

Vickery Coal Project

Environmental
Impact
Statement

APPENDIX N

PRELIMINARY HAZARD
ANALYSIS

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1 INTRODUCTION

The Vickery Coal Mine is owned by Whitehaven Coal Limited (Whitehaven) and is located approximately 25 kilometres (km) north of Gunnedah, in New South Wales (NSW) (Figure 1). Open cut and underground mining activities were conducted at the Vickery Coal Mine between 1986 and 1998. The mine has subsequently been closed and rehabilitated and is currently under care and maintenance.

The Vickery Coal Project (the Project) would involve the development of an open cut coal mine and associated infrastructure, and would facilitate a run-of-mine (ROM) coal production rate of up to approximately 4.5 million tonnes per annum (Mtpa) for a period of 30 years. Further details are provided in Section 2 in the Main Report of the Environmental Impact Statement (EIS).

Whitehaven is seeking Development Consent under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* for the Project.

This Preliminary Hazard Analysis (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 NSW Department of Planning and Infrastructure (DP&I) *Multi-level Risk Assessment* (DP&I, 2011). This PHA also addresses the requirements of the NSW *State Environmental Planning Policy No. 33 - Hazardous and Offensive Development* and has been documented in general accordance with *Hazardous Industry Planning Advisory Paper (HIPAP) No. 6: Hazard Analysis* (NSW Department of Planning [DoP], 2011a).

Assessed risks are compared to qualitative risk assessment criteria developed in accordance with Australian Standard/New Zealand Standard International Organisation for Standardisation (AS/NZS ISO) 31000:2009 *Risk Management – Principles and Guidelines* and in *HIPAP No. 4: Risk Criteria for Land Use Safety Planning* (DoP, 2011b).

1.1 OBJECTIVE AND SCOPE

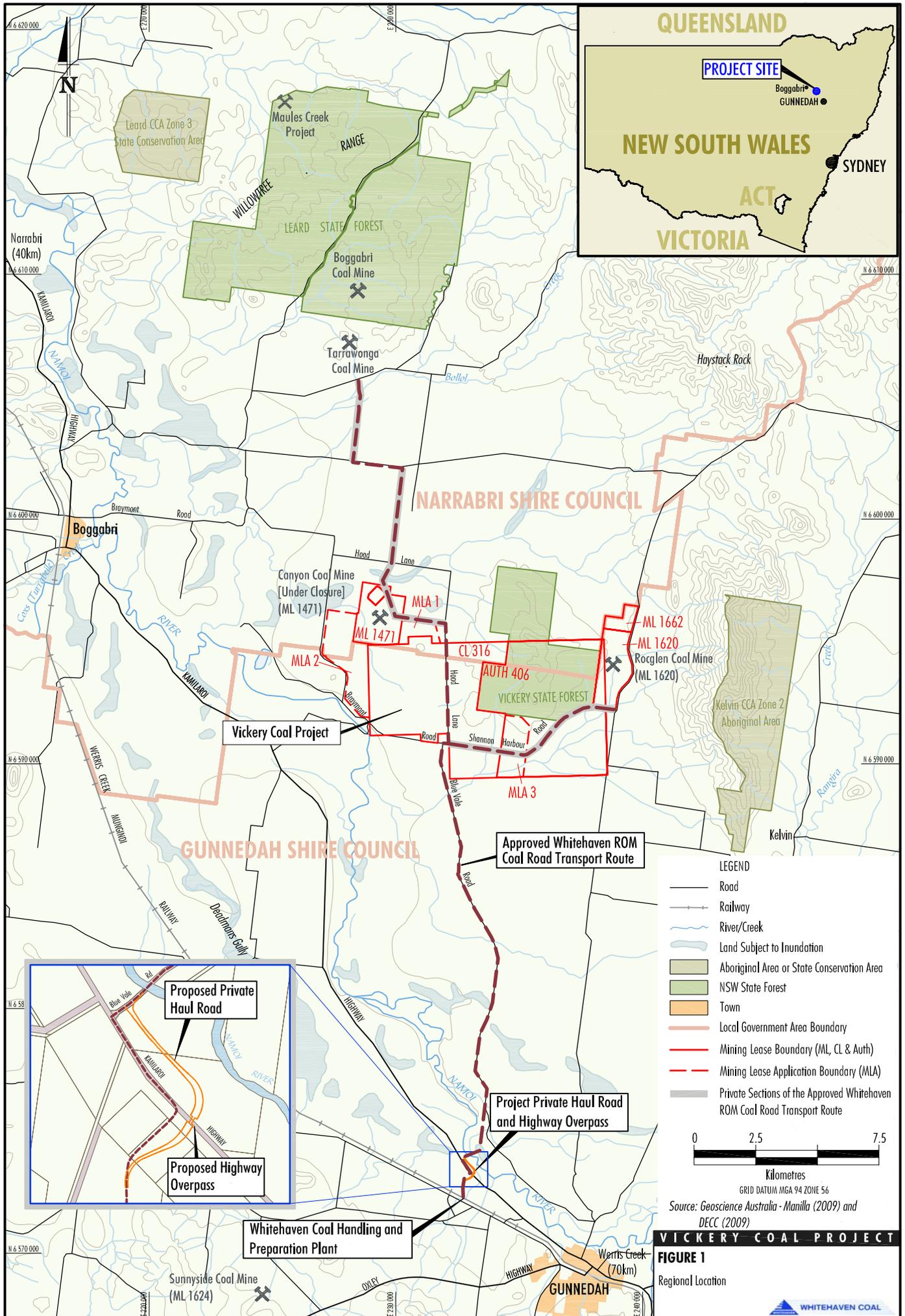
The objective of this PHA is to identify the off-site risks posed by the Project to people, their property and the environment and assess the identified risks using applicable qualitative criteria. In accordance with *Multi-level Risk Assessment* (DP&I, 2011), this assessment specifically covers risks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

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

On-site environmental risks are assessed in the Environmental Risk Assessment (Appendix M of the EIS).

This report should be read in conjunction with the following studies conducted for the EIS:

- Groundwater Assessment (Appendix A of the EIS).
- Surface Water Assessment (Appendix B of the EIS).
- Noise and Blasting Assessment (Appendix C of the EIS).
- Air Quality and Greenhouse Gas Assessment (Appendix D of the EIS).



- Ecological Assessment (Appendix E of the EIS).
- Road Transport Assessment (Appendix F of the EIS).
- Agricultural Impact Statement (Appendix G of the EIS).
- Visual Assessment (Appendix H of the EIS).
- Aboriginal Cultural Heritage Assessment (Appendix I of the EIS).
- Non-Aboriginal Heritage Assessment (Appendix J of the EIS).
- Socio-Economic Assessment (Appendix K of the EIS).
- Geochemistry Assessment (Appendix L of the EIS).
- Environmental Risk Assessment (Appendix M of the EIS).
- Land Contamination Assessment (Appendix O of the EIS).

1.2 PRELIMINARY SCREENING PROCESS

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

In accordance with *Multi-level Risk Assessment* (DP&I, 2011), it was determined that 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 *Multi-level Risk Assessment* (DP&I, 2011), a Level 1 assessment (qualitative analysis) can be justified if the analysis of the facility demonstrates that there are no major off-site risks, if the technical and management controls are well understood and where there are no sensitive surrounding land uses.

The PHA review team (Section 1.3.1) reviewed this screening process and concluded that there is limited potential for scenarios with significant off-site consequences, the technical and management controls are well understood and that there are no sensitive surrounding land uses. Accordingly, the team implemented a Level 1 assessment (qualitative analysis) for this PHA.

1.3 STUDY METHODOLOGY

The methodology employed during the preparation of this PHA was as follows:

- (i) Identify the hazards associated with the Project.
- (ii) Analyse the consequence of identified hazardous events.
- (iii) Qualitatively estimate the likelihood of hazardous events.
- (iv) Propose risk treatment measures.
- (v) Qualitatively assess risks to the environment, members of the public and their property arising from atypical and abnormal events and compare these to the risk criteria outlined in *HIPAP No. 4: Risk Criteria for Land Use Safety Planning* (DoP, 2011b).
- (vi) Recommend further risk treatment measures, if necessary.
- (vii) Qualitatively determine the residual risk assuming the implementation of the risk treatment measures.

1.3.1 Preliminary Hazard Analysis Review Team

The above methodology was implemented during a PHA multi-disciplinary team-based risk review in July 2012. The review participants included technical advisors from Whitehaven including:

- Whitehaven – Project Development Manager – Vickery;
- Whitehaven – Group Environmental Manager; and
- Whitehaven – Environmental Officer.

1.3.2 Risk Management Process

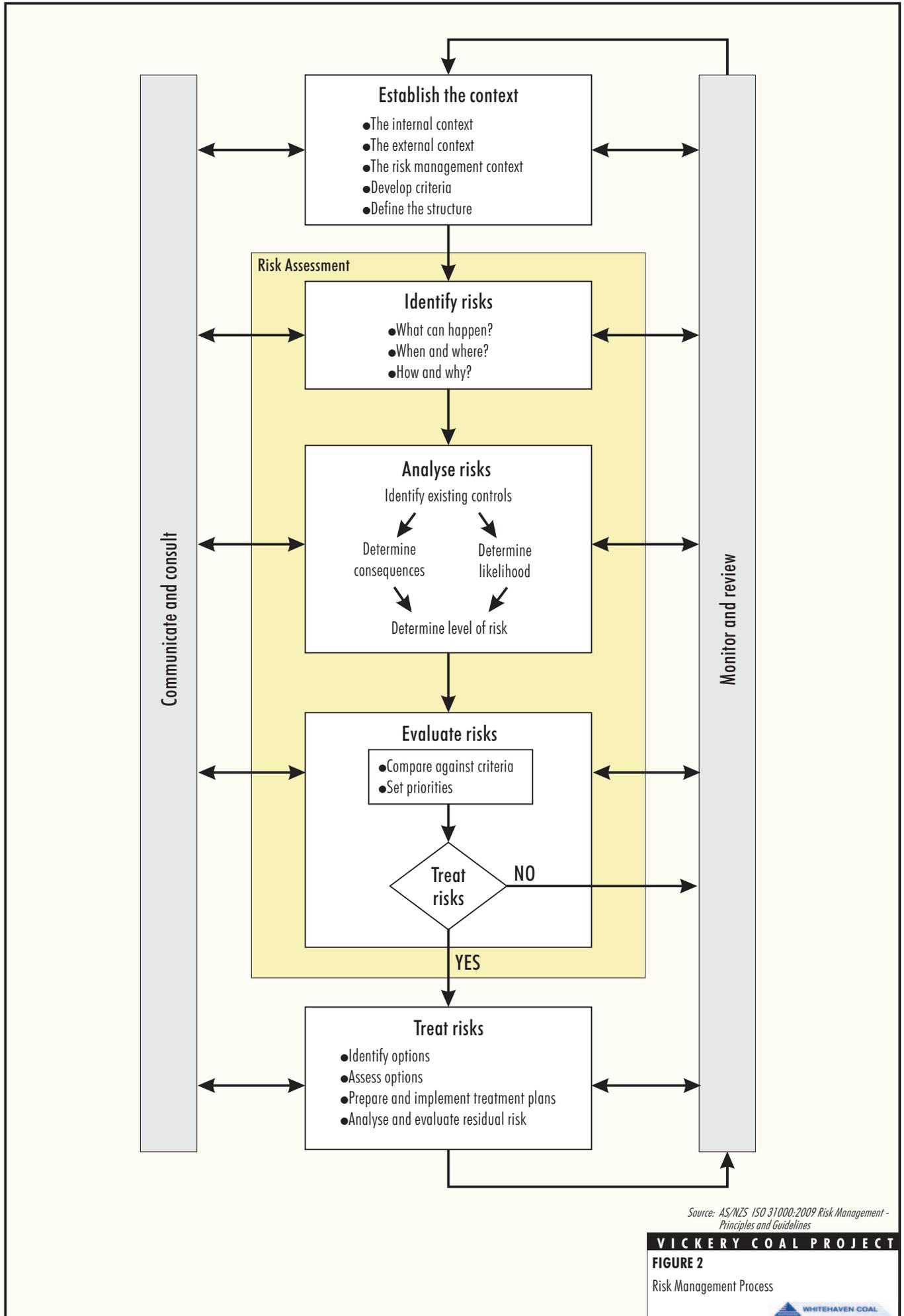
This PHA has been undertaken with regard to the risk management process described in AS/NZS ISO 31000:2009. The risk management process is shown schematically on Figure 2 and includes the following components:

- Establish the context – Sections 1 and 2.
- Identify risks – Section 3.2 and Attachment A.
- Analyse risks – Section 4 and Attachment A.
- Evaluate risks – Section 4 and Attachment A.
- Treat risks – Section 3.2.3 and Attachment A.

1.3.3 Risk Criteria

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

- All 'avoidable' risks should be avoided. This necessitates 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.*
- The risks from a major hazard should be reduced wherever practicable, irrespective of the 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 relevance of safeguards (both technical and locational) as they relate to each risk contributor.*
- 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.*
- 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.*



1.3.4 Qualitative Measures of Consequence, Likelihood and Risk

To undertake a qualitative risk assessment it is useful to define (in a descriptive sense) the various levels of consequence of a particular event, and the likelihood (or probability) of such an event occurring. Risk assessment criteria were developed during the ‘Establish the Context’ phase of the Risk Management Process (Section 1.3.2) in accordance with AS/NZS ISO 31000:2009.

In accordance with AS/NZS ISO 31000:2009, Tables 1, 2 and 3 were reviewed by Whitehaven and were considered to be consistent with the specific objectives and context of this PHA.

**Table 1
Qualitative Measures of Probability**

Event	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

Source: Safe Production Solutions (2009).

**Table 2
Qualitative Measures of Maximum Reasonable Consequence**

	People	Environment	Asset/Production
1	Multiple fatalities	Extreme environmental harm (e.g. widespread catastrophic impact on environmental values of an area)	More than \$1 billion (B) loss or production delay
2	Permanent total disabilities, single fatality	Major environmental harm (e.g. widespread substantial impact on environmental values of an area)	\$100 million (M) to \$1B loss or production delay
3	Major injury or health effects (e.g. major lost workday case/permanent disability)	Serious environmental harm (e.g. widespread and considerable impact on environmental values of an area)	\$5M to \$100M loss or production delay
4	Minor injury or health effects (e.g. restricted work or minor lost workday case)	Material environmental harm (e.g. localised and considerable impact on environmental values of an area)	\$250 thousand (k) to \$5M loss or production delay
5	Slight injury or health effects (e.g. first aid/minor medical treatment level)	Minimal environmental harm (e.g. minor impact on environmental values of an area)	Less than \$250k loss or production delay

Source: Safe Production Solutions (2009).

Combining the probability (Table 1) and consequence (Table 2), Table 3 provides a qualitative risk analysis to assess risk levels.

**Table 3
Risk Ranking Table**

Consequence		Probability				
		A	B	C	D	E
1	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:

	Tolerable
	ALARP – As low as reasonably practicable
	Intolerable

Source: Safe Production Solutions (2009).

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

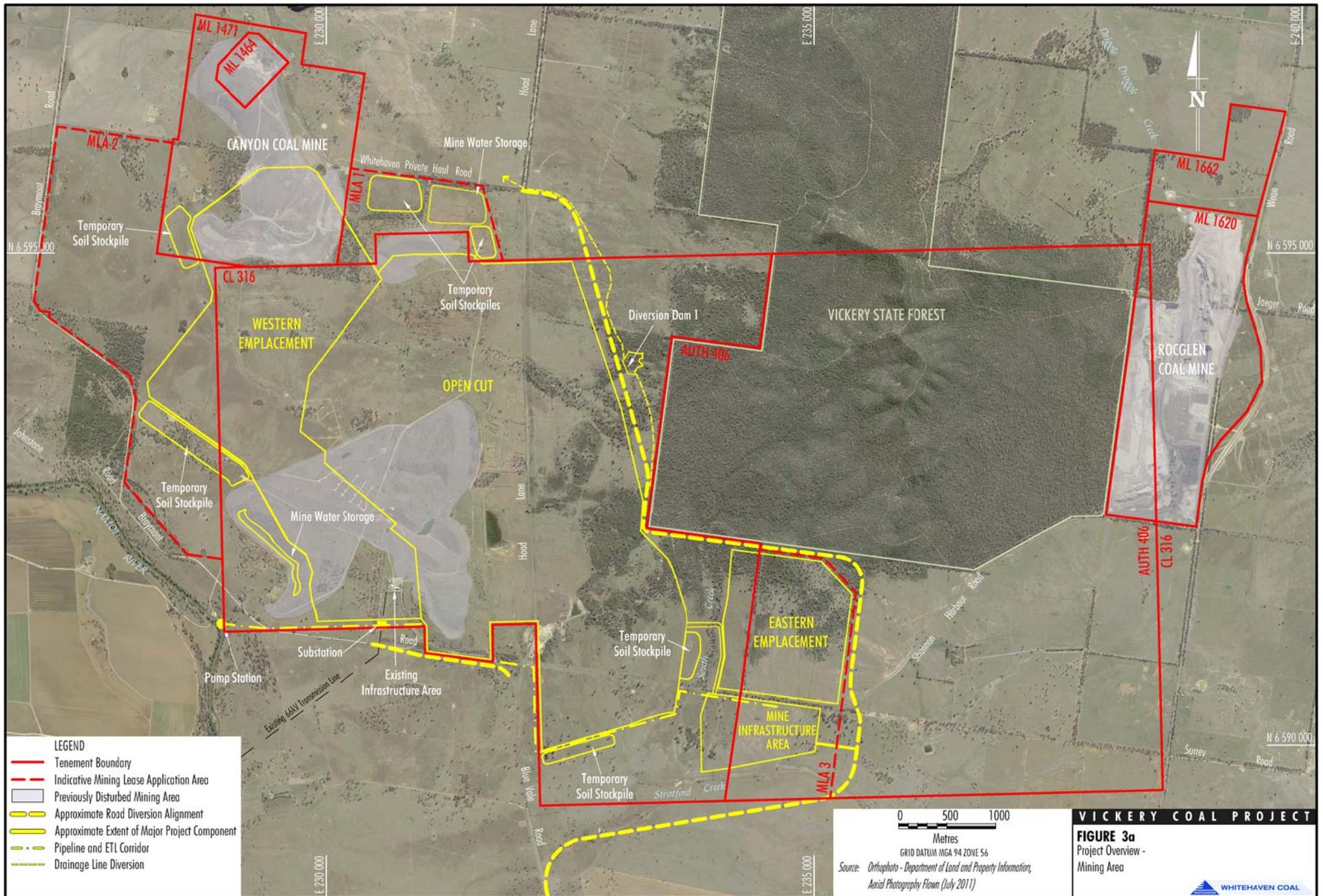
2 PROJECT OVERVIEW

The main activities associated with the development of the Project would include:

- development and operation of an open cut mine within Coal Lease (CL) 316, Authorisation (AUTH) 406, Mining Lease (ML) 1471, Mining Lease Application (MLA) 1, MLA 2 and MLA 3;
- use of conventional mining equipment, haul trucks and excavators to remove up to 4.5 Mtpa of ROM coal and approximately 48 million bank cubic metres of waste rock per annum from the planned open cut;
- placement of waste rock (i.e. overburden and interburden/partings) within external emplacements to the west and east of the planned open cut (i.e. Western Emplacement and Eastern Emplacement) and within mined-out voids;
- construction and use of a Mine Infrastructure Area, including on-site coal crushing, screening and handling facilities to produce sized ROM coal, workshops, offices and services;
- transport of ROM coal by haulage trucks to the Whitehaven Coal Handling and Preparation Plant (CHPP) on the outskirts of Gunnedah (approximately 20 km to the south of the Project open cut);
- use of an on-site mobile crusher for coal crushing and screening of up to 150,000 tonnes of domestic specification coal per annum for direct collection by customers at the mine site;
- use an on-site mobile crusher to produce up to approximately 90,000 cubic metres of gravel materials per annum for direct collection by customers at the mine site;
- construction and use of water supply bores, and a surface water extraction point on the bank of the Namoi River and associated pump and pipeline systems;
- construction and use of new dams, sediment basins, channels, dewatering bores and other control measures in addition to existing water management infrastructure;
- construction and use of new soil stockpile areas, laydown areas and gravel/borrow areas;
- construction of a 66 kilovolt (kV)/11 kV electricity substation and 11 kV electricity transmission line;
- transport of coarse rejects generated at the Whitehaven CHPP via truck to the Project for emplacement within an in-pit emplacement area;
- transport of tailings (i.e. fine rejects) generated within the Whitehaven CHPP via truck to the Project for emplacement within co-disposal storage areas in the open cut and/or disposal in existing off-site licensed facilities (e.g. the Brickworks Pit);
- realignment of sections of Blue Vale Road, Shannon Harbour Road and Hoard Lane to the east and south of the open cut;
- realignment of the southern extent of Braymont Road to the south of the open cut;
- construction of an approximately 1 km long section of private haul road (including an overpass over the Kamilaroi Highway) between Blue Vale Road and the Whitehaven CHPP;
- ongoing exploration, monitoring and rehabilitation activities; and
- construction and use of other associated infrastructure, equipment and mine service facilities.

The proposed life of the Project is 30 years.

Figures 3a and 3b illustrate the general arrangement of the Project. Further detail regarding the Project description is provided in Section 2 in the Main Report of the EIS.





0 50 100 150 200 250
 Metres
 GRID DATUM MGA 94 ZONE 56
 Source: Orthophoto - Department Land and Property Information,
 Aerial Photo Flown (July 2011)

VICKERY COAL PROJECT

FIGURE 3b
 Project Overview -Private Haul Road
 and Kamilaroi Highway Overpass



3 HAZARD IDENTIFICATION

3.1 DESCRIPTION OF HAZARDOUS MATERIALS

The major potentially hazardous materials required for the Project include hydrocarbons, explosives and chemicals. A brief description of these materials is presented below.

In addition, the stockpiling of coal has also been considered in this PHA.

3.1.1 Hydrocarbons

Hydrocarbons used at the Project would include fuels (diesel and petrol), oils, greases, degreaser and kerosene.

Diesel

Diesel is classified as a combustible liquid by Australian Standard (AS) 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids* (Class C1) for the purpose of storage and handling but is not classified as a dangerous good by the criteria of the Australian *Code for the Transport of Dangerous Goods by Road and Rail* (AGD Code) (National Transport Commission, 2007). In the event of a spill, diesel is damaging to soils and aquatic ecosystems and fires can occur if ignited (flash point 61 to 150 degrees Celsius).

The risks associated with the Project include diesel storage and usage. The proposed diesel storage facility includes capacity to store approximately 400,000 litres.

The use of diesel at the Project and the construction and operation of all fuel storages would be undertaken in accordance with the requirements of AS 1940:2004.

Petrol

Petrol is classified as a flammable liquid (Class 3) by AS 1940:2004 and as such is classified as a dangerous good by the criteria of the ADG Code (National Transport Commission, 2007). On-site petrol usage would be minor and petrol engine vehicles would be fuelled off-site at local service stations.

Oils, Greases, Degreaser and Kerosene

Oil is classified as a combustible liquid (Class C2) by AS 1940:2004. Procedures would be developed at the Project for the handling, storage, containment and disposal of workshop hydrocarbons (i.e. oils, greases, degreaser and kerosene) in accordance with AS 1940:2004. Workshop hydrocarbon spills and leaks would also be contained by a purpose-built oil/water separator which would be inspected and maintained on a regular basis.

3.1.2 Explosives

Explosives for the Project would include initiating products and detonators, ammonium nitrate fuel oil and emulsion explosives. Explosives would be transported and used in accordance with safety and operational procedures to be developed for the Project.

Detonators for the Project would be stored within an explosives magazine adjacent to Hoad Lane in accordance with the requirements of AS 2187:1998 *Explosives – Storage, Transport and Use*. Once mining operations advance towards the explosives magazine, the facility would be relocated to a rehabilitated area located on the Western Emplacement. Bulk explosives and explosive products would be delivered from the existing blasting contractors explosives facility located on the Whitehaven private haul road approximately 4 km to the north of the Project, and stored within the explosives magazine area described above.

3.1.3 Chemicals

The management and storage of chemicals at the Project would be conducted in accordance with Whitehaven's prescribed management procedures, Australian Standards and codes.

No chemicals or hazardous materials would be permitted on-site unless a copy of the appropriate Material Safety Data Sheet (MSDS) is available on-site or, in the case of a new product, it is accompanied by a MSDS.

3.2 HAZARD IDENTIFICATION PROCESS

The Project hazard identification table (Attachment A) provides a summary of the potential on-site hazards identified for the Project and a qualitative assessment of the risks posed.

3.2.1 Project Components

As this assessment specifically covers risks from fixed installations (in accordance with *Multi-level Risk Assessment* [DP&I, 2011] [Section 1.1]), the main focus of this assessment was on on-site storage.

3.2.2 Incident Classes

The following generic classes of incident were identified:

- leaks/spills;
- fire;
- explosion; and
- theft.

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

3.2.3 Project Risk Treatment Measures

A number of hazard control and mitigation measures would be described in management plans for the Project. The relevant management plans would include:

- Blast Management Plan.
- Bushfire Management Plan.
- Site Water Management Plan.
- Waste Management Plan.
- Pollution Incident Response Management Plan.

In addition, the following hazard control and mitigation measures would be adopted for the Project:

- **Maintenance** – Ongoing and timely maintenance of all mobile and fixed plant and equipment in accordance with the recommended maintenance schedule, and consistent with the maintenance schemes required by legislation.
- **Staff Training** – Operators and drivers would be trained and (where appropriate) licensed for their positions. Only those personnel 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 applicable codes, guidelines and Australian Standards. Where applicable, Whitehaven would obtain the necessary licences and permits for engineering structures.
- **Contractor Management** – All contractors employed by Whitehaven would be required to operate in accordance with the relevant Australian Standards and NSW legislation.
- **Water Management** – As reported in Appendix B of the EIS, water management structures would be constructed to separate runoff from undisturbed areas and disturbed areas.
- **Coal Stockpile Management** – Coal stockpiles would be managed to reduce the potential for spontaneous combustion.
- **Storage Facilities** – Storage and usage procedures for potentially hazardous materials (i.e. fuels and lubricants) would be developed in accordance with Australian Standards and relevant legislation.
- **Emergency Response** – Emergency response procedures manuals and systems would continue to be implemented.

4 RISK MANAGEMENT AND EVALUATION

Attachment A presents a qualitative assessment of risks associated with the construction and operation of the Project. The assessment evaluates the off-site risks of the Project with potential to impact on the environment, members of the public and their property, and with a focus on fixed installations (Section 1.1).

For this PHA, the 'site' was considered to be consistent with the Project Application Area which includes ML 1471, MLA 1, MLA 2, MLA 3, CL 316 and portions of AUTH 406 and privately-owned portions of the ROM coal transport route.

Hazard treatment measures have been proposed, where required, to produce a 'low' level of risk in accordance with the risk acceptance criteria described in Section 1.3.4. Proposed treatment measures are identified in Section 3.2.3.

5 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 (2007) *Australian Dangerous Goods Code*.

Safe Production Solutions (2009) *Illawarra Coal Holdings Bulli Seam Operations Environmental Risk Assessment*.

ATTACHMENT A

VICKERY COAL PROJECT HAZARD IDENTIFICATION TABLE

Vickery Coal Project Hazard Identification Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood ¹	Consequence ²	Risk ³
On-Site Storage Hydrocarbons (i.e. fuels [diesel and petrol], oils, greases, degreaser and kerosene), explosives and chemicals.	Leak/Spill	Failed tank or associated fittings, pump or pipework or operator error leading to off-site impacts including chemical or fuel contamination.	<ul style="list-style-type: none"> Storage tanks located to minimise potential impacts of leaks/spills. Design of structures/tanks/pipes to relevant standards and legislation. Bundling of storage facilities. Regular inspections and maintenance (where required). Spill management equipment (i.e. spill kits), procedures and training. Operator training. Operational procedures. Signage. Emergency Management System. Contractor Management Standard. 	E	3	20(L)
		Failed storage vessel due to mechanical impact or corrosion leading to off-site impacts including chemical or fuel contamination.	<ul style="list-style-type: none"> Design of structures/tanks/pipes to relevant standards. Bundling of storage facilities. Protection of storage facilities (e.g. bollards). Spill management equipment, procedures and training. Regular inspections and maintenance (where required). Operator training. Operational procedures. Signage. Emergency Management System. Contractor Management Standard. 	D	4	21(L)

Vickery Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood ¹	Consequence ²	Risk ³
On-Site Storage (Continued) Hydrocarbons (i.e. fuels [diesel and petrol], oils, greases, degreaser and kerosene), explosives and chemicals (Continued)	Fire or Explosion	Poor maintenance, poor design, collision or human error leading to off-site fire/explosion/fume emissions-related impacts.	<ul style="list-style-type: none"> • Design of structures/tanks/pipes/blasts to relevant standards. • Availability of fire fighting equipment. • Site policies, management plans and procedures. • Protection of storage facilities (e.g. bollards). • Regular inspections and maintenance where required. • Operator training. • Emergency Management System. • Bushfire Management Plan. 	E	4	23(L)
	Theft	Malicious act resulting in off-site impacts.	<ul style="list-style-type: none"> • Restriction of access to storage areas, including securing storage facilities. • Provision of adequate lighting around storage facilities. • Installation of a perimeter fence to reduce ease of access to the site. 	D	3	17(L)
Run-of-mine (ROM) coal	Explosion	Coal dust explosion at coal stockpiles or coal handling infrastructure leads to off-site explosion related impacts.	<ul style="list-style-type: none"> • Housekeeping activities – site would be kept clean and tidy and fire hazards removed, where practicable. • Water carts with water cannon available for stock pile dust suppression if required. • Fire fighting equipment and spill kits located in on-site vehicles and infrastructure (where appropriate). • Regular inspections and maintenance of fire fighting equipment and storage areas, where required. • Site policies, management plans and procedures. • Operator induction and ongoing training. 	E	3	20(L)

Vickery Coal Project Hazard Identification Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood ¹	Consequence ²	Risk ³
On-Site Storage (Continued) ROM coal (Continued)	Fire	Spontaneous combustion event leads to off-site fire.	<ul style="list-style-type: none"> • Design of ROM coal stockpile. • Availability of fire fighting equipment. • Site policies, management plans and procedures. • Regular inspections and maintenance where required. • Operator training. • Emergency Management System. • Bushfire Management Plan. 	E	4	23(L)
Other infrastructure and supporting systems	Leak/Spill	Leak or spill from water management system leading to off-site impacts associated with water quality.	<ul style="list-style-type: none"> • Regular inspections of water containment structures for structural integrity, effectiveness and for maintenance to maintain their function. • Operator induction and ongoing training. • Water Management Plan (includes Site Water Balance, Surface Water Management Plan and Groundwater Management Plan). 	C	4	18(L)
	Fire	Malfunction of on-site power reticulation resulting in off-site fire.	<ul style="list-style-type: none"> • Power reticulation designed to Australian Standards and legislation – including security measures. • Housekeeping activities – site would be kept clean and tidy and fire hazards removed, where practicable. • Power usage monitoring and alarms. • Fire fighting equipment located in on-site vehicles and infrastructure (where appropriate). • Regular inspections and maintenance of fire fighting equipment where required. • Operator induction and ongoing training. • Bushfire Management Plan 	D	4	21(L)

¹ Refer to Table 1.

² Refer to Table 2.

³ Refer to Table 3.