MACHEnergy

Mount Pleasant Operation

A JOINT VENTURE WITH JCDA Japan Coal Development Australia

Appendix Q

Preliminary Hazard Analysis

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1 INTRODUCTION

The Mount Pleasant Operation is a major operating open cut coal mine and associated infrastructure, located approximately 3 kilometres (km) north-west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW) (Figure 1).

This Preliminary Hazard Analysis (PHA) forms part of an Environmental Impact Statement (EIS), which has been prepared to accompany a Development Application for the Mount Pleasant Optimisation Project (the Project) in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act, 1979*.

This PHA has been conducted as part of the EIS to evaluate the potential hazards associated with the Project in accordance with:

- the general principles of risk evaluation and assessment outlined in the NSW Government *Multi-level Risk Assessment* guideline (Department of Planning and Infrastructure [DP&I], 2011);
- the requirements of the NSW *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*; and
- *Hazardous Industry Planning Advisory Paper (HIPAP) No. 6: Hazard Analysis* (HIPAP No. 6) (NSW Department of Planning [DoP], 2011a).

Assessed risks have been compared to qualitative risk assessment criteria developed in accordance with the International Organisation for Standardisation (ISO) 31000:2018 *Risk Management – Guidelines*, and *HIPAP No. 4: Risk Criteria for Land Use Safety Planning* (HIPAP No. 4) (DoP, 2011b).

1.1 OVERVIEW OF THE MOUNT PLEASANT OPERATION

The Mount Pleasant Operation Development Consent DA 92/97 was granted on 22 December 1999. The Mount Pleasant Operation was also approved under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) in 2012 (EPBC 2011/5795).

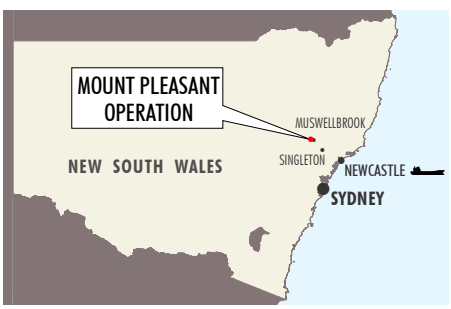
MACH Energy Australia Pty Ltd (MACH Energy) acquired the Mount Pleasant Operation from Coal and Allied Operations Pty Ltd on 4 August 2016. MACH Energy commenced construction activities at the Mount Pleasant Operation in November 2016 and commenced mining operations in October 2017, in accordance with Development Consent DA 92/97 and EPBC 2011/5795.

MACH Mount Pleasant Operations Pty Ltd now manages the Mount Pleasant Operation as agent for, and on behalf of, the unincorporated Mount Pleasant Joint Venture between MACH Energy (95 per cent [%] owner) and J.C.D. Australia Pty Ltd (5% owner)[1].

The approved Mount Pleasant Operation includes the construction and operation of an open cut coal mine and associated rail spur and product coal loading infrastructure located approximately 3 km north-west of Muswellbrook in the Upper Hunter Valley of NSW (Figures 1 and 2).

The mine is approved to produce up to 10.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. Up to approximately nine trains per day of thermal coal products from the Mount Pleasant Operation are transported by rail to the Port of Newcastle for export, or to domestic customers for use in electricity generation.

[1] Throughout this report, MACH Mount Pleasant Operations Pty Ltd and the unincorporated Mount Pleasant Joint Venture will be referred to as MACH.



LEGEND

- Mining Operation
- Proposed Mining Operation (Application Lodged)
- Railway
- Local Government Boundary
- State Forest/Reserve
- National Parks and Wildlife Estate
- Mining Lease Boundary (Mount Pleasant Operation)

Source: NSW Spatial Services (2020)

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MOUNT PLEASANT OPTIMISATION PROJECT

Project Location

Figure 1

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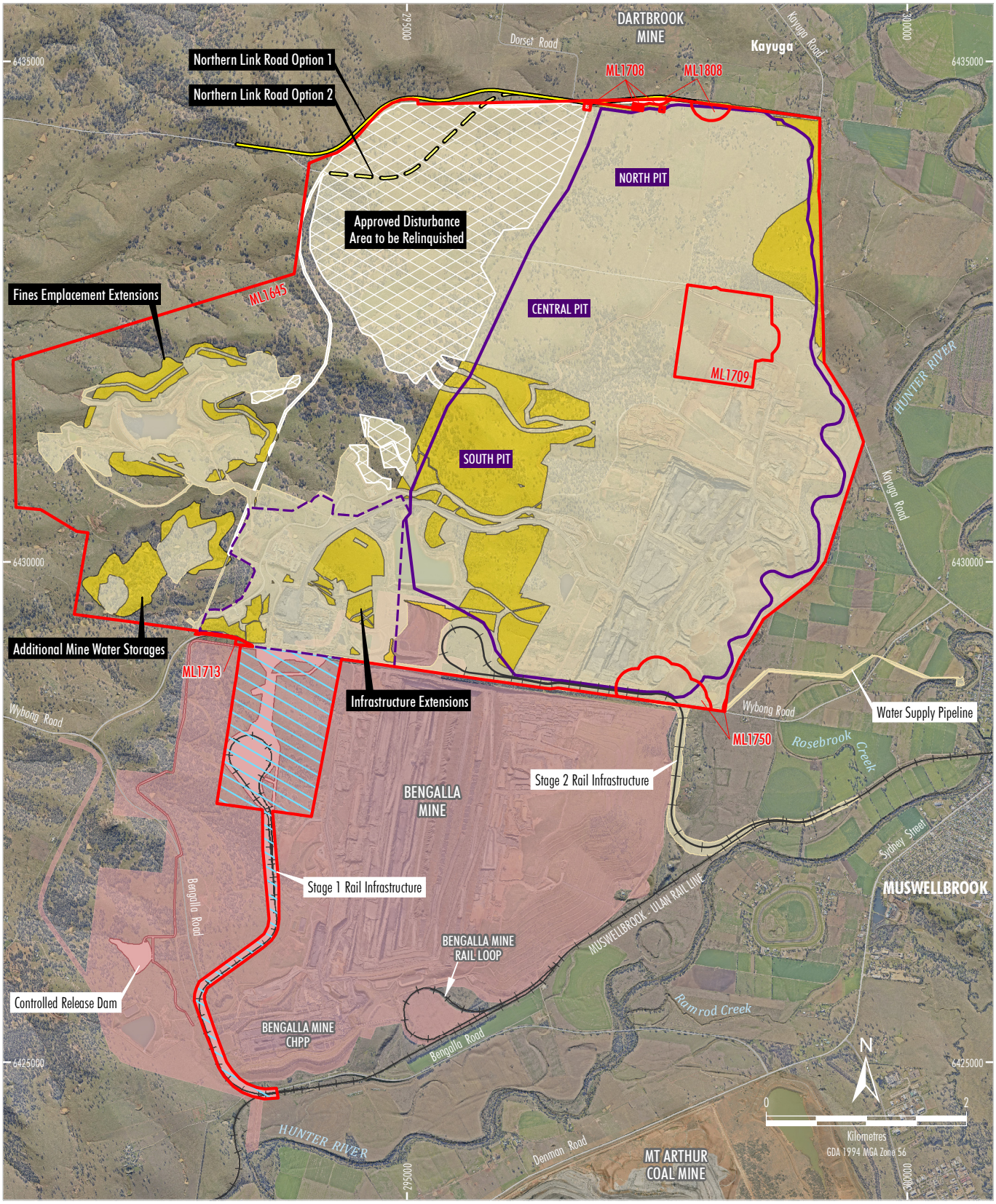

MAC-18-02 SSD_EIS_App Figure 2_Rev M

LEGEND

Existing Mine Elements

- Mining Lease Boundary (Mount Pleasant Operation)
- Approximate Extent of Existing/Approved Surface Development (DA92/97) [1]
- Infrastructure to be removed under the Terms of Condition 37, Schedule 3 (DA92/97)
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)
- Existing/Approved Mount Pleasant Operation Infrastructure within Bengalla Mine Approved Disturbance Boundary (SSD-5170) [1]

Additional/Revised Project Elements

- Approved Disturbance Area to be Relinquished [2]
- Approximate Additional Disturbance of Project Extensions [1]
- Northern Link Road Option 1 Centreline [3]
- Northern Link Road Option 2 Centreline
- Approximate Extent of Project Open Cut and Waste Rock Emplacement Landforms
- Revised Infrastructure Area Envelope

NOTES

1. Excludes some incidental Project components such as water management infrastructure, access tracks, topsoil stockpiles, power supply, temporary offices, other ancillary works and construction disturbance.
2. Subject to detailed design of Northern Link Road alignment.
3. Preferred alignment subject to landholder access.

Source: MACH (2020); NSW Spatial Services (2020); Department of Planning and Environment (2016) Orthophoto: MACH (2020)

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MOUNT PLEASANT OPTIMISATION PROJECT

Project General Arrangement

Figure 2

1.2 OVERVIEW OF THE PROJECT

The Project would include the following development:

- increased open cut coal extraction within Mount Pleasant Operation Mining Leases (MLs) by mining of additional coal reserves, including lower coal seams in North Pit;
- staged increase in extraction, handling and processing of ROM coal up to 21 Mtpa (i.e. progressive increase in ROM coal mining rate from 10.5 Mtpa over the Project life);
- staged upgrades to the existing Coal Handling and Preparation Plant (CHPP) and coal handling infrastructure to facilitate the handling and processing of additional coal;
- rail transport of up to approximately 17 Mtpa of product coal to domestic and export customers;
- upgrades to workshops, electricity distribution and other ancillary infrastructure;
- existing infrastructure relocations to facilitate mining extensions (e.g. local roads, powerlines and water pipelines);
- construction and operation of new water management and water storage infrastructure in support of the mine;
- additional reject dewatering facilities to allow co-disposal of fine rejects with waste rock as part of ROM waste rock operations;
- development of an integrated waste rock emplacement landform that incorporates geomorphic drainage design principles for hydrological stability, and varying topographic relief to be more natural in exterior appearance;
- construction and operation of new ancillary infrastructure in support of mining;
- extension to the time limit on mining operations to 22 December 2048;
- an average operational workforce of approximately 600 people, with a peak of approximately 830 people;
- ongoing exploration activities; and
- other associated infrastructure, plant, equipment and activities.

An indicative Project general arrangement is provided on Figure 2. A detailed description of the Project is provided in Section 3 of the main text of the EIS.

1.3 OBJECTIVE AND SCOPE

The objective of this PHA is to identify the off-site risks posed by the Project to people, their property and the environment, and assess the identified risks using relevant qualitative criteria. In accordance with the *Multi-level Risk Assessment* guideline (DP&I, 2011), this assessment specifically covers risks from fixed installations and does not encompass off-site transportation by road, rail, air, sea or pipeline.

This PHA, therefore, considers off-site risks to people, property and the environment (in the presence of existing and proposed controls) arising from atypical and abnormal hazardous events and conditions (e.g. equipment failure, operator error or external events), with specific focus on fixed installations on-site. This assessment does not consider risks to MACH employees or property, or risks that are not atypical or abnormal (e.g. long-term effects of typical dust emissions).

On-site environmental risks and potential long-term impacts are considered in the Environmental Risk Assessment (Appendix Q of the EIS) and in a range of specialist studies conducted for the EIS (Appendices A to P and S).

1.4 PRELIMINARY SCREENING PROCESS

Preliminary screening to determine the requirement for a PHA was undertaken for the Project, taking into account broad estimates of possible off-site consequences or effects from hazardous materials present on-site and their locations. “Potentially hazardous industry” is defined by the DP&I (2011) as industry that has “potential for significant injury, fatality, property damage or harm to the environment in the absence of controls”.

In accordance with the *Multi-level Risk Assessment* guideline (DP&I, 2011), it was determined the Project is potentially hazardous, as the possibility of harm to the off-site environment in the absence of controls could not be discounted.

According to the *Multi-level Risk Assessment* guideline (DP&I, 2011), a Level 1 assessment (qualitative analysis) can be justified if all, or most, of the following conditions are met:

- the analysis of the facility demonstrates there are no major off-site risks;
- the technical and management controls are well understood and readily implemented; and
- there are no sensitive surrounding land uses.

The PHA review team (Section 1.5.1) reviewed this screening process and concluded there is limited potential for scenarios with significant off-site consequences or effects, and the technical and management controls are well understood and readily implemented. Sensitive surrounding land uses are limited, as the mine infrastructure is generally located in the south-west corner of the Mount Pleasant Operation MLs and the majority of adjacent land is mine-owned. Given the small number of potentially sensitive land uses in the vicinity of fixed installations, and the other conditions are met, the team implemented a Level 1 assessment (qualitative analysis) for this PHA.

1.5 STUDY METHODOLOGY

The following methodology was employed during the preparation of this PHA:

1. Identify the potential hazards associated with the Project.
2. Analyse the consequences or effects of identified hazardous events.
3. Qualitatively estimate the likelihood of the identified hazardous events.
4. Propose risk treatment measures for the identified hazardous events.
5. Qualitatively assess risks to the environment, members of the public and their property arising from atypical and abnormal events, and compare to the risk criteria outlined in HIPAP No. 4 (DoP, 2011b).
6. Propose further risk treatment measures, if necessary.
7. Qualitatively determine the residual risk assuming the implementation of proposed risk treatment measures.

1.5.1 Preliminary Hazard Analysis Review Team

The above methodology was implemented during a PHA multi-disciplinary team-based review of the Project in January 2020. The review participants included technical and operational specialists from MACH, including:

- Chris Lauritzen, General Manager – Resource Development.
- Richard Bailey, General Manager – Operations.
- Andrew Reid, Environmental Superintendent.
- Chloe Annandale, Environmental Advisor.
- Paul O'Loughlin, Principal Mining Engineer.

1.5.2 Risk Management Process

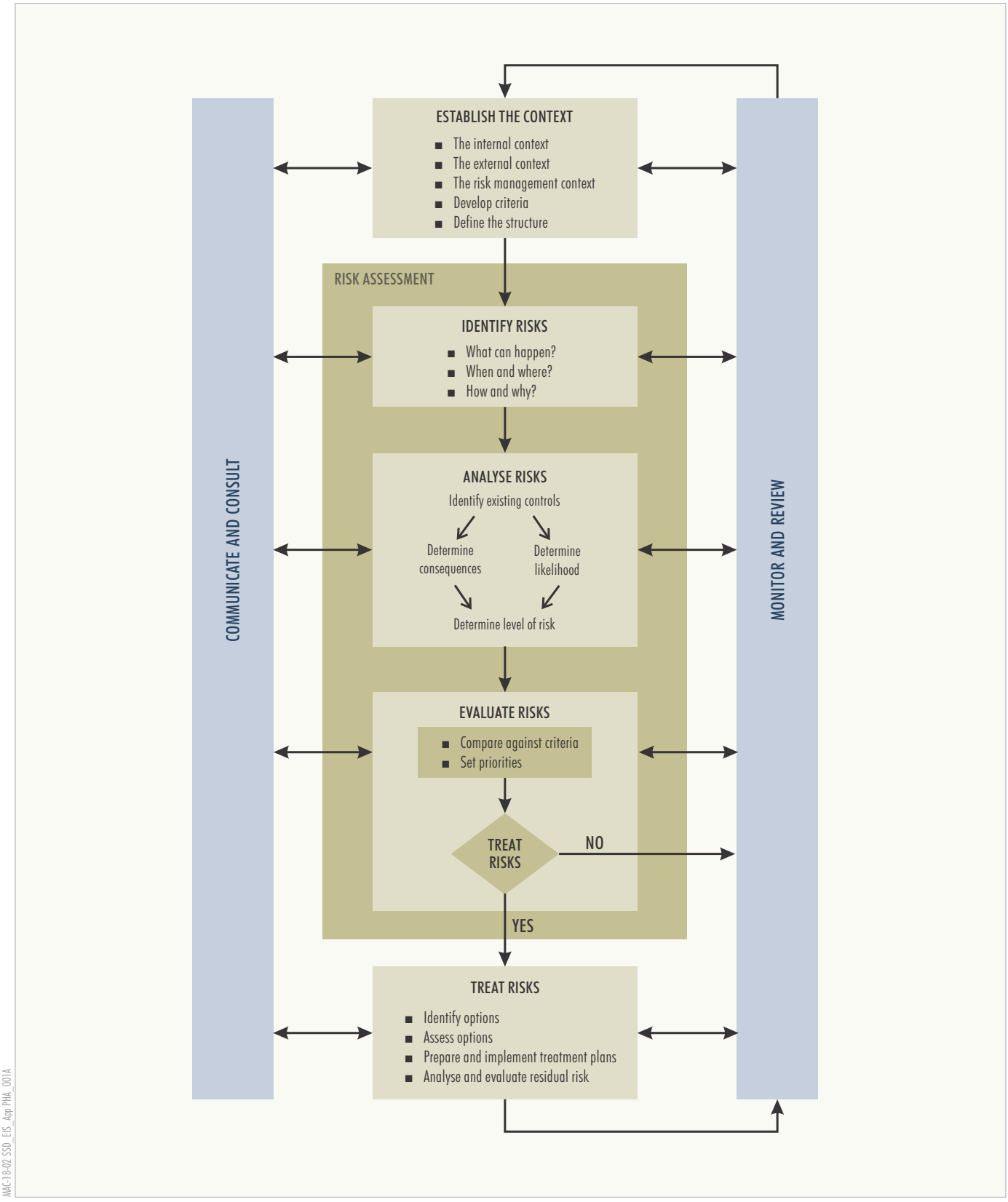
This PHA has been undertaken in consideration of the risk management process described in ISO 31000:2018. The risk management process is shown schematically on Figure 3 and includes the following components:

- Establish the context (Section 1).
- Identify risks (Section 2.2 and Attachment A).
- Analyse risks (Section 3 and Attachment A).
- Evaluate risks (Section 3 and Attachment A).
- Treat risks (Section 2.2.3 and Attachment A).

1.5.3 Risk Criteria

This PHA adopted the following qualitative criteria (DoP, 2011b):

> *(a) All 'avoidable' risks should be avoided. This necessitates the investigation of alternative locations and technologies, wherever applicable, to ensure that risks are not introduced in an area where feasible alternatives are possible and justified.*
>
> *(b) The risks from a major hazard should be reduced wherever practicable, irrespective of the numerical value of the cumulative risk level from the whole installation. In all cases, if the consequences (effects) of an identified hazardous incident are significant to people and the environment, then all feasible measures (including alternative locations) should be adopted so that the likelihood of such an incident occurring is made very low. This necessitates the identification of all contributors to the resultant risk and the consequences of each potentially hazardous incident. The assessment process should address the adequacy and relevancy of safeguards (both technical and locational) as they relate to each risk contributor.*
>
> *(c) The consequences (effects) of the more likely hazardous events (i.e. those of high probability of occurrence) should, wherever possible, be contained within the boundaries of the installation.*
>
> *(d) Where there is an existing high risk from a hazardous installation, additional hazardous developments should not be allowed if they add significantly to that existing risk.*



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Source: Handbook (HB) 203:2012 Managing Environment Related Risk

Figure 3

1.5.4 Qualitative Measures of Consequence, Likelihood and Risk

To undertake a qualitative risk assessment, it is useful to define the various levels of consequences of a particular event, as well as the likelihood (probability) of the event occurring. The risk assessment consequence and likelihood descriptors were developed during the 'Establish the Context' phase of the Risk Management Process (Section 1.5.2) in accordance with ISO 31000:2018.

In accordance with ISO 31000:2018, Tables 1, 2 and 3 were reviewed by MACH and were considered to be consistent with the specific objectives and context of this PHA.

The hazard identification table (Attachment A) illustrates the systematic application of the above criteria for the hazardous events identified for the Project.

Table 1
Qualitative Measures of Probability

Rank	Likelihood	Description
A	Almost Certain	Happens often
B	Likely	Could easily happen
C	Possible	Could happen and has occurred elsewhere
D	Unlikely	Hasn't happened yet but could
E	Rare	Conceivable, but only in extreme circumstances

After: Risk Mentor (2020).

Table 2
Qualitative Measures of Maximum Reasonable Consequence

Rank	Consequence	Example
1	Extreme environmental harm	Widespread catastrophic impact on environmental values of an area.
2	Major environmental harm	Widespread substantial impact on environmental values of an area.
3	Serious environmental harm	Widespread and considerable impact on environmental values of an area.
4	Material environmental harm	Localised and considerable impact on environmental values of an area.
5	Minimal environmental harm	Minor impact on environmental values of an area.

After: Risk Mentor (2020).

Table 3
Risk Ranking Table

		Probability				
		A	B	C	D	E
Consequence	1	1(H)	2(H)	4(H)	7(M)	11(M)
	2	3(H)	5(H)	8(M)	12(M)	16(L)
	3	6(H)	9(M)	13(M)	17(L)	20(L)
	4	10(M)	14(M)	18(L)	21(L)	23(L)
	5	15(M)	19(L)	22(L)	24(L)	25(L)

Notes: L – Low, M – Moderate, H – High.
Rank numbering: 1 – highest risk; 25 – lowest risk.

Legend – Risk Levels:

	Intolerable
	ALARP – As low as reasonably practicable
	Low – Tolerable

After: Risk Mentor (2020).

2 HAZARD IDENTIFICATION

The potential hazards for the Project include the continued handling and storage of hydrocarbons, chemicals and explosives. A brief description of each of these materials is presented below. The description below focuses on the existing facilities associated with the Mount Pleasant Operation that would continue to be used for the Project, and additional facilities proposed for the Project, where relevant.

In addition, the continued on-site stockpiling of coal has been considered as a potential hazard in this PHA, as well as some risks relating to mining operations (e.g. blasting, highwall slumping and unplanned/unauthorised movement of mobile equipment off-site). Further, while transportation is not covered by the *Multi-level Risk Assessment* guideline (DP&I, 2011) (Section 1.3), potential risks associated with on-site rail movements have also been considered.

2.1 DESCRIPTION OF HAZARDOUS MATERIALS

2.1.1 Hydrocarbons

Hydrocarbons used at the Project would continue to include fuels (diesel and petrol), oils, greases, degreasers, coolant and minor quantities of other hydrocarbons (e.g. acetylene for welding).

Diesel

Diesel is classified as a combustible liquid (Class 1) by Australian Standard (AS) 1940:2017 *The Storage and Handling of Flammable and Combustible Liquids* for the purpose of handling and storage, but is not classified as a dangerous good in accordance with the criteria of the *Australian Code for the Transport of Dangerous Goods by Road or Rail* (ADG Code) (National Transport Commission, 2017). In the event of a spill, diesel is damaging to soils and aquatic ecosystems, and fire can occur if ignited (flash point of approximately 61 to 150 degrees Celsius).

The risks associated with the Project include continued handling, storage and use of diesel. The current diesel storage on-site includes:

- three 110 kilolitre (kL) self-bunded diesel storage tanks located at the Mine Infrastructure Area;
- one 110 kL self-bunded diesel storage tank located at the go-line area;
- one 110 kL self-bunded diesel storage tank located at the explosives reload facility;
- one 68 kL self-bunded diesel storage tank located at the construction area; and
- one 15 kL self-bunded diesel storage tank located at the CHPP.

The fuel storage capacity of the Mine Infrastructure Area would be progressively expanded for the Project, approximately doubling the total capacity for diesel storage.

All additional fuel storage facilities would be constructed and operated in accordance with AS 1940:2017.

Petrol

Petrol is classified as a flammable liquid (Class 3) by AS 1940:2017 and as a dangerous good according to the criteria of the ADG Code (National Transport Commission, 2017). On-site petrol usage would continue to be minor and petrol engine vehicles would continue to be fuelled off-site.

Oils, Greases, Degreasers and Coolant

Oil is classified as a combustible liquid (Class C2) by AS 1940:2017. MACH would continue to follow the existing procedures for the handling, storage, containment and disposal of workshop hydrocarbons (e.g. oils, greases, degreasers and coolant) as documented in the Waste Management Plan, Mining Operations Plan, and other relevant site procedures, which have been developed in consideration of AS 1940:2017.

The current oil storage on-site includes:

- two 12 kL self-bunded oil storage tanks at the Mine Infrastructure Area;
- one 12 kL self-bunded oil storage tank at the CHPP; and
- one 500 litre self-bunded oil storage tank at the rail load-out facility.

The current waste oil storage on-site includes:

- one 12.5 kL self-bunded oil storage tank at the Mine Infrastructure Area;
- one 10 kL self-bunded oil storage tank at the CHPP; and
- one 1 kL self-bunded oil storage tank at the rail load-out facility.

Coolant and waste coolant are currently stored in two separate 5 kL self-bunded coolant storage tanks located at the Mine Infrastructure Area.

Grease is currently stored in a 2 kL self-bunded storage tank at the CHPP.

Workshop hydrocarbon spills and leaks would continue to be managed in accordance with the Waste Management Plan.

Other Hydrocarbons

Minor quantities of other hydrocarbons may be used at the Project for construction, development and maintenance activities (e.g. acetylene for welding). The handling and storage of other hydrocarbons on-site would continue to be conducted in accordance with the existing procedures in place at the Mount Pleasant Operation, which have been developed in consideration of the Australian Standards and relevant codes.

2.1.2 Chemicals

The management and storage of chemicals (including minor quantities of radioactive isotopes used in CHPP instruments) at the Project would continue to be conducted in accordance with the existing procedures in place at the Mount Pleasant Operation, which have been developed in consideration of the relevant Australian Standards and codes.

Consistent with existing procedures at the Mount Pleasant Operation, no chemicals or hazardous materials would be permitted on-site unless a copy of the appropriate Safety Data Sheet (SDS) is available on-site or, in the case of a new product, is accompanied by an SDS.

2.1.3 Explosives

Consistent with the existing Mount Pleasant Operation, explosive materials required for the Project would include initiating products, ammonium nitrate fuel oil and emulsion explosives.

Explosives storage would continue to be conducted in accordance with the NSW *Explosives Act, 2003* and *Explosives Regulation, 2013*. The *Explosives Regulation, 2013* details the requirements for the safe storage, transport, handling and disposal of explosive materials, with reference to AS 2187.2:2006 *Explosives – Storage and Use – Use of Explosives* for specific guidelines.

Explosives are currently stored in a licensed explosives magazine in accordance with Workcover requirements and applicable Australian Standards.

The explosives reload facility currently includes approximately 60 tonnes of ammonium nitrate and a 90 kilotonne ammonium nitrate emulsion tank.

The existing explosives storage facility would continue to be used for the Project; however, the explosives reload facility would be expanded to accommodate the increased usage of explosives for the Project.

2.1.4 Liquid and Non-liquid Wastes

The existing wastewater treatment plant at the Mount Pleasant Operation would continue to be used to treat effluent on-site, and would be expanded to accommodate the increase in workforce for the Project. Effluent disposal would continue to be undertaken in accordance with the Waste Management Plan and regulated under Environment Protection Licence 20850.

In accordance with Environment Protection Licence 20850 and the Waste Management Plan, waste tyres are disposed of on-site in the waste rock emplacement.

Waste hydrocarbons would continue to be collected and stored on-site (refer Section 2.1.1) prior to being removed by licensed contractors in accordance with the Waste Management Plan.

2.2 HAZARD IDENTIFICATION PROCESS

2.2.1 Project Components

As this assessment specifically covers risk from fixed installations associated with the Project (in accordance with *Multi-level Risk Assessment* [DP&I, 2011] [Section 1.3]), the main focuses of this assessment were on-site storages, coal stockpile areas, water management structures and fine reject storage. In addition, some additional risk scenarios relating to mining operations (e.g. blasting, highwall slumping and unplanned/unauthorised movement of mobile equipment off-site) were identified and included in this PHA. While transportation is not covered by the *Multi-level Risk Assessment* guideline (DP&I, 2011) (Section 1.3), potential risks associated with on-site rail movements have also been considered. Further discussion on the scope and objectives of this PHA are described in Section 1.3.

2.2.2 Incident Classes

The following classes of incidents were identified:

- spill/leak;
- fire;
- explosion;
- excessive vibration or overpressure;
- flyrock;

- unauthorised movement of mobile plant;
- theft;
- pit slope failure;
- water or fine reject storage embankment failure;
- malfunction of equipment/mine infrastructure;
- malicious acts/terrorism; and
- release of disease/biological pathogen.

These classes of incident were applied to the Project component areas to identify scenarios, for which treatment measures were developed.

2.2.3 Project Risk Treatment Measures

MACH implements a safety management system to manage risks to health and safety in accordance with the requirements of the *Work Health and Safety (Mines and Petroleum Sites) Act, 2013* and the *Work Health and Safety (Mines and Petroleum Sites) Regulation, 2014*. MACH would continue to meet these obligations for the Project.

MACH's safety management system is documented in the Environmental Management Strategy, which includes a number of environmental management plans, strategies and programmes for the Mount Pleasant Operation, including, but not limited to, the following:

- Noise Management Plan;
- Blast Management Plan;
- Air Quality and Greenhouse Gas Management Plan;
- Water Management Plan, incorporating: Site Water Balance, Erosion and Sediment Control Plan, Surface Water Management Plan, Groundwater Management Plan, Surface and Ground Water Response Plan;
- Biodiversity Management Plan;
- Aboriginal Heritage Management Plan;
- Aboriginal Heritage Conservation Strategy;
- Maintenance Management Plan;
- Visual Impact Management Plan;
- Waste Management Plan (including Fines Emplacement Plan);
- Construction Environmental Management Plan;
- Rehabilitation Strategy;
- Rehabilitation Management Plan; and
- Pollution Incident Response Management Plan.

Additional, more specific environmental management plans developed by MACH (e.g. the Bushfire Management Plan and Spontaneous Combustion Management Plan), are also implemented at the Mount Pleasant Operation.

A number of hazard controls, including mitigation and management measures, are described in the environmental management plans, strategies and programmes in place at the Mount Pleasant Operation.

Key hazard controls and mitigation measures that would continue to be applied for the Project include:

- **Maintenance** – Ongoing and timely maintenance of all mobile and fixed plant equipment in accordance with the recommended maintenance schedule of the original equipment manufacturer, and consistent with maintenance schemes required by relevant legislation.
- **Staff Training** – Equipment operators and drivers would be trained and (where appropriate) licensed for their positions. Only personnel who are appropriately licensed to undertake skilled and potentially hazardous work would be permitted to do so.
- **Engineering Structures** – Mining and civil engineering structures would be constructed in accordance with the applicable Australian Standards, codes and guidelines. Where applicable, MACH would obtain the necessary licences and permits for the construction of engineering structures.
- **Contractor Management** – All contractors employed by MACH would be required to operate in accordance with the relevant Australian Standards and NSW legislation.
- **Water Management** – As reported in Appendix D of the EIS, water management structures would be constructed to generally separate runoff from disturbed areas and undisturbed areas.
- **Coal Stockpile Management** – Coal stockpiles would be monitored and managed to reduce the potential for spontaneous combustion.
- **Storage Facilities** – Storage and usage procedures for potentially hazardous materials (e.g. hydrocarbons, chemicals and explosives) would be followed. The storage and usage procedures would continue to be consistent with Australian Standards and relevant legislation. A register would be kept up-to-date with the chemicals and dangerous goods stored on-site.
- **Emergency Response** – Emergency response procedures systems and manuals would continue to be implemented.
- **Waste Management System** – Waste would continue to be managed in consideration of general waste management principles (reduce, re-use, recycle). Waste disposal measures and a waste monitoring programme are described in the Waste Management Plan.

3 RISK MANAGEMENT AND EVALUATION

Attachment A presents a qualitative assessment of the potential risks associated with the construction and operation of the Project. As described in Section 1.3, the assessment particularly evaluates the off-site risks of fixed installations at the Project to people, their property and the environment arising from abnormal and atypical hazardous events and conditions.

Hazard treatment measures have been proposed, where required, to result in a 'low' level of potential risk in accordance with the risk acceptance criteria described in Section 1.5.3. Proposed risk treatment measures are described in Section 2.2.3.

The Level 1 assessment conducted is considered justified, as this PHA demonstrates a societal risk in the negligible zone and there are no potential scenarios with significant off-site consequences in accordance with the *Multi-level Risk Assessment* Guideline (DP&I, 2011) (Section 1.4).

4 REFERENCES

Department of Planning (2011a) *Hazardous Industry Planning Advisory Paper No. 6: Hazard Analysis*.

Department of Planning (2011b) *Hazardous Industry Planning Advisory Paper No. 4: Risk Criteria for Land Use Safety Planning*.

Department of Planning and Infrastructure (2011) *Multi-level Risk Assessment*.

National Transport Commission (2017) *Australian Code for the Transport of Dangerous Goods by Road & Rail*. Edition 7.6.

Risk Mentor (2020) *Mount Pleasant Optimisation Project Environmental Risk Assessment*.

ATTACHMENT A

HAZARD IDENTIFICATION AND ANALYSIS TABLE

Table A-1
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
On-site Storage Hydrocarbons (e.g. diesel, oils, greases, degreasers and coolant) and chemicals.	Leak/spill	Failure of tank or associated fittings, pump or pipework, or operator error, which leads to off-site impacts including hydrocarbon or chemical contamination.	• Design and construction of structures/tanks/pipes and storage facilities to relevant standards and legislation. • Storage facilities located to minimise potential impacts of leaks/spills. • Bunding (or use of double-skinned tanks) of storage facilities/pipes to relevant standards and legislation. • Water Management Plan, including existing site water management controls for operational areas (e.g. runoff from major infrastructure areas reports to environmental dams). • Regular inspections and maintenance, where required. • Waste Management Plan. • Spill management equipment (e.g. spill kits), procedures and training. • Operational procedures and operator training. • Register of dangerous goods and Safety Data Sheets (SDS). • Emergency Response Systems. • Pollution Incident Response Management Plan.	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
On-site Storage (Continued) Hydrocarbons (e.g. diesel, oils, greases, degreasers and coolant) and chemicals.	Leak/spill	Failure of storage vessel due to collision, corrosion, or extreme natural phenomena (e.g. earthquake, flood or severe storm), which leads to off-site impacts including hydrocarbon or chemical contamination.	• Design and construction of structures/tanks/pipes and storage facilities to relevant standards and legislation. • Storage facilities located to minimise potential impacts of leaks/spills. • Bunding (or use of double-skinned tanks) of storage facilities/pipes to relevant standards and legislation. • Water Management Plan, including existing site water management controls for operational areas (e.g. runoff from major infrastructure areas reports to environmental dams). • Regular inspections and maintenance, where required. • Separation of tanks from refuelling areas. • Protection of storage vessels from collision (e.g. bollards). • Waste Management Plan. • Spill management equipment, procedures and training. • Operational procedures and operator training. • Signage. • Register of dangerous goods and SDS. • Emergency Response Systems. • Pollution Incident Response Management Plan.	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
On-site Storage (Continued) Hydrocarbons (e.g. diesel, oils, greases, degreasers and coolant) and chemicals.	Fire/explosion	Poor maintenance or design, co-located storage of incompatible chemicals (including the minor quantities of radioactive isotopes used in CHPP instruments), collision, human error, or extreme natural phenomena (e.g. earthquake, flood or severe storm), which leads to off-site fire/explosion/fume emissions-related impacts.	• Design and construction of structures/tanks/pipes and storage facilities to relevant standards and legislation. • Appropriate storage of hydrocarbons, explosives and chemicals as required by relevant standards and legislation. • Storage facilities located to minimise potential impacts of fire/explosion. • Bunding (or use of double-skinned tanks) of storage facilities/pipes to relevant standards and legislation. • Protection of storage vessels from collision (e.g. bollards). • Register of dangerous goods and SDS. • Liaison with the Rural Fire Service to facilitate rapid response. • On-site emergency response team. • Firefighting equipment located in on-site vehicles and infrastructure, where appropriate. • Regular inspections and maintenance of firefighting equipment. • Regular maintenance of fire breaks to slow the spread of fire. • Operational procedures and operator training. • Bushfire Management Plan. • ‘Hot work’ permits. • Smoking is prohibited on-site.	C	4	18(L)
	Theft/malicious act/terrorism	Theft or malicious act, which leads to off-site impacts.	• Restriction of access to storage facilities. • Adequate lighting around storage facilities. • Maintenance of a perimeter fence to reduce ease of access to the site. • Closed-circuit television (CCTV) camera surveillance on-site. • Register of dangerous goods and SDS. • Restricted access to unauthorised persons. • Automated boom gates (requiring authorised identification badges) at entry points to mine, CHPP and other industrial areas and security patrols of operational areas at night.	D	5	24(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
On-site Storage (Continued) Run-of-mine (ROM) and product coal stockpiles.	Equipment malfunction	Breakdown of dust suppression equipment combined with unfavourable meteorological conditions, which leads to significant off-site dust emissions.	• Real-time air quality monitoring systems, and modification of stockpiling/coal handling in event of elevated air quality levels off-site. • Regular maintenance of all dust suppression equipment. • Availability of site water carts. • Regular inspections of coal stockpiles.	C	5	22(L)
	Fire	Spontaneous combustion event, which leads to off-site fire-related impacts (fume/emissions).	• Design and management of coal stockpiles (e.g. size, shape and age tracking). • Spontaneous Combustion Management Plan. • Separation of stockpiles from potential fire hazards. • Regular monitoring of coal stockpiles, including the use of thermal imaging as required. • Priority washing of selected ROM coal from particular coal seams. • Stockpile dust suppression equipment. • Availability of site water carts. • Spontaneous combustion propensity testing to inform decision-making and management measures. • Regular communication of coal stockpile status and active management. • Liaison with the Rural Fire Service to facilitate rapid response. • On-site emergency response team. • Firefighting equipment located in on-site vehicles and infrastructure, where appropriate. • Regular inspections and maintenance of firefighting equipment. • Regular maintenance of fire breaks to slow the spread of fire. • Operational procedures and operator training. • Bushfire Management Plan. • ‘Hot work’ permits. • Smoking is prohibited on-site.	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
On-site Storage (Continued) Carbonaceous waste rock in out-of-pit or in-pit waste rock emplacements.	Fire	Spontaneous combustion event, which leads to off-site fire-related impacts (fume/emissions).	• Spontaneous Combustion Management Plan. • Housekeeping activities – the site would be kept clean and tidy, with fire hazards removed, where practicable. • Selective emplacement of carbonaceous waste rock material (e.g. at sufficient depth, or encapsulated). • Ongoing monitoring of waste rock emplacements. • Availability of site water carts. • Liaison with the Rural Fire Service to facilitate rapid response. • On-site emergency response team. • Firefighting equipment located in on-site vehicles and infrastructure, where appropriate. • Regular inspections and maintenance of firefighting equipment. • Regular maintenance of fire breaks to slow the spread of fire. • Operational procedures and operator training. • Bushfire Management Plan. • 'Hot work' permits. • Smoking is prohibited on-site.	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
On-site Storage (Continued) Carbonaceous waste rock in highwalls.	Fire	Spontaneous combustion event, which leads to off-site fire-related impacts (fume/emissions).	• Spontaneous Combustion Management Plan. • Housekeeping activities – the site would be kept clean and tidy, with fire hazards removed, where practicable. • Ongoing monitoring of highwalls. • Availability of site water carts. • Liaison with the Rural Fire Service to facilitate rapid response. • On-site emergency response team. • Firefighting equipment located in on-site vehicles and infrastructure, where appropriate. • Regular inspections and maintenance of firefighting equipment. • Regular maintenance of fire breaks to slow the spread of fire. • Operational procedures and operator training. • Bushfire Management Plan. • 'Hot work' permits. • Smoking is prohibited on-site.	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
On-site Storage (Continued) Explosives.	Fire/explosion	Poor maintenance or design, collision, human error or extreme natural phenomena (e.g. earthquake, flood or severe storm), which leads to off-site fire/explosion/fume emissions-related impacts.	• Design of explosives storage facilities to relevant standards and legislation, including the relevant provisions of Australian Standard (AS) 4326:2008 *The Storage and Handling of Oxidizing Agents*. • Explosives storage facilities located a significant distance from sensitive land uses to minimise potential impacts of fire/explosion. • Blast Management Plan. • Liaison with the Rural Fire Service to facilitate rapid response. • On-site emergency response team. • Firefighting equipment located in on-site vehicles and infrastructure, where appropriate. • Regular inspections and maintenance of firefighting equipment. • Regular maintenance of fire breaks to slow the spread of fire. • Operational procedures and operator training. • Bushfire Management Plan. • 'Hot work' permits. • Smoking is prohibited on-site.	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
On-site Storage (Continued) Explosives.	Theft/malicious act/terrorism	Theft or malicious act, which leads to off-site impacts.	• Restriction of access to explosives storage facilities. • Dedicated magazine for the storage of explosives. • Adequate lighting around explosives storage facilities. • Explosives storage facility location remote from public roads. • Maintenance of an explosives inventory, with regular auditing. • Operational procedures, operator training and management plans (e.g. Blast Management Plan). • Maintenance of a perimeter fence to reduce ease of access to the site. • CCTV camera surveillance on-site. • Restricted access to unauthorised persons. • Automated boom gates (requiring authorised identification badges) at entry points to mine, CHPP and other industrial areas and security patrols of operational areas at night.	E	4	23(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Construction/ Development Project construction and development activities, such as construction of the Stage 2 Coal Handling and Preparation Plant, construction of the Northern Link Road or development of water storage and management infrastructure.	Leak/spill	Spill of hydrocarbons, chemicals, sewage wastes or domestic wastes, which leads to off-site impacts on nearby watercourses or land.	• Water Management Plan, including existing site water management controls for operational areas (e.g. runoff from major infrastructure areas reports to environmental dams). • Waste Management Plan. • Storage of hydrocarbons and chemicals in accordance with relevant standards and legislation. • Spill management equipment, procedures and training. • Operational procedures and operator training. • Register of dangerous goods and SDS. • Emergency Response Systems. • Pollution Incident Response Management Plan. • Construction-specific environmental controls.	C	5	22(L)
	Fire/explosion	Chemicals or hydrocarbons ignite due to lightning strike, malicious act or human error, which leads to off-site impacts.	• Appropriate storage of hydrocarbons and chemicals as required by relevant standards and legislation. • Storage facilities located to minimise potential impacts of fire/explosion. • Liaison with the Rural Fire Service to facilitate rapid response. • On-site emergency response team. • Firefighting equipment located in on-site vehicles and infrastructure, where appropriate. • Regular inspections and maintenance of firefighting equipment. • Regular maintenance of fire breaks to slow the spread of fire. • Operational procedures and operator training. • Bushfire Management Plan. • 'Hot work' permits. • Smoking is prohibited on-site. • Construction-specific environmental controls.	D	4	21(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Construction/ Development (Continued) Project construction and development activities, such as construction of the Stage 2 Coal Handling and Preparation Plant, construction of the Northern Link Road or development of water storage and management infrastructure.	Fire	Construction activity near fuel or chemicals storage results in a fire, which leads to off-site impacts.	• Appropriate storage of hydrocarbons and chemicals as required by relevant standards and legislation. • Storage facilities located to minimise potential impacts of fire. • Liaison with the Rural Fire Service to facilitate rapid response. • On-site emergency response team. • Firefighting equipment located in on-site vehicles and infrastructure, where appropriate. • Regular inspections and maintenance of firefighting equipment. • Regular maintenance of fire breaks to slow the spread of fire. • Operational procedures and operator training. • Bushfire Management Plan. • 'Hot work' permits. • Smoking is prohibited on-site. • Construction-specific environmental controls.	C	4	18(L)
	Fire	Vehicle fire or electrical fire, which leads to off-site bushfire.	• Liaison with the Rural Fire Service to facilitate rapid response. • On-site emergency response team. • Firefighting equipment located in on-site vehicles and infrastructure, where appropriate. • Regular inspections and maintenance of firefighting equipment. • Regular maintenance of fire breaks to slow the spread of fire. • Operational procedures and operator training. • Bushfire Management Plan. • 'Hot work' permits. • Smoking is prohibited on-site. • Construction-specific environmental controls.	D	3	17(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Construction/ Development (Continued) Project construction and development activities, such as construction of the Stage 2 Coal Handling and Preparation Plant, construction of the Northern Link Road or development of water storage and management infrastructure.	Theft	Theft of construction materials, which leads to an off-site event causing injury.	• Design and construction of storage facilities to relevant standards and legislation – including security measures. • Restriction of access to storage facilities. • Adequate lighting around storage facilities. • Maintenance of a perimeter fence to reduce ease of access to the site. • CCTV camera surveillance on-site. • Restricted access to unauthorised persons. • Automated boom gates (requiring authorised identification badges) at entry points to mine, CHPP and other industrial areas and security patrols of operational areas at night.	C	4	18(L)
	Uncontrolled/ unauthorised movement	Mobile plant or equipment parts are moved off-site in an uncontrolled/ unauthorised manner, which results in a collision off-site and associated impacts.	• Construction activities to be undertaken by appropriately licensed and trained personnel. • Ground disturbance permit process and demarcation of areas to be disturbed prior to disturbance works. • Planning of construction activities to minimise the potential for off-site impacts. • Environmental Management System. • Operational procedures and operator training. • Construction-specific environmental controls. • Maintenance of a perimeter fence to reduce ease of access to the site. • CCTV camera surveillance on-site. • Restricted access to unauthorised persons. • Automated boom gates (requiring authorised identification badges) at entry points to mine, CHPP and other industrial areas and security patrols of operational areas at night. • Mobile equipment would not be left idling, and keys would be removed when unattended.	C	4	18(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Construction/ Development (Continued) Project construction and development activities, such as construction of the Stage 2 Coal Handling and Preparation Plant, construction of the Northern Link Road or development of water storage and management infrastructure.	Release of disease/ biological pathogen	Construction/development activity leads to the release of disease/ biological pathogen (e.g. disturbance of disease-carrying vermin), which leads to off-site impacts.	• Pre-clearance surveys of vegetated areas, including identification of pest species that require control prior to disturbance (e.g. vermin). • Pest management in accordance with the Biodiversity Management Plan. • Health and Safety Management System.	E	4	23(L)
Other Infrastructure and Supporting Systems Waste management system, water management system, fine reject pipelines and storage and on-site power reticulation.	Leak/spill	Spill of hydrocarbons, chemicals, sewage wastes or domestic wastes, which leads to off-site impacts on watercourses or land.	• Water Management Plan, including existing site water management controls for operational areas (e.g. runoff from major infrastructure areas reports to environmental dams). • Waste Management Plan. • Storage of hydrocarbons and chemicals in accordance with relevant standards and legislation. • Spill management equipment, procedures and training. • Operational procedures and operator training. • Register of dangerous goods and SDS. • Emergency Response Systems. • Pollution Incident Response Management Plan.	C	4	18(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Other Infrastructure and Supporting Systems (Continued) Waste management system, water management system, fine reject pipelines and storage and on-site power reticulation.	Leak/spill	Leak or spill from water management system (e.g. the Controlled Release Dam and associated pipeline, Hunter River water supply pipeline, sediment dams or the additional Project mine water storages), leak from the fine reject pipelines, or equipment malfunction associated with the water treatment facility, potentially due to extreme natural phenomena (e.g. earthquake, flood or severe storm), which leads to off-site impacts associated with water quality.	• Water Management Plan, including existing site water management controls for operational areas (e.g. runoff from major infrastructure areas reports to environmental dams). • Waste Management Plan. • Design and construction of water management infrastructure to relevant standards and legislation. • Regular inspections of water containment and reticulation infrastructure for structural integrity and effectiveness, and repair as required to maintain function. • Water meters to prevent overtopping, pumping controls and auto shutoff systems. • Lining of water storages (i.e. select clay emplacement) where necessary. • Operational procedures and operator training. • Environmental Management System. • Pollution Incident Response Management Plan.	D	4	21(L)
	Mine water dam embankment failure	Slump or collapse of mine water dam embankment (including the Controlled Release Dam), which leads to off-site impacts associated with water quality or damage to off-site infrastructure.	• Water Management Plan, including existing site water management controls for operational areas (e.g. runoff from major infrastructure areas reports to environmental dams). • Design and construction of water management infrastructure to relevant standards and legislation, including Dams Safety NSW requirements. • Dams Safety NSW oversight. • Regular inspections of water containment infrastructure for structural integrity and effectiveness, and repair as required to maintain function. • Blast monitoring and post-blast inspections. • Survey monitoring, piezometers and water quality monitoring. • Operational procedures and operator training. • Environmental Management System. • Pollution Incident Response Management Plan.	C	4	18(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Other Infrastructure and Supporting Systems (Continued) Waste management system, water management system, fine reject pipelines and storage and on-site power reticulation.	Fines Emplacement Area embankment failure	Slump or partial collapse of Fines Emplacement Area embankment, which leads to off-site impacts associated with water quality, damage to off-site infrastructure or causes injury.	• Fines Emplacement Plan (within the Waste Management Plan). • Design and construction of the Fines Emplacement Area to relevant standards and legislation, including Dams Safety NSW requirements. • Use of the 'downstream' embankment raise method, which provides greater stability than the 'upstream' method that relies on the structural integrity of deposited fine rejects. • Sub-aerial fine rejects deposition, with deposition points relocated as required to maintain the decant pond as far as possible from the embankment. • Dams Safety NSW oversight. • High Risk Activity Notification process with the NSW Resources Regulator. • Regular inspections of the Fines Emplacement Area for structural integrity and effectiveness, and repair as required to maintain function. • Blast monitoring and post-blast inspections. • Survey monitoring, piezometers and water quality monitoring. • Operational procedures and operator training. • Environmental Management System. • Pollution Incident Response Management Plan.	C	4	18(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Other Infrastructure and Supporting Systems (Continued) Waste management system, water management system, fine reject pipelines and storage and on-site power reticulation.	Leak/spill	Leak/spill from the Fines Emplacement Area, which leads to off-site impacts associated with water quality.	• Fines Emplacement Plan (within the Waste Management Plan). • Design and construction of the Fines Emplacement Area to relevant standards and legislation, including Dams Safety NSW requirements. • Sub-aerial fine rejects deposition, with deposition points relocated as required to maintain the decant pond as far as possible from the embankment. • Placement of an environmental dam downstream of the Fines Emplacement Area to capture any leaks/spills. • Dams Safety NSW oversight. • High Risk Activity Notification process with the NSW Resources Regulator. • Regular inspections of the Fines Emplacement Area for structural integrity and effectiveness, and repair as required to maintain function. • Blast monitoring and post-blast inspections. • Survey monitoring, piezometers and water quality monitoring. • Operational procedures and operator training. • Environmental Management System. • Pollution Incident Response Management Plan.	C	4	18(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Other Infrastructure and Supporting Systems (Continued) Waste management system, water management system, fine reject pipelines and storage and on-site power reticulation.	Fire	Malfunction of on-site power reticulation or water reticulation (e.g. Hunter River pump station), which leads to off-site bushfire.	• Power reticulation and water reticulation systems designed to relevant standards and legislation. • Regular inspections of power and water reticulation infrastructure for structural integrity and effectiveness, and repair as required to maintain function. • Liaison with the Rural Fire Service to facilitate rapid response. • On-site emergency response team. • Firefighting equipment located in on-site vehicles and infrastructure, where appropriate. • Regular inspections and maintenance of firefighting equipment. • Regular maintenance of fire breaks to slow the spread of fire. • Operational procedures and operator training. • Weed and vegetation management. • Bushfire Management Plan. • 'Hot work' permits. • Smoking is prohibited on-site.	C	4	18(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Open Cut Operations Drill and blast operations, stability of open cuts and operation of mobile plant.	Flyrock	Significant flyrock ejected from blast, which leads to damage to property or persons off-site.	• Blast Management Plan. • Planning and design of blasts to ensure adequate controls are in place to reduce the potential for significant flyrock. • Maintenance of buffer distances from blast events. • Operational procedures and operator training. • Where blasting occurs in close proximity to local roads, temporary road closures would occur in accordance with the Road Closure Management Plan. • Blast monitoring (including video recording) to validate blast design and performance and Blast Review Process (continuous improvement).	D	4	21(L)
	Excessive overpressure or vibration	Blast event generates excessive overpressure or vibration, which leads to damage to off-site infrastructure, including nearby prescribed dams.	• Blast Management Plan. • Planning and design of blasts to ensure adequate controls are in place to reduce the potential for significant overpressure and vibration. • Maintenance of buffer distances from blast events. • Operational procedures and operator training. • Where blasting occurs in close proximity to local roads, temporary road closures would occur in accordance with the Road Closure Management Plan. • Blast monitoring (including video recording) to validate blast design and performance and Blast Review Process (continuous improvement).	C	4	18(L)
	Excessive overpressure or vibration	Blast event generates excessive overpressure or vibration, which leads to damage to off-site sensitive Aboriginal or historic heritage items.	• Blast Management Plan. • Planning and design of blasts to ensure adequate controls are in place to reduce the potential for significant overpressure and vibration. • Maintenance of buffer distances from blast events. • Operational procedures and operator training. • Blast monitoring (including video recording) to validate blast design and performance and Blast Review Process (continuous improvement).	D	4	21(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Open Cut Operations Drill and blast operations, stability of open cuts and operation of mobile plant.	Excessive blast fume	Blast event generates excessive blast fume, which leads to damage to property or persons off-site.	• Blast Management Plan (including the Blast Fume Management Strategy). • Planning and design of blasts to ensure adequate controls are in place to reduce the potential for generation of significant blast fume. • Maintenance of buffer distances from blast events. • Operational procedures and operator training. • Blast monitoring (including video recording) to validate blast design and performance and Blast Review Process (continuous improvement).	C	4	18(L)
	Pit slope failure	Slump or collapse of open cut highwalls, which leads to off-site damage to infrastructure (e.g. roads or nearby prescribed dams).	• Establishment of appropriate buffer distances between the top of the open cut highwalls and off-site infrastructure, in consideration of available geotechnical advice and factors of safety. • Open cut highwalls designed to appropriate geotechnical standards. • Regular inspections and surveys of the open cuts.	C	4	18(L)
	Uncontrolled/ unauthorised movement	Mobile plant or equipment parts are moved off-site in an uncontrolled/ unauthorised manner, which results in a collision off-site and associated impacts.	• Ground disturbance permit process and demarcation of areas to be disturbed prior to disturbance works. • Planning of activities to minimise the potential for off-site impacts. • Environmental Management System. • Operational procedures and operator training. • Bunds/berms on the perimeter of operational areas to minimise the potential for mobile plant or equipment to move off-site. • Maintenance of a perimeter fence to reduce ease of access to the site. • CCTV camera surveillance on-site. • Restricted access to unauthorised persons. • Automated boom gates (requiring authorised identification badges) at entry points to mine, CHPP and other industrial areas and security patrols of operational areas at night.	C	4	18(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Open Cut Operations (Continued) Drill and blast operations, stability of open cuts and operation of mobile plant.	Leak/spill	Spill of hydrocarbons (e.g. fuel, oils or greases) from mobile equipment, which leads to off-site impacts to watercourses.	• Water Management Plan, including existing site water management controls for operational areas (e.g. runoff from major infrastructure areas reports to environmental dams). • Waste Management Plan. • Spill management equipment, procedures and training. • Operational procedures and operator training. • Emergency Response Systems. • Pollution Incident Response Management Plan. • Regular inspections and maintenance of mobile equipment, as required.	D	4	21(L)
	Release of disease/ biological pathogen	Mining operations lead to the release of disease/ biological pathogen (e.g. disturbance of disease-carrying vermin), which leads to off-site impacts.	• Pre-clearance surveys of vegetated areas, including identification of pest species that may require control prior to disturbance (e.g. vermin). • Pest management in accordance with the Biodiversity Management Plan. • Health and Safety Management System.	E	4	23(L)
Rail Transport of Product Coal On-site	Spill	Loaded train leaving the site spills product coal from the rail bridge onto Wybong Road, potentially causing injury.	• Design and construction of the rail spur and rail bridge to relevant standards and legislation. • Speed limits on the rail spur and level grade of the rail bridge. • Barriers on the rail bridge. • Liaison with rail operators to ensure trains are driven by appropriately licensed and trained personnel. • Liaison with rail operators to ensure trains are suitable for use on the rail spur and are well maintained.	D	4	21(L)

Table A-1 (Continued)
Hazard Identification and Analysis

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood [1]	Consequence [2]	Risk [3]
Rail Transport of Product Coal On-site (Continued)	Uncontrolled/ unauthorised movement	Loaded train leaving the site overturns on the rail bridge, causing a large volume of coal or other debris to land onto Wybong Road, potentially causing serious injury.	• Design and construction of the rail spur and rail bridge to relevant standards and legislation. • Speed limits on the rail spur and level grade of the rail bridge. • Barriers on the rail bridge. • Liaison with rail operators to ensure trains are driven by appropriately licensed and trained personnel. • Liaison with rail operators to ensure trains are suitable for use on the rail spur and are well maintained.	E	2	16(L)
	Batter/cutting/ bridge failure	Slump or collapse of rail spur batter/cutting/bridge, causing debris to land onto off-site road infrastructure, potentially causing serious injury.	• Design and construction of the rail spur and rail bridge to relevant standards and legislation and in consideration of available geotechnical advice and factors of safety. • Batters/cuttings designed to appropriate geotechnical standards. • Inspections and surveys of the batters/cuttings/bridge following identification of any damage (e.g. cracks). • Design of blasts to minimise potential damage to rail infrastructure.	E	2	16(L)
	Leak/spill	Spill of hydrocarbons (e.g. train fuel or oils), which leads to off-site impacts to watercourses.	• Waste Management Plan. • Spill management equipment, procedures and training. • Emergency Response Systems. • Pollution Incident Response Management Plan. • Liaison with rail operators to ensure trains are suitable for use on the rail spur and are well maintained.	D	4	21(L)

[1] Refer to Table 1.
[2] Refer to Table 2.
[3] Refer to Table 3.