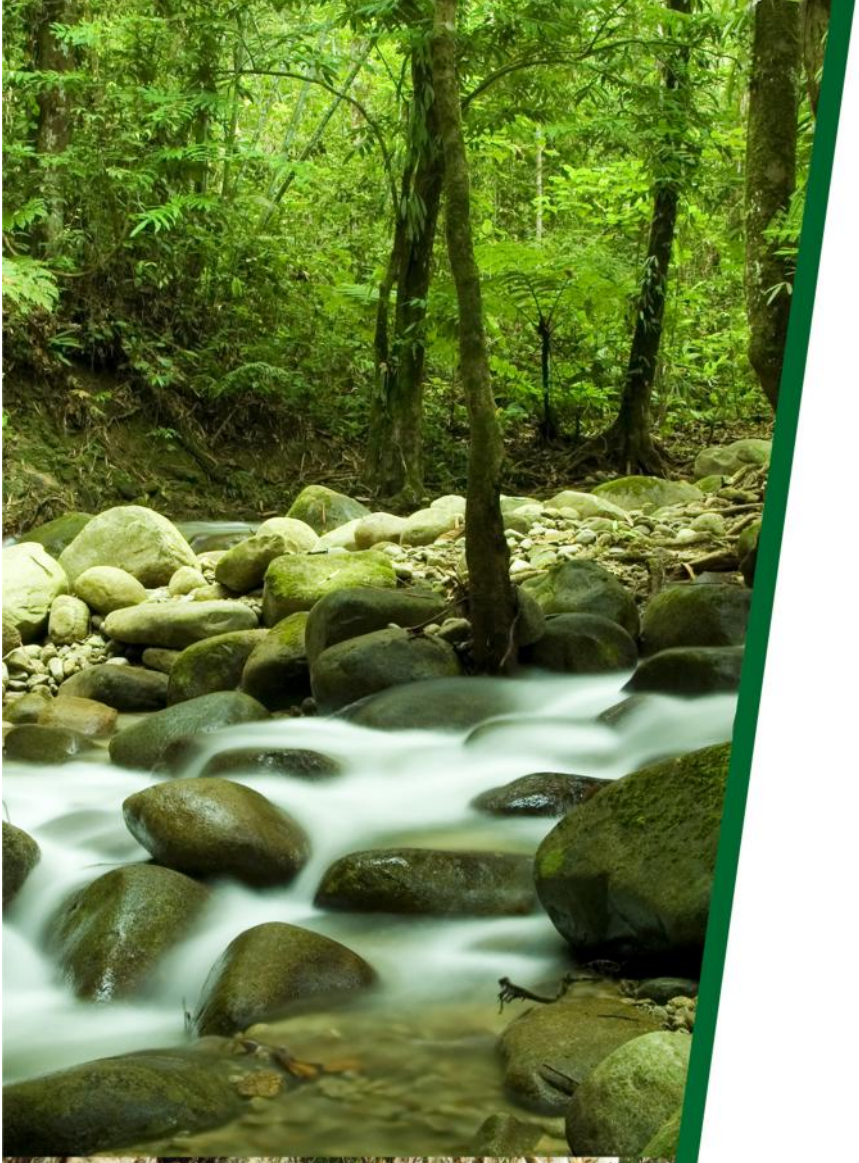
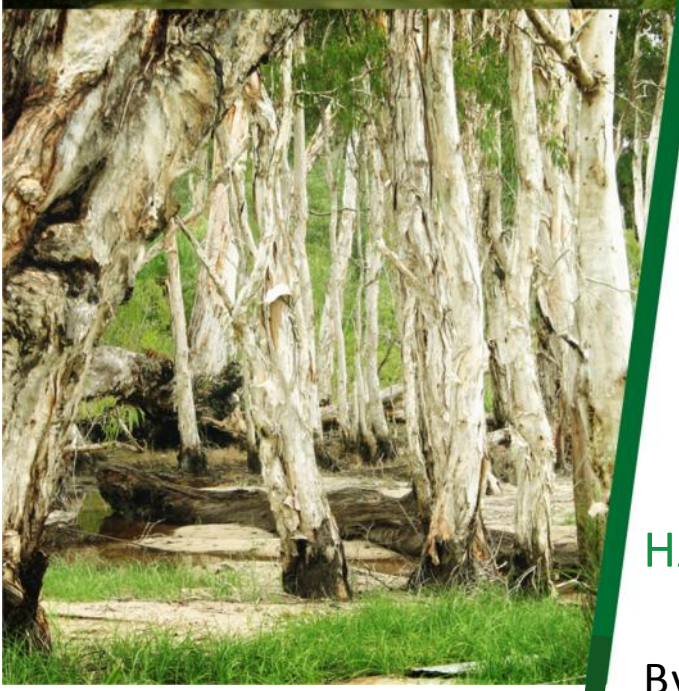
Appendix 32

Hazard and Risk Assessment Report





HAZARD AND RISK ASSESSMENT REPORT

Byerwen Coal Pty Ltd

15 May 2013

Prepared by
Environmental & Licensing Professionals Pty Ltd

environmental and licensing professionals pty ltd

A GREENCAP CONSULTING COMPANY

DOCUMENT CONTROL SHEET

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Project:	Byerwen Coal Project	**Issue Date:**	15 May 2013
Title:	Hazard and Risk Assessment Report		
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Client:	Byerwen Coal Pty Ltd		
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Revision Number	Date	Prepared by	Approved by
Rev A			
Rev B			
Rev C			
00	1 March 2013	LS	RO
01	15 May 2013	AS	RO

Number of Copies									
Revision Number	**A**	**B**	**C**	**D**	**00**	**01**	**02**	**03**	**04**
ELP File					1	1			
Client					1	1			
Department									

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1 INTRODUCTION

1.1 Objective

The objective of this report is to describe the potential hazards and risks to people and property that may be associated with the Byerwen project and to undertake a preliminary risk assessment. A draft risk management plan is presented.

This report addresses the terms of reference (TOR) for an environmental impact statement (EIS) issued by the Queensland Coordinator-General Department of State Development, Infrastructure and Planning (DSDIP) (formerly Department Employment, Development and Economic Innovation (DEEDI)) dated July 2011.

1.2 Scope

The potential hazards and risks to people and property that may be associated with the project are identified and possible frequencies are predicted. This includes potential hazards, accidents, spillages and abnormal events that may occur during all stages of the project; identifying all hazardous substances to be used, stored, processed or produced and the rate of usage; potential wildlife hazards; and potential natural events and implications related to climate change.

A preliminary risk assessment was undertaken in accordance with *AS/NZSS ISO 31000:2009 Risk Management – Principles and Guidelines*, taking into account:

- External and on site risks, including transport risks
- Potential for mosquito breeding sites
- Construction, operation and decommissioning phases of the project
- Analysis of the identified hazards, examining individual and collective likelihood and consequences of each identified hazard involving injuries and fatalities to workers and to the public
- Quantitative levels of risk

Details of risk control measures are included and a draft risk management plan is presented.

The proponent's preference is for accommodation to be provided in Glenden and Collinsville, however should this option be rejected by the local authorities, the proponent will seek the necessary approvals to accommodate all workers in a camp on the project mining leases and the hazard and risk assessment will be updated, as required.

The scope of this report does not include assessment of environmental risks or economic risks associated with project delays. Environmental risks and potential economic impacts are addressed in other sections of the EIS.

1.3 Methodology

1.3.1 Overview

Assessment of hazards and risk to people and property from the construction, operation and decommissioning of the project was undertaken via a preliminary risk assessment in accordance with AS*/NZS ISO 31000: 2009. Risk Management – Principles and Guidelines* and *IEC/ISO 31010 Risk Management: 2009. – Risk Assessment Techniques.* The hazard and risk assessment also considers the potential impact on surrounding land use.

The study applies to abnormal hazardous events and conditions, rather than conditions considered to be routine. Hazard identification takes into account compliance with regulatory requirements and therefore

deliberately licensed release of pollutants such as air emissions and waste disposal is not included in the assessment.

The assessment involved:

- Describe values including sensitive receptors.
- Identify any potential hazards to people and property, documented in a hazard identification word diagram.
- Review of relevant statistics and information to obtain probability data for hazardous events.
- Evaluate the risks associated with each hazard.
- Propose mitigation measures.
- Prepare a draft risk management plan.

1.3.2 Risk Analysis Criteria

ISO 31000 states that risk analysis consists of determining the causes and sources of risk, their consequences and likelihood taking into account the effectiveness and efficiency of controls. Criteria for likelihood and consequence are detailed in Table 1-1 and Table 1-2.

Table 1-1 Likelihood Scale

Likelihood	Descriptor	Description	Indicative frequency
A	Almost Certain	Is expected to occur in most circumstances	More frequently than monthly
B	Likely	Will probably occur in most circumstances	Monthly - yearly
C	Possible	Could occur	Every one year to 25 years
D	Unlikely	Could occur but is not expected	Every 25-50 years
E	Rare	Could occur only in exceptional circumstances	Once every 50 years or more, unlikely to occur during life of mine

Source: Adapted from ISO 31010: 2009 and Coal Services Health and Safety Trust (2007)

Table 1-2 Consequence Scale

Consequence	Descriptor	Health and safety - public and site workers	Community amenity	Environment	Property damage – cost to repair or replace infrastructure, including lost revenue
1	Negligible	First aid treatment, no lost time injury.	Minor impact to amenity for up to a few days affecting local residents.	Negligible reversal environmental impact on site requiring no or minor remediation.	<$10,000
2	Minor	Minor injury or illness – reversible, requiring medical treatment.	Short term localised impact e.g. weeks to months.	Minor environmental impact, on or off site, able to be promptly contained and cleaned up.	$10,000 - $100,000
3	Moderate	Serious injury or illness requiring medical/hospital treatment. Will recover.	Medium term e.g. 1-5 years on the local community. Region wide concern.	Environmental impact with short term effect off site requiring significant remediation.	$100,000-$1 million
4	Severe	Severe irreversible permanent disabling injuries or illnesses.	Significant and long term impact to the region e.g. > 5 years.	Prolonged environmental impact requiring significant remediation, with recovery expected in the medium term – years.	$1 million – $100 million
5	Catastrophic	Fatality. Multiple severe irreversible permanent disabling injuries or illnesses to tens of people.	Permanent, significant and ongoing impact on a wide scale e.g. state-wide.	Significant environmental impact with long term effect requiring major and ongoing remediation.	> $100 million

Source: Adapted from DRET (2008) and ISO 31010: 2009.

1.3.3 Risk Level

The likelihood and consequence scales are combined to evaluate the overall level of risk, as outlined in **Table 1-3.**

Table 1-3 Risk Levels

Likelihood level	Consequence level				
	Negligible (1)	Minor (2)	Moderate (3)	Severe (4)	Catastrophic (5)
Almost certain (A)	Medium	High	Extreme	Extreme	Extreme
Likely (B)	Medium	Medium	High	Extreme	Extreme
Possible (C)	Low	Medium	High	High	Extreme
Unlikely (D)	Low	Low	Medium	High	High
Rare (E)	Low	Low	Medium	Medium	High

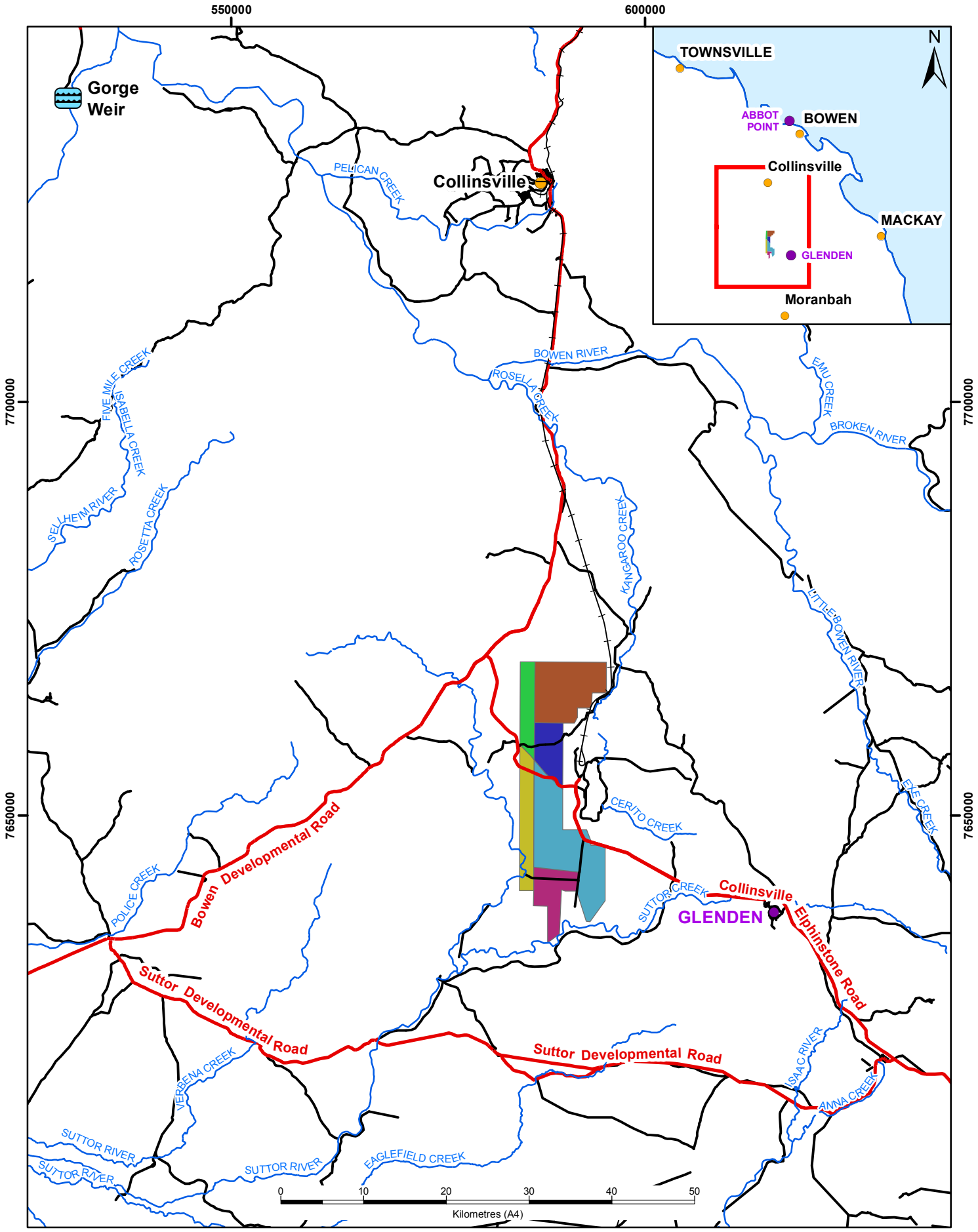
1.4 Location

The project is located in the Whitsunday Regional Council and Isaac Regional Council government areas (in the north and south respectively). It is located approximately 20 km west of the mining township of Glenden, 60 km south of Collinsville, and lies approximately 140km west of the regional centre of Mackay.

The project tenements are traversed by the Collinsville-Elphinstone Road and the Goonyella to Abbot Point (GAP) rail line. Access to the project area will be via the existing Collinsville-Elphinstone Road which connects to the Bowen Developmental Road and Suttor Developmental Road. These are highways from either Bowen via Collinsville or from Mackay via Glenden and Nebo.

The project area is traversed by the existing GAP railway line. The proposed Alpha Coal Project railway line will traverse the project area. In relation to the project's train loading facilities (northern and southern rail loops and rail spurs) connected to the GAP railway, the hazard and risk assessment extends to the point of intersection with the Goonyella to Abbot Point railway line operated by QR National. Hazards and risks associated with the GAP railway line have been assessed in QR's EIS. Never the less this hazard and risk assessment considers interactions between project activities and the GAP railway.

The project's location and regional context is shown in **Figure 1-1**. Local government boundaries in relation to the mining leases are shown in **Figure 1-2**.



Legend

- Gorge Weir
- Main Towns
- GAP Railway
- Highway
- Main Road
- Local Roads
- MLA 10355
- MLA 10356
- MLA 10357
- MLA 70434
- MLA 70435
- MLA 70436

Regional Context

Figure 1-1 | **Byerwen Coal Project**

Date: 13/11/2012

Author: emma.lewis

Map Scale: 1:600,000

Revision: R1

Coordinate System: GDA 1994 MGA Zone 55

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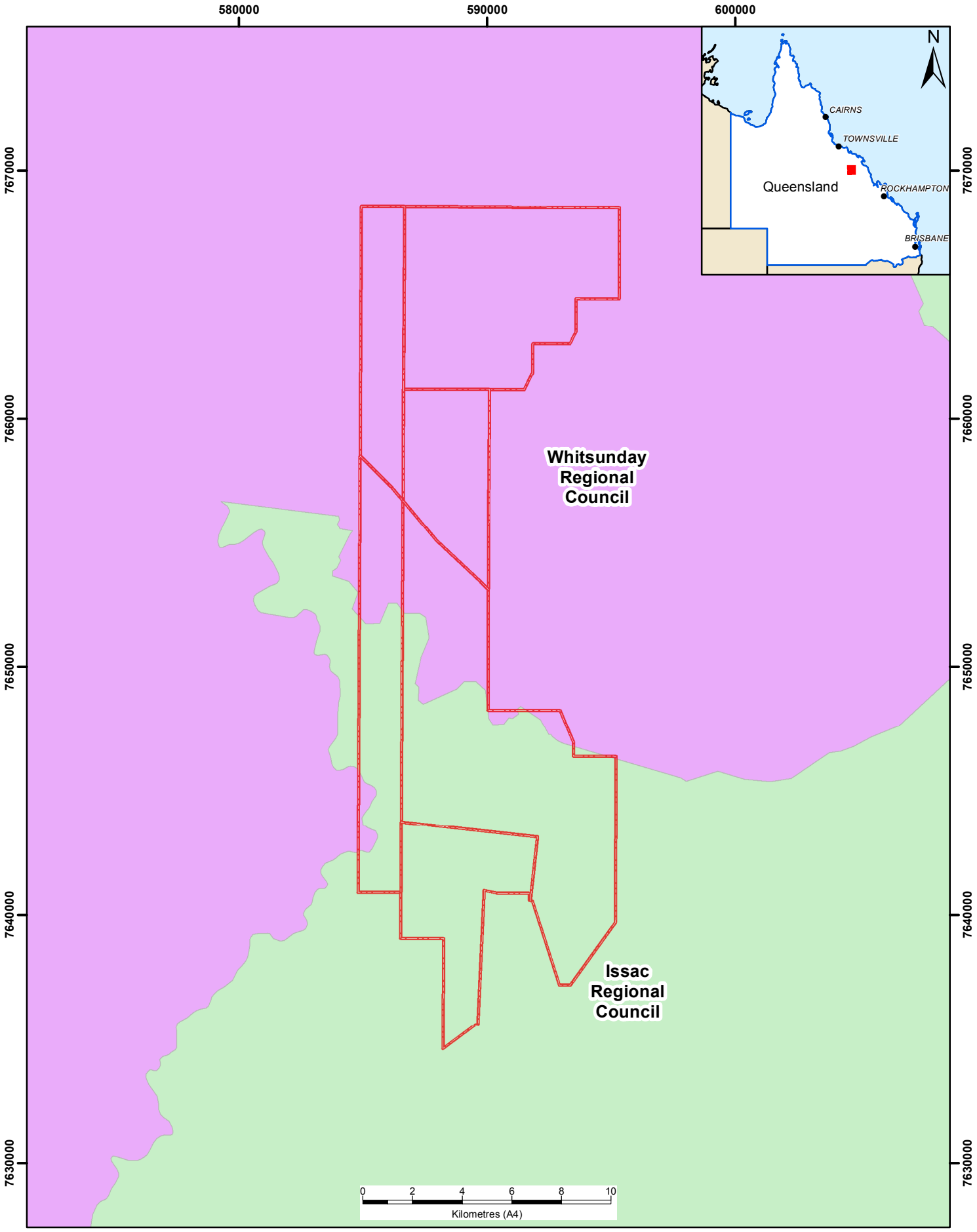

Legend

- Mining Lease Boundaries
- Isaac Regional Council
- Whitsunday Regional Council

Local Government Boundaries		QCOAL GROUP
Figure 1-2	**Byerwen Coal Project**	elp environmental and licensing professionals pty ltd
Date: *13/11/2012*	**Author:** emma.lewis	
	Map Scale: 1:200,000	
Revision: R1	**Coordinate System:** GDA 1994 MGA Zone 55	
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1.5 Surrounding Land Use

The existing land use within the project area is cattle grazing and residential. Ten potential homesteads (with residences being potential sensitive receptors) were identified within and surrounding the project area. One homestead, Suttor North homestead (R1), is located in the project area. Suttor North is owned by Leichardt Pastoral Pty Ltd which is a wholly owned subsidiary of Byerwen Coal. The distance of the potential residences to the project area boundary are as shown in **Table 1-4**.

Table 1-4 Potential Residences Within and Surrounding the Project Area

Homestead / Potential Residence	Approximate distance to project area boundary
R1 - Suttor North homestead	Within project area
R2 - Suttor Creek homestead	6.8 km
R3 - Lancewood homestead	10 km
R4 - Wollombi homestead	0.6 km
R5 - Cerito homestead	5.8 km
R6 - Byerwen homestead	1.3 km
R7 - Weetalaba homestead	5 km
R8 - Glenden homestead	18.2 km
R9 – Talwood	3.7km
R10 - Fig Tree homestead	13.2 km

The closest population centres include:

- Glenden, approximately 20 km to the east (population 1,308[1])
- Collinsville, approximately 57 km to the north (population 4,044[1])
- Moranbah, approximately 70 km to the south (population 8,965[1]).

The regional centre of Mackay is located approximately 135 km to the east of the project area.

The existing land environment values are based on agriculture, as the dominant land use at the project area is beef cattle grazing. An area in the south-east of the project area (on Suttor Creek Station) was cultivated for cotton but this is understood to have ceased a number of years ago.

To the east of the project area is Xstrata's Newlands Mine, which has expanded to include Suttor Creek Mine and Wollombi Mine, adjacent to the south of the project area. Therefore both adjacent to the south and the east of the site, land use is currently coal mining. Newlands Mine has existing mining infrastructure, including the Newlands - Abbot Point railway line.

The project proposes to house site workers in the nearby towns of Glenden and Collinsville.

1.6 Sensitive Receptors

Sensitive receptors were identified through aerial imagery searches and knowledge of QCoal (refer **Figure 1-3**). Receptors were selected on the basis of being a dwelling, potential dwelling or other infrastructure used for community or social purposes; and

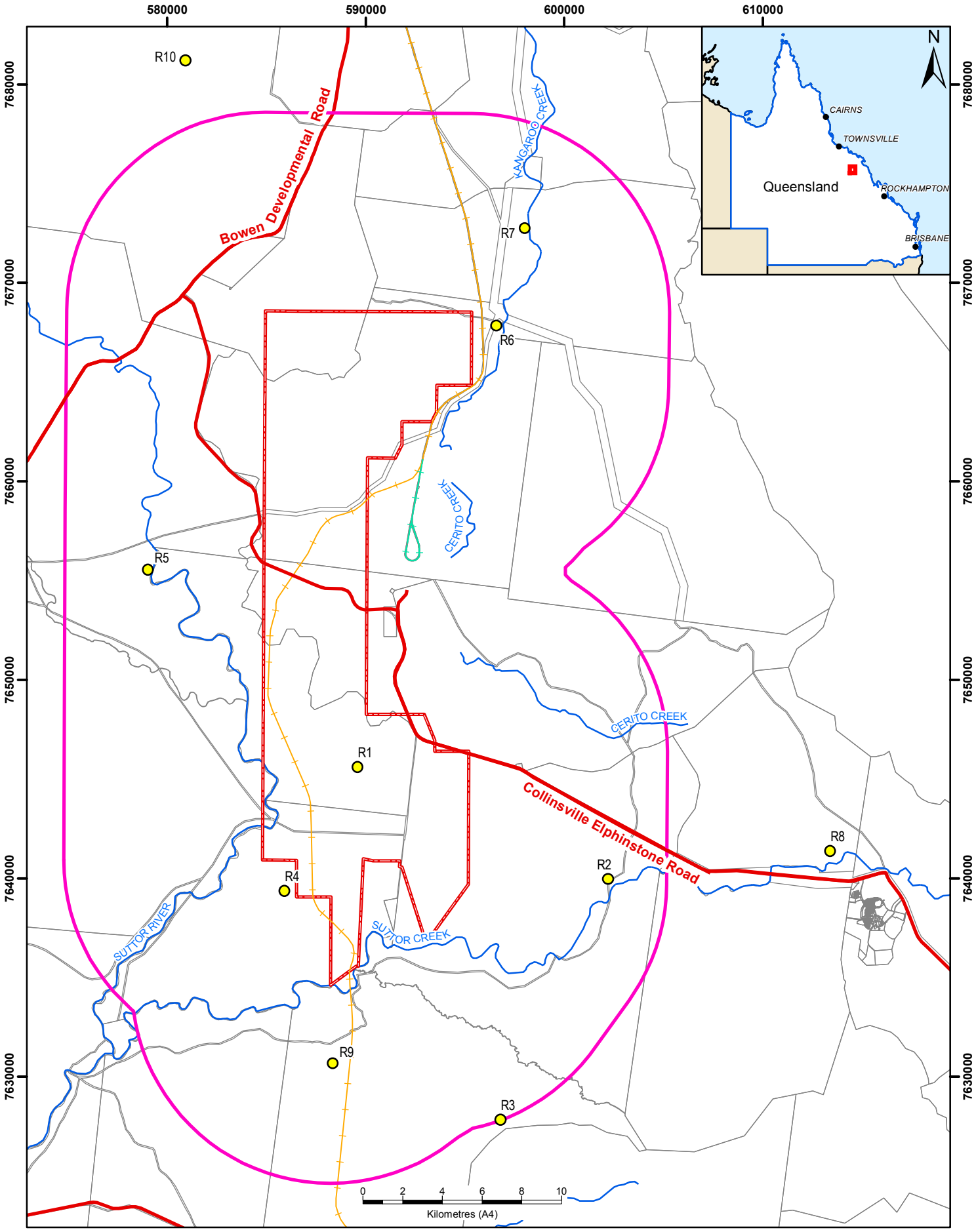
- being within 10km of the boundary of the project tenements (the project area) or

[1] Australian Bureau of Statistics (2011)

- containing a dwelling greater than 10km from the boundary of the project tenements but that is on a property intersected by the project tenements or
- within 5 km of the road linking Glenden to the project tenements.

The following receptors were not considered for the hazard and risk assessment for the reasons described below:

- Receptor 1 is a house on a property that is wholly owned by Byerwen Coal and will not be occupied during mining activities
- Receptor 4 is an unoccupied property and will remain unoccupied for the life of the project
- Receptor 9 is two sheds, with no dwelling.



Legend

- Project Area
- Cadastre
- 10km Buffer
- Sensitive Receptors
- GAP Railway
- Newlands Mine Rail Loop
- Major Watercourses
- Main Road

Sensitive Receptors	QCOAL GROUP
Figure 1-3	**Byerwen Coal Project**
Date: *13/11/2012*	**Author:** emma.lewis
Revision: R1	**Map Scale:** 1:250,000
	Coordinate System: GDA 1 994 MGA Zone 55
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1.7 Cumulative Impacts

Consideration has been given to the cumulative impacts of a number of mining and major infrastructure projects occurring during the same period in the Isaac, Mackay and Whitsunday Regional Councils, as detailed in Chapter 34 - Cumulative Impacts of the EIS. Projects considered to contribute to cumulative effects have been selected on the basis that they have either commenced or are scheduled to commence in the same timeframe as the proposed Byerwen Coal Project, they are located within the study area, and are likely to increase the hazards and risks of the project.

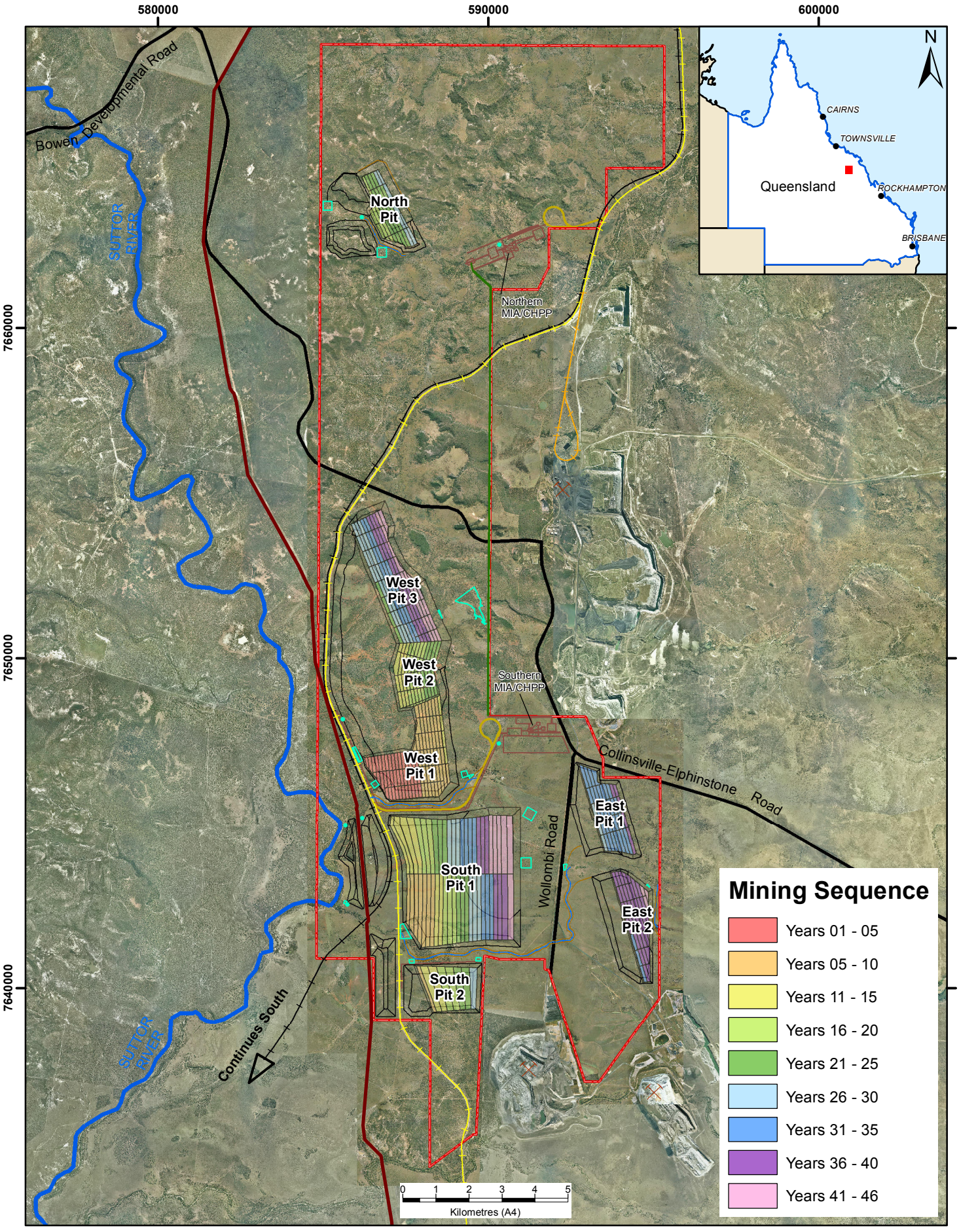
1.8 Project Description

The components of the project considered for this assessment include the following:

- Open cut coal mines will be developed in the project area. Mining will occur 7 days per week and excavate to depths of up to 350m (South Pit 1). The project will generate up to 15Mtpa of run of mine (ROM) coal to produce approximately 10Mtpa of product coal for the export market. Open cut mining will use a combination of dragline, large excavator, truck and dozer equipment.
- Out of pit waste rock dumps will be created adjacent to the coal mining areas within the project area. Once there is sufficient space for in-pit dumping, pits will progressively be backfilled with waste rock. Out of pit and in pit final landform will be to a maximum height of 60m above the natural ground level.
- A water management system will be constructed that diverts clean water, captures and manages mine area runoff and pit water for reuse. This will include water storage infrastructure for mine affected water and sediment control ponds for sediment laden runoff.
- ROM coal haul roads will connect open cut pits to the northern and southern CHPP's and associated loading facilities for ROM coal.
- Conveyors will be constructed to connect product coal pads adjacent to the northern and southern CHPPs to the respective TLFs.
- Southern and northern TLFs comprising train loading bin, rail loop and rail spur.
- Heavy vehicle and light vehicle overpass crossings will be required for the GAP rail line.
- Light vehicle access roads will be constructed in and around the two CHPP plants and the MIAs and wherever possible it will be intended to separate the light vehicle traffic from any heavy mining or earthmoving equipment access roads.
- Southern CHPP and MIA and northern CHPP and MIA. MIA facilities will include:
  - Site offices
  - Hard stands and laydowns
  - Administration facility
  - Workshop and stores, including tyre change and storage facility
  - Heavy vehicle servicing area
  - Heavy vehicle and light vehicle was down facilities
  - Generator (if required)
  - Potable water storage tanks
  - Reticulated service, including fire fighting
  - Potable water treatment and sewage treatment plants
  - External area lighting
- Process water comprising both coal rejects and dewatered fines from the CHPPs will be pumped to co-disposal facilities. Co-disposal dams will be situated adjacent to each CHPP for placement and water reuse.

- Power to infrastructure in the southern and northern tenement areas will be supplied by a connection to an existing 66kV power line that originates from the Newlands substation and which intersects the tenements adjacent to the Collinsville-Elphinstone Road. All additional power lines will be located within the mining lease boundaries. It is anticipated that power lines will be installed above ground on steel or concrete poles.
- Water pipelines will be constructed to connect the existing SunWater pipeline to raw water storage facilities adjacent to the northern and southern CHPPs. These will be wholly within the project area.
- The project (construction and operation) will be accessed via the Collinsville-Elphinstone Road, at two points, one for the northern MIA and CHPP, and one for the southern MIA and CHPP.
- A sewage treatment plant (STP) with bunded storage will be situated on site. Treated effluent will be reused (for irrigation), with sludge material to be disposed of by a certified third party contractor at an appropriately licensed regional waste disposal facility.
- Provision will be made for diesel storage, portable back-up power generators and storage for tyres and other materials.
- Explosives magazine and storage

An overview of the project layout is shown in **Figure 1-4.**



Legend

- Project Area
- Waste Rock Dumps and Pits
- Burdekin to Moranbah Pipeline
- GAP Rail line
- Newlands Mine Rail Loop
- Alpha Coal Project Rail Line
- Train Loading Facilities
- Central Infrastructure Corridor
- Dam (mine affected, sediment affected, clean water)
- Suttor River
- Drainage Bund
- Drainage Diversion
- Formed Road
- Mine Infrastructure
- Existing Mine Site

Project Layout

QCOAL GROUP

Figure 1-4 — **Byerwen Coal Project**

Date: *28/02/2013*

Author: samuel.ferguson

Map Scale: 1:150,000

Revision: R1

Coordinate System: GDA 1 994 MGA Zone 55

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2 HAZARD IDENTIFICATION

The focus of the hazard identification is on abnormal hazardous events and conditions, as specified in *Hazardous Industry Planning Advisory Paper No. 3: Risk Assessment, NSW Department of Planning*.

Routine emissions and operations are identified in other technical reports prepared for the project EIS and are addressed via pollution control mechanisms and legislation.

Potential health and safety hazards that may affect site workers in normal on site day-to day activities during the construction and operation of the project are listed in **Table 2-1**. These hazards are well addressed in workplace health and safety legislation and relevant Australian standards and are not included in the hazard identification process for this EIS.

For each hazardous incident (e.g. fire, spill, leak, collision) the potential initiating events have been defined in order to represent the range of possible incidents as recommended in *Hazardous Industry Planning Advisory Paper No. 6: Hazard Analysis, NSW Department of Planning*. This enables a more accurate assessment of the conceivable scenarios that could lead to the hazard and therefore appropriate risk treatment measures can be recommended.

Compliance with regulatory requirements is mandatory and therefore the hazard identification processes has assumed compliance with regulatory requirements and relevant Australian Guidelines and Codes applicable to the management and mitigation of hazards and risks at a Queensland coal mining operation such as the Byerwen project. Hazard identification and recommended risk treatment measures have been identified based on the premise that legislation and relevant, widely accepted, Australian Guidelines and Codes are implemented whilst undertaking the activity. These include:

- *Work Health and Safety Act 2011 and Work Health and Safety Regulation 2011* – aims to secure the health and safety of workers and workplaces. Workers and others are to be given the highest level of protection from hazards and risks as is reasonably practicable
- *Coal Mining Safety and Health Act 1999* - aims to protect the safety and health of personnel at coal mines as well as people that may be affected by coal mining operations. There is a requirement to ensure that the risk of injury or illness to any person resulting from coal mining operations be at an acceptable level and requires a means of monitoring the effectiveness and management of health and safety.
- *Coal Mining Health and Safety Regulation 2001* - requires Queensland coal mines to have systems in place to undertake risk identification and assessment, hazard analysis, hazard management and control as well as reporting and recording health and safety data.
- *Explosives Act 1999* - includes requirements for the safe handling, storage, transport and manufacturing of explosives.
- *Explosives Regulation 2003* - includes specific limits and requirements for the safe handling, storage, transport and manufacturing of explosives.
- AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines - provides a framework for managing risk and specifies the elements of the risk management process.
- *AS 1940:2004. The Storage and Handling of Flammable and Combustible Liquids* – includes 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). AS1940:2004 also includes 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* –details the requirements and precautions for the storage of explosives and for the location, design, construction and maintenance of magazines.
- *AS 2187.2:2006 Explosives – Storage and Use – Use of Explosives* – details the requirements and precautions for the use of factory-made, commercially available explosives and certain explosives mixed or assembled at sites.
- Department Mines and Energy (now DNRM) (2008). Guidance Note QGN10. Handling Explosives in Surface Mines and Quarries.
- ADG 7. Australian Goods Code - provides technical requirements for the land transport of dangerous goods across Australia.
- Queensland Health (2002). Guidelines to minimise mosquito and biting midge problems in development areas.
- State Planning Policy 1/03 (2003). Mitigating the Adverse Impacts of Floods, Bushfire and Landslide.

2.1 Site Workers Health and Safety

Table 2-1 details the health and safety hazards that are likely to be present in normal on-site day-to-day activities during construction and operation of the project. These hazards are well addressed in workplace health and safety legislation and relevant standards and will be complied with at all times during the construction, operation and decommissioning of the project.

Table 2-1 Hazard Identification - Site Workers Health and Safety

Hazard	Description	Consequence	Risk treatment measures
Manual Handling	Incorrect handling	Injury likely to recover from	Use approved safe work method, training and competency assessment, provide equipment fit for purpose and suitable allocation of resources.
Slips and trips	Water, oil on ground	Injury likely to recover from	Use approved safe work method, training and competency assessment.
Interaction with mobile equipment	Worker hit by mobile equipment	Injury / fatality	Training, competency assessment, systems of authorisations, inspections, signage, traffic management plan, “no go” zones, dedicated pedestrian walkways.
Working at heights	Fall	Injury / fatality	Training, competency, appropriate scaffolding and/or PPE, inspections, safe work methods.
Working with electrical equipment	Electric shock / Electrocution	Injury / fatality	Qualified electricians, training, competency, approved safe work methods, equipment maintenance, testing and tagging procedures, inspections, separate / barricade work areas, isolation permit system.
Equipment with moving parts	Failure to isolate correctly	Injury / fatality	Isolation procedures, tag protection system, maintenance of guarding, inspections, training, competency.
Falling objects	Object falls from	Injury	PPE, barricading, approved safe work methods.

Hazard	Description	Consequence	Risk treatment measures
	height		
Fatigue	Operating plant and equipment whilst tired	Injury / fatality	Fit for work program, fatigue management plan, traffic plan.
Confined space	Suffocation	Fatality	Confined space permits, training, competency, approved safe work method statement, equipment serviced regularly.
Pinch points	Crush	Fatality	Safe work methods, training, competency, guarding, barricading, signage
Lightning	Struck by lightning	Fatality	Storm procedures, approved safe work methods, lightning masts.
Wildlife hazards	Snake bites	Fatality	PPE e.g. long trousers, high sided safety boots, first aid training, emergency management plan.
Disease vectors	Mosquito bites	Illness	PPE e.g. long trousers, long shirts, insect repellent where required. Water bodies, including dams, managed to avoid stagnation hence minimizing potential for mosquito breeding sites.
Dust	Clearing, excavation, unsealed roads, blasting	Respiratory issues	Watering roads, dust suppression, PPE.
Noise	Excessive noise from plant and equipment	Hearing loss	PPE, noise barriers, equipment location.
Sun burn	Working in sun without protection	Skin damage, no treatment	PPE, provision of sunscreen.
Dehydration /Heat Stress	Working in hot conditions without sufficient water	Hospitalisation	PPE, safe work method statement, provide water, training.
Welding and cutting	Fumes, hot metal, sparks	Poisoning, skin burn, foreign object in eye	PPE, safe work method statement, qualifications.
Exposure to hazardous substances	Oils, diesel, chemicals	Skin, eye irritation	PPE, training, MSDS, standards and procedures for transporting, handling, using and disposing of hazardous substances.
Fire	Buildings, vehicles, conveyors, CHPP	Smoke inhalation	Emergency exits, training, Emergency Management Plan, fire extinguishers, fire alarms.

2.2 Hazardous Substances

The project will use a number of hazardous substances during construction and operations.

Table 2-2 provides an indicative list of hazardous substances to be used during the project and the likely quantities stored on site. Material Safety Data Sheets (MSDS) will be available on site where these substances are to be stored or used.

Table 2-2 Indicative List of Hazardous Substances

Chemical name	Storage location	Highest likely total storage quantity	Rate of usage	Comments
Explosives • Primers • Detonators • Ammonium nitrate with not more than 0.2% total combustible material	Explosives magazine located in an isolated area on site separated from other mining infrastructure on the project area. Nearest residence to the magazine will be at least 3km away.	No bulk explosives stored on site – mixed on site	50,000 tpa	Storage facility designed and constructed to AS 2187 Explosives – Storage, Transport and Use.
Methyl Isobutyl Carbinol (MIBC)	MIA	550t	8,000 – 13,000 tpa	
Diesel	MIA fuel facility comprising of a number of interconnected self-bunded bulk diesel storage tanks.	800kL	20,000 kLpa	Diesel will be reticulated to heavy vehicle service bays and heavy and light vehicle bowsers. Access to the fuel facility will be via internal MIA access roads. The fuel facility will be located at a safe operating distance from other MIA and surrounding facilities in accordance with AS1940 The storage and handling of flammable and combustible liquids. There will be no in-field fuel storage. Fuel trucks will transfer from the fuel storage tanks to mine vehicles.
Oils • Transmission oil • Hydraulic oil • Diesel Engine oil • Final drive oil • Waste oil	MIA lube and oil facility	• 30,000L • 15,000L • 10,000L • 10,000L • 25,000L	2,250,000 Lpa	Self bunded lube and oil storage tanks
Lubricants and coolants • Engine coolant • Gear oil	MIA lube and oil facility	• 2,500L • 2,500L	187,500 Lpa	Self bunded lube and oil storage tanks

Chemical name	Storage location	Highest likely total storage quantity	Rate of usage	Comments
• Other lubricants		• 2,500L		
Petrol	MIA	Minor	Minor	
Paint	MIA	Minor	Minor	
Solvents	MIA	Minor	Minor	
Thinners	MIA	Minor	Minor	

2.3 Natural Hazards

2.3.1 Flood

The project is located in the headwaters of the Suttor River catchment which is a tributary of the Burdekin River. The Suttor River catchment covers an area of approximately 65,000 km^2 although the catchment area upstream of the proposed mine site is around 900 km^2 on the Suttor River and 750 km^2 on Suttor Creek. No data was available on the flood history of the project area.

The flooding impact assessment concludes that flood protection measures can be designed to protect pit and final void from 1 in 1,000 year flood events.

2.3.2 Bushfire

Bushfire risk analysis maps for Isaac Regional Council and Whitsunday Regional Council have been prepared (June 2008) and cover the project area. The project area is classified as low and medium risk. There does not appear to be any available information on the actual frequency of bushfires that may affect the project location.

2.3.3 Wildlife

A search of the Department of Environment and Heritage Protection (EHP) wildlife online database for Isaac Regional Council and Whitsunday Regional Council RC identified a number of wildlife species that are potentially dangerous to humans. These included mammals such as red fox, dingoes, rats, pigs; and reptiles such king brown snake, eastern brown snake, western brown snake, common death adder and red-bellied black snake.

2.3.4 Vector-borne Disease

Increasing potential freshwater breeding sites such as receding flood waters and pooling water can result in larger numbers of mosquitoes, which in turn increases the potential for outbreaks of mosquito-borne diseases (Queensland Health 2011). Notifiable diseases reported in Queensland include Barmah Forest Virus, Ross River Virus, Dengue Fever and Malaria.

2.3.5 Climate Change

The impacts of climate change on the project area show projections of temperature increases and either declining or increasing rainfall depending on the climate model. It is expected that the frequency and intensity of storms and cyclones will not change significantly in the area of the project.

2.4 Preliminary Hazard Identification

The following hazard identification process identifies the non-routine hazards associated with the construction, operation and decommissioning (abbreviated as C,O,D) of the mine and associated infrastructure taking into account the project description, natural hazards and estimated hazardous substances being stored and used on site. Transport risks and interaction with external projects are also identified. Potential health and safety hazards to the site workers for routine operations are not included as these have been previously identified and can be addressed by compliance with relevant standards and regulations.

Table 2-3 Hazard Identification Word Diagram

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
Transport					
Transporting personnel, equipment and materials to and from the site and within site	C,O,D	Vehicle accident	• Driver error • Fatigue • Vehicle collision • Adjacent landholder on access routes	• Injury to public / site worker • Fatality to public / site worker • Property damage	The project will be accessed via the Suttor Developmental Road, Bowen Developmental Road and Collinsville-Elphinstone Road.
	C,O,D	Spill, leak of liquid or fumes	• Incorrect loading • Tank failure • Collision	• Property damage • Fire • Health impacts from contamination (soil, water, groundwater)	Secure loading of materials, procedures, training, spill management, Emergency Management Plan.
	C,O,D	Excessive dust	• High winds • Unsealed roads	• Vehicle accident / collision	Speed limits, paving, watering roads, wind breaks.
Transport of explosives to and within site	O	Fire, explosion	• Driver error • Vehicle collision • Failure of equipment • Failure to comply with procedures	• Property damage • Injury / fatality site worker • Injury / fatality public • Health impacts from contamination (soil, water, groundwater)	Speed limits, traffic management plan, transport in accordance with relevant standards, training, Emergency Management Plan.
Transport of fuel to and within site	C,O,D	Fire Spill, leak	• Driver error • Vehicle collision • Failure of equipment • Failure to comply with procedures	• Property damage • Injury / fatality site worker • Injury / fatality public • Health impacts from contamination (soil, water, groundwater	Speed limits, traffic management plan, transport in accordance with relevant standards, training, Emergency Management Plan.

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
Storage					
Storage of fuel	C,O,D	Spill, leak	• Failure of equipment • Failure to comply with procedures	• Property damage • Health impacts from contamination (soil, water, groundwater)	Fuel storage designed and operated in accordance with AS1940. Bunds, signage, spill procedures, emergency response planning, training, inspection and maintenance program.
	C,O,D	Fire, explosion	• Ignition source or fire • Failure of equipment • Failure to comply with procedures	• Injury to public / site worker • Fatality to public / site worker • Property damage	Fuel storage designed and operated in accordance with AS1940. Signage, emergency response planning, training, inspection and maintenance program.
Storage of explosives	O	Fire, explosion	• Ignition source or fire • Failure of equipment • Failure to comply with procedures	• Injury to public / site worker • Fatality to public / site worker • Property damage	Management of blasting and handling of explosives in accordance with Australian Standards and Regulations. Explosives management plan including maintenance of a blasting exclusion zone and appropriate signage. Licensed, trained, experienced competent personnel, Emergency Management Plan.
Construction and Installation					
Clearing and earthworks	C	Excessive dust	• High winds • Unsealed roads	• Vehicle accident / collision	Speed limits, paving, watering roads, wind breaks.
	C	Landslide	• Heavy rainfall	• Property damage	Erosion and sediment control plan include diversion and management of water runoff and progressive stabilisation.

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
	C	Wildlife (e.g. snakes)	• Disturbance / clearance of habitat	• Injury to site worker • Injury to public • Fatality to site worker / public	Awareness of site personnel regarding hazards, Emergency Response Plan.
Construction and installation of Infrastructure including: • CHPP, MIA, administration and service facilities • dams • rail • power • fencing • access roads • yards and laydown areas • water diversion system	C	Fire	• Works such as welding, grinding in combination with high winds	• Injury to site worker • Injury to public • Property damage	Staff training, procedures relating to controlling sources of ignition, Emergency Response Plan.
	C	Excessive dust	• High winds • Unsealed roads	• Vehicle accident / collision	Speed limits, paving, watering roads, wind breaks.
	C	Erosion	• Heavy rainfall • Failure to comply with erosion and sediment control plan	• Property damage	Erosion and sediment control plan including diversion and management of water runoff and progressive stabilisation.
	C	Vehicle accident	• Collision of construction vehicles / workers crossing Collinsville-Elphinstone Road • Collision of construction vehicles / workers crossing Goonyella Abbot Point Railway line • Collision of vehicles / workers crossing the Xstrata haul road	• Injury to public / site worker • Fatality to public / site worker • Property damage	Traffic management plan.
Coal Mining Operations					
Topsoil stripping and	O	Excessive dust	• High winds	• Vehicle accident / collision	Speed limits, paving, watering roads,

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
storage			• Unsealed roads		wind breaks.
	O	Landslide	• Heavy rainfall	• Property damage	Erosion and sediment control plan include diversion and management of water runoff and progressive stabilisation.
	O	Wildlife (e.g. snakes)	• Disturbance • Clearance of habitat	• Injury to site worker • Injury to public	Awareness of site personnel regarding hazards, Emergency Response Plan.
Blasting	O	Fly rock projected outside blast zone	• Misfire • Failure to comply with explosive management plan	• Injury to public / site worker • Fatality to public / site worker • Property damage	Management of blasting and handling of explosives in accordance with Australian Standards and Regulations. Explosives management plan including maintenance of a blasting exclusion zone and appropriate signage. Licensed, trained, experienced competent personnel. Dust control measures and monitoring, explosives management plan, training.
	O	Vibration exceeding design criteria	• Misfire • Failure to comply with explosive management plan	• Property damage	
	O	Excessive dust	• High winds • Failure to comply with procedures	• Property damage • Public amenity	
	O	Uncontrolled blast	• Ignition source such as mobile phone, static electricity, lightning	• Injury to public / site worker • Fatality to public / site worker • Property damage	
Removal of waste rock	O	Excessive dust	• High winds • Unsealed roads	• Vehicle accident / collision	Dust controls procedures, monitoring.
	O	Pit slope failure	• Incorrect design, failure to excavate in accordance with mine plan, geological	• Injury • Fatality to site worker	Mine plan, surveys, inspections.

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
			anomaly		
Waste Rock Dump Operation	O	Excessive dust	• High winds	• Vehicle accident / collision	Speed limits, paving, watering roads, wind breaks.
	O	Dump slope failure	• Dump batters slope failure	• Injury to worker • Fatality to worker • Property damage	Mine plan, waste rock management plan, surveys, inspections.
Hauling ROM Coal	O	Vehicle accident, Fire	• Driver error • Vehicle collision • Vehicle roll over	• Injury to site worker • Fatality to site worker • Property damage	Road design, signage, speed limits, vehicle maintenance, roll over bars, fitness for work, training, traffic management.
	O	Dust	• High winds • Unsealed roads	• Vehicle accident/collision • Property damage	Dust control measures and monitoring.
CHPP facilities including crushing, screening, processing, blending, washing	O	Coal dust	• High wind • Failure to comply with procedures	• Property damage	Dust control procedures and monitoring.
	O	Fire Explosion	• Ignition source or fire • Spontaneous combustion	• Injury to site worker • Fatality to site worker • Property damage	Fire breaks maintained, control of ignition sources via procedures and training, watering, equipment available to rapidly manage stockpiles, Emergency Management Plan, training.
	O	Leak, spill	• Equipment failure • Failure to comply with procedures	• Health impacts from contamination (soil, water, groundwater) • Property damage	Bunding equipment and material, location of CHPP away from potential to enter watercourses, spills procedure, Emergency Management Plan, training, inspection and maintenance programs.
Coal stockpiling and handling at train	O	Dust	• High winds • Failure to comply with	• Property damage • Public amenity	Dust control measures, monitoring.

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
loading facility			procedures		
	O	Fire	• Ignition source or fire • Spontaneous combustion	• Injury to public / site worker • Fatality to public / site worker • Property damage	Fire breaks maintained, control of ignition sources via procedures and training, watering, equipment available to rapidly manage stockpiles, Emergency Management Plan, training.
Product coal transport – rail loop and rail spur	O	Fire	• Ignition source or fire • Spontaneous combustion	• Injury to public / site worker • Fatality to public / site worker • Property damage	Fire breaks maintained around the activity area including the conveyor to the train loading bin, control of ignition sources via procedures and training, Emergency Management Plan, training, exclusion of public, dedicated crossing points for landholders, cattle grids.
	O	Coal dust	• High winds • Failure to comply with procedures	• Property damage • Public health	Dust control measures, cover conveyor, spill trays, monitoring.
	O	Vehicle accident	• Vehicle and train collision	• Injury to public / site worker • Fatality to public / site worker • Property damage	Traffic control measures Traffic management plan.
Earthworks and re-contouring of excavated surfaces and spoil dumps	O	Land instability, water hazard	• Failure to comply with Final Void Plan	• Injury to public / site worker • Fatality to public / site worker	Final Void Plan to be developed and implemented progressively through the life of the mine to ensure geotechnical stability, void stability, management of water quality, rehabilitation taking into account native flora and fauna.
Waste Management					
Management of mine-affected waters –	C,O	• Uncontrolled release	• Equipment failure • Failure to comply with	• Property damage • Injury to public /site worker	Appropriate design, procedures,

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
collection, storage and disposal		• Storage facility failure • Overtopping of storage facility	procedures • Overfilling or heavy rainfall resulting in exceeding design capacity	• Fatality to public / site worker	training, inspection and maintenance. Emergency procedures for unplanned releases. Design and construction of dam in accordance with required standards, routine inspections and monitoring.
Waste management (solid) – storage, transfer and disposal	C,O	Vermin	• Failure to comply with procedures	• Health impacts	Appropriate design and distance from ML boundary, procedures, training, inspection and maintenance.
Management of rejects, including co-disposal dams, reject water	O,D	Leak, spill	• Equipment failure • Failure to comply with procedures	• Health impacts from contamination (soil, water, groundwater) • Property damage	Bunding equipment and material, location of CHPP away from potential to enter watercourses, spills procedure, Emergency Management Plan, training, inspection and maintenance programs.
	O,D	Release of tailings	• Dam failure	• Health impacts from contamination (soil, water, groundwater) • Property damage	Design and construction of dam in accordance with required standards, routine inspections, Emergency Management Plan, training.
	O,D	Stagnant water	• Failure to comply with procedures	• Disease vector - mosquitoes	Mosquito control plan Inspections and monitoring.
	O,D	Storage facility failure. Overtopping of storage facility.	• Overfilling or heavy rainfall exceeding design capacity	• Property damage • Injury to public / worker • Fatality to public / site worker	Design and construction of dam in accordance with required standards, routine inspections and monitoring, Emergency Management Plan, training.
Maintain Infrastructure					

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
Road maintenance – internal and external	C,O	Dust	• High winds • Unsealed roads	• Vehicle accident/collision	Dust control measures and monitoring.
Water infrastructure	C,O	Subsidence	• Pipeline leak or failure	• Property damage	Appropriate design, inspection and maintenance.
Decommissioning					
Remediation of contaminated land	D	Release (leaching)	• Failure to comply with remediation plan	• Health impacts from contamination (soil, water, groundwater)	All contaminated land will be remediated prior to mine closure and surrender of land (e.g. soil quality investigation and remediation will be undertaken in accordance with EHP Guidelines for Contaminated Land).
Demolition, remediation of co-disposal dam	D	Leaching	• Failure to adequately rehabilitate co-disposal dam.	• Health impacts from contamination (soil, water, groundwater)	Rehabilitate dam area. Cap surface with benign overburden material to prevent water ingress. Vegetate in accordance with the rehabilitation plan. Register the site on the Environmental Management Register and the Contaminated Land Register with EHP. Implement Site Management Plan.
Final Void	D	Final void landform	• Fall	• Injury to public • Fatality to public • Injury / fatality to livestock	Maintenance of bunding and fencing and signage to prevent trespassing.
External Factors					
External factors	C,O,D	Sabotage Protest	• Security breach	• Injury to public / site worker • Fatality to public / site worker	Security management plan, fencing.

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
				• Property damage	
	C,O,D	Disease outbreak	• Epidemic	• Illness to public / site worker • Fatality to public / site worker • Property damage	Site hygiene standards, Emergency Management Plan.
Interaction with Third Party Elements					
Goonyella to Abbot Point railway line. Alpha Coal Project railway line	O	Fly rock from blasting	• Misfire • Failure to comply with explosive management plan	• Injury to public / site worker • Fatality to public / site worker • Property damage	Blast design plan and monitoring program. Management of blasting and handling of explosives in accordance with Australian Standards and Regulations. Explosives management plan including maintenance of a blasting exclusion zone and appropriate signage. Licensed, trainer, experienced and competent personnel.
	C,O,D	Vehicle accident	• Vehicle and train collision	• Injury to public / site worker • Fatality to public / site worker • Property damage	Traffic control measures, Traffic management plan, Bridge or conveyor for hauling waste rock over rail lines.
Access road / heavy vehicle road intersects Collinsville-Elphinstone Road	C,O	Vehicle accident	• Vehicle collision	• Injury to public / site worker • Fatality to public / site worker • Property damage	Traffic control measures for crossings. Traffic management plan.
Xstrata mine vehicles along the transport	C,O	Vehicle accident	• Vehicle collision	• Injury to public / site worker • Fatality to public / site worker	Traffic control measures.

Activity / (Phase)	Phase (C,O,D)	Hazard	Cause / Initiating event	Potential consequences	Risk treatment measures
route from mines south of the project to the Xstrata Newlands Mine that bisects Byerwen tenements				• Property damage	Traffic management plan. Liaison with Xstrata.
SunWater Pipeline (Burdekin to Moranbah)	C,O	Vehicle accident	• SunWater operator failing to comply with procedures	• Injury to public / site worker • Fatality to public / site worker • Property damage	Demarcation of easement. Traffic controls.
Gas Pipeline	C,O,D	Gas release – fire or explosion	• Accidental disturbance	• Injury to public / site worker • Fatality to public / site worker • Property damage	Site procedures, site map, signage, contractor management.
	O	Pipeline failure	• Vibration from blasting	• Injury to public / site worker • Fatality to public / site worker • Property damage	Blast design plan and monitoring program. Management of blasting and handling of explosives in accordance with Australian Standards and Regulations. Explosives management plan including maintenance of a blasting exclusion zone and appropriate signage. Licensed, trainer, experienced and competent personnel.
Interaction with cattle / livestock, wildlife	C,O,D	Cattle, livestock, wildlife	• Vehicle accident	• Injury to public / site worker • Fatality to public / site worker • Property damage • Livestock damage	Fencing. Equipment barricaded.

3 LIKELIHOOD OF HAZARDOUS EVENTS

The cause or initiating event for the hazards identified can be categorised broadly as follows:

- natural Hazards – heavy rainfall, wildlife, landslide, bushfire
- equipment failure leading to loss of containment of either solids, liquids or gases
- vehicle collision
- failure to comply with procedures – operator error
- fire
- external factors and interaction with third parties

Whilst there is not accurate quantitative data to determine likelihood of the identified hazardous events, various data sets are available to provide indicative figures on which to base a risk analysis, as presented below.

The Australian Government Attorney-General's Department (AGD) contains records of all natural and non-natural disasters and emergencies in Australia.

Disaster has been defined as "a serious disruption to community life which threatens or causes death or injury in that community and/or damage to property which is beyond the day-to-day capacity of the prescribed statutory authorities and which requires special mobilisation and organisation of resources other than those normally available to those authorities."

Emergency has been defined as "an event, actual or imminent, which endangers or threatens to endanger life, property or the environment, and which requires a significant and coordinated response."

Natural, technological and human-caused events are included in the Database. These events meet at least one of the following criteria:

- three or more deaths
- 20 injuries or illnesses
- Significant damage to property, infrastructure, agriculture or the environment; or disruption to essential services, commerce or industry; or trauma or dislocation of the community at an estimated total cost of A$10 million or more.

3.1 Natural Hazards

Extremes of climates including temperature extremes, droughts, floods, extreme winds and tropic cyclones and bushfire risk were reviewed in this EIS, Chapter 11 Climate and Climate Change, and included the likelihood of occurrence.

Risks associated with impacts to the project caused by extremes of climate were assessed as low to medium for all potential impacts. Current and future controls are expected to reduce the risk of potential impacts (under the current and future climate predictions for the project area) to an acceptable level.

3.1.1 Bushfires

AGD disaster database reports five records of bushfire in Queensland, all outside the project area. The project area is classified as low and medium risk. There does not appear to be any available information on the actual frequency of bushfires that may affect the project location.

3.1.2 Landslide

There are no landslide events recorded in Queensland (AGD database).

3.1.3 Flooding

The Suttor River is an ephemeral watercourse and does not hold permanent water, although seasonal waterholes do exist. The AGD database includes 35 flood events in Queensland, however does not appear to specifically cover the project area.

The flooding impact assessment concludes that flood protection measures can be designed to protect pit and final void from 1 in 1,000 year flood events.

3.1.4 Wildlife

The most recent published survey of deaths from snakebite in Australia found a death rate of around 3.2 deaths per year with most bites occurring during the warmer months, when snakes are more active. Australian studies of snakebite incidence demonstrate a majority of males among the victims, possibly related to risk taking behaviour or to occupational exposure (Australian Venom Research Unit, 2012).

It is possible that construction and operational workers may encounter snakes on site. Workers are to be advised to leave snakes alone. First aid facilities will be available on site, with emergency evacuation procedures in place, in the unlikely event that a worker is bitten. It is very unlikely that the potential disturbance to wildlife as a result of the project will result in an increased risk to people and property around the site.

3.2 Transport and Traffic

3.2.1 Road Crash Data

The traffic and transport report prepared for this EIS details TMR crash statistics between January 2005 and December 2009 for the road sections relevant to the project, as shown in **Table 3-1**.

Table 3-1 Crash Statistics Summary

Road section	Fatality		Injury		Property damage		Total
	Number	% of total	Number	% of total	Number	% of total	
Collinsville Elphinstone Road Between Suttor Development Road and Bowen Development Road	2	18%	8	73%	1	9%	11
Bowen Development Road Between Collinsville Elphinstone Road to the Bruce Highway	1	2%	40	78%	10	20%	51
Peak Downs Highway North Eton Road to Suttor Development Road	5	6%	41	49%	37	45%	83
Suttor Development Road Peak Downs Highway to Collinsville Elphinstone Road	3	23%	6	46%	4	31%	13

The crash data reflected general trends for rural road environments, namely single vehicle accidents at mid-block locations. Traffic modelling undertaken for the EIS indicates that the project is expected to have no significant contributing factor to the observed crashes and is consistent with the rural environment.

3.2.2 Bus Crash Data

According to the ADG Disaster database, there have been 3 bus crashes resulting in multiple fatalities in Queensland, however these have all been outside the project area.

3.3 Explosion

AGD disaster database reports seven industrial mine incidents in Queensland with the most recent occurring at the Moura Mine, Taroom, in 1995 where 11 miners were killed as a result of an underground explosion. Of the seven incidents, 5 were explosions, 1 was a fire and 1 was as a result of spontaneous combustion. These incidents were in underground mines, not open-cut mines. It was noted that the database did not include any records of disasters or emergencies resulting from the use of explosives.

3.4 Loss of Containment

Failure of bulk storage tanks has been estimated as low in the order of 5×10^{-6} per tank year (Atherton and Ash, 2007).

3.5 Coal Mine Worker Statistics

The Queensland Department of Natural Resources and Mines (2012) publish health and safety statistics related to the health and safety of mine workers at open cut surface coal mines in Queensland. These statistics relate to the health and safety of the open cut coal mine workers only and, in the absence of quantitative data, they provide an indication of the likelihood of events leading to hazards that can impact on people and property. For example, high potential incidents reported in the five year period 1/7/2006 to 30/6/2011 are shown in **Table 3-2**.

A high potential incident is defined as an event or series of events that causes or has the potential to cause a significant adverse effect on the safety or health of a person.

Table 3-2 Coal Open Cut 1/7/2006 – 30/6/2011 High Potential Incidents

Type of incident	Number of incidents over 5 year period (1/7/2006 – 30/6/2011)
Fire	733
Vehicle	497
Electrical	358
Loss of control / unplanned movement	354
Mobile plant	344
Use of explosives	251
Falls or slips of ground	137
Falling or flying materials	102
Equipment / structural failure	97
Physiological / psychological	73
Person falling	61

Type of incident	Number of incidents over 5 year period (1/7/2006 – 30/6/2011)
Other	59
Explosion	22
Physical work environment	21
Noxious / asphyxiating gas	17
Hydraulics / compressed air	10
Hot surface / material	8
Gas ignition	8
Inrush / inundation	6
Winding, haulage or conveyor	5
Lightning strike	4
Chemical (use or exposure to)	3
Radiation	3
Gas outburst	1
Spontaneous combustion	1

3.6 Vector-borne disease

Queensland Health reports on the number of notifications of vector borne disease, as shown in **Table 3-3**. Statistics for the project area were not available. The Byerwen project has the potential to increase the risk of mosquito-borne diseases in situations where there is an increase in habitat suitable for mosquito-breeding such as stagnant water, dams and stormwater basins. Water within 5km of a community poses the greatest risk (Queensland Health 2011), therefore any vector-borne disease associated with the construction and operation of the project is more likely to affect the workforce, rather than to the population external to the site given the greater distance (approximately 20km) to the nearest community of Glenden.

Table 3-3 Notification of Vector Borne Diseases in Queensland – 2011

Vector-borne disease	Queensland reports 2011
Barmah Forest Virus	874
Ross River Virus	186
Dengue Fever	1216
Malaria	3

3.7 Epidemics

According to the Attorney-General Disaster Database (2012), there have been four epidemics identified in Queensland, of which the H1N1 influenza outbreak in 2010 is relevant. The others relate to bubonic plague (1925), poliomyelitis (1959) and Spanish flu (1919).

3.8 Third Party Interference

The project is located in a sparsely populated area. It is expected that the site will maintain a secure perimeter around the project footprint areas and the train load facility to ensure that the general public is excluded. Therefore it is expected that the potential for external party interference is low.

4 HAZARD ANALYSIS AND RISK ASSESSMENT

This section outlines the risk analysis undertaken in accordance with the method described in ***Section 1*** and using the hazard identification word diagram in ***Section 2***. The assessment of likelihood and consequence takes into account the data relating to probability of initiating events described in ***Section 3.*** Consideration of the frequency factors, project design and available operational details, as well as the local environment is also taken into account.

The risk analysis takes into account the risk treatment measures included in the hazard identification word diagram on the basis that it is expected that all legal requirements, relevant standards, guidelines and codes of practice will be implemented in the design, construction, operation and decommissioning of the project. The objective of the risk analysis is to determine whether the residual risks are tolerable and if they are not then to propose new risk treatment measures.

Where the residual risk was determined as high or extreme, these activities are included in the draft risk management plan.

Tables are prepared for the following:

- Transportation (**Table 4-1**)
- Bulk storage (**Table 4-2**)
- Construction and Installation (**Table 4-3**)
- Coal Mining Operations (**Table 4-4**)
- Waste Management (**Table 4-5**)
- Maintenance (**Table 4-6**)
- Decommissioning (**Table 4-7**)
- Interaction with External Factors and Third Parties (**Table 4-8**)

4.1 Risk Evaluation - Transportation

The risk levels associated with the transportation activities are summarised in **Table 4-1**. High risks were associated with transporting personnel, equipment and materials to and from the site and within the site; transporting explosives to and within the site; and transporting fuel to and within the site. It should be noted that the risk ratings are determined as high when there is a possibility of the consequence resulting in a severe injury or fatality, even though the likelihood of the event is “unlikely” (rating of D). No extreme risks were identified.

The draft risk management plan will include mitigation measures to address these transport risks.

Table 4-1 Hazard Analysis for Transportation

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
Transporting personnel, equipment and materials to and from the site and within site	C,O,D	Vehicle accident	Injury to public / site worker	3	C	High
			Fatality to public / site worker	5	D	High
			Property damage	3	B	High
	C,O,D	Spill, leak of liquid or fumes	Property damage	2	C	Low
			Fire	2	C	Low
			Health impacts from contamination (soil, water, groundwater)	2	D	Low
	C,O,D	Excessive dust	Vehicle accident / collision	3	D	Medium
Transport of explosives to and within site	O	Fire, explosion	Injury to public / site worker	3	C	High
			Fatality public / site worker	5	D	High
			Health impacts from contamination (soil, water, groundwater)	2	D	Low
			Property damage	3	D	Medium
Transport of fuel to and within site	O	Fire Spill, leak	Injury to public / site worker	3	C	High
			Fatality public / site worker	5	D	High
			Health impacts from contamination (soil, water, groundwater)	2	D	Low
			Property damage	3	D	Medium

4.2 Risk Evaluation - Bulk Storage

The risk levels associated with the bulk storage activities are summarised in **Table 4-2**. High risks were associated with fire / explosion storing fuel and explosive. It should be noted that the risk ratings are determined as high when there is a possibility of the consequence resulting in a severe injury or fatality, even though the likelihood of the event is "unlikely" or "rare" (rating of D or E). No extreme risks were identified.

The draft risk management plan will include mitigation measures to address these bulk storage risks.

Table 4-2 Hazard Analysis for Bulk Storage

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
Storage of fuel	C,O	Spill, leak	Property damage	2	C	Medium
			Health impacts from contamination (soil, water, groundwater)	2	D	Low
	C,O	Fire, explosion	Injury to public / site worker	4	D	High
			Fatality public / site worker	5	D	High
			Health impacts from contamination (soil, water, groundwater)	2	D	Low
Storage of explosives	O	Fire, explosion	Injury to public / site worker	4	E	Medium
			Fatality public / site worker	5	E	High
			Property damage	2	E	Low

4.3 Risk Evaluation - Construction and Installation

The risk levels associated with the construction and installation activities are summarised in **Table 4-3**. High and extreme risks were associated with the potential for a vehicle accident and a high risk was determined for the potential of a fatal snake bite during clearing. It should be noted that the risk ratings are determined as high or extreme when there is a possibility of the consequence resulting in a severe injury or fatality, even though the likelihood of the event is "unlikely" (rating of D). No extreme risks were identified.

The draft risk management plan will include mitigation measures to address these transport risks and snake bite risk.

Table 4-3 Hazard Analysis for Construction and Installation

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
Clearing and earthworks	C	Excessive dust	Vehicle accident / collision	3	D	Medium
	C,O	Landslide	Property damage	2	D	Low
	O	Wildlife (e.g. snakes)	Injury to site worker	3	D	Medium
			Injury to public	3	D	Medium
			Fatality site worker / public	5	E	High
Construction and installation of Infrastructure including: • CHPP, MIA, administration and service facilities • Dams • Rail • Power • Fencing • Access roads • Yards and Laydown areas • Water diversion system	C	Fire	Injury to site worker	3	D	Medium
			Injury to public	3	D	Medium
			Property damage	3	D	Medium
		Excessive dust	Vehicle accident / collision	3	D	Medium
		Erosion	Property damage	2	E	Low
		Vehicle accident	Injury to public / site worker	3	C	High
			Fatality to public / site worker	5	D	High
			Property damage	3	B	High

4.4 Risk Evaluation - Coal Mining Operations

The risk levels associated with coal mining operations are summarised in **Table 4-4**. High risks were associated with the potential for:

- fly rock projected outside the blast zone
- an uncontrolled blast
- pit slope failure in the removal of waste rock
- wall / slope failure operating the waste rock dump
- fire / explosion at the CHPP
- fire at the coal stockpiling and train loading facility
- dam failure or overtopping of storage facility
- land instability during earthworks

The above risks were rated as high as there was the possibility of the consequence resulting in a severe injury or fatality. It should be noted that in all cases, the likelihood was assessed as 'unlikely' or 'rare' (D or E).

High risks were associated with the potential for vehicle accident while hauling ROM coal due to the possibility of the consequence resulting in a severe injury or fatality.

No extreme risks were identified.

The draft risk management plan will include mitigation measures to address these operational risks.

Table 4-4 Hazard Analysis for Coal Mining Operations

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
Topsoil stripping and storage	O	Excessive dust	Vehicle accident / collision	3	D	Medium
		Landslide	Property damage	2	D	Low
		Wildlife (e.g. snakes)	Injury to site worker	3	D	Medium
			Injury to public	3	D	Medium
			Fatality site worker / public	5	E	High
Blasting	O	Fly rock projected outside blast zone	Injury to public / site worker	3	E	Medium
			Fatality to public / site worker	5	E	High
			Property damage	2	D	Low
		Vibration exceeding design criteria	Property damage	3	E	Medium
		Excessive dust	Property damage	1	C	Low
			Public amenity	1	D	Low
		Uncontrolled blast	Injury to public / site worker	3	E	Medium
			Fatality to public / site worker	5	E	High
			Property damage	2	E	Low
Removal of waste rock	O	Excessive dust	Vehicle accident / collision	3	D	Medium
	O	Pit slope failure	Injury to site worker	4	D	High
			Fatality to site worker	5	D	High
Waste rock dump operation	O	Excessive dust	Vehicle accident / collision	3	D	Medium
	O	Wall / slope failure	Injury to site worker	4	D	High

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
			Fatality to site worker	5	D	High
			Property damage	2	D	Low
Hauling ROM coal	O	Vehicle accident Fire	Injury to site worker	3	C	High
			Fatality to site worker	5	D	High
			Property damage	2	B	Medium
	O	Excessive dust	Vehicle accident / collision	3	D	Medium
			Property damage	1	D	Low
CHPP facilities including crushing, screening, processing, blending, washing	O	Coal dust	Property damage	1	D	Low
	O	Fire / explosion	Injury to site worker	3	D	Medium
			Fatality to site worker	5	E	High
			Property damage	2	C	Medium
	O	Leak, spill	Health impacts from contamination (soil, water, groundwater)	2	E	Low
			Property damage	1	E	Low
Coal stockpiling and handling at train loading facility	O	Excessive dust	Property damage	1	D	Low
			Public amenity	1	D	Low
	O	Fire	Injury to public / site worker	3	D	Medium
			Fatality to public / site worker	5	E	High
			Property damage	2	C	Medium
Product coal transport – rail loop and rail spur	O	Fire	Injury to public / site worker	3	D	Medium
			Fatality to public / site worker	5	E	High

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
			Property damage	2	C	Medium
	O	Excessive dust	Property damage	1	E	Low
			Public amenity	1	D	Low
	O	Vehicle accident	Injury to public / site worker	3	C	High
			Fatality to public / site worker	5	D	High
			Property damage	2	B	Medium
Earthworks and re-contouring of excavated surfaces and spoil dumps	O	Land instability Water hazard	Injury to public / site worker	3	D	Medium
			Fatality to public / site worker	5	E	High

4.5 Risk Evaluation - Waste Management

The risk levels associated with waste management activities are summarised in **Table 4-5**. High risks were associated with the potential for water storage facility overtopping or failure. The high risk was attributed to the possibility of the consequence resulting in a fatality, even though the likelihood was very low (rating E). No extreme risks were identified.

The draft risk management plan will include mitigation measures to address the potential for overtopping.

The risk of spread of mosquito-borne disease was evaluated as low. Therefore a mosquito management plan is not required as the proposed controls appear to be adequate.

Table 4-5 Hazard Analysis for Waste Management

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
Management of mine-affected waters – collection, storage and disposal	C,O	Uncontrolled release, Storage facility failure, Overtopping of storage facility	Injury to public / site worker	3	E	Medium
			Fatality to public / site worker	5	E	High
			Property damage	4	C	High
Waste management (solid) – storage, transfer and disposal	C,O	Vermin	Health impacts	1	E	Low
Management of rejects, including co-disposal dams, reject water	O,D	Leak, spill	Health impacts from contamination (soil, water, groundwater)	2	E	Low
			Property damage	1	E	Low
	O,D	Release of tailings	Health impacts from contamination (soil, water, groundwater)	2	D	Low
			Property damage	2	D	Low
	O,D	Stagnant water	Disease vector - mosquitoes	1	D	Low
		Storage facility failure, Overtopping of storage facility	Injury to public / site worker	3	E	Medium
			Fatality to public / site worker	5	E	High
			Property damage	4	C	High

4.6 Risk Evaluation - Maintenance

The risk levels associated with the maintenance activities are summarised in **Table 4-6**. No high or extreme risks were identified.

Table 4-6 Hazard Analysis for Maintenance

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
Road maintenance – internal and external	C,O	Excessive dust	Vehicle accident / collision	3	D	Medium
			Property damage	1	E	Low
Water infrastructure	C,O	Subsidence	Property damage	2	D	Low

4.7 Risk Evaluation - Decommissioning

The risk levels associated with decommissioning activities are summarised in **Table 4-7**. High risks were associated with the potential for the final land form creating a risk to the public. The high risk was attributed to the possibility of the consequence resulting in a fatality, even though the likelihood was low (rating D). No extreme risks were identified.

The draft risk management plan will include mitigation measures to address the management of the final void.

Table 4-7 Hazard Analysis for Decommissioning

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
Remediation of contaminated land	D	Release (leaching)	Health impacts from contamination (soil, water, groundwater)	2	E	Low
Demolition, remediation of co-disposal dam	D	Leaching	Health impacts from contamination (soil, water, groundwater)	2	E	Low
Final Void	D	Final land form	Injury to public	3	D	Medium
			Fatality to public	5	D	High
			Injury / fatality to livestock	2	C	Medium

4.8 Risk Evaluation - Interaction with External Factors and Third Party Elements

The risk levels associated with external factors and third party elements are summarised in **Table 4-8**. High risks were associated with sabotage / protest and disease outbreak attributed to the possibility of the consequence resulting in a fatality, even though the likelihood was 'rare' (rating E).

The draft risk management plan will include mitigation measures to address the management of the sabotage / protest and disease outbreak.

High risks were identified resulting from the interaction with third parties, namely:

- Goonyella to Abbot Point railway line
- Alpha Coal Project railway line
- Access road / heavy vehicle road intersects Collinsville-Elphinstone Road
- Xstrata mine vehicles along the transport route from mines south of the project to the Xstrata Newlands Mine that bisects Byerwen tenements
- SunWater Pipeline (Burdekin to Moranbah)
- Gas pipeline
- Interaction with cattle / livestock, wildlife

These risks related to the potential for vehicle accidents, fly rock from blasting and explosion from the gas pipeline. The risk has been assessed as high as the consequence could result in a fatality, however likelihood of the event was 'unlikely' or 'rare' (D or E in most cases).

4.9 Cumulative Risk

Potential interactions with third parties were identified in **Table 4-8**, with associated hazards and risks identified.

Upon review of the projects considered in cumulative impact assessment (Chapter 34 EIS, **Table 34-1**), it was determined that it is unlikely that there is an increased risk on the hazards identified as a result of the other projects identified.

There is no data available to quantitatively determine the level of change that may result on the risk contours of other relevant existing or proposed industrial facilities in the area as a result of the proposed project, however, it is unlikely that the hazards and risks associated with the Byerwen project will present additional /increased hazards and risks to other existing or proposed facilities in the vicinity of the project area.

Table 4-8 Hazard Analysis for Interaction with External Factors and Third Party Elements

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
External factors	C,OD	Sabotage	Injury to public / site worker	3	E	Medium
		Protest	Property damage	3	E	Medium
	C,O,D	Disease outbreak	Illness to public / site worker	3	E	Medium
			Fatality to public / site worker	5	E	High
Goonyella to Abbot Point railway line. Alpha Coal project railway line	O	Fly rock from blasting	Injury to public / site worker	3	E	Medium
			Fatality to public / site worker	5	E	High
			Property damage	2	D	Low
	C,O,D	Vehicle accident (collision with train)	Injury to public / site worker	4	D	High
			Fatality to public / site worker	5	E	High
			Property damage	3	D	Medium
Access road / heavy vehicle road intersects Collinsville-Elphinstone Road	C,O	Vehicle accident	Injury to public / site worker	3	C	High
			Fatality to public / site worker	5	D	High
			Property damage	3	D	Medium
Xstrata mine vehicles along the transport route from mines south of the project to the Xstrata Newlands Mine that bisects Byerwen tenements	C,O	Vehicle accident	Injury to public / site worker	3	C	High
			Fatality to public / site worker	5	D	High
			Property damage	3	B	High
SunWater Pipeline (Burdekin to Moranbah)	C,O	Vehicle accident	Injury to public / site worker	3	D	Medium
			Fatality to public / site worker	5	E	High
			Property damage	3	C	High

Activity	Phase	Hazard	Potential consequences	Consequence	Likelihood	Risk level
Gas pipeline	C,O,D	Gas release – fire or explosion	Injury to public / site worker	4	D	High
			Fatality to public / site worker	5	E	High
			Property damage	3	D	Medium
	O	Pipeline failure	Injury to public / site worker	3	D	Medium
			Fatality to public / site worker	5	E	High
			Property damage	3	D	Medium
Interaction with cattle / livestock, wildlife	C,O,D	Cattle, livestock, wildlife	Injury to public / site worker	3	D	Low
			Fatality to public / site worker	5	D	High
			Property damage	1	D	Low
			Livestock damage	1	D	Low

5 RISK MANAGEMENT

The purpose of the risk management plan is to provide a framework for the implementation of the risk treatment and reduction measures proposed in this hazard and risk report. A preliminary draft risk management plan has been prepared and attached at ***Appendix 1***.

It should be acknowledged that the preliminary draft risk management plan is based on the information available at the time of preparing the report and will require review once the project design and details are finalised and the detailed risk assessment process has taken place.

It is reiterated that the risk assessment did not consider environmental impacts as they are assessed in other sections of the EIS. Routine operational health and safety risks have been identified and are to be managed in accordance with legislation, standards and codes of practice.

The risk assessment process should be undertaken in detail prior to construction and operation and be maintained as operations and conditions may change. In line with standard industry practice, job safety and environmental analyses should take place prior to the commencement of any activity.

The preliminary risk assessment undertaken for the project indicates that the greatest risks to people and property relate to:

- vehicle collisions and accidents
- fire
- explosion
- snake bite
- fly rock projecting outside blast zone
- pit slope failure in the removal of waste rock
- wall failure operating the waste rock dump
- dam failure or overtopping of storage facility
- land instability during earthworks
- final land form
- sabotage
- disease outbreak.

Risks were determined as “high” on the relative scale due to the potential for a fatality, even though the likelihood of an event was assessed as rare or unlikely. No “extreme” risks were identified.

6 CONCLUSION

The risks of hazards to people and property associated with the project were identified and evaluated. The risks associated with each identified hazard were determined based on the likelihood and consequences of the hazard and risk, taking into account standard risk treatment measures.

The risk assessment resulted in the following:

- The majority of hazards associated with the activities have a low or medium risk level based on the potential consequences and likelihood of the hazard occurring assuming standard risk treatment measures are implemented and working effectively
- Those risks that were determined as "high" on the relative scale were due to the potential for a severe injury or fatality, even though the likelihood of an event was assessed as rare or unlikely
- No "extreme" risks were identified.
- With respect to cumulative risk, the project activities undertaken outside the ML may interact with other project activities in the region however this interaction is unlikely to increase risk level, assuming the treatment measures recommended are implemented and working effectively

The preliminary risk assessment undertaken for the project indicates that the greatest risks to people and property relate to:

- vehicle collisions and accidents
- fire
- explosion
- snake bite
- fly rock projecting outside blast zone
- pit slope failure in the removal of waste rock
- wall failure operating the waste rock dump
- dam failure or overtopping of storage facility
- land instability during earthworks
- final land form
- sabotage
- disease outbreak.

This assessment is a preliminary hazard and risk assessment for the project. A framework for the ongoing assessment and management of risks is detailed in the draft risk management plan attached at ***Appendix 1***.

A more specific evaluation of hazards will be undertaken when final detailed design and mine operating plans have been developed prior to the construction phase and then prior to the operational phase.

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APPENDIX 1 – RISK MANAGEMENT PLAN

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A GREENCAP CONSULTING COMPANY

1. INTRODUCTION

The objective of this draft risk management plan is to provide the framework for the implementation of risk treatment measures throughout all phases of the Project. This is a preliminary draft plan based on the information available at the pre-feasibility stage of the Project that addresses the potential hazards and risks to people and property.

2. RISK MANAGEMENT

2.1 Design Phase

With the benefit of a detailed final design, the preliminary hazard and risk assessment should be updated to cover all hazards identified throughout the life of the project.

2.2 Construction Phase

A Construction Environment, Health and Safety (EHS) plan will be prepared upon completion of the design stage. The Construction EHS plan will focus on hazards related to both site operations and potential off site impacts. HIPAP7: Construction Safety Guidelines (NSW DoP, 2011) recommends the construction study covers the following:

- Familiarisation with past and proposed operations and a review of construction and commissioning programs
- Review of construction safety including identification and analysis of hazards and review / revision of construction operational controls
- Safety assurance including verification that the design intent is maintained throughout the construction period via safety management systems and pre-commissioning checks
- Change management procedures during construction

2.3 Operations Phase

The proponent will structure health, safety and environmental management systems in accordance with *OHSAS 18001: 2007. Occupational Health and Safety Management Systems. Requirements* and the principles of *ISO14001:2004 Environmental Management Systems – Requirements with Guidance for Use.*

Risk management principles in line with *ISO 31000:2009. Risk Management Principles and Guidelines* will be used to identify hazards, assess risks and identify control at all stages throughout the project. The outcome of the risk management process will be the development of operational control such as health and safety plans, safe work procedures, job safety analyses, inspections, monitoring and audits. Risks will be managed in accordance with the hierarchy of control, with elimination being the first control method to be used.

Hazards and risk will be identified during the project risk assessment process and documented in a risk register that will be regularly updated. The risk register will be reviewed at any time prior to the introduction of new plant or equipment; change in operations, conditions or plant; after an incident; and at least annually.

Safe work procedures will be developed for routine tasks to address the following hazards:

- Driving
- Manual handling
- Slips and trips
- Interaction with mobile equipment
- Working at heights
- Working with electrical equipment, lightning

- Working with moving parts
- Falling objects
- Fatigue
- Confined spaces
- Pinch points
- Wildlife hazards
- Disease vectors
- Dust
- Noise
- Sunburn, dehydration, heat stress
- Welding and cutting
- Hazardous substances
- Fire

Audits will be conducted on a scheduled and regular basis, dependent on the risk of the activity.

2.4 Preliminary Risk Assessment Results

The preliminary risk assessment undertaken for the project indicates that the greatest risks to people and property relate to:

- Vehicle collisions and accidents
- Fire
- Explosion
- Snake bite
- Fly rock projecting outside blast zone
- Pit slope failure in the removal of waste rock
- Wall / slope failure operating the waste rock dump
- Dam failure or overtopping of storage facility
- Land instability during earthworks
- Final land form
- Sabotage
- Disease outbreak

Risks were determined as “high” on the relative scale due to the potential for a fatality, even though the likelihood of an event was assessed as rare or unlikely.

Additional treatment measures are to be assessed and implemented as required to ensure that risks are made as low as reasonably practicable (ALARP). These are summarised in Table 2-1 and section 2.5 and 2.6 and will be updated as the project progresses.

It should be noted that in the majority of cases, the risk level is not reduced as there remains a rare or unlikely potential for a consequence of a severe injury or fatality and therefore the rating will remain as a high.

Table 2-1 Additional Management of Project Activities with Associated Risks of "High"

Hazard	Management Plan Document
Vehicle collisions and accidents	Fatigue management procedure Traffic Management Plan Emergency Management Plan
Fire	Emergency Management Plan Safety and Health Management Plan
Explosion	Emergency Management Plan
Snake bite	Emergency Management Plan Safety and Health Management Plan
Fly rock projecting outside blast zone	Emergency Management Plan Blast Management Plan
Pit slope failure in the removal of waste rock	Emergency Management Plan
Wall / slope failure operating the waste rock dump	Emergency Management Plan Waste Rock Management Plan
Dam failure or overtopping of storage facility	Emergency Management Plan Dam design and construction standards
Land instability during earthworks	Emergency Management Plan Sediment and Erosion Control Plan
Final landform	Rehabilitation and Decommissioning Plan Emergency Management Plan
Sabotage	Emergency Management Plan
Disease outbreak	Develop plan, when likelihood is greater. Advice from Queensland Health.

2.5 Risk Management - Natural Hazards

2.5.1 Bushfire

Implications of a medium risk in accordance with SPP 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide are that it becomes a "natural hazard management area". The preliminary hazard and risk assessment identified the project area to be contained within low and medium risk areas. Therefore a bushfire management plan will be developed to take into account the following:

- Maintain safety of people and property by avoiding areas of high or medium bushfire hazard
- Design and siting of buildings
- Firebreaks, setbacks from vegetation and access to firefighting and emergency vehicles

- Adequate road access for firefighting and other emergency vehicles
- Providing an adequate and accessible water supply for fire-fighting purposes
- Ensure public safety and environment are not adversely affected by the detrimental impacts of bushfire on hazardous materials manufactured or stored in bulk

These items are addressed in the detailed design of the site and the Emergency Response Plan.

2.5.2 Vector-borne disease

The preliminary hazard and risk assessment identified the potential for the spread of mosquito borne disease as low. Therefore a mosquito management plan is not required.

As specified in the Queensland Health (2002) *Guidelines to minimise mosquito and biting midge problems in new development* areas, the most appropriate way to control mosquitoes is to prevent them from breeding. It is important to address potential mosquito problems before there is a significant increase in the adult population. Where required, mosquito control programs should integrate a variety of control strategies i.e. surveillance, reducing stagnant water and spraying.

Any incidence of vector-borne disease will be referred to a doctor, with subsequent notification to Queensland Health. Additional treatment measures may be required if the incidence of disease increases beyond background levels in the general community. It is expected that Queensland Health will provide adequate monitoring of incidence of the known vector-borne diseases and will implement appropriate programs to control any outbreaks. It is unlikely that a significant increase in the incidence of vector-borne disease will occur.

2.5.3 Wildlife

A procedure will be developed prior to clearing to ensure worker safety. This should take into account prevention of snake bites, as well as first aid and medical treatment. Training and awareness will also be considered.

Suitable site personnel will be trained in first aid. Procedures will be in place to ensure effective transportation to the nearest ambulance service at Glenden, as required.

Further detail will be included in the Emergency Management Plan.

2.6 Risk Management - Site Hazards

2.6.1 Fire

An on-site fire response capability will be maintained and supported as detailed in the Emergency Response Plan.

Proposed control measures include:

- Preventive measures relating to control of ignition sources
- Preventive maintenance
- Training
- Competent and experience workforce
- Safety and Health Management System
- Emergency response plan and rehearsals

Fire drills will be undertaken on a routine basis. The project will have a team of employees trained in fire-fighting to the relevant coal competency standards. All fire-fighting facilities and equipment will be installed and maintained by a certified supplier.

Further detail on the management of fire is included in the Emergency Management Plan.

2.6.2 Explosion / Blasting

Transport, storage and use of explosives and flammable substances will be managed in accordance with AS2187 and Queensland *Explosives Act 1999.* These requirements address:

- Design and site selection of storage facilities
- On site manufacture of explosives
- Blast planning, preparation and management
- Management of misfires and defects
- Emergency procedures

Further detail on the management of fire is included in the Emergency Management Plan.

2.6.3 Vehicle Accidents

A traffic management plan will be prepared as part of the EHS system. Procedures will be in place to ensure all drivers are competent, trained and fit for work to minimise the potential for vehicle accidents. Standard operating procedures, roster control and fatigue management guidelines will be developed to minimise and reduce the risk of driver fatigue. These will be in addition to the statutory guidelines set by TMR for Queensland.

The Emergency Management Plan will include how to manage a vehicle accident, whether it takes place on or off-site.

2.7 Residual Impacts

It is considered that if the mitigation measures detailed in the draft risk management plan and the hazard and risk report are implemented then all risks will be within acceptable limits.