Tarrawonga Coal Project

Environmental Assessment

APPENDIX P

PRELIMINARY HAZARD ANALYSIS

Resource Strategies

Tarrawonga Coal Pty Ltd

TARRAWONGA COAL PROJECT

APPENDIX P
PRELIMINARY HAZARD ANALYSIS

Tarrawonga Coal Pty Ltd

AUGUST 2011
Project No. WHC-10-04
Document No. APPENDIX P-A
ID: 00413543

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1 INTRODUCTION

This Preliminary Hazard Analysis (PHA) has been conducted as part of the Environmental Assessment (EA) to evaluate the potential hazards associated with the Tarrawonga Coal Project (the Project) in accordance with the general principles of risk evaluation and assessment outlined in the New South Wales (NSW) Department of Planning and Infrastructure (DP&I) *Multi-Level Risk Assessment* (DP&I, 2011). This PHA also addresses the requirements of *State Environmental Planning Policy (SEPP) No. 33 - Hazardous and Offensive Development* and has been assessed in general accordance with *Hazardous Industry Planning Advisory Paper (HIPAP) No. 6: Hazard Analysis* (Department of Planning [DoP], 2011a).

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

The Tarrawonga Coal Mine is located approximately 15 kilometres (km) north-east of Boggabri and 42 km north-northwest of Gunnedah in NSW (Figure 1). The Tarrawonga Coal Mine is owned and operated by Tarrawonga Coal Pty Ltd (TCPL), which is a joint venture between Whitehaven Coal Mining Pty Ltd (Whitehaven) (70 percent [%] interest) and Boggabri Coal Pty Limited (BCPL) (a wholly owned subsidiary of Idemitsu Australia Resources Pty Ltd) (30% interest).

The Tarrawonga Coal Mine commenced operations in 2006 and currently produces up to approximately 2 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. The proposed Project would involve the continuation of open cut mining operations at the Tarrawonga Coal Mine and would facilitate a ROM coal production rate of up to 3 Mtpa. The Project would also extend the life of the current open cut operations at the Tarrawonga Coal Mine by approximately 17 years (i.e. from 1 January 2013).

1.1 OBJECTIVE AND SCOPE

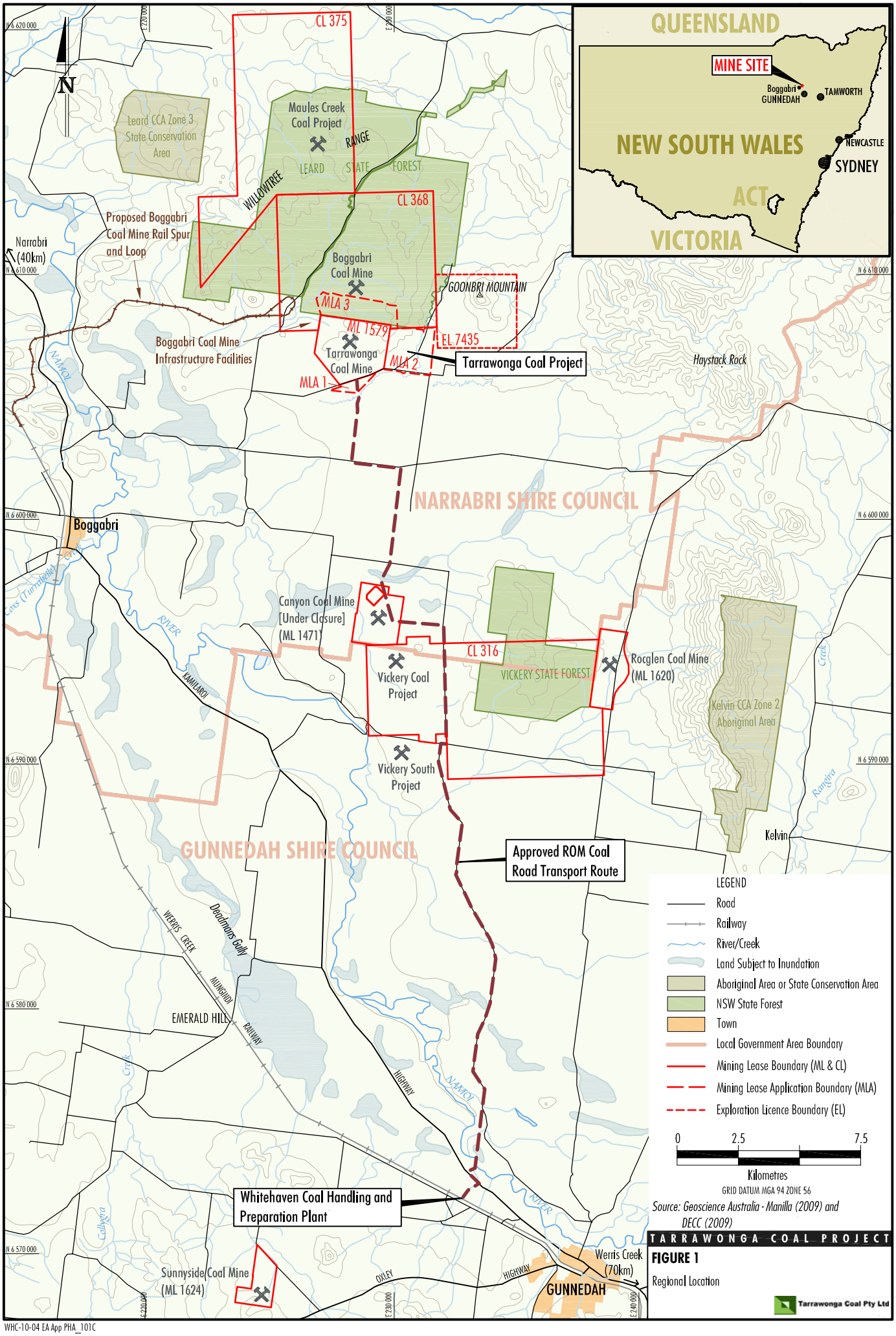
The objective of this PHA is to identify the off-site risks posed by the Project to people, their property and the environment and assess the identified risks using applicable qualitative criteria. In accordance with *Multi-level Risk Assessment* (DP&I, 2011), this assessment specifically covers risks 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 TCPL employees or TCPL-owned property.

On-site environmental risks are assessed in the Environmental Risk Assessment (Appendix O of the Project EA).

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

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



WHC-10-04 EA App PHA_101C

- Fauna Assessment (Appendix E of the EA).
- Flora Assessment (Appendix F of the EA).
- Controlling Provisions of the EPBC Act Relevant to the Tarrawonga Coal Project Environmental Assessment (Appendix G of the EA).
- Road Transport Assessment (Appendix H of the EA).
- Agricultural Resources and Productivity Assessment (Appendix I of the EA).
- Visual Assessment (Appendix J of the EA).
- Aboriginal Cultural Heritage Assessment (Appendix K of the EA).
- Non-Aboriginal Heritage Assessment (Appendix L of the EA).
- Socio-Economic Assessment (Appendix M of the EA).
- Geochemistry Assessment (Appendix N of the EA).
- Environmental Risk Assessment (Appendix O of the EA).
- Land Contamination Assessment (Appendix Q of the EA).
- Concept Design for Low Permeability Barrier and Permanent Goonbri Creek Alignment (Appendix R of the EA).

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 team could not discount the possibility of harm to the off-site environment in the absence of controls.

According to *Multi-level Risk Assessment* (DP&I, 2011), a Level 1 assessment 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, existing controls are in place at the existing Tarrawonga Coal Mine 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 on 29 July 2011. The review participants included technical advisors from TCPL including:

- TCPL – Group Environmental Manager;
- TCPL – Environmental Officer; and
- TCPL – Engineering Surveyor.

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 *Risk Management – Principles and Guidelines*. 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

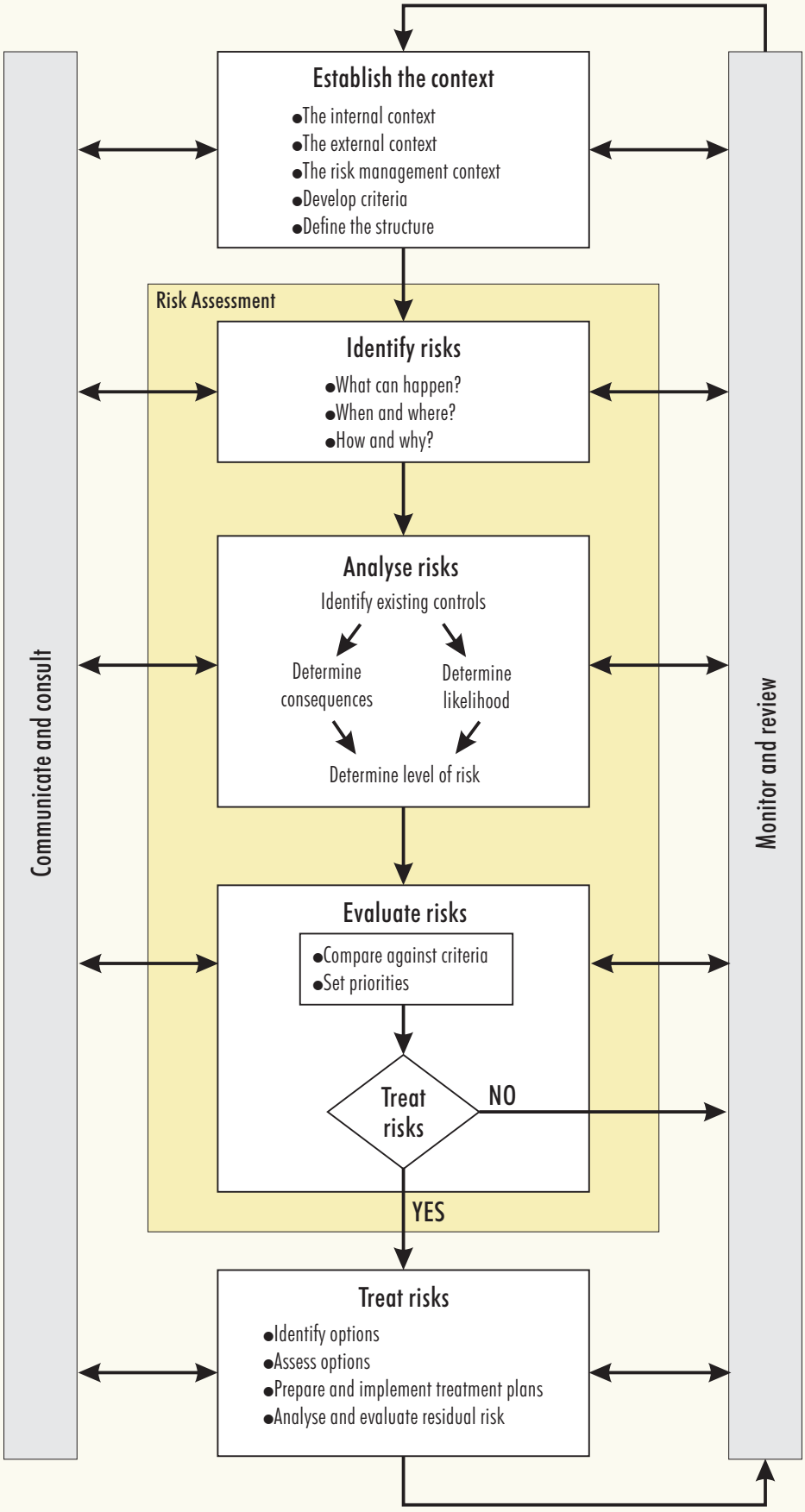
This PHA considered the following qualitative criteria (DoP, 2011b):

(a) 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.

(b) 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.

(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.



Source: AS/NZS ISO 31000:2009 Risk Management - Principles and Guidelines

PRELIMINARY HAZARD ANALYSIS

FIGURE 2
Risk Management Process

Tarrawonga Coal Pty Ltd

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 TCPL 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 (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

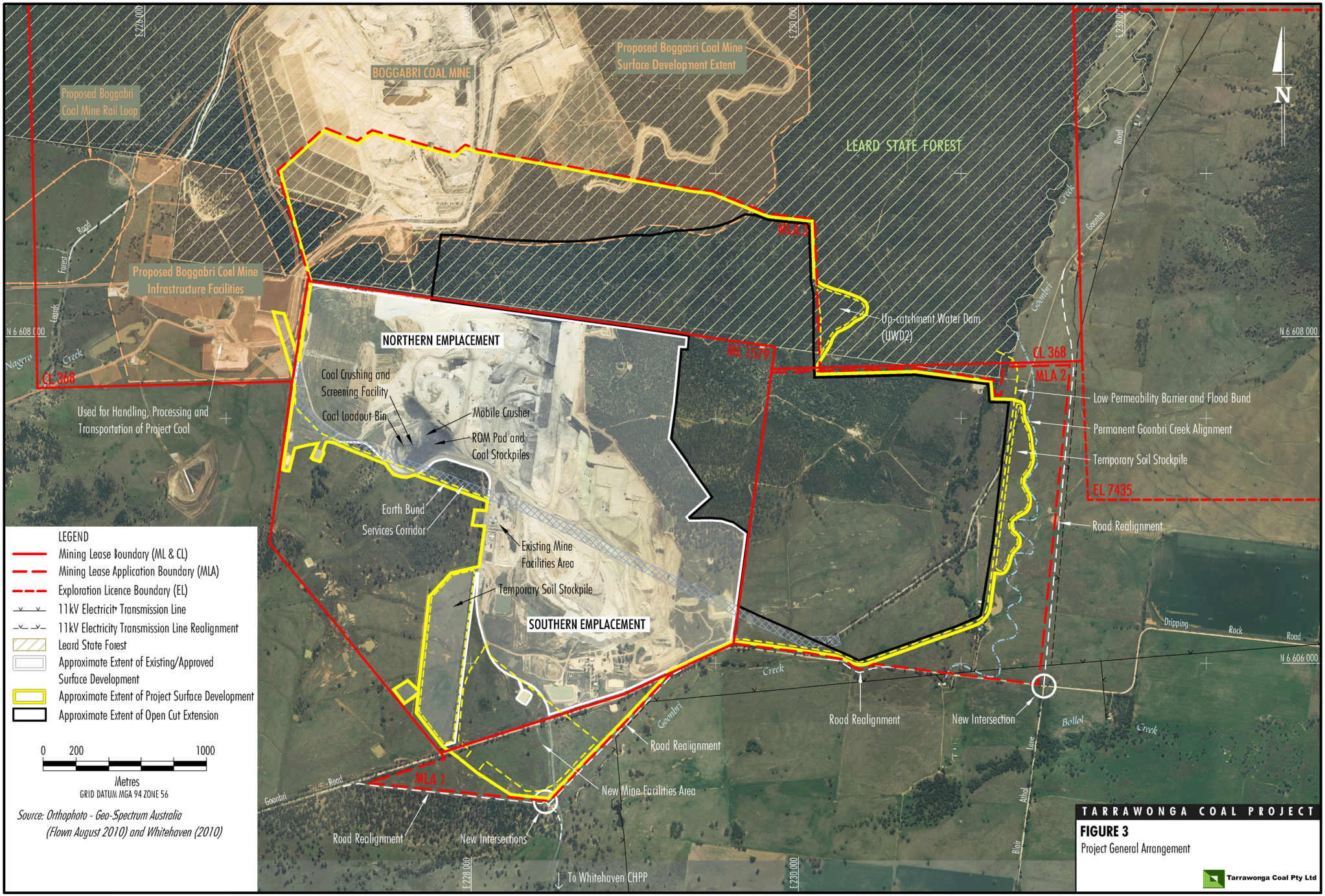
The main activities associated with the development of the Project would include (Figure 3):

- continued development of mining operations in the Maules Creek Formation to facilitate a Project ROM coal production rate of up to 3 Mtpa, including open cut extensions:
  - to the east within Mining Lease (ML) 1579 and Mining Lease Application (MLA) 2; and
  - to the north within Coal Lease (CL) 368 (MLA 3) which adjoins ML 1579;
- ongoing exploration activities;
- construction and use of a services corridor (including haul road link) directly from the Project open cut mining operation to the upgraded Boggabri Coal Mine Infrastructure Facilities[1];
- use of upgraded Boggabri Coal Mine Infrastructure Facilities for the handling and processing of Project coal and the loading of Project product coal to trains for transport on the Boggabri Coal Mine private rail spur to the Werris Creek Mungindi Railway[1];
- construction and use of a new mine facilities area including relocation of existing mine facilities infrastructure and service facilities;
- use of an existing 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 existing 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;
- progressive backfilling of the mine void behind the advancing open cut mining operation with waste rock and minor quantities of coarse reject material;
- continued and expanded placement of waste rock in the Northern Emplacement (including integration with the Boggabri Coal Mine emplacement) and Southern Emplacement, as mining develops;
- progressive development of new haul roads and internal roads, as mining develops;
- realignment of sections of Goonbri Road and construction of new intersections;
- construction of an engineered low permeability barrier to the east and south-east of the open cut to reduce the potential for local drainage of alluvial groundwater into the open cut;
- removal of a section of Goonbri Creek within the Project open cut and the establishment of a permanent Goonbri Creek alignment and associated flood bund to the east and south-east of the open cut;
- progressive development of sediment basins and storage dams, pumps, pipelines and other water management equipment and structures;
- continued development of soil stockpiles, laydown areas and gravel/borrow areas;
- ongoing monitoring and rehabilitation; and
- other associated minor infrastructure, plant, equipment and activities.

The proposed life of the Project is 17 years, commencing 1 January 2013.

Figure 3 illustrates the general arrangement of the Project. Further detail regarding the Project description is provided in Section 2 in the Main Report of the EA.

[1] Subject to approvals and upgrades being in place for the transfer of Project ROM coal to the Boggabri Coal Mine Infrastructure Facilities.



TARRAWONGA COAL PROJECT

FIGURE 3

Project General Arrangement

Tarrawonga Coal Pty Ltd

WHC-10-04 EA App PHA_102C

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 Tarrawonga Coal Mine 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* (AS 1940:2004) (Class C1) for the purpose of storage and handling but is not classified as a dangerous good by the criteria of the Australian Dangerous Goods (ADG) 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 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.

Existing hydrocarbon storage facilities (including two self bunded diesel fuel tanks with capacities of 68,000 litres (L) and 105,000 L located adjacent the workshop at the new mine facilities area) would continue to be operated in accordance with the requirements of AS 1940:2004. All new/relocated storage tanks would be located in facilities designed to comply with Australian Standards.

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. 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 have been developed at the Tarrawonga Coal Mine for the handling, storage, containment and disposal of workshop hydrocarbons (i.e. oils, greases, degreaser and kerosene) in accordance with AS 1940:2004. Waste oil would be stored within a bunded area and would be collected by a licensed contractor.

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 the existing safety and operational procedures at the Tarrawonga Coal Mine.

No explosive materials are stored on-site at the Tarrawonga Coal Mine. Detonators, bulk explosives and explosive products (e.g. emulsion, prill and diesel) would continue to be stored at the blasting contractor's compound, located off-site (along the ROM coal road transport route).

3.1.3 Chemicals

The management and storage of chemicals at the Tarrawonga Coal Mine (such as flocculants and surfactants) would continue to be conducted in accordance with TCPL'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 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 are described in the following existing Tarrawonga Coal Mine management documents:

- Blast Management Plan.
- Bushfire Management Plan.
- Groundwater Contingency Plan.
- Site Water Management Plan.
- Transport Route Construction Plan.
- Waste Management Plan.

A number of hazard control and mitigation measures would be incorporated into existing management plans or new management plans where required for the Project. In addition, the following hazard treatment measures would be adopted for the Project:

- **Engineering Structures** – Mining and civil engineering structures would be constructed in accordance with applicable codes, guidelines and Australian Standards. Where applicable, TCPL would obtain the necessary licences and permits for engineering structures.
- **Contractor Management** – All contractors employed by TCPL would be required to operate in accordance with the relevant Australian Standards and NSW legislation.
- **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 1579, MLAs 1, 2 and 3, portions of Coal Lease (CL) 368 and privately-owned portions of the existing 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

TARRAWONGA COAL PROJECT HAZARD IDENTIFICATION TABLE

Tarrawonga 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) 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.	• Storage tanks located to minimise potential impacts of leaks/spills. • Design of structures/tanks/pipes to relevant standards and legislation. • Bunding of storage facilities. • Regular inspections and maintenance (where required). • Spill management equipment (ie. 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.	• Design of structures/tanks/pipes to relevant standards. • Bunding of storage facilities. • Protection of storage facilities (eg. 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)

Tarrawonga 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 Hydrocarbons (i.e. fuels [diesel and petrol], oils, greases, degreaser and kerosene) and chemicals (continued)	Fire or Explosion	Poor maintenance, poor design, collision or human error leading to off-site fire/explosion/ fume emissions-related impacts.	• Design of structures/tanks/pipes/blasts to relevant standards. • Availability of fire fighting equipment. • Site policies, management plans and procedures. • Protection of storage facilities (eg. 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.	• 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 Tarrawonga Coal Mine site. • Storages adjacent to workshop which is manned 24 hours a day, 7 days a week, which deters general public entering the site.	D	3	17(L)
On-Site Storage ROM coal	Fire	Spontaneous combustion event leads to off-site fire.	• 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)

1 Refer to Table 1.
2 Refer to Table 2.
3 Refer to Table 3.