Central Queensland Coal Project

Chapter 21 - Hazard and Risk

Central Queensland Coal

CQC SEIS, Version 3

October 2020

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Terms and Abbreviations

AEP	Annual Exceedance Probability
ARI	Average Recurrence Interval
AS	Australian Standards
BoM	Bureau of Meteorology
CHPP	Coal Handling and Preparation Plant
CMSH Act	Queensland *Coal Mining Safety and Health Act 1999*
CMSH Regulation	Coal Mining Safety and Health Regulation 2017
DES	Queensland Department of Environment and Science
DEWS	(former) Queensland Department of Energy and Water Supply
DILGP	(former) Queensland Department of Infrastructure, Local Government and Planning
DNRME	Queensland Department of Natural Resources, Mines and Energy
EA	Environmental Authority
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP Act	*Environmental Protection Act 1994*
EP Regulation	Queensland Environmental Protection Regulation 2019
ERP	Emergency Response Plan
ESSCC	Earth Systems Science Computational Centre
FIA	Failure Impact Assessment
FIFO	Fly-in-fly-out
H_2SO_4	Sulfuric Acid
HIPAP	Hazardous Industry Planning Advisory Papers
HPI	High Potential Incident
kg	Kilogram(s)
km	Kilometre(s)
L/month	Litre(s) per month
L/y	Litre(s) per year
m	Metres
MIA	Mine Infrastructure Area
ML	Mining Lease
ML/y	Megalitre(s) per year

mm	Millimetre(s)
N/A	Not applicable
NSW	New South Wales
NZS	New Zealand Standards
PAR	Population at Risk
Planning Regulation	Queensland Planning Regulation 2017
PRCP	Progressive Rehabilitation and Closure Plan
QFES	Queensland Fire and Emergency Services
QLD	Queensland
SDS	Safety Data Sheet
SEIS	Supplementary Environmental Impact Statement
SEPP	State Environmental Planning Policies
SHMS	Safety and Health Management System
SPP	State Planning Policy
t	Tonne(s)
t/year	Tonne(s) per year
TBC	To be confirmed
The Project	The Central Queensland Coal Project
TLF	Train Loadout Facility
ToR	Terms of Reference
WHSQ	Workplace Health and Safety Queensland
WT%	Percentage by weight

21 Hazard and Risk

21.1 Introduction

This chapter describes potential hazards and risks associated with the development and operation of the Central Queensland Coal Project (the Project) that may have an impact on people and property. The risks associated with rehabilitation and decommissioning are considered unlikely to be greater or significantly different from those detailed in this chapter and will be the subject of a separate assessment during the formulation of the Progressive Rehabilitation and Closure Plan (PRCP), which will be subject to an approvals process of its own following approval of the Environmental Impact Assessment (EIS).

As potential hazards and risks to the natural environment have been addressed in other sections of this Supplementary Environmental Impact Statement (SEIS), they will not be addressed in this chapter. This chapter will focus on the hazard identification of abnormal events and conditions which have potential to impact people and property both on and offsite.

Matters raised in submission to the EIS and earlier SEISs (i.e. SEIS v1 and v2) relating to Chapter 21 – Hazard and Risk were predominately focused on coal hazards in respect of spontaneous combustion and respirable dust. This chapter was previously revised to address these comments in earlier versions of SEISs. Appendix A13 includes the full details of all submissions received for the EIS and Version 1 of the SEIS. The submissions received relating to the SEIS version 2 are addressed in Chapter 3 of this SEIS (i.e. Version 3).

It is noted, however, that no submissions relating to hazard and risk that required substantial changes to this chapter were received regarding SEIS Version 2. As such, the majority of the changes in this chapter have been to address changes to the Project layout and updates to the legislative framework.

21.1.1 Environmental Objectives and Performance Outcomes

There are no specific objectives and outcomes for health and safety in the Environmental Protection Regulation 2019 (EP Regulation). Table 1 of the Project Terms of Reference (ToR) specifies that the environmental objectives for the Project, relevant to hazards and safety are that construction and operation of the project should ensure:

- the risk of, and the adverse impacts from, natural and man-made hazards are avoided, minimised or mitigated to protect people and property
- the community's resilience to natural hazards is maintained or enhanced
- developments involving the storage and handling of hazardous materials are appropriately located, designed and constructed to minimise health and safety risks to communities and individuals and adverse effects on the environment
- the project prevents or minimises the production of hazardous contaminants and waste and
- if the production of hazardous contaminants and waste is unavoidable, the project treats and/or contains hazardous contaminants until their disposal at an approved facility.

21.1.2 Terms of Reference Addressed in this Chapter

Table 21-1 summarises the requirements from the ToR for the Project relevant to this Chapter, and where they are addressed.

Table 21-1: ToR cross-reference

Terms of Reference	Section of the EIS
8.13 Hazards and Safety	
Describe the potential risks to people and property that may be associated with the project in the form of a risk assessment for all components of the project and in accordance with relevant standards.	Sections 21.4 and 21.5
The assessment should address the following matters: • potential hazards, accidents, spillages, fire and abnormal events that may occur during all stages of the project, including estimated probabilities of occurrence	Sections 21.4 and 21.5
• hazard analysis and risk assessment in accordance with AS/NZS ISO 31000:2009 Risk management—principles and guidelines and with HB203:2006 Environmental risk management principles and processes	Sections 21.4, 21.5
• demonstrate that any major hazard facility involving dangerous and hazardous materials is appropriately located in accordance with the State Development Assessment Provisions, Module 13 – Major hazard facilities	Not applicable as no Major Hazard Facility is included in the Project
• identify all hazardous substances and any explosives to be used, transported, stored, processed or produced and the rate of usage; evaluate the risks associated with the secure storage, use and transportation of explosives to ensure the risks are within an acceptable standard in accordance with Australian Standard AS2187.1[1]	Sections 21.4.5, 21.4.6 and 21.5
• potential wildlife hazards, including a development of a mosquito management plan in accordance with Queensland Health guidelines[2], natural events (e.g. cyclone, storm tide inundation, flooding, bushfire) and implications related to climate change and adaptation	Section 21.4.1; 21.5 and Chapter 17 - Biosecurity
• describe natural hazards that may affect the site with at least a 1% AEP or 100 year ARI level, including mapping of the potential hazard areas at the site	Section 21.4.1 and Chapter 9 – Surface Water
• how siting, layout and operation of the development will avoid or mitigate the risks, particularly with regard to the release of hazardous materials during natural hazard events	Section 21.5.1
• how natural processes and the protective function of landforms and vegetation will be maintained in sea erosion and storm tide inundation areas	n/a - see Section 21.4.1.4
• include an assessment of the risk that the project will damage the infrastructure of the Bruce Highway	Chapter 6 – Traffic and Transport
• show in plan view, and in a number of cross sections of suitable scale, the depth of the excavations in the North and South pits adjacent to the Bruce Highway. Discuss how geotechnical stability can be assured, and erosion protection on exposed faces can be successfully implemented, on the long block of unmined material supporting the Bruce Highway across the middle of the Central Queensland Coal Project. Discussions should examine the case of maximum	Chapter 6 – Traffic and Transport and Appendix A4b – Geotechnical Assessment

[1] *Australian Standard AS 2187*, Explosives-storage transport and use

[2] E.g. Queensland Health – *Guidelines to minimise mosquito and biting midge problems in new developments*, available from http://www.health.qld.gov.au/ph/documents/cdb/14804.pdf

Terms of Reference	Section of the EIS
exposure on the face of the unmined material during mining operations, and on the long term stability of the Highway route after closure of the mine.	
Provide details on the safeguards that would reduce the likelihood and severity of hazards, consequences and risks to persons, within and adjacent to the project area(s).	Sections 21.5 and 21.6
Identify the residual risk following application of mitigation measures.	Section 21.5.1
Present an assessment of the overall acceptability of the impacts of the project in light of the residual uncertainties and risk profile.	Section 21.5.1
Provide an outline of the proposed integrated emergency management planning procedures (including evacuation plans, if required) for the range of situations identified in the risk assessment developed in this section.	Section 21.6
Assess the risk of spontaneous combustion for the proposed coal mine and provide the following information: • describe the quality and quantity of carbonaceous waste material including coarse rejects and fine tailings stockpile at the mine site	Chapter 8 – Waste Rock and rejects; Section 21.4
• discuss the potential risk of spontaneous combustion from the coal and waste stockpile areas	Section 21.4.2
• discuss the prevention and control measures adopted for spontaneous combustion, and	Section 21.4.2
• describe likely impacts of spontaneous combustion incidents on the receiving environment	Sections 21.4.2 and 21.5.1
• develop and implement "spontaneous combustion management plan" by considering NSW spontaneous combustion management guidelines.[3]	Section 21.4.2
Outline any consultation undertaken with the relevant emergency management authorities, including the Local Disaster Management Group.	Chapter 19B - Social, Sections 21.1.3.3, 21.5.1and 21.6.2

21.1.3 Relevant Legislation and Policy Instruments

Various State legislation aims to manage risks, primarily to protect the environment and safeguard human health and wellbeing. Regulatory obligations require compliance with respect to both construction and operational phases of the Project. The relevant regulatory framework associated with hazard and risk in coal mining includes:

- *Coal Mining Safety and Health Act 1999* (CMSH Act)
- *Public Health Act 2005*
- *Explosives Act 1999* and
- *Fire and Rescue Service Act 1990.*

Relevant guidelines and standards which have been considered in the hazard and risk assessment include the following:

- State Planning Policy (SPP) – State Interest Guidance Material: Emissions and Hazardous Activities (Department of Infrastructure, Local Government and Planning (DILGP) 2018)

[3] http://www.resourcesandenergy.nsw.gov.au/__data/assets/pdf_file/0007/419515/MDG-1006.pdf

http://www.resourcesandenergy.nsw.gov.au/__data/assets/pdf_file/0006/419514/MDG-1006-TR-spontaneous-combustion-management.pdf

- SPP draft guidance material for bushfire hazards (DILGP 2016)
- Workplace Health and Safety Queensland's (WHSQ) Managing Risks of Hazardous Chemicals in the Workplace Code of Practice 2013 (WHSQ 2013)
- Workplace Health and Safety Queensland's Model Planning Scheme Development Code for Hazardous Industries and Chemicals 2016 (WHSQ 2016)
- NSW Hazardous Industry Planning Advisory Papers (HIPAPs) (NSW Department of Planning 2011c)
- AS/NZS ISO 31000:2018 Risk Management – Guidelines (Standards Australia 2018)
- AS 1940:2017 The Storage and Handling of Flammable and Combustible Liquids (Standards Australia 2017)
- AS 2187.1:1998/1 Explosives – Storage, Transport and Use – Storage (Standards Australia 1998)
- AS 2187.2:2006 Explosives – Storage and Use – Use of Explosives (Standards Australia 2006a)
- AS/NZS 4745:2012 Code of Practice for Handling Combustible Dusts (Standards Australia 2012)
- AS/NZS 60079.10.2:2016 Explosive Atmospheres – Classification of areas – Combustible dust atmospheres (Standards Australia 2016)
- HB203:2006 Environmental risk management principles and processes (Standards Australia 2006b) and
- Australian Code for the Transport of Dangerous Goods by Road and Rail – 7th Edition (National Transport Commission 2017).

21.1.3.1 Coal Mining Safety and Health Act 1999

The object of the *Coal Mining Safety and Health Act 1999* (CMSH Act) is to protect the health and safety of people at, or who may be impacted by, a coal mine and to monitor and ensure that the risk of injury or illness is at an acceptable level. Central Queensland Coal is required to comply with the obligations and approvals of the CMSH Act and Coal Mining Safety and Health Regulation 2017 (CMSH Regulation) for the Project.

21.1.3.1.1 Coal Mining Safety and Health Regulation 2001

The CMSH Regulation requires coal mines to implement systems that involve risk identification and assessment, hazard analysis, management and control. The CMSH Regulation defines hazard as a 'thing or situation with potential to cause injury or illness to a person'.

Risk is defined in the CMSH Regulation as:

- the risk of injury or illness to a person arising out of a hazard and
- measured in terms of consequences and likelihood.

21.1.3.1.2 Coal Mining Health and Safety Standards

There are a number of coal mining health and safety standards made by the Minister under section 72(1) of the CMSH Act. These standards provide ways of achieving an acceptable standard of risk. Operators can manage risk differently but must be able to show that it is at least equivalent to the recognised standard to discharge their duty of care. The current approved standards include:

- RS2: Control of Risk Management Practices (July 2003)

- RS3: Explosion Protection of Diesel Engines (November 2019a)
- RS7: Criteria for the Assessment of Drugs in Coal Mines
- RS8: Conduct of Mine Emergency Exercises
- RS9: Monitoring of Sealed Areas
- RS10: Mine Surveying and Drafting (September 2011) and
- RS11: Training in Coal Mines (July 2012).

RS2 – Control of Risk Management Practices provides technical guidance on risk identification, risk analysis and evaluation, risk treatment and monitoring and review of risks. This standard describes an auditable practice at mines for formal risk management studies conducted in the development of the mine safety management system. This standard provides a high-level risk assessment structure and has been used to govern the development of the Project preliminary risk assessment.

21.1.3.2 Explosives Act 1999

The *Explosives Act 1999* provides guidance for the handling, use, transport, storage and manufacturing of explosives. Work involving the use of explosives requires an authority. The storage of explosives and other related dangerous materials will be undertaken in accordance with this Act. Security sensitive ammonium nitrate is regulated under this Act and there are strict storage requirements imposed. No permanent explosive storage will be located onsite; however, this legislation will be applicable to transport and use of explosives on the Project.

21.1.3.3 Fire and Rescue Services Act 1990

The Fire and Rescue Services Regulation 2001*,* under the *Fire and Rescue Services Act 1990,* requires the operator to establish effective relationships with the Queensland Fire and Emergency Services to provide for the prevention and response to fires and incidents endangering persons, property or environment. Emergency response procedures will be developed in consultation with the emergency services and other related government agencies.

21.1.3.4 Queensland State Planning Policy

The Queensland Planning Regulation 2017 (Planning Regulation) gives effect to a suite of supporting instruments such as the State Planning Policy 2017 (SPP). The SPP is a statutory instrument prepared under the Planning Act that relates to matters of Queensland interest. The SPP applies to a range of circumstances under the Planning Act, including for development assessment and when proposed new planning schemes are made or amended. It provides a comprehensive set of principles to guide state government and local government in the planning of land use and development within Queensland. The provisions of the SPP may also be considered under the standard criteria of the *Environmental Protection Act* 1994 (EP Act) which includes matters of State interest.

The SPP includes 17 state interests under five broad themes. The Safety and Resilience to Hazards theme is relevant to this Chapter. The State Interest Statement in relation to Natural hazards, risk and resilience is “The risks associated with natural hazards, including the projected impacts of climate change, are avoided or mitigated to protect people and property and enhance the community’s resilience to natural hazards” (DILGP 2017, p19). The interests in the assessment of hazard and risk are:

- Emissions and hazardous activities - Community health and safety, and the natural and built environment, are protected from potential adverse impacts of emissions and hazardous activities. The operation of appropriately established industrial development, major infrastructure, and sport and recreation activities is ensured.
- Natural hazards, risk and resilience - The risks associated with natural hazards, including the projected impacts of climate change, are avoided or mitigated to protect people and property and enhance the community's resilience to natural hazards.

21.1.3.5 NSW Department of Planning Guidelines

The NSW Department of Planning guidelines relating to hazardous or offensive development have also been used as guidance as they provide in depth and robust methodology to identify when and how a preliminary hazard analysis should be undertaken to meaningfully estimate the risk to people, property and the environment. The methodologies in these guidelines are commonly adopted in local councils throughout Queensland.

The relevant NSW guidelines referred to include:

- Applying State Environmental Planning Policies (SEPP 33) - Hazardous and Offensive Development Application Guidelines (NSW Department of Planning 2011a)
- Assessment Guideline - Multi-level Risk Assessment (NSW Department of Planning 2011b)
- HIPAP No. 3 – Risk Assessment (NSW Department of Planning 2011d)
- HIPAP No. 4 – Risk Criteria for Land Use Planning (NSW Department of Planning 2011e) and
- HIPAP No. 6 – Hazard Analysis (NSW Department of Planning 2011c).

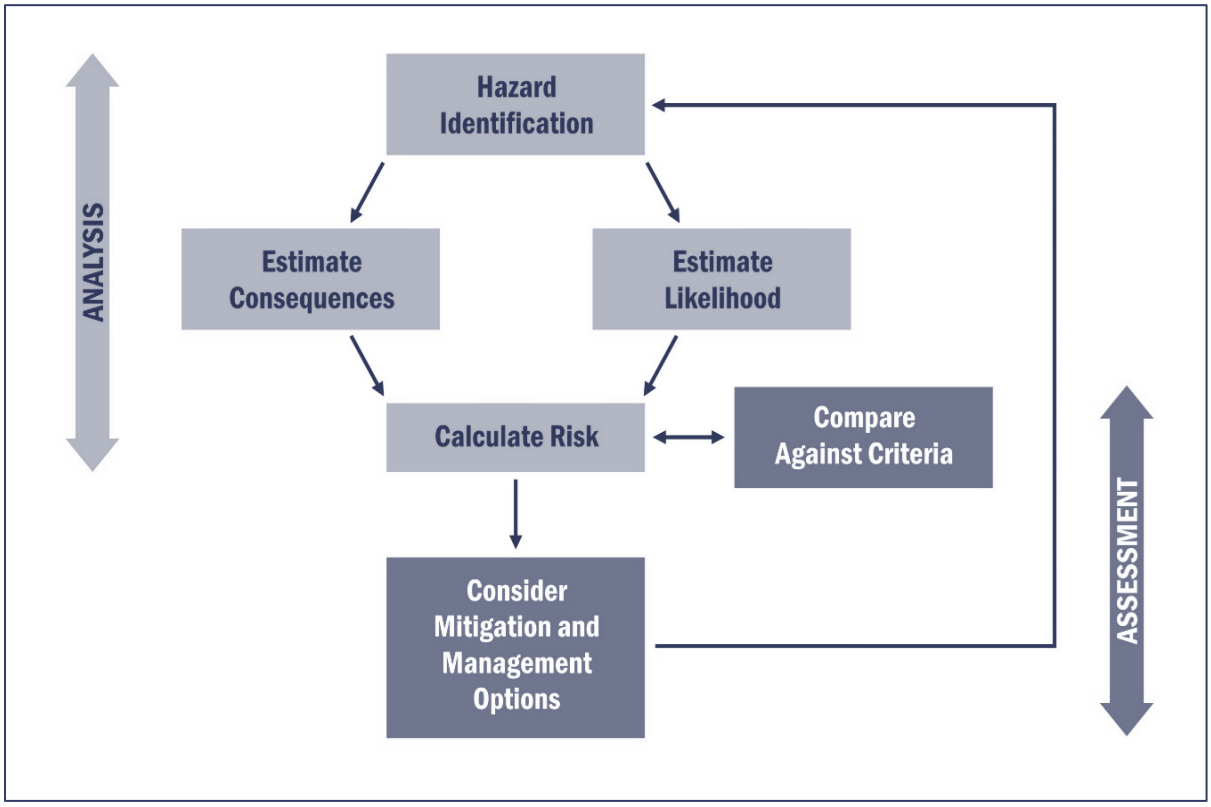
21.2 Methods

This section presents the methodology used for the assessment of hazards and risks to the community from the construction and operation of the Project. The assessment involved the identification of community values and sensitive receptors.

An overview of the basic methodology undertaken is presented in Figure 21-1. The techniques used in each of these stages is discussed in detail in the following sections.

More detail on specific issues can also be found in the following chapters of this EIS:

- Chapter 6 – Traffic and Transport
- Chapter 7 – Waste Management
- Chapter 9 – Surface Water
- Chapter 10 – Groundwater
- Chapter 11 – Rehabilitation and Decommissioning
- Chapter 12 – Air Quality
- Chapter 13 – Noise and Vibration
- Chapter 14 – Terrestrial Ecology
- Chapter 19B – Social and
- Chapter 20 – Health and Safety.



Source: Department of Planning (NSW) 2011c

Figure 21-1: Hazard analysis methodology

21.2.1 Community Values and Sensitive Receptors

Values were identified based on an understanding of the land uses associated with the surrounding community. For this chapter, a community value is defined as:

> *Any value that is related to sensitive receptors or property that could be affected by any hazardous material and actions associated with the Project. A property can be a state or local government controlled road, place of residence and work or recreational area.*

Sensitive receptors were identified using onsite visits and aerial imagery. The receptors identified for this chapter are consistent with those identified in Chapter 12 – Air Quality and Chapter 13 – Noise and Vibration. For this chapter, sensitive receptors include:

- residential dwellings
- library or educational institution (including a school, college and university)
- childcare centre
- school or playground
- hospital or other medical institution
- commercial or retail activity and
- parks or gardens which are open to the public.

Sensitive receptors identified for the Project are outlined in Section 21.3.

21.2.2 Hazard Analysis

Hazard analysis involves a comprehensive hazard identification, including the identification of incident scenarios and proposed operational and organisational safeguards. In identifying possible conditions that could lead to a hazardous incident, consideration was given to the Project's proposed activities and a review of similar open cut coal mine projects in Queensland.

Hazards and impacts for the Project were identified using the process outlined in the following sections:

- hazard identification and
- estimate likelihood and probability.

The hazard identification and likelihood process is discussed in further detail below.

21.2.2.1 Hazard Identification

Several techniques were adopted to identify hazards associated with equipment, processes, natural and manmade external effects and influences. The hazards were identified by an experienced review team using the following approach:

- A review of the Project's components (as outlined in Chapter 1 – Introduction and Project Description) to identify the activities and facilities proposed during the construction and operation phases of the Project (that is open cut mining, haul roads and Train Loadout Facility (TLF), construction and operation of water treatment facilities, vehicle use, explosives storage, use and handling of dangerous goods).
- Identification of hazardous materials being transported to the Project during the construction and operation phases.
- Identification of both technological, man-made and natural hazards, including:
  - the range of potentially hazardous incidents that may be associated with each of the activities and facilities at the Project area (that is clearing activities, chemical storage and stockpile management)
  - potentially hazardous incidents associated with people, activities and property because of the Project, but outside the Project area (that is vehicular accidents with transporting Project materials) and
  - natural hazards that may occur in the area that have the potential to impact on the Project and community.
- For operational hazards on a mine site, the major scenario events were established, and for each identified event the possible initiating events were identified. Consideration was given to factors such as the behaviour of personnel and equipment, location of ignition sources and meteorological conditions.

21.2.2.2 Estimated Likelihood and Probability

To estimate the likelihood of outcomes of hazardous incidents, two types of information were considered. Firstly, the likelihood of the initiating event and secondly, the probabilities of the initiating event developing into a worst-case scenario. A review of incident frequency and data from coal mines was undertaken to provide guidance on the likelihood ratings. Definitions for hazards and impacts have been included in Table 21-2.

Table 21-2: Definitions for identification of hazards and impacts

Term	Definition
Hazard	An event with the potential to cause harm. This can include hazardous substances, plant and equipment, work processes, wildlife hazards or other aspects of the surrounding environment.
Impact	The harm that would result from the hazardous event. The impact can be related to health and safety, amenity, a resource and / or functionality of an area or piece of infrastructure.

21.2.3 Preliminary Hazardous Substances Analysis

This section presents the risk identification process for the storage and handling of hazardous substances associated with the Project.

21.2.3.1 Hazardous Substances Analysis

Under the New South Wales' SEPP 33, a preliminary risk screening of a proposed development is required to determine the need for a Preliminary Hazard Analysis. In the absence of Queensland trigger volumes these guidelines have been adopted. They provide a preliminary screening to enable the identification and assessment of the storage specific dangerous goods classes that have the potential for significant off-site effects. The pre-screening process includes:

- identification of all hazardous substances, volume, storage and location and
- an initial screening against the identified threshold for the substance.

As diesel will be stored away from other hazardous substances and ammonia nitrate will not be stored onsite, there was no dangerous goods storage that required further assessment.

21.2.4 Risk Assessment

The risk assessment methodology applied to the hazard and risk assessment is outlined in Chapter 3 – Introduction and Project Description.

21.3 Description of Existing Values

To identify the potential hazards and risks associated with the Project, the surrounding environment and community safety values of the study area have been assessed. The study area for the hazard and risk assessment is defined as any property within 25 km. This section describes the land use, potential sensitive receptors, community values and landscape aspects which may be impacted by the Project.

21.3.1 People

The people who are within or transit the surrounding area which have been considered as part of this assessment include:

- residents (identified from homesteads)
- road users
- downstream water users and
- mine workers and contractors.

Sensitive receptors within a 10 km radius of the Project were identified. Areas considered to be a sensitive receptor for the population, that is, a place where members of the community are likely

to occupy, included: townships, residential homesteads, recreational areas, hospitals, libraries, public parks, schools, kindergartens and commercial businesses or workplaces.

Importantly, no hospitals, libraries, schools, or kindergartens are located within 10 km of the site. The nearest commercial business is the Tooloombah Creek Service Station which is located 3.3 km and 4.7 km from Mine Infrastructure Area (MIA) / Coal Handling and Preparation Plant (CHPP)1 and MIA / CHPP2, respectively. The next nearest commercial businesses are in the townships of Ogmore and Marlborough, located approximately 6.8 km and 25.3 km to the northeast and southeast of the closest edge of the Project, respectively. The Tooloombah Creek Conservation Park is located on the Bruce Highway, 2.9 km and 4.5 km from MIA / CHPP1 and MIA / CHPP2, respectively. There is also a truck stop on the Bruce Highway directly opposite the Conservation Park.

This has been described further in Section 21.2.1 and Chapter 20 - Health and Safety and is illustrated in Figure 21-2.

21.3.2 Downstream Water Users

There are several surface water entitlements in Tooloombah and Deep Creek for irrigation, stock and domestic supply. The entitlements that may be impacted by the Project by being located adjacent to or downstream of operations include the following:

- 119/CP900367 – Irrigation entitlement located on parcel of land adjacent to the Mamelon property, separated by Deep Creek, and approximately 3 km downstream of mine infrastructure and environmental dam release point locations on Deep Creek.
- 1/RP616700 - Domestic / stock supply entitlement located on parcel of land adjacent to the Mamelon property and straddling Tooloombah Creek. The extraction point appears to supply a small off-stream storage on the western overbank of Tooloombah Creek, on the Bar-H property.
- 45/MPH26062 - Irrigation entitlement on parcel of land directly bordering the Project to the north and extracting approximately 6 km downstream of the Bruce Highway on Tooloombah Creek.

Domestic and stock water users do not need a water licence under the *Water Act 2000*, therefore enquiries will continue to be made to property owners to identify any unregistered use of the water in Deep and Tooloombah Creeks. The Mamelon homestead has one groundwater bore to supply water for their stock and domestic uses, however, the ongoing use of this bore once mining operations commence is still to be decided.

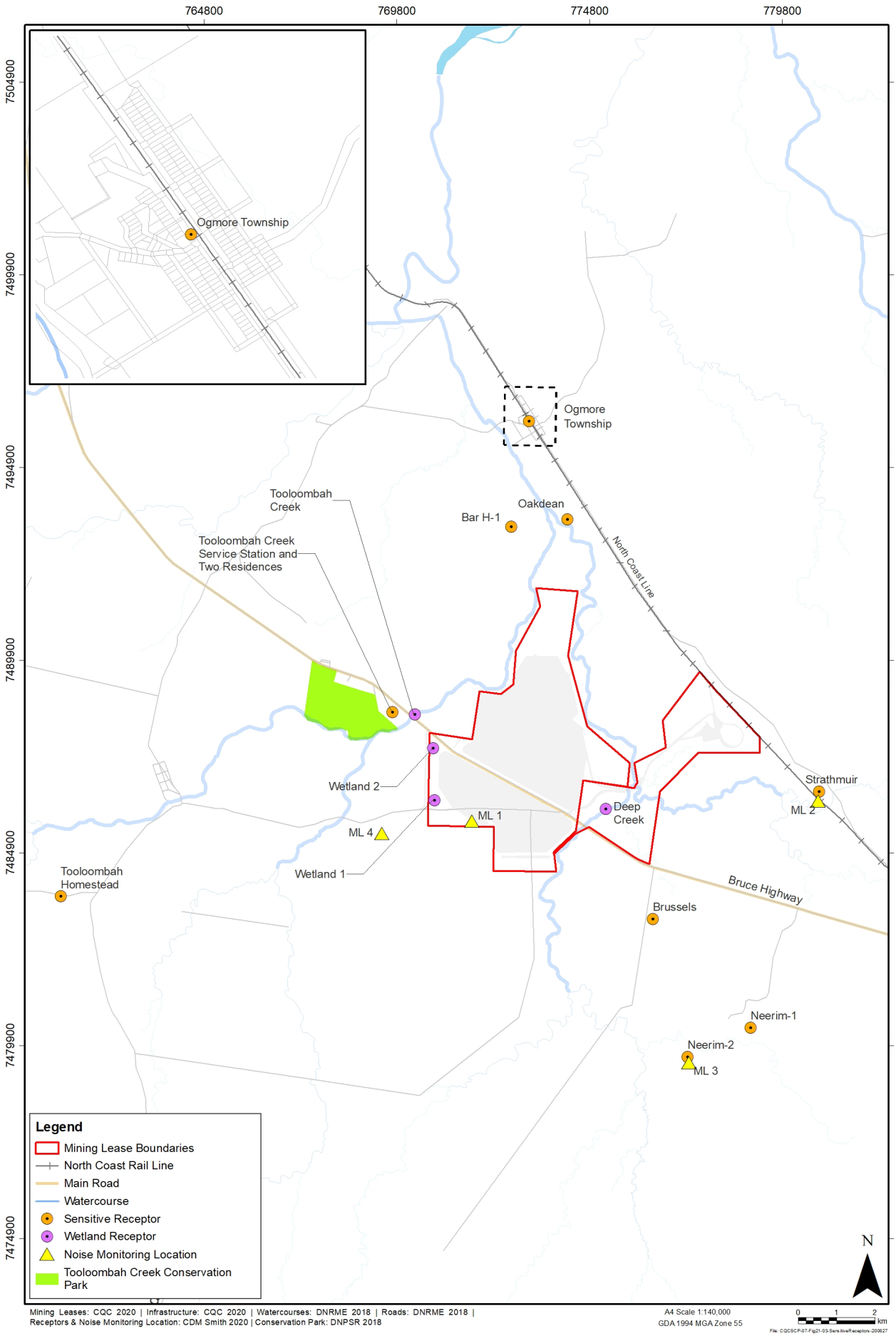


Figure 21-2: Sensitive receptors

21.3.3 Property

Property is something tangible or intangible to which an owner has a legal right. Third party property has been considered in this assessment and includes:

- state and local government-controlled transport infrastructure
- privately owned rail infrastructure (Queensland Rail – North Coast Rail Line)
- public or private utility infrastructure
- public resources such as forests, water reserves, stock routes, state and recreational areas
- surrounding privately leased or owned agricultural land, land resources and infrastructure and
- landholder infrastructure, vehicles and equipment.

21.3.3.1 State and Local Government Controlled Roads

During the construction and operational phases, road transport will be the principal method for the transportation of materials and equipment to the Project. The Bruce Highway will be the major access route from and to the Project area. Roads will also be used throughout the construction and operation of the mine to transport waste products generated by the Project and to mobilise Project personnel. The assumed directional proportions of workforce by locations during construction and operation are presented in Table 21-3 and the assumed directional proportions of heavy vehicle movements during construction and operation are presented in Table 21-4.

Table 21-3: Assumed directional proportions of workforce by location

Direction from Project site	Assumed origin / destination of workforce movements		Assumed directional proportion of construction and operations workforce
North	Regional	Mackay	13%
	Local	Clairview	Combined 35%(1)
	Local	St Lawrence	
	Local	Ogmore	
South	Local	Marlborough	15%
	Regional	Rockhampton	38%

(1) All movements associated with Clairview, St Lawrence and Ogmore are assumed to be originating or destined for St Lawrence, as this is the worst case for the Project

Table 21-4: Assumed directional proportions of heavy vehicle movements

Project phase	Local		Regional		State		Port	
	North of site	South of site	North of site	South of site	North of site	South of site	Brisbane	Mackay
Construction	50%	50%	25%	75%	50%	50%	60%	40%
Operational	50%	50%	25%	75%	-	-	60%	40%

21.3.3.2 Rail Network

The proposed transport corridor will be located within proximity to the North Coast Rail Line. Central Queensland Coal will construct an additional rail siding to allow the Project to connect into this line. The Central Queensland mine is located approximately 3.5 km west of the North Coast Rail Line.

21.3.3.3 Public or Private Utility Infrastructure

There are no easements for public or private utility infrastructure across the Project area. A Powerlink electrical transmission easement containing 275 kilovolt overhead powerlines crosses the southern end of the Mining Lease (ML) area but is located well outside of the Project's disturbance footprint.

21.3.3.4 Public Resources - Forests, Water Reserves, State and Recreational Areas

The nearest public resource to the Project area is the Tooloombah Creek Conservation Park, located approximately 2 km to the west. There is also a reserve adjacent the northern boundary of this Conservation Park. Bukkulla Conservation park is approximately 20 km to the east. The nearest National Park is Goodedulla National Park, located approximately 50 km to the south of the Project area.

There is a single wetland of high ecological significance (Wetland 1) located to the southwest of the Central Queensland mine area and several lakes and rural water storage dams on either side of the Bruce Highway alignment. These lakes and rural water storage dams have not been defined as wetlands by the Department of Environment and Science (DES) and all are characterised as artificial wetlands (see Chapter 9 – Surface Water).

21.3.3.5 Surrounding Agricultural Land and Equipment, Infrastructure and Vehicles

The surrounding landholders hold freehold and leasehold land used for cattle grazing. There is potential that land adjacent to the Project may be subject to contamination or exposure to air borne substances in the event of a major hazard.

21.4 Hazard Analysis

A hazard analysis was undertaken on natural hazards, coal hazards, transportation hazards, construction of the TLF, general workplace hazards and the storage of dangerous goods. The operation of the rail is excluded from this assessment.

21.4.1 Natural Hazards

The adverse impacts of bushfires, landslides and flooding have been assessed with consideration to the State Planning Policy – State Interest Guideline – Natural Hazards, Risk and Resilience. This policy is a statutory instrument aimed at minimising the adverse impacts of natural hazards on people, property, economic activity, and the environment when making decisions about development. Whilst the Project will be exempt from assessment under the Policy, it has been considered to ensure that natural hazards are assessed as part of the construction and operation of the Project. The potential hazards identified from natural and extreme weather events have been identified in Table 21-5.

Table 21-5: Natural hazard identification

Facility/event	Cause	Possible consequences	Prevention/detection required
Natural Events			
Bushfire	• accidental or deliberate human caused ignition • lightning and or spontaneous combustion of existing fuel loads and • explosion during construction or operation.	• damage to infrastructure • combustion of coal stockpiles and • injury or fatality.	• maintenance of fire breaks • mines Rescue Team and Emergency Response Vehicle and Equipment aligned with Local Rural Fire Service • communication with Rural Fire Service • reduction of fuel loads onsite • monitoring of climatic conditions • slashing grass around infrastructure, particularly electrical substations and fuel storages and • implementation of an Emergency Response Plan (ERP).
Landslides	• heavy rain and • tectonic activity.	• wall collapse • damage to infrastructure • regulated structure failure • injury or death and • rupture or damage to dangerous goods storage facility.	• infrastructure designed to relevant standards • appropriate location of infrastructure and • implementation of an ERP.
Earthquake	• tectonic activity.	• strata failure leading to wall collapse • damage to infrastructure and • rupture of dangerous goods storage facility.	• infrastructure designed to relevant standards for the low risk of the area and • implementation of an ERP.
Flooding	• extreme rainfall event causing watercourse flow more than bank full discharge thus causing flooding of the floodplain and overbank areas and • construction of mine infrastructure leading to	• open pit flooding and possible contamination of runoff • controlled and non-controlled release of contaminated water due to dam overtopping • loss of production and operations shut down • injury or death and • impact to downstream water users because of controlled and non-controlled point	• monitoring of climatic conditions and short term and long term seasonal forecast information • all regulated structure assessment, design, monitoring and reporting requirements conducted in accordance with EHP guidelines • undertake pre-wet season inspections of drainage, water storage infrastructure • flood levees and diversion drains designed to divert clean water runoff around open pits

Facility/event	Cause	Possible consequences	Prevention/detection required
	changes to land use, overland flow paths or floodplain storage volume.	discharges from contaminant storages.	for up to and including the 1:1,000 AEP[1] flood event and • implementation of an ERP

[1]Average Exceedance Probability

This section provides a brief discussion of the likelihood and severity of these hazards to the Project area (refer to Chapter 4 – Climate for further detail) and provides control strategies.

21.4.1.1 Earthquakes

Australia is typically considered to be a tectonically stable continent (GA 2015). Nevertheless between 1977 and 2000, an average of 110 earthquakes per year have been recorded by the Queensland seismic network (Earth Systems Science Computational Centre [ESSCC] 2012). Most were of very low magnitude. Over the last century, there have been 17 earthquakes of magnitude six or greater, including one in Central Queensland in 1918 that caused property damage in Rockhampton.

The potential for earthquakes to occur within or surrounding the Project has been determined as low. There has been one earthquake recorded within a 100 km radius of the Project area since 1990 to May 2017. This earthquake occurred in 1992 approximately 55 km south of the Project area. The closest recorded earthquake that was a magnitude above 4 occurred off the coast of Yeppoon, approximately 160 km east of the Project, in 1998. This earthquake measured a magnitude of 4.7.

As the Project area is considered geologically stable, it is highly unlikely that an earthquake of a magnitude that could adversely impact the Project would occur within or surrounding the Project area and as such has not been accounted for within design.

21.4.1.2 Landslides

The Livingstone Shire Planning Scheme (2018) OM18 – Landslide Hazard Area mapping identifies the Project area occupying land where there is no identified landslide hazard. The topography within the Project area and immediate surrounding area is generally flat to gently undulating (Figure 21-3). In general, topographic relief is quite flat, with only a very small minority of the site having an instantaneous surface slope of greater than 12% (see Figure 21-3). The State Planning Policy states that the potential for landslides occurs when a slope is 15% or greater (DILGP 2017). As such, that the risk of a landslide occurring is low.

Any landslide hazard during construction and operation shall be minimised by practicing erosion and sediment control best practice, including but not limited to reducing batter slopes, providing greater than 70% ground cover, minimising stockpile heights and diverting up gradient surface water around disturbed areas.

Considering the topographic nature in conjunction with the soil features of the Project, area it is unlikely that the Project area will be subject to severe landslides.

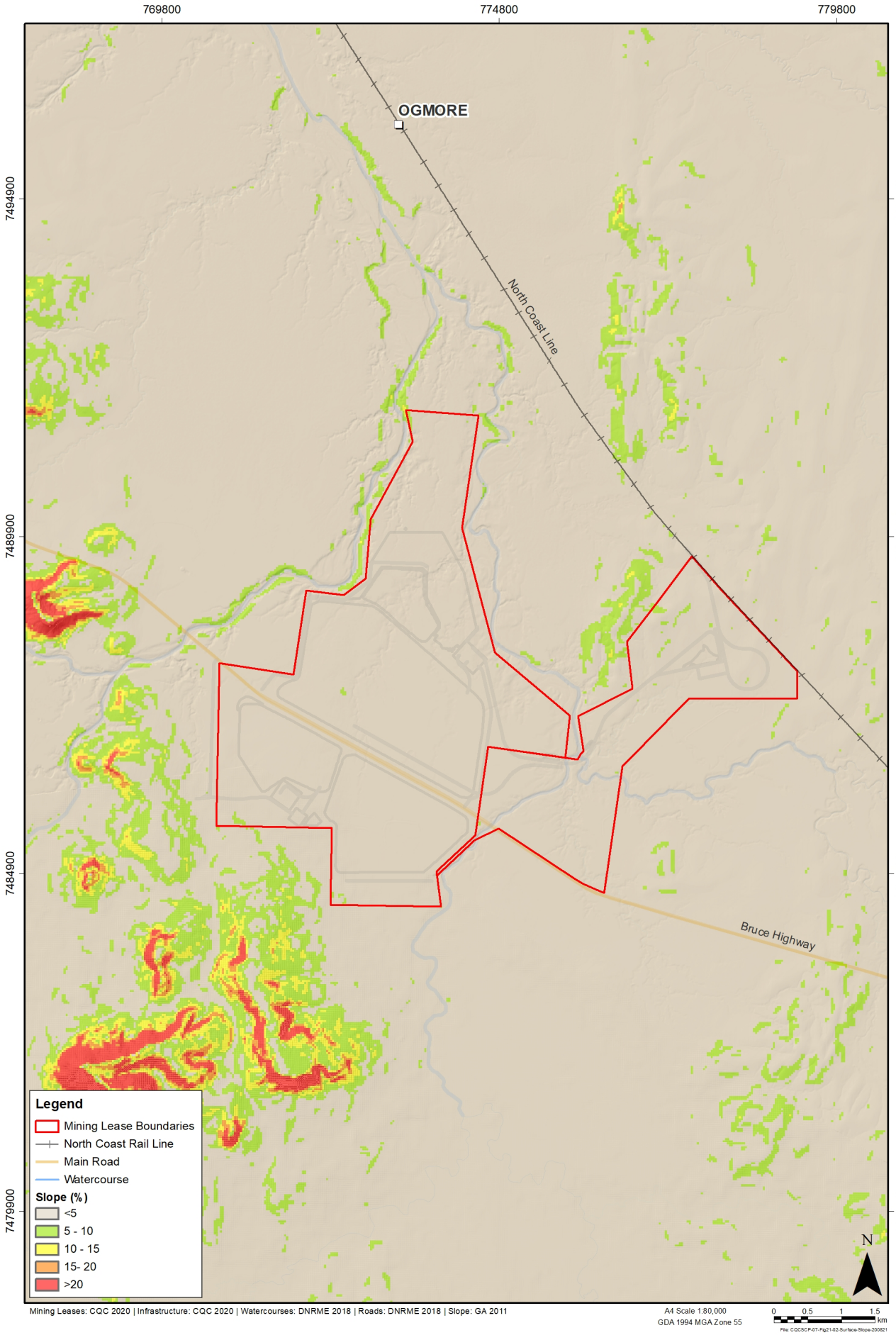


Figure 21-3: Surface slope analysis

21.4.1.3 Bushfires

The bushfire danger period in the Project area is spring (Figure 21-4); however, the actual danger period is determined by the existing seasonal weather conditions. The Livingstone Shire Planning Scheme (2018) OM12 – Bushfire Hazard Area mapping identifies the Project area primarily occupying land that is not identified as a bushfire hazard area (Figure 21-5). Given the extensive clearing of remnant vegetation to support cattle grazing and the gentle to undulating landscape, the area is assessed as having a 'low' and 'medium' bushfire threat.

Specific procedures will be outlined in the ERP to respond to the event of a bushfire. With the provision of management measures outlined in Table 21-5 the risk of bushfire starting or impacting the Project area is expected to be reduced. The ERP developed for the Project will include details of provisions for site access roads, for firefighting and emergency vehicles, as well as the safe evacuation of staff in the event of an emergency.

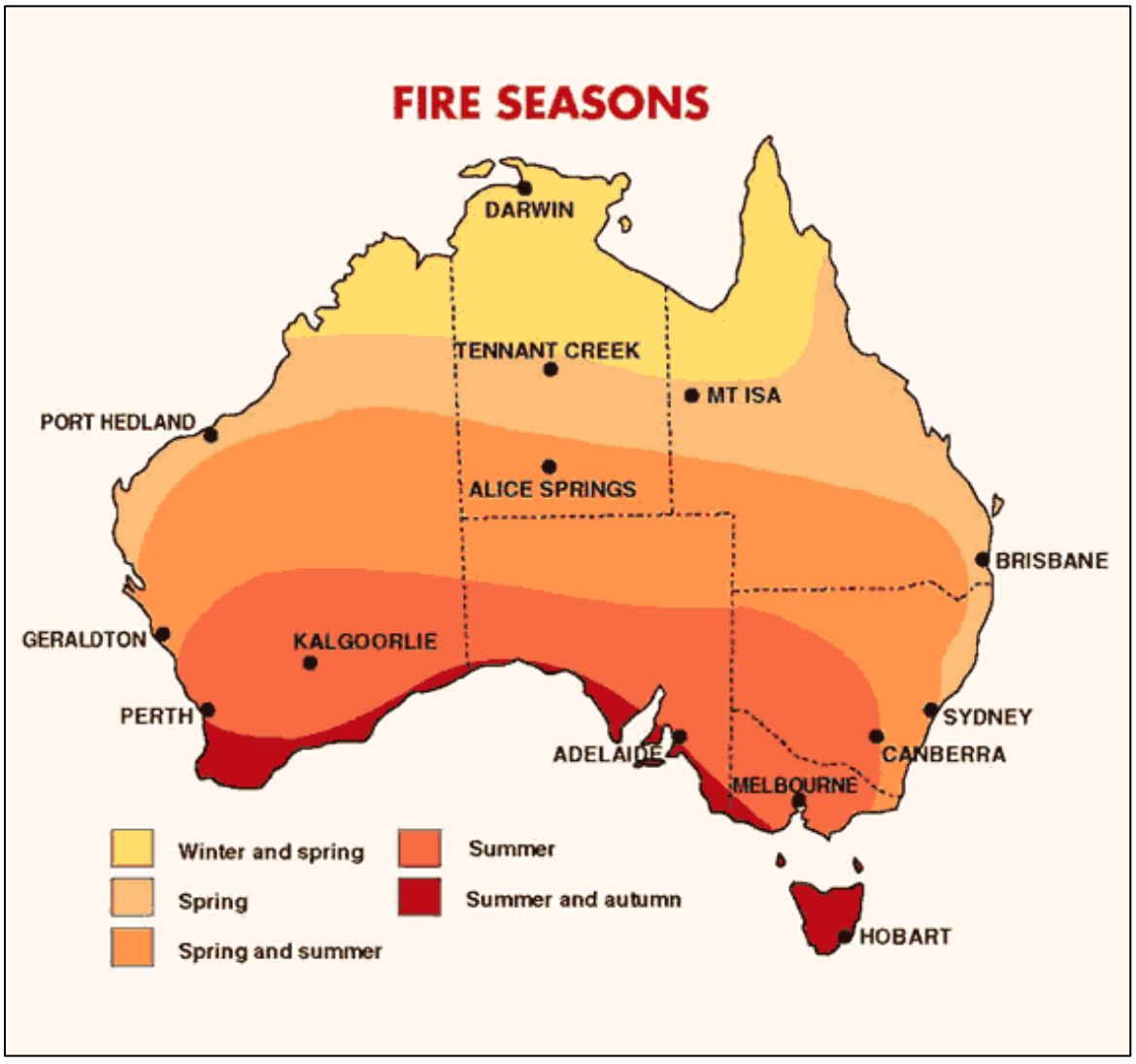


Figure 21-4: Australian bushfire threat

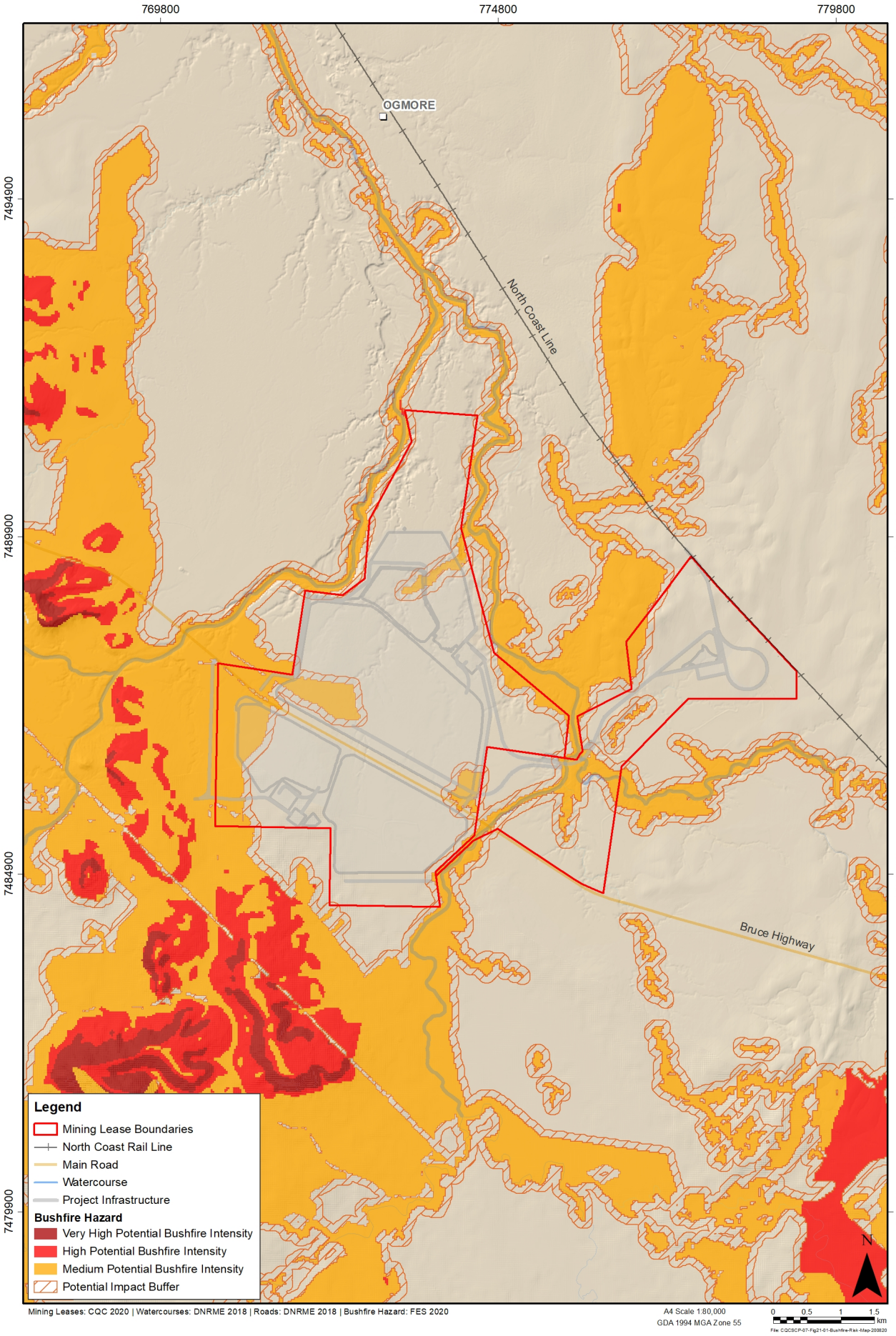


Figure 21-5: Livingstone Shire bushfire risk map

21.4.1.4 Sea Erosion and Storm Tides

According to the Livingstone Shire Council (2018) mapping the site is not:

- a flood hazard area (OM17 Flood Hazard Area mapping)
- a storm tide hazard area (OM14 Coastal Hazard - Area Storm Tide Area) and
- an erosion prone area (OM13 Coastal Hazard Area – Erosion Prone Area mapping).

Downstream of the Project area, the State's Development Assessment Mapping System indicates sections of Deep Creek and Tooloombah Creek are potentially subject to 'medium' level impacts from storm tide inundation (Figure 21-6).

Flooding events occur during the wet season, with the Styx River containing most of the flow within the channel and overbank before overflowing into the floodplain areas. Within the vicinity of the Project, Deep Creek and Tooloombah Creek are incised with channel depths of more than 5 m. Tooloombah Creek is well-defined with little evidence of floodplain discharges while Deep Creek demonstrates numerous locations of floodplain discharges evident by the erosion on the bank and lack of vegetation.

Extreme flood events have the potential to fill open cut pits. In these events the disposal of this volume of water presents significant problems to mining operations. Prolonged rainfall over Queensland's mining regions during the 2010 / 2011 wet season severely affected the industry. Eighty-five per cent of Queensland coal mines had to either restrict production or close entirely (Queensland Floods Commission of Inquiry 2012). However, this was an unusually wet year[4].

In terms of proximity of cyclones to the Project area, during the 47 year period from 1969 to 2016, eight cyclones were recorded within 100 km of the Project and one, Tropical cyclone *Fiona*: February 1971 (red line), within 50 km (see Figure 21-7). In March 2017, Tropical cyclone *Debbie* hit the coast of Queensland just north of the Project as a Category 4 cyclone and tracked inland (Figure 21-7). Tropical cyclone *Debbie* did not track within 50 km of the Project; however, the low-pressure system associated with the cyclone resulted in high wind speeds of up to 76 km/hour at St Lawrence and significant rainfall of up to 145.4 mm (BoM 2017). Notwithstanding that only one cyclone has been recorded with 50 km of the Project area since 1969, the risk of direct impacts to the Project area as a result of a cyclone exists.

Water used in, or resulting from, mining operations is likely to come into contact with contaminants, such as salts and metals. Thus, it will often be of lower quality than fresh water in rivers and creeks. There is significant community concern in the release of coal affected waters on the community health and safety values which is discussed in Chapter 20 – Health and Safety.

Water will be managed on site via a number of dams, catchment diversion drains, levees and pipes.

[4] During this wet season there were 10 tropical cyclones, which is near the long term average of 11 events per wet season (BOM 2020). However, five of the tropical cyclones during 2010–11 were in the severe category, which is above average. Furthermore, at least 29 systems developed into tropical depressions (one level below a tropical cyclone). This is well above the number of tropical depressions observed in any tropical cyclone season in the Australian region since at least the mid-1990s. In addition, three of the tropical cyclones (*Tasha, Yasi and Anthony*) crossed the Queensland coast in the 2010–11 season.

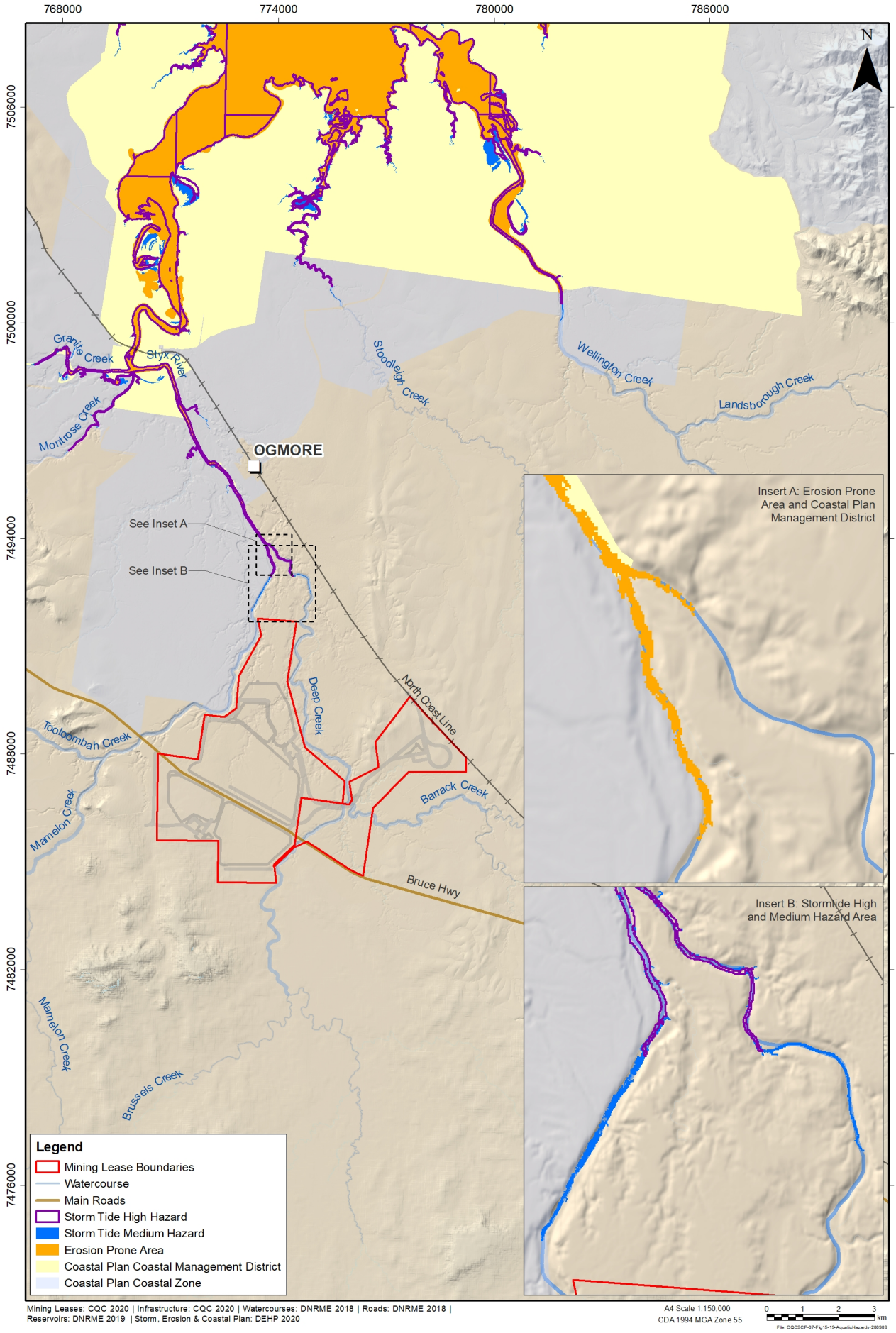
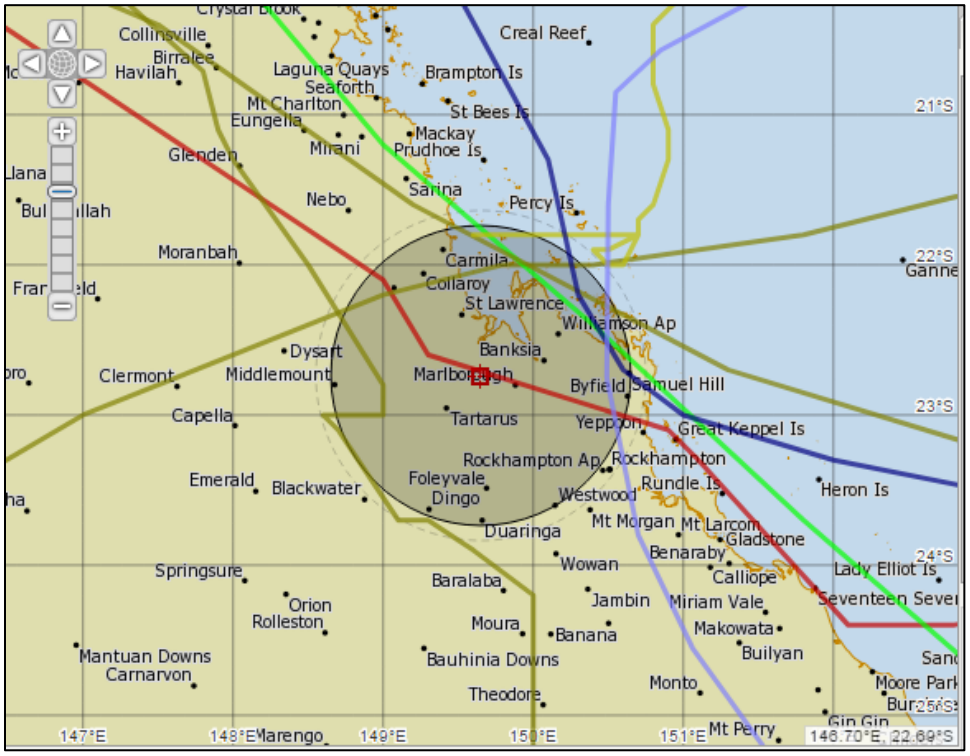


Figure 21-6: Coastal zone, management district, storm tides, hazard and erosion prone area



Source: BoM 2020

Figure 21-7: Occurrences of tropical cyclones within 100 km of the Project between 1969 and 2018

During wet climatic conditions, controlled releases from Dam 1 to Deep Creek will be required to prevent excessive accumulation of water within the site storages and minimise the risk of uncontrolled discharges to the receiving environment. Releases will only occur during flow events in Deep Creek.

To manage the risks from flooding, a mine water management system has been developed (see Chapter 9 – Surface Water). A system of flood protection levees and diversion drains has been developed to prevent ingress of clean water runoff to pits for up to and including the 1% annual exceedance probability (AEP) rainfall event. This provision reduces the volumes of water entering pits and becoming contaminated, and hence reduces the storage requirements of pit dewatering dams. All regulated dams are conceptualised in accordance with EHP guidelines and include storage provisions to reduce the probability of non-controlled discharges of contaminated water from dam failure or overtopping during extreme rainfall events or wet seasons. Water held in pit dewater dams is prioritised for reuse in mine operations, which reduces the net raw water demand from external sources. Environmental dams are located downstream of stockpiles and disturbed areas to reduce sediment loads entering the watercourses and controlled discharges reduced to a contingency measure and subject to Environmental Authority (EA) conditions.

21.4.2 Coal Hazards

The adverse impacts of coal hazards on the Project area have been assessed. The properties of coal and the mining methods have the potential to cause hazardous events, through spontaneous combustion, explosions and the inhalation of coal dust. The potential Project hazards have been identified in Table 21-6. A management system will be developed, with consideration of the NSW Spontaneous Combustion Management Guideline (Industry and Investment NSW 2011) to

minimise the risk of spontaneous combustion occurring and to manage the risks should spontaneous combustion occur.

Table 21-6: Coal hazard identification

Facility/event	Cause	Possible consequences	Prevention/detection required
Coal Hazards			
Spontaneous combustion – coal stockpiles	• heat generated from oxidation within coal stockpiles.	• bushfires • air quality degradation and health impacts to workers • damage to infrastructure and • injury or death.	• accumulations of carbonaceous materials in roadways are to be avoided • extraction of as much of the coal seam as possible • design and mining methods to reduce risk for open cut mining • routine monitoring of the coal stockpiles • stockpile compaction • minimising the coal stockpile stagnancy through turning stockpiled materials and • testing of Raw & Product Coal to ascertain the likelihood of an event and the prevailing ambient conditions.
Spontaneous combustion – waste rock stockpiles	• heat generated from oxidation within coal and waste rock stockpiles.	• bushfires • air quality degradation and health impacts to workers • damage to infrastructure and • injury or death.	• battering of spoil piles where practical to reduce angles and increase compaction • reducing dump and stockpile heights to reduce size segregation • degree of surface compaction - (low dump height produces greatest compaction) • planning waste rock stockpiles so that inert material is dumped over the top of carbonaceous materials • increasing topsoil so soil organisms will increase oxygen • uptake at the surface of spoil and reduce oxygen ingress into spoil • topsoil handling to maximise biological values is important in achieving optimum re-vegetation and

Facility/event	Cause	Possible consequences	Prevention/detection required
			maximum depletion of oxygen and • increasing the degree of re-vegetation. Stability of spoil is important in maintaining coherence of surface protection layers. This also reduces oxygen ingress.
Release of coal dust – during coal handling and processing	• breaking of coal through movement or crushing / processing • blasting and • wind generated from machines or work activities.	• respiratory disease • coal workers' pneumoconiosis and chronic obstructive pulmonary disease • lung impairment, disability and premature death • potential to lead to cancer and • decreased visibility leading to injury.	• dust suppression • dust monitoring • provide and make mandatory use of personal protective equipment and • removal of dust accumulation through equipment and plant design.
Explosion of combustible dust or gases	• dust generated from machines and • mechanical errors from improperly used or malfunctioning mining equipment (such as safety lamps or electrical equipment).	• fires • injury or death • air quality degradation and health impacts and • damage to infrastructure.	• dust removal procedure • dust suppression and • equipment design.

21.4.2.1 Spontaneous Combustion of Product Coal

Coal is a combustible material that will naturally oxidise when exposed to air by exothermic reaction processes (Busfield 2012). When sufficient heat from the oxidation is generated to ignite the coal, then coal will burn (Busfield 2012). This spontaneous combustion can occur in thermal coal waste areas, coal pillars or coal stockpiles. During the operations phase, coal stockpiles may combust spontaneously resulting in fire and smoke, having the potential to pose a health and safety risk to onsite workers. Coal dust explosions can also occur in the open pits from a build-up of coal dust which is ignited from exhausts or lightning strikes.

Testing coal for propensity for spontaneous combustion is useful although there are limitations in its validity. Better hazard analysis is obtained from appreciation of the characteristics of spontaneous combustion and an understanding of the places in the mine where heating may develop. Spontaneous combustion is a more prevalent risk in thermal coal stockpiles but can also occur in low grade coking coal.

Unless there are attempts to monitor temperature changes within the heaps, spontaneous combustion is more likely to be detected in an advanced stage by smell, visual observation of shimmering (heating) of the air above the heap, or smoke and flames when the coal is loaded out.

The off-site risk from spontaneous combustion of a coal stockpile includes impacts to air quality and ignition of a bushfire. Central Queensland Coal will develop a management system to minimise the risk of spontaneous combustion occurring and to manage the risks should spontaneous combustion occur. These procedures would include routine monitoring of the coal stockpiles, stockpile compaction and minimising the stockpile stagnancy. A Bushfire Management Plan will also be prepared (see draft Environmental Management Plan in Appendix 12).

21.4.2.2 Spontaneous Combustion of Waste Rock Material

In pit emplacement areas are more susceptible to spontaneous combustion due to the inherent mixing that occurs through the mining process of the various waste materials removed. Consequently, managing spontaneous combustion in active spoil areas can prove to be difficult at times, dependent upon the location of outbreaks. If outbreaks occur in inaccessible areas, management of these areas involves visual monitoring prior to developing accesses into the areas for remediation works to be undertaken. If outbreaks occur in readily accessible areas, these access problems are not encountered, and remediation can be planned and undertaken with minimal changes to operations at the time.

Several factors have been identified over time, as being the most appropriate management tools to be utilised in reducing active spontaneous combustion or self-heating of areas. These include the following:

- battering of spoil piles where practical to reduce angles and increase compaction
- reducing dump and stockpile heights to reduce size segregation
- degree of surface compaction (low dump height produces greatest compaction)
- planning waste rock stockpiles so that inert material is dumped over the top of carbonaceous materials
- increasing topsoil so soil organisms will increase oxygen
- uptake at the surface of spoil and reducing oxygen ingress into spoil
- topsoil handling to maximise biological values is important in achieving optimum re-vegetation and maximum depletion of oxygen and
- increasing the degree of re-vegetation.

Stability of spoil is important in maintaining coherence of surface protection layers. This also reduces oxygen ingress.

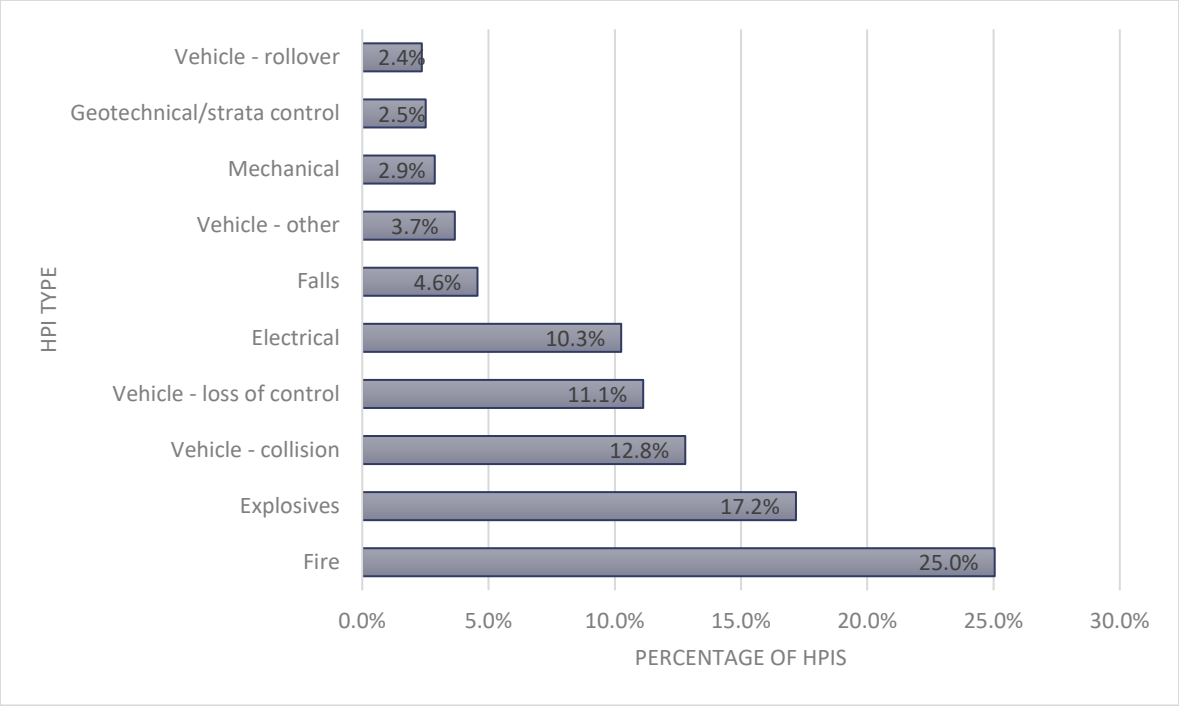
21.4.2.3 Respirable Dust

Dust is a by-product of the coal mining process, which is caused by the breaking of coal (Busfield 2012). Invisible dust, which is made of small particles, creates a risk to respiration (Busfield 2012). With long-term exposure, serious lung disease can eventuate. The health and safety risks associated with respirable dust are examined in greater detail in Chapter 20 – Health and Safety and are addressed in the Air Quality Management Plan included in the draft EMP (Appendix 12). This plan will be further developed prior to construction in conjunction with approval and EA conditions.

21.4.3 Major Operational Hazards

Major operational hazards that may occur because of the mine construction and operation have been assessed. Major operational hazards have the potential to cause significant damage to

property with the possibility to result in fatalities. There were two fatal injuries in the surface coal mining industry in Queensland in 2018-2019 (DNRM 2019) compared with one in 2018-17. There were 34 permanent incapacities reported for 2018-2019 from surface coal activities. As presented in Figure 21-8, fire, use of explosives and vehicle use were the three leading high potential incidents at surface coal mines. A high potential incident (HPI) is defined in the CMSH Act as an event, or a series of events, that causes or has the potential to cause a significant effect on the safety or health of a person.



Source: DNRM 2019

Figure 21-8: High potential incidents at surface coal mines 2018-2019

Major operational hazards that have the potential to occur are identified in Table 21-7.

Table 21-7: Major operational hazard identification

Facility/event	Cause	Possible consequences	Prevention/detection required
Major Operational Hazards			
Electrocution	• contact with concealed and live overhead power sources and power lines • lightning strike • equipment failure and • open wires.	• injury or death • explosions • burns • electrical fault leading to mine and equipment failure and • fire.	• anti-static clothing • earthing • appropriate equipment design • mine emergency planning procedures • maintenance if electrical equipment, power sources and power lines and • appropriate location of electrical equipment.

Facility/event	Cause	Possible consequences	Prevention/detection required
Dam failure	• equipment failure • dam design and • erosion and slumping.	• injury or death and • stockpile damage.	• designed to Australian National Committee on Large Dams standards and • annual integrity inspections.
Vehicle or equipment collisions or crushing	• rail haulage failure • personnel transport accident • driver fatigue • vehicle or equipment failure and • heavy and large loads.	• injury or death and • crushing, contusion and fracture injuries.	• adherence to licensing and training requirements • adequate signage and lighting • speed limits (particularly in the transport corridor) • safe operating procedures • adequate worker rest and • traffic procedures.
Explosion	• build-up of methane and excessive heat and • open flames.	• injury or death • bushfires • destruction of property and • mine failure.	• temperature reduction and • monitoring of gas levels.
Toxic atmosphere	• damage to gas and toxic storages.	• asphyxiation and • injury or fatality.	• correct use of gas.
Contamination	• improper storage of chemicals • damage to chemical storage and • equipment failure.	• injury or death • contamination of soils and / or surface water and • chemical explosion resulting in property damage and injury or death.	• protection of chemical storages and • correct identification and location of chemicals and hazardous substances.
Wall collapse	• inappropriate mine design and construction • equipment failure and • natural hazard event such as earthquake.	• injury or death • crushing, contusion and fracture injuries and • destruction to property.	• mine design • appropriate evacuation and emergency procedure • appropriate and adaptable rescue procedure and • equipment repair procedure.
Fires	• chemical reaction • spontaneous combustion • open flame • faulty equipment and • improper cigarette disposal.	• injury or death • bushfires and • destruction of property.	• provision of fire protection equipment • firefighting equipment and • provision of fire suppression system.

21.4.3.1 Electrocution

Electrocution accounted for 10.3% of high potential incidents in 2018-2019 at surface coal mines (DNRM 2019). Electrocution has the potential to cause fires or lead to death. Anti-static clothing as well as equipment and cable maintenance will be implemented.

21.4.3.2 Dam Failure

All proposed storages and levees have undergone a preliminarily consequence category assessment against the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/1933 Version 5.01) (DES 2016) to determine the minimum hydraulic performance requirements and provisions for prevention of dam failure or discharge of contaminants from overtopping.

The assessment is provided in the Preliminary Dams Consequence Category Assessment in Appendix A5e.

The assessment considered each of the following failure event scenarios:

- 'Failure to contain – seepage' – spills or releases to ground and/or groundwater via seepage from the floor and/or sides of the structure.
- 'Failure to contain – overtopping' – spills or releases from the structure that result from loss of containment due to overtopping of the structure.
- 'Dam break' – collapse of the structure due to any possible cause.

Dam 1 was classified under the 'High' consequence category for the dam break scenario and 'Significant for the failure to contain scenario, and so is classified as 'High' and is a regulated structure. Environmental Dams 1B and 1C, Dam 4 and the levee were classified under the 'Significant' consequence category for the 'failure to contain' and dam break' scenarios. Levees were determined to be regulated structures and hence must have a crest elevation higher than the peak 0.1% AEP flood level.

The 'failure to contain – seepage' scenario has a minimum classification of 'significant' in the consequence manual. Leak detection and monitoring may be imposed through EA conditions for regulated dams containing contaminants, such as the MIA dams, Dam 4 at the TLF, and Dam 1 receiving the pit dewatering.

Only dams with an embankment height of greater than 10 m may be categorised as 'referrable', thus requiring a Failure Impact Assessment (FIA). Dam 1 could possibly fall within this category, pending the outcomes of further assessment and final detailed design. The dam FIA, if required, will be undertaken as outlined in the 'Guidelines for Failure Impact Assessment of Water Dams' (DNRME 2018). The population at risk (PAR) determined by the FIA will inform the failure impact category that applies to the dam and subsequently the minimum design requirements outlined in applicable Australian National Committee on Large Dams guidelines. The chief executive will then impose dam safety conditions, which are likely to include the following:

- the provision of design and construction reports
- the preparation of an Emergency Response Plan as prescribed by the Department of Energy and Water Supply (DEWS) guideline for referable dams
- the production of Operation and Maintenance Manual procedures in accordance with Queensland Department of Natural Resources, Mines and Energy (DNRME) guidelines and
- development of standard operating procedures.

It is not anticipated that any of the dams conceptualised herein will create a PAR due to the sparse population density. The nearest homestead within the floodplain of the Styx River (Bowman Homestead) is greater than 2.5 km downstream of any of the storages.

Coarse rejects and fines from the CHPP are to be stored in an in-pit co-disposal cell. There is therefore no tailings storage proposed.

A more detailed summary of the consequence assessment outcomes is given in Chapter 9 – Surface Water.

21.4.3.3 Vehicle or Equipment Collisions or Crushing

Over the five year period from 2014 to 2018, 60 per cent of worker fatalities (555 fatalities) involved vehicles (Safework Australia 2018). This is the single biggest fatality hazard within the workforce. Open cut mining involves 500 t and 350 t excavators, crusher dump hoppers, tracked dozers, graders, water trucks and 240 t and 180 t haul trucks. The coal handling and processing involves transport conveyors, sizing stations, feed bins, wash plants, D double haul trucks, haul trucks to return waste to the co—disposal cells and train loading facilities. Further discussion of the mining and product handling processes can be found within Chapter 1 – Introduction and Project Description.

21.4.3.4 Explosions

There are two key initiating events for explosions in coal mines; spontaneous combustion (see Section 21.4.2) and methane explosions. Methane explosions occur due to a build-up of methane gas contacting a heat source in association with a reduced air environment that is unable to dilute the gas level below its explosion point. Hybrid explosions consisting of a combination of methane and coal dust can also occur. Explosions in surface processing facilities are caused by accumulations of flammable gas and / or combustible dust mixed with air in the presence of an ignition source. While much progress has been made in preventing explosion disasters in coal mines, explosions still occur, sometimes producing multiple fatalities. Gas ignition explosions have accounted for some 147 incidents worldwide which has caused 9,855 fatalities (MacNeill 2008).

Explosions, particularly because of flammable gas have the potential to cause significant impact on the immediate and surrounding areas. Excessive heat and open flames, as well as the improper storage of gas and chemicals, can lead to gas explosions. The Project will store several flammable gases and liquids including acetylene, diesel fuel and hydraulic oils.

21.4.3.5 Toxic Atmosphere

Toxic substances can affect people in many ways and the seriousness of the exposure will be highly dependent on the sensitivity of the individual and on the duration of the exposure. Toxic gases can cause harm in low levels over extended periods of time (chronic exposure) or in higher concentrations over a short period of time (acute exposure). Toxic impacts may result from a build-up of gases in an enclosed place, such as the release of a chemical from the storage. A risk is defined based on three criteria, (i) depending upon type of gas, (ii) ignition temperature of the gas, and (iii) likelihood of gas being present in flammable concentrations.

21.4.3.6 Contamination

Improper storage of chemicals, damage to chemical storage areas and equipment failure can lead to chemical leakage. The release of hazardous chemicals has the potential to cause harm to the immediate and surrounding areas resulting in contamination of soils or water which can cause

illness or injury through chemical exposure. Protection of chemical storages and correct identification and location of chemicals and hazardous substances will decrease the likelihood of leakage of chemicals from occurring.

21.4.3.7 Fires

Fire is a leading cause of high potential incidents at surface coal mines (see Figure 21-8). During 2018-2019, 25% of high potential incidents at surface coal mines were fire related (DNRM 2019). To reduce the likelihood and impact of fires, fire protection equipment, firefighting equipment and provision of fire suppression systems will be implemented and provided.

21.4.4 General Worksite Hazards

This section details the general worksite hazards which are likely to be associated with the normal day to day activities of the mine during construction and operation. General worksite hazards are identified in Table 21-8.

Table 21-8: General worksite hazard identification

Facility/ event	Cause	Possible consequences	Prevention/detection required
General Worksite Hazards			
Working at heights	• failure of personal safety equipment • adverse environmental conditions such as wind and rain • inadequate assessment of working area • worker misjudgement • inadequate design and construction of the mine and • safety equipment being wrongfully used.	• injury or death	• appropriate and detailed assessment of environmental conditions • restrict work in adverse conditions • risk assessment of work area by competent person • provision of appropriate training • selection and use of appropriate personal safety equipment including scaffolding and safety harnesses and • ongoing training and safety awareness.
Falling objects and impacts of projectiles	• adverse environmental conditions such as wind and rain • disintegration of moving parts • persons throwing objects • incorrect use of explosive hand tools and • improper storage of objects.	• injury or death and • damage to or destruction of property.	• inclusion of a falling object protection system, including on mobile equipment • selection and use of personal protection equipment • engineering design and construction • employee training • correct design of explosive power tools and • disciplined worker behaviour.

Facility/ event	Cause	Possible consequences	Prevention/detection required
Human fatigue	• overwork • less than adequate sleep leading to acute sleep loss and impairment • commute before and after shifts • extended shifts • individual medical and • psychosocial or other factors.	• injury and • human error.	• risk based journey management / fatigue management plans and • regular breaks.
Self-harm	• working away from family and friends • inadequate and unsupportive workplace and conditions • fly-in fly-out working conditions • workplace bullying • repetitive tasks and • physiological impairments.	• injury or death and • injury to others.	• awareness programs and campaigns • support groups • employee assistance program • provision of a suicide help line • periodic health assessment • pre-employment health assessment and • anti-bullying policy.
Disease vectors (such as insects and rodents)	• spread of disease through insects and rodents • inadequate sanitary control • inadequate insect and pest control • substandard sanitation and waste disposal and • ponding of water conducive to insect environment.	• spread of disease • infection and • insect and pest outbreak.	• correct disposal of waste • ensure no ponding of dirty water • regular insect and pest inspections • maintenance of facilities and hygienic state and • provision of personal protective equipment.
Fitness for duty	• less than adequate sleep • consumption of alcohol causing behavioural, psychomotor or other effects • prescription drugs • illicit drugs	• injury or death and • losses in concentrati on leading to mine failure.	• job design to consider fatigue • supervisor training and skills in monitoring fitness for duty • management of sleep opportunity • employee assistance program • mental health strategies • education • prohibition of alcohol consumption onsite

Facility/ event	Cause	Possible consequences	Prevention/detection required
	• psychological impairment and • physical impairment.		• random mandatory testing for alcohol and illicit drugs • workforce based health promotion and assessment programs • periodic health assessment and • pre-employment health assessment.
Body stressing	• repetitive work and movements from manual tasks and • lifting, sustaining postures.	• injury and • human error.	• ensure regular breaks are taken • encourage the seeking of help early when symptoms are first felt and • regular health and fitness checks.
Disease and illness	• inadequate facilities (bathing and washing) • inadequate first aid • inadequate sanitary control • substandard water control and • inadequate sanitation and waste disposal.	• spread of disease or illness.	• clean hygienic bathing facility and hand washing facilities • correct disposal of waste • maintenance of facilities and hygienic state • maintain adequate supplies of first aid and personal protective equipment • ensure employee competence in administering first aid • provision of adequate toilet facility • hygienic first aid facilities • water supplied at acceptable standard • drinking water to be potable and • monitoring and testing of water.
Encounter with or bite from biting insect or dangerous fauna	• environment conducive to biting insects and dangerous fauna • inappropriate sanitation and waste disposal • inadequate first aid • slow first aid and response timing and • inadequate first aid.	• spread of disease and • injury or death.	• correct disposal of waste • maintenance of facilities and hygienic state • maintain adequate supplies of first aid and personal protective equipment and • ongoing safety training and awareness programs.
Exposure to heat	• excessive heat from welding • excessive heat from weather and the environment and • dehydration.	• injury or death.	• shielding • ventilation • correct selection and use of personal and protective equipment • shade • worker hydration and • rest.
Incorrect manual handling	• carrying of loads (heavy and light)	• injury	• equipment design • limit load size

Facility/ event	Cause	Possible consequences	Prevention/detection required
	• incorrect lifting techniques • repetitive movements • pushing and pulling and • incorrect storage of loads.	• damage to property and • injury to others.	• provision of carrying points and devices • personal protection equipment • weight identification and labelling • correct storage of loads • provision of lifting devices • use of lighter equipment • adequate rest and breaks and • early diagnosis.
Excessive noise levels	• exposure to excessive noise levels.	• injury and • hearing loss and impairment.	• design and specification of building • design and specification of equipment • hearing conservation program • periodic monitoring of work areas • equipment selection criteria • limit of personal exposure • provision of personal protective equipment, including mandatory use of protective ear-muff devices • noise attenuation devices on equipment and • noise barriers.
Slipping and tripping	• inadequate storage of equipment • incorrect clothing and • incorrect construction and design of surfaces.	• injury or death and • damage to property.	• housekeeping of floor surfaces and walkways • provision of properly fitting clothing • safety footwear • clear marking of walkways • suitable construction of walkways • suitable design of lighting systems • provision of guardrails • maintenance of floor surfaces and • warning sign for maintenance work.

21.4.5 Dangerous Goods and Hazardous Substances

A hazardous material is a material which, in sufficient quantities, has the potential to cause harm to people, property or the environment due to its chemical, physical or biological properties. The construction and operation of the Project will involve the storage and handling of dangerous goods and hazardous substances. The full range of hazardous substances that may be handled, stored and used during the various phases of the Project will not be finalised until detailed planning for the mine has been completed. A preliminary assessment of the nature and quantity of materials to be handled or stored as part of the Project has been undertaken to determine the hazardous materials that may pose an offsite impact. The findings are presented below.

21.4.5.1 Preliminary Hazard Analysis

As part of the preliminary risk screen, the quantities of all classes of hazardous substances included in the proposed development and any adjacent existing inventory must be assessed. Quantity information has been provided in Table 21-9.

In the absence of appropriate Queensland guidelines, the NSW Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (Department of Planning [NSW] 2011a) have been adopted and provide screening thresholds for hazardous substances. These thresholds identify the maximum quantities of dangerous goods. Storages above these thresholds pose an onsite and offsite risk. If any of the screening thresholds are exceeded the proposed development is to be considered 'potentially hazardous industry' and SEPP 33 applies, which requires further assessment.

It is likely other dangerous goods may be required during the construction and operational phases of the Project. In the event this occurs, existing Standard Operating Procedures will be reviewed to ensure safety processes and storage and handling procedures are adequate and conform to AS 1940-2017.

21.4.5.1.1 Ammonium Nitrate – Fuel Oil

It is estimated that 18,600 t/year of ammonium nitrate and emulsion on average will be required for blasting events. Ammonium nitrate and emulsion has the potential to be combustible at high temperatures. It is considered slightly flammable to flammable in the presence of heat, combustible materials or organic materials. It is non-flammable in the presence of shocks. Ammonium nitrate poses potential acute health effects, as it hazardous when it contacts the skin or eye. It is also hazardous when ingested or inhaled.

21.4.5.1.2 Diesel Fuel

Diesel fuel will be required for vehicle use during all phases of the Project. Diesel will be stored in bunded tanks at the onsite fuel farm. The capacity of the fuel farm is anticipated to be 1,200,000 L, to provide a five day storage capacity. Diesel is a highly volatile and combustible substance which has the potential to cause damage if not handed and stored properly. Diesel fuel can cause skin irritation and eye damage. Diesel fuel is toxic when ingested or inhaled.

Table 21-9: Indicative list of hazardous substances

Chemical name	DG Class[1]	UN number[2]	Packing group[3]	Raw/storage concentration (WT%)	Maximum quantity stored	Approximate rate of use	Screening threshold (SEPP33)	Purpose/use
Detonators, primers, boosters and detonating cord	1.1B	0029 0030 0042 or 0065	N/A	N/A	2 x 10,000 detonator magazines (20kg/0.02 t) and 1 x 10 t magazine	TBC	300 m from the boundary of the ML	Blasting for construction and operations
Bulk explosive including Ammonium nitrate – Fuel Oil (explosive, blasting, Type B or Agent blasting Type B)	1.1D 1.5D	0082 or 0331	N/A	N/A	Mixed onsite. None stored	18,600 t/year	N/A	Blasting for construction and operations
Diesel fuel	3 (Class C1) 1	1202	III	N/A	1,200,000 L	53.7 ML/y	N/A	Fuel for vehicles and mobile equipment during all phases
Lubrication/ hydraulic oils	3 (Class C2) 2	N/A	N/A	N/A	45,000 L	805,000 L/y	N/A	Hydraulic oils to lubricate plant and equipment during all phases
Solvents and thinners	3	1090	II	99.5	300 L	50 L/month	N/A	Degreasing agent during construction and operation
Paints	3	1263	III	N/A			N/A	Paint during construction and operations

Chemical name	DG Class[1]	UN number[2]	Packing group[3]	Raw/storage concentration (WT%)	Maximum quantity stored	Approximate rate of use	Screening threshold (SEPP33)	Purpose/use
Batteries	8	2794 2796	II	N/A	20 large batteries and 50 L of acid	N/A	25 t (Package II)	Light and heavy vehicles during all phases
Sulfuric acid (H_2SO_4)	8	2796	II	15-51		N/A	25 t (Package II)	100% concentration for dilution with deionised water to 40% when used in batteries
Waste oil	N/A	N/A	N/A	N/A	N/A	10,000 L/y construction 100,000 L/y operations	N/A	From equipment / machinery
Used vehicle tyres	N/A	N/A	N/A	N/A	N/A	15 t	N/A	Spent tyres from mine vehicles

1 **DG Class** = Dangerous Goods class means the hazard class of the dangerous goods as stated in the ADG Code.

2 **UN numbers** = Four-digit numbers that identify hazardous substances and articles (such as explosives, flammable liquids, toxic substances, etc.) in the framework of international transport. UN numbers range from UN0001 to approximately UN3500 and are assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods. They are published as part of their *Recommendations on the Transport of Dangerous Goods*.

3 **Packaging Group** = Assigned to dangerous goods (other than Class 1, 2 and 7) according to the degree of risk the goods present (PGI – great danger; PGII – medium danger; and PGIII – minor danger).

21.4.5.2 Hazard Identification

The hazards associated with dangerous goods and hazardous material within a coal mining operation are described at Table 21-10.

Table 21-10: Dangerous goods and hazardous substances hazard identification

Facility/event	Cause	Possible consequences	Prevention/detection required
Explosion of chemical substance, flammable and combustible liquid and flammable gas	• excessive heat • incorrect storage • exposure to naked flame and • poor storage design.	• injury or death and • damage to property.	• safe use • heat reduction • adherence on to storage guideline and design • correct disposal • correct use of liquid and • safety data sheets register.
Contamination of soil and water	• improper training and • disposal not in conjunction with codes and standards.	• injury or death and • damage to property.	• safe disposal procedures will be implemented • design and construction of storage areas and bunds will be in accordance with AS 1940 • hazardous substances register and • safety data sheets register.
Explosion or fire or leakage from a transport accident involving transportation of hazardous substances	• transport mishap and • improper training.	• injury or death • bushfire and • contamination of waterways and water supply.	• ensure operators are appropriately licensed and competent • ensure the correct storage of the hazardous substances • design of transportation • traffic procedures involving proper signage and speed limits and • safety data sheets register.
Toxic exposure	• improper training and • disposal not in conjunction with codes and standards.	• injury or death and • damage to property.	• adequacy of storage facilities • design and construction of storage areas and bunds will be in accordance with AS 1940 • hazardous substances register and • safety data sheets register.
Unexpected detonation	• transport mishap • tampering by personnel	• injury or death	• employee training and competence

Facility/event	Cause	Possible consequences	Prevention/detection required
	• stray current initiation • static electricity • stability deterioration due to age • rough handling of primer (during transport preparation, charging and dealings with misfires) • rough handling of detonator • personnel incompetence • chemical reaction of explosives with charged ground • drilling, cutting or loading material containing misfired explosives • incorrect loading procedure • incorrect primer preparation • incorrect selection of explosive type to suit unusual ground conditions • inductive initiation and • lack of quality control during manufacture.	• major mine failure and • damage to property.	• access limitation • explosive security • safe location for storage • proper supervision • controlled and planned misfire procedure • operating procedure • stock auditing and rotation • disposal procedure • separation of explosive type • storage facilities design and maintenance • earthing, handling and loading procedures • firing procedure and • safety data sheets register.

A Safety Data Sheet (SDS) register will be established and retained within the Project area and will be made available to all site personnel for review, prior to construction commencing. The SDS register will be kept up to date in accordance with legislative requirements and the Project's Safety and Health Management System (SHMS).

21.4.6 Transportation and Storage of Hazardous Substances

All hazardous goods will be stored in a signed area on concrete bunded pads in accordance with AS 1940. The concrete pad will have a sump with an oily water separator. Areas where hazardous goods are stored will be monitored frequently to ensure spillages and incidents are accurately observed, cleaned up and recorded. Storage areas will be roofed to prevent flooding of the bunded areas to ensure land and / or surface and groundwater contamination, does not occur.

All containers which hold dangerous or hazardous goods will be appropriately labelled and SDS' made available for all substances in accordance with the National Guidelines for Occupational Health and Safety Competency. In addition, all safety processes and storage and handling

procedures will be compliant with AS/NZS1940-2017: The Storage and Handling of Flammable and Combustible Liquids.

Transport of hazardous substances to the Project area will be in accordance with the Australian Dangerous Goods Code 7th Edition (version 7.7) (National Transport Commission 2020). Access to a delivery route for hazardous substances to the Project area will be dependent on the origin of the material. The most likely roads to be used for access to the Project area are detailed in Table 21-11.

Additional traffic volumes on regional roads increases the statistical risk of a traffic collision. Traffic and transport associated with the Project is discussed further in Chapter 6 – Traffic and Transport.

Table 21-11: Proposed transport routes for the delivery of hazardous substances

Origin	Route
Mackay	Bruce Highway south to the Project area
Rockhampton	Bruce Highway north to the Project area
Gladstone	Hanson Road, Mt Larcom Road, Bruce Highway via Rockhampton

21.4.7 Management of Poisons Associated with Invertebrate and Vertebrate Pest Species Control

The approach to the management of invertebrate and vertebrate pest species is discussed in EIS Chapter 17 – Biosecurity.

Except for personal insect repellent products, it is not anticipated that large volumes of poisons associated with the control of invertebrate pests will be stored on site. Similarly, it is not anticipated that large volumes of poisons associated with vertebrate pest control will be stored on site.

It is expected that licenced contractors will be used to manage broad scale invertebrate and vertebrate pest management programs from time to time. In doing so, it is expected that contractors will be responsible for the use and management of commercial volumes of such poisons in accordance with the relevant requirements for labelling, containers, storage, disposal, record-keeping, possession, distribution of product samples and any other relevant controls.

Should this change during the life of the Project, Central Queensland Coal will discuss the handling, use and storage requirements for commercial qualities of invertebrate pest management poisons with Queensland Health.

21.5 Risk Assessment of Project Hazard and Risk

A risk assessment was undertaken to rank the risks of the identified natural and operational hazards. The consequence rating examined the potential for offsite impacts and any potential impact on forests, water reserves, state and local government controlled roads, places of residence and recreational areas. Where high risks were identified, Central Queensland Coal reviewed the proposed controls and proposed sufficient mitigation to reduce the risk to as low as reasonably possible.

Prior to construction, Central Queensland Coal will revise the risk assessment in accordance with industry best practice. The review will reassess and develop risk mitigation strategies including reviews of Standard Operating Procedures, emergency planning and the completion of a Hazard

and Operability Assessment, in accordance with the risk assessment methodologies detailed in this chapter.

21.5.1 Risk Assessment Results

The risk assessment for construction and operational hazards is summarised in Table 21-12. The table includes an assessment of hazards to the surrounding land uses. The risks outlined apply to different stages of the Project (i.e. construction, operation and decommissioning). Furthermore, each risk may apply to a single Project component (i.e. Central Queensland mine, haul road or the TLF) or the overall Project area.

After identifying the range of hazards assessed as being likely to occur within the Project area, the following matters were considered for each hazard in the risk assessment:

- design controls and mitigation measures identified for each hazard, including prevention and response measures
- the impact that could occur because of each hazard
- the consequences of each impact if they were to occur, including direct impacts of incidents and the potential for escalation and secondary incidents
- the likelihood of events occurring and leading to an impact
- the likelihood of each impact occurring, considering the proposed controls and
- the extent to which hazard risk profiles are reduced because of implementing control and mitigation measures (residual risk).

Most identified hazards during the construction and operation phases have an unmitigated risk profile of Medium to Low. Some hazards scored an unmitigated risk profile of High.

Table 21-12: Risk assessment for project activities

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
Natural Hazards									
Bushfire **(Construction and Operation)**	**Mine area** • damage to infrastructure and property • combustion of coal stockpiles and • injury or fatality.	The Project area presents a low to medium bushfire severity. The site is sparsely vegetated.	4	3	M	• undertake bushfire site assessment to determine level of bushfire risk affecting the site, with consideration to SPP guideline on bushfire • maintenance of fire breaks • communication with Queensland Fire and Emergency Services (QFES) and QLD rural fire service • rescue equipment aligned with local service providers • communication with rural fire service • mines rescue team and emergency response vehicle • reduction of fuel loads onsite • monitoring of climatic conditions • slashing grass around infrastructure, particularly electrical substations and fuel storages • implementation of a Bushfire Management Plan and • implementation of an ERP.	3	4	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
	Haul road and TLF • Closure of haul road during fire event impacting production and • Damage to infrastructure, signs or barriers.	The haul road and TLF are in a sparsely vegetated area with low topographical relief. It is possible a fire may occur in the area every few years.	3	3	H	• undertake bushfire site assessment to determine level of bushfire risk affecting the site, with consideration to SPP guideline on bushfire • communication with rural fire service • maintaining a fire break alongside haul road • slashing of grass • identify and maintain alternative emergency access to and from the TLF in the event of haul road closure • onsite staff trained in firefighting utilising equipment aligned with that used by local emergency service providers and • identification and maintenance of onsite water supplies in the vicinity (TLF) in the unlikely event of a bushfire.	4	3	M
Flooding **(Construction, Operation)**	**Mine area** • open cut pit flooding and subsequent release of mine affected water or loss of productivity • overtopping of regulated storages causing uncontrolled release of contaminated water to deep or	Drainage features discharge directly to open pit mine areas making open pit flooding from clean water runoff certain. Modelling shows that riverine flooding does not impact on mine infrastructure areas making likelihood of risk to humans or infrastructure from flooding negligible.	2	4	M	• monitoring of climatic conditions and short and long term seasonal forecast information • implementation of an effective mine water management system to maximise reuse and minimise production and potential discharge of mine affected water • the mine life is estimated to be 19 years and, after levees, the processing facilities (CHPP and MIA), water dams, environmental dams and open pits are	4	4	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
	Tooloombah creek and Styx river • risk to humans or infrastructure from riverine flooding causing injury or fatality and • increased level of sedimentation above that which is naturally carried in the catchment.					flood immune up to and including the 0.1% AEP flood event[1]. The 0.1% AEP event has a 0.1% probability of being exceeded in any given year, or 1.9% probability of being exceeded over a 19 year period therefore the dams, processing facilities and the mine pits have a high level of flood immunity from Tooloombah and Deep Creek • undertake pre wet season inspections of drainage structures, including hazardous dams assessments • construct contaminant storages as tanks or dams with no external catchment to reduce overtopping risk from rainfall events • design, construction, monitoring and reporting of dams and levees in accordance with the EHP manual for assessing consequence categories and hydraulic performance of structures and • implementation of an ERP.			

[1] Note that CHPP and MIA 1, Waste Rock Stockpile 1 and the associated Environmental Dams are outside the probable maximum flood (PMF) level and so will not flood under any event.

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
	Haul road and TLF • risk to humans or infrastructure from riverine flooding causing injury or fatality • closure of the haul road / TLF and loss of production • access to the project area is restricted for emergency services and • evacuation from the site is restricted.	There is a chance of the haul road being closed intermittently for short periods each year due to flooding.	4	5	L	• transport infrastructure will be built to withstand a 2 year flood event, only low flood immunity is required due to catchment size and flood impact duration • additional onsite resources and training provided to nominated staff to attend to emergencies and • emergency response system to be prepared in consultation with emergency services.	4	5	L
Earthquake **(Construction and Operation)**	**Project area** • strata failure leading to wall collapse • damage to infrastructure and • rupture of dangerous goods storage facility.	Never occurred in area, extremely unlikely. Geologically stable area.	5	3	L	• infrastructure designed to relevant standards for the low risk of the area and • implementation of an ERP.	5	2	L
Landslides **(Construction and Operation)**	**Mine area** • wall collapse • damage to infrastructure • regulated structure failure	The site is generally historically eroded and stable and unlikely to have any significant landslides.	5	3	L	• infrastructure designed to relevant standards • appropriate location of infrastructure and • implementation of an ERP.	5	4	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
	• injury or death and • rupture or damage to dangerous goods storage facility.								
	Haul road and TLF • damage to infrastructure and road failure and • road closure which may impact on production.	Failure of cut and fill embankments through poor drainage or geotechnical instability from design and construction is unlikely.	3	4	L	• roads will be designed to engineering standards for off highway bulk haulage vehicles.	4	4	L
Lightning / Storm **(Construction and Operation)**	**Project area** • damage to property and • injury or death.	Lightning storms are known to occur in the area. However, strikes to people and equipment are unlikely.	4	3	M	• monitor and evaluate weather forecasts to indicate potential risks to the project • design mitigation of risk into infrastructure elements – such appropriate surge protectors, lightning protection and earth grids for communication towers • in the event of an approaching storm, infrastructure and equipment onsite would be secured appropriately and • suspend outdoor activities during a storm event.	4	4	L
Coal Hazards									
Release of Coal Dust – During Coal Handling and Processing	**Project area** • respiratory disease • coal workers' pneumoconiosis and	The release of coal dust is certain however, the consequences of the coal dust inhalation may occur only	3	3	H	• dust suppression • dust monitoring • provide and make mandatory use of personal protective equipment and	4	4	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
(Operation)	chronic obstructive pulmonary disease • lung impairment, disability and premature death • potential to lead to cancer and • decreased visibility leading to injury.	in severe cases of continued coal dust inhalation.				• removal of dust accumulation through equipment and plant design.			
Spontaneous Combustion **(Construction and Operation)**	**Mine area and TLF** • fire could spread offsite and create a bushfire which could damage property and life • release of gases and smoke potentially degrading air quality within both the immediate and wider vicinity of the fire area • fires can endure for long periods of time and release greenhouse gases, noxious fumes and soot particles • impact surrounding vegetation by	Likelihood of occurrence is possible and more likely in thermal coal stockpiles or within the open cut pits. More likely to occur in coal stockpiles where coal has exposure to sunlight and has been stagnant for long periods of time.	4	3	M	• compliance with Recognised Standard 3 'explosion protection of diesel engines' (DNRME 2019) • accumulation of carbonaceous materials in roadways are to be avoided • education and training of staff • design and mining methods to reduce risk • firefighting equipment to be stationed upon earthmoving equipment working on the coal face • compliance with RS9 the monitoring of sealed areas • routine monitoring of the coal stockpiles • stockpile compaction • earthmoving equipment may be used reshape stockpile levels removing the risk of heat build-up and	4	4	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
	increasing the ground temperature and • loss of coal product.					• minimise the stockpile stagnancy.			
Major Operational Hazards									
Electrocution **(Construction and Operation)**	**Project area** • burns or disturbances to heart rhythm (heart failure) which could be fatal • electrical fault leading to mine and equipment failure and • fire.	The likelihood and severity of injury from electrocution depend on the voltage and time exposure to the shock. Electricity is the sixth leading cause of high potential injury in open cut mines.	3	2	H	• anti-static clothing • earthing • earth fault limited systems • multiple levels of electrical protection • installation and verification by electrical engineers • appropriate equipment design • mine emergency planning procedures • maintenance of electrical equipment, power sources and power lines and • appropriate location of electrical equipment.	4	3	M
Dam Failure **(Construction and Operation)**	**Mine area and TLF** • stockpile damage • damage to property and • injury or fatality of worker.	Queensland and the other parts of Australia have been almost entirely free of catastrophic dam failures. In 1929, a mining dam in Tasmania failed during exceptionally high floods and 14 lives were lost, but there have been no other disasters.	5	3	L	• annual structural integrity inspections • maintenance of wet weather allowance at beginning of wet season and • designed and certified by engineer.	5	3	L
Vehicle or Equipment Collisions or Crushing	**Project Area** • injury or death and • crushing, contusion and fracture injuries.	In Australia, over the five years from 2007–08 to 2011–12, 36 Mining workers died from work-	2	3	H	• adherence to licensing and training requirements • adequate signage and lighting	4	4	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
(Construction, Operation)		related injuries—21 of which involved a vehicle.				• speed limits (particularly on the internal roads and haul roads) • safe operating procedures • use of roll-over protection systems in mine site vehicles and • adequate worker rest.			
Fires **(Construction and Operation)**	**Project area** • injury or death • bushfires and • destruction of property.	A fire is not likely to occur but is possible within the site.	4	4	L	• provision of fire protection equipment • firefighting equipment and trained personnel • provision of fire suppression system and • emergency procedures	4	4	L
Wall Collapse **(Operation)**	**Mine area** • injury or death • crushing, contusion and fracture injuries and • destruction to property.	Unlikely to occur but may occur once or twice over the Project lifetime. The likelihood of workers being under the segment is unlikely due to the limited manual labour within the pit.	4	3	M	• geotechnical aspects are adequately considered in relation to the design, operation and abandonment of quarry operations • adequate consideration is given to local geological structure and its influence on wall stability • adequate consideration is given to shear strength of the rock mass and its geological structure • a proper analysis of rain water inflow, surface drainage pattern, groundwater regime and mine de-watering procedures and their influence on wall stability over time	5	3	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
						• where necessary, appropriate designs of rock reinforcement are applied and used, and the quality of installation is verified • analysis of open pit wall stability for the projected geometry of the pit • appropriate drilling and blasting procedures are used to develop final walls and • appropriate methods of open pit wall monitoring are used to determine wall stability conditions.			
General Worksite Hazards									
Working at Heights **(Construction and Operation)**	**Project area** • injury or death.	Working at heights will be required at times on tall structures such as the TLF or the coal handling and preparation plant for maintenance.	3	4	M	• proper and detailed assessment of environmental conditions • restrict work in adverse conditions • risk assessment of work area by competent person • provision of proper training • selection and use of proper personal safety equipment including scaffolding and safety harnesses and • ongoing training and safety awareness.	4	4	L
Falling Objects and Impacts of Projectiles	**Project area** • injury or death and • destruction to property.	Where there is at height work platforms (such as mobile work platforms, fixed work platforms) there is a high risk objects may be dropped.	2	3	H	• inclusion of a falling object protection system, including on mobile equipment • selection and use of personal protection equipment • engineering design and construction	3	4	M

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
(Construction and Operation)						• employee training • correct design of explosive power tools and • disciplined worker behaviour.			
Body Stressing **(Construction and Operation)**	**Project area** • injury and • human error.	From 2008 to 2011 body stressing accounted for 34% of work cover claims in Australia (Safework Australia 2018).	2	3	H	• ensure regular breaks are taken • encourage the seeking of help early when symptoms are first felt and • regular health and fitness checks.	3	4	M
Human Fatigue **(Construction and Operation)**	**Project area** • loss of alertness • drowsiness • slips or accidents and • injury or death.	There is a high occurrence of fatigue amongst shift workers.	1	4	H	• risk based journey management / fatigue management plans • well-designed residential accommodation and • regular breaks.	3	4	M
Exposure to Heat / Sun **(Construction and Operation)**	**Project area** • sunstroke (heat stroke) • dehydration causing lost time injury or death and • cancer from sun exposure causing lost time injury or death.	Very likely in summer months for work carried out in direct sun and less likely in winter months.	1	4	H	• shielding • ventilation • correct selection and use of personal and protective equipment • shade • worker hydration • rest breaks and • adequate training for all site personnel, ensuring each employee can identify the encroachment of risk to health by heat exposure.	2	4	M
Fitness for Duty	**Project area**	Drug use in the mining industry is prevalent and is an identified	1	4	H	• job design to consider fatigue	2	4	M

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
(Construction and Operation)	• accidents due to error can result in injury or death • losses in concentration leading to mine failure • reduced productivity and lost time and • damage to equipment.	concern with police and the community.				• supervisor training and skills in monitoring fitness for duty • management of sleep opportunity • employee assistance program • mental health strategies • education • prohibition of alcohol consumption onsite • random mandatory testing for alcohol and illicit drugs • workforce based health promotion and assessment programs • periodic health assessment and • pre-employment health assessment.			
Self-harm **(Construction and Operation)**	**Project area** • injury or death.	Research carried out by Edith Cowan University (ECU) in WA showed that 28 per cent of FIFO respondents exhibited significant symptoms of depression, more than double the rate of people in the general population who suffer from moderate to high levels of depression, anxiety or stress, sitting at 13 per cent.	4	3	**M**	• awareness programs and campaigns • support groups • employee assistance program • provision of a suicide help line • periodic health assessment • pre-employment health assessment and • anti-bullying policy.	5	3	**L**
Disease and Illness	**Project area** • spread of disease and • illness.	There is high risk of illness and disease, especially the cold and flu virus spreading around workplaces and accommodation facilities due	1	4	**H**	• clean hygienic bathing and hand washing facilities • correct disposal of waste	3	4	**M**

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
(Construction and Operation)		to the sharing of facilities and contact between personnel.				• maintenance of facilities and hygienic state • maintain adequate supplies of first aid and personal protective equipment • ensure employee competence in administering first aid • provision of adequate toilet facilities • hygienic first aid facilities • water supplied at acceptable standard • drinking water to be potable and • monitoring and testing of water.			
Disease Vectors (such as Insects and Rodents) **(Construction and Operation)**	**Project area** • spread of disease • infection and • insect and pest outbreak.	Rodents and biting insects occur and have potential to spread diseases. There are more mosquitos prevalent after rain events when the risk is increased.	4	4	L	• correct disposal of waste • ensure no ponding of dirty water • regular insect and pest inspections • maintenance of facilities and hygienic state and • provision of personal protective equipment.	4	4	L
Venomous Bite (Snake or Spider) **(Construction and Operation)**	**Project area** • serious harm or death.	Likelihood of bite occurrence in cleared areas is low, while likelihood in vegetated areas is slightly higher.	4	2	H	• training in basic first aid to field staff • appropriate personal protective equipment • snakebite response procedure within the ERP and • onsite emergency response.	4	3	M

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
Incorrect Manual Handling **(Construction and Operation)**	**Project area** • injury • damage to property and • injury to others.	A significant number of roles within a coal mine requires manual handling and these tasks present a high risk of injury.	2	4	**M**	• equipment design • limit load size and handling procedures • provision of carrying points and devices • personal protection equipment • weight identification and labelling • correct storage of loads • provision of lifting devices • use of lighter equipment • adequate rest and breaks and • early diagnosis.	3	4	**M**
Excessive Noise Levels **(Construction and Operation)**	**Project area** • injury and • hearing loss and impairment.	The operation of the processing plants, crushers, vehicles, generators and the detonation of explosives all create high levels of noise emissions to workers onsite. Offsite noise is generally limited to detonation of explosives.	3	4	**M**	• design and specification of building • design and specification of equipment • hearing conservation program • periodic monitoring of work areas • equipment selection criteria • limit of personal exposure • provision of personal protective equipment, including mandatory use of protective equipment • noise attenuation devices on equipment and • noise barriers.	4	4	**L**

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
Slipping and Tripping **(Construction and Operation)**	**Project area** • injury or death and • damage to property.	There are numerous high-risk areas for slips, trips and falls within a mine site and the occurrence of these injuries is likely.	2	4	M	• housekeeping of floor surfaces and walkways • provision of properly fitting clothing • safety footwear • clear marking of walkways • suitable construction of walkways • no running policy • suitable design of lighting systems • provision of guardrails • maintenance of floor surfaces and • warning sign for maintenance work.	4	4	L
Dangerous Goods and Hazardous Substances									
Explosion of Chemical Substance, Flammable and Combustible Liquid and Flammable Gas **(Construction and Operation)**	**Mine area** • property damage and • injury or death as result of fire or explosion.	The main chemical onsite in any significant volume is diesel which is a combustible liquid. This will be stored away from any ignition sources and separated for other chemical storages. It considered that only exceptional circumstances would cause an explosion of this substance storage.	4	2	H	• safe handling and storage • heat reduction and ignition source separation • adherence on to storage guideline and design • correct disposal and • safety data sheets register.	5	3	L
Explosion of Chemical Substance, Flammable and Combustible	• property damage and • injury or fatality as result of fire or explosion.	The main chemical transported in a significant volume is diesel which is a combustible liquid.	4	2	H	• a road-use management plan will be implemented for all mine related traffic included oversize loads • ensure operators are licensed and competent	5	3	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
Liquid and Flammable Gas During Transportation **(Construction and Operation)**						• enforce zero alcohol and illegal drugs policy • ensure regular vehicle maintenance schedule • all project related vehicles will be required to carry first aid kits • ensure contractors are responsible and adhere to road rules, speed limits and use headlights while driving • first aid, firefighting and spill response kits will be available on all trucks carrying dangerous goods and all drivers will be trained in the use of these items • social impact strategy implemented (including fatigue management) and contractor transportation to comply with transport operations (road use management – fatigue management) regulation 2008 and • all regulated contractors to be licensed in accordance with *Transport Operations (Road Use Management – Drivers Licensing) Regulation 1999*.			
Unexpected Detonation **(Construction and Operation)**	**Mine area** • injury or death • major mine failure and • damage to property.	The open cut mining methods will use blasting to remove overburden material, as such there is a possible risk that unexpected detonations may occur.	4	2	H	• employee training and competence • access limitation and explosive security • safe location for storage • proper supervision • controlled and planned misfire procedure	4	4	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
						• operating procedure • stock auditing and rotation • disposal procedure • separation of explosive type • storage facilities design and maintenance • earthing, handling and loading procedures • firing procedure and • safety data sheets register.			
Toxic Exposure from Gas Leaks or Chemical Vapours in Confined Space **(Construction and Operation)**	**Mine area** • injury or death and • damage to property.	Unlikely a storage facility could leak through failure of the storage tank or accidently release.	4	3	M	• adequacy of storage facilities and ventilation • design and construction of storage areas and bunds will be in accordance with AS 1940 (Standards Australia 2017) • hazardous substances register and • safety data sheets register.	5	3	L
Contamination **(Construction and Operation)**	**Project area** • contamination of soils, groundwater and surface water • reduction in agricultural production from soil and water contamination and	There are 4 properties with water entitlements located adjacent to and or downstream of operations.	4	4	L	• storage tanks, bunds and transfer facilities will be designed, constructed and operated in accordance with AS 1940 (Standards Australia 2017) • spill response equipment will be available onsite • storage and 'dirty' areas will drain to environmental dams • collision protection – bollards or restricted access in place	5	4	L

Hazard event	Consequence	Likelihood	Unmitigated risk			Mitigation measures	Residual risk		
			L	C	R		L	C	R
	• human health impacts from contamination of water supply.					• all appropriate personnel will be trained in fuel storage, transport and transfer procedures • pressure vent valves checked prior to fill / discharge • foam injection system in appropriate tanks and • water cooling system on each tank. • see chapter 9 – surface water for more details on mitigation measures for surface water protection. • see Chapter 10 – Groundwater for more details on groundwater protection.			

(C = Consequence: L = Likelihood: R = Risk)

21.6 Hazard and Risk Management and Mitigation

21.6.1 Integrated Risk Management System

An Integrated Risk Management System for the construction and operational phases of the Project will be prepared and implemented. The System will be developed as a requirement of the Coal Mining Safety and Health Act and Regulation, which require management and operating systems for each mine. The systems must incorporate risk management elements and practices. The system will include the aspects illustrated in Figure 21-9 and discussed below.

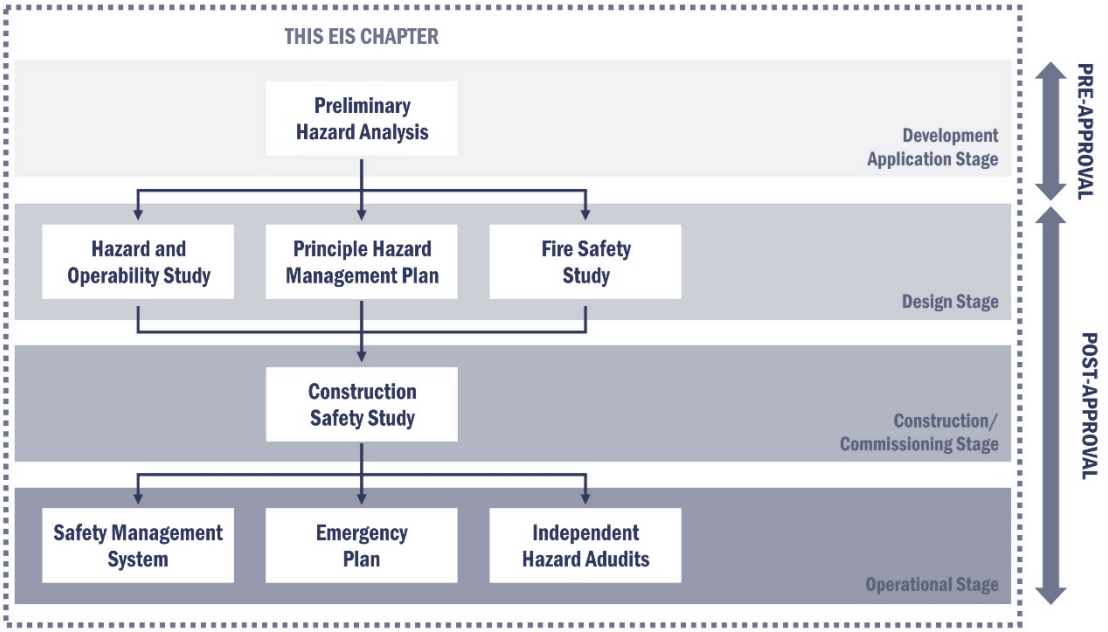


Figure 21-9: Integrated risk management

Preliminary Hazard Analysis - this represents the first conceptual hazard review which feeds into concept design of the Project.

Hazard and Operational Study - this is a comprehensive and systematic examination of the detailed design of the proposed facilities. It is carried out by design engineers and operational personnel. It will identify possible deviations from normal operating conditions which could lead to hazardous occurrence and any protections which need to be included into detailed design, such as isolations and emergency stop controls.

Fire Safety Study – will be undertaken in the design of the fire protection and fighting system onsite. It will identify the specific fire hazard areas and ensure adequate fire safety and fire response systems in the final design. It will address the direct effects of flame, radiant heat, and explosion and the release of toxic materials in the event of a fire and the potential for contaminated fire water management.

Emergency Procedures and Plans – these will be developed for all stages of onsite activity. The development, implementation and frequent practicing (drills) increase the Project's emergency preparedness. Emergency preparedness can reduce the likelihood and the magnitude of potentially hazardous incidents and reduce the consequences of incidents that occur. Emergency procedures

will be specifically developed and tailored for the hazards at each facility and locality within the Project area.

Principle Hazard Management Plan – upon completion of all the above risk assessments the risk assessment should be updated to encompass and refine all identified risks. This Principle Hazard Management Plan must meet the requirements of RS2 –Control of Risk Management Practices. This plan will determine risk levels to be used as the basis for future plant operations and should refine safety control commitments to improve the risk levels to as low as reasonably possible. Persons providing technical information, are required to sign off on the identified parameters.

Construction Safety Study and Safety - a construction safety study will result in formalised arrangements to ensure the safety of workers and surrounding land uses is maintained during the construction phase. These studies focus on the potential for hazardous incidents and will form the basis for the development of the Safety Management Plan. The Safety Management Plan will be developed in consultation with Queensland Ambulance Service.

Safety and Health Management System (SHMS)- will include safety policy, organisational structure and responsibilities, emergency and operating procedures, document control, change management procedures and performance auditing.

Safety Audits – to monitor and ensure the safety management system is functioning it is essential that safety audits are undertaken. The Project will undertake one toward the end of the first year of operation and every second year throughout the operational period.

A hazard and operability study, fire safety study, emergency plan and an updated hazard analysis are appropriate assessment studies and safety procedures to be undertaken as part of the detailed design of the proposed development. The SHMS, standard operating procedures including those for emergency response planning and management, together with ongoing hazard audits will be implemented for both the construction and operational stages of the Project.

Given design works are ongoing, the hazard and risk assessment will be updated prior to the commencement of the construction and operational phases of the Project respectively, and continually throughout the Project's lifecycle, including decommissioning and rehabilitation phases.

21.6.2 Emergency Planning and Response

Emergency planning and response is discussed in Chapter 20 – Health and Safety. An ERP will be developed in consultation with the Queensland Fire and Emergency Services, Queensland Police Service and Queensland Ambulance Service. The ERP will be developed to ensure that the potential consequence of emergency situations as identified in this EIS is minimised as far as possible. The ERP will form a critical component of the SHMS.

Each year every mine is required under Coal Mining Health and Safety Standard 'RS8 Conduct of Mine Emergency Exercises' to conduct a major practical exercise designed and organised by a committee convened under the auspices of the Site Senior Executive. In addition, regular minor emergency exercises will be conducted throughout each year to ensure the Project can adequately respond to an emergency.

The ERP will also include controls required to ensure adequate control of wastes and other potential pollutants on the site. Prior to the start of the wet season, the site will be prepared by ensuring all waste materials, receptacles and

storages are properly contained and stable, and will be able to withstand wet season rainfall without leaching or other loss of contaminants. A site audit will be conducted prior to each wet season with the results provided internally in written form.

A similar process will occur prior to forecast storms or other extreme weather events, whereby all wastes are contained and restrained so as to avoid loss of materials during the event.

21.6.3 Security

All areas with high risk of unauthorised public access within the Project area will be monitored and access to these areas will be via a secure entry point. Prior to being given access to these areas, visitors will complete mandatory registration and an environment, health and safety induction.

21.6.4 Continuous Improvement of Hazard and Risk Process

Central Queensland Coal is committed to continuous improvement of the hazard and risk process as per AS/NZS ISO 31000:2018 Risk Management and the New South Wales Department of Planning Hazardous Industry Planning Advisory Paper 6 – Hazard Analysis (2011c). When new resources are purchased, when new hazards arise, or when there are other changes to the work environment and for general safety performance monitoring, the hazard and risk processes will be reviewed. This will result in an improvement in the Project's hazard and risk management.

A schematic of the preliminary and ongoing method for hazard and risk analysis is shown at Figure 21-10. It outlines the process involved with identifying and managing potential risks for any activity. The figure also illustrates the method for continuous hazard and risk management. It is used to guide the hazard and risk assessment for an activity that may have been altered or updated.

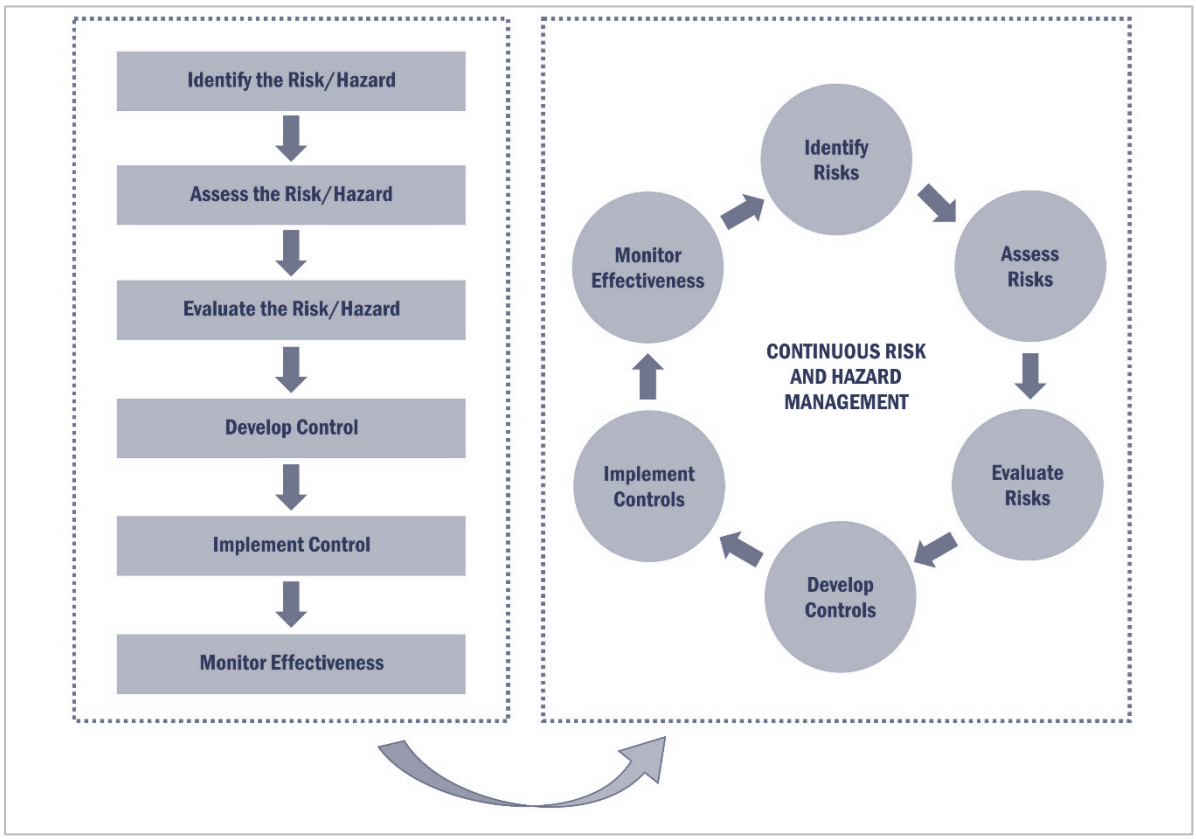


Figure 21-10: Hazard and risk assessment process

21.7 Conclusion

The construction, operation and decommissioning risks assessed for this Project are common to all open cut mining activities, haul roads and TLF. These risks are subject to legislative obligations, standards and guidelines.

A final landform has been designed and it is detailed in Chapter 11 – Rehabilitation and Decommissioning but a risk assessment has not yet been undertaken for that phase of the Project. However, the risks associated with rehabilitation and decommissioning are considered unlikely to be greater or significantly different from those detailed in this chapter. Furthermore, the rehabilitation and closure of the project will be the subject of a PRCP, which will be subject to an approvals process of its own following approval of the EIS, so a hazard and risk assessment will be undertaken for the rehabilitation and decommissioning phase during that process. It is assumed that new technologies and innovations are to be expected throughout the Project's operational life, and as such will alter current baseline risk assessment results which have been currently undertaken.

Impacts to people and property were considered as part of this assessment. The people with potential exposure to hazards included surrounding residents, road users, downstream water users and mine workers and contractors. Importantly, no hospitals, libraries, schools, or kindergartens are located within 10 km of the site. There are only nine residential receptors within 10 km of the site. The nearest residential and commercial receptors (Tooloombah Creek Service Station complex which consists of a service station and two residential receptors) are located approximately 2.2 km from the edge of Open Cut 1. Past the service station, the next nearest commercial businesses are in the townships of Ogmore and Marlborough, located approximately 6.8 km and 25.3 km to the northeast and southeast of the closest edge of the Project, respectively.

Three downstream water users were identified between the Project area and the point where the Styx River enters Broad Sound. The surrounding land in proximity to the Project area is rural agricultural leasehold lands.

The main hazard and risks arising from a coal mine include natural hazards, coal hazards, major operational hazards, general worksite hazards and hazards associated with dangerous goods transport and storage. The site is relatively free from natural hazards other than flooding which presents a potential risk. Coal poses several hazards from spontaneous combustion and respirable dust risks; the highest risk areas of the Project are the stockpiles and crushing plants. Measures to minimise the risks of spontaneous combustion and dust have been included into the design and operation planning for the site.

A review of Queensland and Australian incident statistics identified the high risk operational hazards which cause the greatest number of incidents and fatalities within coal mines. These hazards and risk will be examined, and areas which could pose these hazards will have a prevention and detection system in place to manage the risk to the lowest possible levels. General workplace hazards have also been identified and will be managed through onsite training and the health and safety management system.

A preliminary risk screen was undertaken of all the identified dangerous goods storage and transportation volumes against the NSW SEPP 33 which was adopted as guidance to offsite hazard and risk. None of the stored hazardous materials exceeded the trigger limits and required further assessment or consequence modelling.

Project construction and operational preliminary risk assessment results indicated that the baseline safety and health risk profile varied from low to high. Once mitigation measures and design treatments were applied to the assessed hazards, residual risk scores were reduced. The residual medium risks identified for the Project include:

- coal hazards such as spontaneous combustion
- major operational hazards including:
  - vehicle collisions
  - exposure to high voltage
  - contact with electrified wires
  - toxic atmospheres in confined spaces and
  - entrapment or wall failure and
- general worksite hazards including falling objects, body and heat stress, fatigue, fitness for duty, manual handling, fauna related injury and potential for disease from biting insects.

Mining is inherently a higher risk industrial activity and controls and design will minimise these risks as far as possible.

Overall, the risks to community receptors, environmental sensitive receptors and State and local government-controlled roads can be considered acceptable. A robust and detailed integrated risk management process and safety plans will, however, be required and implemented to ensure that the hazards and risks onsite are kept as low as practically possible.

21.8 Commitments

In relation to hazard and risk, Central Queensland Coal's commitments are provided in Table 21-13.

Table 21-13: Commitments – Hazard and Risk

Commitments
Develop a management system to minimise the risk of spontaneous combustion occurring and to manage the risks should spontaneous combustion occur.
A Safety Data Sheet register will be established and retained within the Project area and will be made available to all site personnel for review, prior to construction commencing.
A Hazardous Substances register will be established and retained within the Project area.
Revise the risk assessment in accordance with industry best practice.
Review of the Project's hazard and risk processes when new resources are purchased, new hazards arise or when there are other changes to the work environment and for general safety performance monitoring.
Prepare and implement an Integrated Risk Management System for the construction and operational phases of the Project.
Implement a Safety and Health Management System that integrates risk management elements and practices to safety of workers, contractors and the community.
Develop an Emergency Response Plan, in accordance with relevant legislation requirements, including training for emergency response personnel, prior to construction.
Prepare and implement a Social Impact Strategy, inclusive of: • the communication and integration of Central Queensland Coal's commitments through its procurement strategies and procedures and within its supply chain • the development and implementation of workforce recruitment and management strategies and • the development and implementation of a workforce behaviour and code of conduct.

Commitments
Undertake a detailed risk assessment considering risks to safety and health associated with the rehabilitation and decommissioning phase of the Project.