrastructure e.g. roads/towns/sewage plant Natural sources e.g. turbidity from flood	Discharges will be minor and will occur only during high flow periods Flow in creeks may be reduced due to storage of water on-site in accordance with Department of Environment and Heritage Protection (DEHP) requirements.	Water quality impacts from the SGCP will be negligible given the containment of mine affected water
Noise impacts to nearby sensitive receptors	Surrounding mines Agricultural activities Other infrastructure e.g. roads Natural sources e.g. birds, wind	Operation of mining equipment Blasting	Modelling indicates that noise levels at nearby sensitive receptors will be within acceptable limits in the majority of modelled cases
Vibration impacts to nearby sensitive receptors	Surrounding mines Agricultural activities Trains Traffic	Operation of mining equipment Blasting	Modelling indicates that vibration levels at nearby sensitive receptors will be within acceptable limits
Traffic/transport accidents and incidents	All other road users	Transport of workers from Alpha to the site. Movement of heavy vehicles associated with the SGCP	No significant increase in transport accidents or incidents is predicted

19.8.8. Monitoring and Auditing

Eleven sensitive receptors, including the accommodation village, have been identified within 19 km of the closest approach of the SGCP. The closest homestead is located within one km of the Mining Lease Application (MLA) 70453.

In summary, the dust exposure increase above existing ambient levels at all sensitive receptors is relatively low (i.e. an increase in dust exposure of less than 20 % and in many instances less than 10 % above the dust levels currently experienced in the area). The likely dust levels from the railway line was also modelled. It was determined that the dust exposure at all sensitive receptors is negligible and the cumulative impact (railway and mining) readily complies with all dust goals. The SGCP has minimal impact on the air sheds' ability to accept additional industrial (mining) operations.

19.8.8.1. Dust

To address the issues as outlined in **Appendix L—Air Quality Technical Report**:

- (a) potential PM₁₀ (24 hour maximum) exceedence at the proposed accommodation village in Case 1
- (b) potential PM₁₀ (24 hour maximum) exceedence at Villafield Station Homestead and the proposed accommodation village in Case 2
- (c) future dust exposure levels from the SGCP.

The existing long-term real-time dust concentration monitoring network (i.e. the Creek Farm Station homestead and Alpha) will be maintained to demonstrate seasonal variation of the air quality of the area. The units will be left in place for an extended period to account for the ramp up in production and the operation of the dragline in the northern pits.

The units are capable of recording PM₁₀ atmospheric concentrations daily. Once construction has commenced the monitoring results will be reviewed monthly to assess whether there is an increase in dust concentrations above predicted levels.

As discussed with the former Department of Environment and Resource Management (DERM), in order to evaluate the accuracy of the units, a high volume sampler monitoring event would be scheduled within the first 12 months of operation of the long-term dust monitoring units.

Local meteorological data is collected from a monitoring station installed by the SGCP at the Creek Farm Homestead. It is recommended that this station continue to collect temperature, relative humidity, rainfall and wind speed data over the life of the SGCP.

A network of seven dust deposition gauges has been installed at sensitive receptors surrounding the SGCP. Dust deposition (fallout) monitoring will be undertaken at these locations over the life of the SGCP.

For further information of air quality modelling refer to **Section 10—Air Quality**.

The SGCP will monitor emissions on receiving any complaints and put in place actions to mitigate the emissions.

Dust suppression strategies will be in place, ie stockpile and conveyor sprays, haul road dust suppression, minimising disturbance and progressive rehabilitation. No health related dust monitoring will take place.

19.8.8.2. Noise

The *EPP (Noise)* acoustic quality objectives and the *EPP (Noise)* sleep disturbance goals to protect human health and wellbeing are met at all locations (except the accommodation village) with wide open windows (**Appendix M—Noise and Vibration Technical Report**). Consequently, the windows at the accommodation village will need to be closed and the rooms will need to be air conditioned.

The calculated noise levels in Alpha comply with the goals to avoid background creep for all time periods.

However, the homesteads close to and east of the SGCP are likely to exceed the goals to avoid background creep during the evening and night. The two most adversely affected locations, the Creek Farm and Chesalon Station homesteads, exceed the night goal for approximately 15 % of the time.

It is proposed to monitor noise at the accommodation village and initially monitor background creep at the Creek Farm and Chesalon Station homesteads. A noise management plan will detail ongoing noise monitoring requirements including responses to noise complaints.

An auditing program will be implemented at the SGCP Operations. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.