ENVIRONMENTAL ASSESSMENT

Duralie Extension Project

APPENDIX L
PRELIMINARY HAZARD ANALYSIS

GLOUCESTER COAL

ResourceStrategies

DURALIE EXTENSION PROJECT

APPENDIX L
PRELIMINARY HAZARD ANALYSIS

DURALIE
COAL

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L1 INTRODUCTION

This Preliminary Hazard Analysis (PHA) has been conducted as part of the Environmental Assessment (EA) to evaluate the hazards associated with the Duralie Extension Project (the Project) in accordance with the general principles of risk evaluation and assessment outlined in the New South Wales (NSW) Department of Urban Affairs and Planning (DUAP) *Multi-Level Risk Assessment* (DUAP, 1999). This PHA also addresses the requirements of State Environmental Planning Policy (SEPP) No. 33 (Hazardous and Offensive Development) and has been documented in general accordance with *Guidelines for Hazard Analysis: Hazardous Industry Planning Advisory Paper No. 6* (DUAP, 1992a).

Assessed risks are compared to the qualitative risk assessment criteria developed in accordance with Australian Standard/New Zealand Standard (AS/NZS) 4360:2004 *Risk Management* (AS/NZS 4360:2004). Further, this PHA considers the qualitative criteria provided in *Risk Criteria for Land Use Safety Planning: Hazardous Industry Planning Advisory Paper No. 4* (DUAP, 1992b) and *Risk Criteria for Land Use Safety Planning: Hazardous Industry Planning Advisory Paper No. 4 Consultation Draft* (NSW Department of Planning [DoP], 2008).

The Duralie Coal Mine (DCM) is located approximately 10 kilometres (km) north of the village of Stroud and approximately 20 km south of Stratford in the Gloucester Valley in NSW. The DCM is owned and operated by Duralie Coal Pty Ltd (DCPL), a wholly owned subsidiary of Gloucester Coal Ltd (GCL).

The proposed Project would involve the continuation of open pit mining operations at the DCM. The area of proposed open pit mining is situated to the north-west of the existing open pit. The Project would extend the life of the current operations at the DCM by approximately nine years.

Existing facilities at the DCM would be used to service the Project. However, some new facilities and/or modifications to existing infrastructure would be required to support the ongoing mining activities and the proposed increase in coal production.

L1.1 OBJECTIVE AND SCOPE

The objective of this PHA is to identify the risks posed by the Project to people, property and the environment and assess the identified risks using applicable qualitative criteria. This assessment 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). The assessment does not consider risks to DCPL employees or property.

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

- Surface Water Assessment (Appendix A of the EA).
- Groundwater Assessment (Appendix B of the EA).
- Noise and Blasting Impact Assessment (Appendix C of the EA).
- Air Quality Assessment (Appendix D of the EA).
- Terrestrial Flora and Fauna Assessment (Appendix E of the EA).
- Aquatic Ecology Assessment (Appendix F of the EA).
- Socio-Economic Assessment (Appendix G of the EA).
- Road Transport Assessment (Appendix H of the EA).
- Geochemistry Assessment (Appendix I of the EA).
- Aboriginal Cultural Heritage Assessment (Appendix J of the EA).
- Non-Aboriginal Heritage Assessment (Appendix K of the EA).
- Environmental Risk Assessment (Appendix M of the EA).
- Rehabilitation and Landscape Management Strategy (Appendix N of the EA).
- Visual Assessment (Appendix O of the EA).

L1.2 STUDY METHODOLOGY

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

(i) Identify the hazards associated with the Project.

(ii) Examine the maximum reasonable consequence[1] of identified events.

(iii) Qualitatively estimate the likelihood of 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 applicable qualitative criteria.

(vi) Recommend further risk treatment measures if considered warranted.

(vii) Qualitatively determine the residual risk assuming the implementation of the risk treatment measures.

L1.2.1 Preliminary Hazard Analysis Workshop

The above methodology was implemented during a PHA workshop on 23 September 2009. The workshop participants (i.e. the risk assessment team) included technical advisors from DCPL including:

- GCL – Manager - Approvals and Environment Stratford and Duralie Operations; and
- GCL – Safety and Training Superintendant.

Representatives of Resource Strategies Pty Ltd facilitated the workshop.

L1.2.2 Risk Management Process

This PHA has been undertaken with regard to the risk management process described in AS/NZS 4360:2004 *Risk Management.* The risk management process is shown schematically on Figure L-1 and includes the following components:

- Establish the context – Sections L1 and L2.
- Identify risks – Section L3.2 and Attachment LA.
- Analyse risks – Section L4 and Attachment LA.
- Evaluate risks – Section L4 and Attachment LA.
- Treat risks – Section L3.2.3 and Attachment LA.

L1.2.3 Risk Criteria

This PHA considered the following qualitative criteria (summarised from DUAP, 1992b; DoP, 2008):

(a) All 'avoidable' risks should be avoided. This necessitates investigation of alternative locations and technologies where applicable.

(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.

(c) The consequences (effects) of the more likely hazardous events 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.

[1] Definition of Maximum Reasonable Consequence – The worst-case consequence that could reasonably be expected, given the scenario and based upon the experience of the workshop participants.

L1.2.4 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 in accordance with AS/NZS 4360:2004 which allows the risk assessment team to develop risk criteria during the establish the context phase.

In accordance with AS/NZS 4360:2004, Tables L-1, L-2 and L-3 were reviewed by the PHA workshop team (Section L1.2.1) at the commencement of the workshop as part of establishing the context. The tables were considered to be consistent with the specific objectives and context of the PHA.

Table L-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 L-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 and consequence, Table L-3 provides a qualitative risk analysis matrix to assess risk levels.

Table L-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).

Risk acceptance criteria for the Project have been formulated following consideration of the *Risk Criteria for Land Use Safety Planning: Hazardous Industry Planning Advisory Paper No. 4* (DUAP, 1992b) and AS/NZS 4360:2004 *Risk Management* guidelines, *viz.*:

> *Qualitative Risk Acceptance Criteria:*
>
> *The risk posed by an event is at a level where the residual risk levels are considered tolerable, following consideration of the proposed risk mitigation and minimisation measures.*

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

L2 PROJECT OVERVIEW

The main activities associated with the development of the Project would include (Figure L-2):

- continued development of open pit mining operations at the DCM to facilitate a run-of-mine (ROM) coal production rate of up to approximately 3 million tonnes per annum, including:
  - extension of the existing approved open pit in the Weismantel Seam to the north-west (i.e. Weismantel Extension open pit) within Mining Lease (ML) 1427 and Mining Lease Application (MLA) 1; and
  - open pit mining operations in the Clareval Seam (i.e. Clareval North West open pit) within ML 1427 and MLA 1;
- ongoing exploration activities within existing exploration tenements;
- progressive backfilling of the open pits with waste rock as mining develops, and continued and expanded placement of waste rock in out-of-pit waste rock emplacements;
- increased ROM coal rail transport movements on the North Coast Railway between the DCM and Stratford Coal Mine in line with increased ROM coal production;
- continued disposal of excess water through irrigation (including development of new irrigation areas within ML 1427 and MLA 1);
- raising of the existing approved Auxiliary Dam No. 2 from Relative Level (RL) 81 metres (m) to approximately RL 100 m to provide significant additional on-site storage capacity to manage excess water on-site;
- progressive development of dewatering bores, pumps, dams, irrigation infrastructure and other water management equipment and structures;
- development of new haul roads and internal roads;
- upgrade of existing facilities and supporting infrastructure as required in line with increased ROM coal production;
- continued development of soil stockpiles, laydown areas and gravel/borrow pits;
- establishment of a permanent Coal Shaft Creek alignment adjacent to the existing DCM mining area;
- ongoing monitoring and rehabilitation; and
- other associated minor infrastructure, plant, equipment and activities.

The Project would extend the life of the current operations at the DCM by approximately nine years.

Figure L-2 illustrates the general arrangement of the Project. A description of the Project is provided in Section 2 in the Main Report of the EA.

L3 HAZARD IDENTIFICATION

L3.1 DESCRIPTION OF HAZARDOUS MATERIALS

The major potentially hazardous materials required for the Project include diesel, petrol, hydrocarbons (oils, greases, degreaser and kerosene), explosives and gas cylinders. A brief description of these materials is presented below.

L3.1.1 Diesel

Diesel is classified as a combustible liquid by AS 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids* (AS 1940:2004) (Class C1) for the purposes of storage and handling but is not classified as a dangerous good by the criteria of the Australian Dangerous Goods (ADG) Code. In the event of a spill, diesel is damaging to soils and aquatic ecosystems and fires can occur if it is 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 storage facilities would be undertaken in accordance with the requirements of AS 1940:2004.

On-site annual diesel usage would be up to approximately 15,000 kilolitres during operations.

L3.1.2 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. All fuel storage facilities would be constructed and operated in accordance with AS 1940:2004.

L3.1.3 Hydrocarbons

Oil is classified as a combustible liquid (Class C2) by AS 1940:2004. All hydrocarbon storage facilities would be constructed and operated in accordance with AS 1940:2004.

Waste oil would be placed in drums within a bunded area and would be collected by a licensed waste contractor for off-site disposal.

Small quantities of grease, degreaser and kerosene would also be required. Storage facilities for these hydrocarbons would be constructed and operated in accordance with the requirements of AS 1940:2004.

L3.1.4 Liquid Petroleum Gas

Liquid Petroleum Gas is classified as a flammable gas (Class 2.1) by the ADG Code. Gas cylinders would be stored in accordance with AS/NZS 1596:2002 *The Storage and Handling of LP Gas.*

L3.1.5 Explosives

Explosives required 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 DCM.

Detonators, bulk explosives and explosive products (e.g. emulsion, prill) would continue to be stored at the explosives storage, located west of the main infrastructure area in accordance with the requirements of AS 2187-1998 *Explosives – Storage Transport and Use – Storage*.

L3.1.6 Chemicals

The management and storage of chemicals at the DCM would continue to be conducted in accordance with the existing management procedures, Australian Standards and codes. All chemicals brought on-site for use at the operation would be recorded in the existing inventory registers at the DCM.

No chemicals or hazardous material 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 an MSDS.

L3.2 HAZARD IDENTIFICATION PROCESS

The Project hazard (or risk) identification table (Attachment LA) was formulated during the PHA workshop discussed in Section L1.2.1. It provides a summary of the potential off-site risks and hazards identified for the Project and a qualitative assessment of the risks posed.

L3.2.1 Project Components

For the purposes of hazard identification and assessment, the Project was subdivided into the following areas:

- transport to site;
- on-site storage;
- transport on-site;
- transport off-site;
- mining operations;
- general operations; and
- water management.

L3.2.2 Incident Classes

The following generic classes of incident were identified:

- leaks/spills;
- fire;
- explosion;
- theft;
- pit slope failure;
- unplanned movement off-site; and
- excessive vibration.

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

L3.2.3 Project Risk Treatment Measures

A number of hazard control and mitigation measures are described in the following existing DCM management documents:

- Topsoil Stripping Management Plan.
- Vegetation Clearance Protocol.
- Coal Transportation Management Plan.
- Aboriginal Cultural Heritage Management Plan.
- Erosion and Sedimentation Control Plan.
- Lighting Management Plan.
- Potentially Acid Forming Materials Management Plan.
- Irrigation Management Plan.
- Rehabilitation Management Plan.
- Health and Safety Management Plan.
- Training and Competency Scheme.
- Inspection Program Scheme.
- Information and Communication Plan.
- Surface Transport Management Plan.
- Slope Stability Management Plan.
- Airborne Dust Management Plan.
- Contractor Management Plan.
- Mechanical Engineering Management Plan.
- Emergency Management Plan.
- Project Health and Safety Management Plan.
- Isolation Arrangements.
- Electrical Engineering Management Plan.
- Fitness for Work Management Plan.
- Commissioning and Testing Plan.
- Control and Supervision of Electrical Work Plan.
- Live Testing and Working near Electrical Apparatus Plan.
- Portable Electrical Equipment Plan.
- Working with Lasers Plan.

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

- **Maintenance** – Ongoing and timely maintenance of all mobile and fixed plant and equipment in accordance with the manufacturer's recommended maintenance schedule, and consistent with the maintenance schemes required by relevant standards. Only vehicles permitted to carry dangerous goods would be used for transport of hazardous materials.
- **Staff Training** – Operators and drivers would be trained and (where appropriate) licensed for their job descriptions. Only those personnel licensed to undertake skilled and potentially hazardous work would be permitted to do so.

- **Engineering Structures** – Civil engineering structures would be constructed in accordance with applicable codes, guidelines and Australian Standards.
- **Contractor Management** – All contractors employed by DCPL 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.

L4 RISK MANAGEMENT AND EVALUATION

Attachment LA presents a qualitative assessment of risks associated with the construction and operation of the Project. The assessment evaluates the risk of the Project impacting on the environment, members of the public and their property. 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 L1.2.4. Proposed treatment measures are identified in Section L3.2.3.

L5 REFERENCES

Department of Planning (2008) *Risk Criteria for Land Use Safety Planning: Hazardous Industry Planning Advisory Paper No. 4 Consultation Draft*.

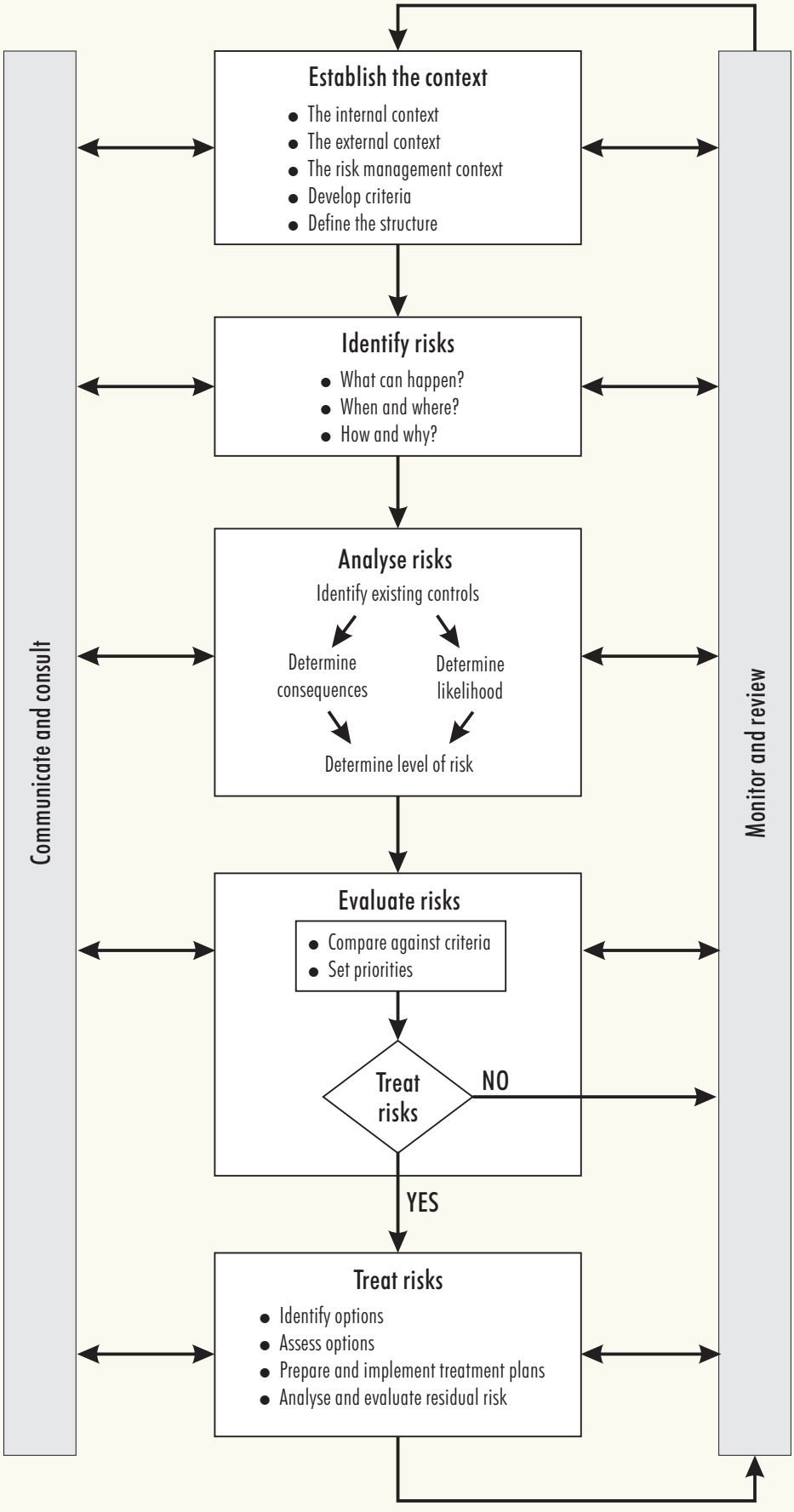
Department of Urban Affairs and Planning (1992a) *Guidelines for Hazard Analysis: Hazardous Industry Planning Advisory Paper No. 6*.

Department of Urban Affairs and Planning (1992b) *Risk Criteria for Land Use Safety Planning: Hazardous Industry Planning Advisory Paper No 4*.

Department of Urban Affairs and Planning (1999) *Multi-Level Risk Assessment*. Revised Edition.

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

FIGURES



Source: AS/NZS 4360: 2004 Risk Management

PRELIMINARY HAZARD ANALYSIS

FIGURE L-1

Risk Management Process

DURALIE COAL

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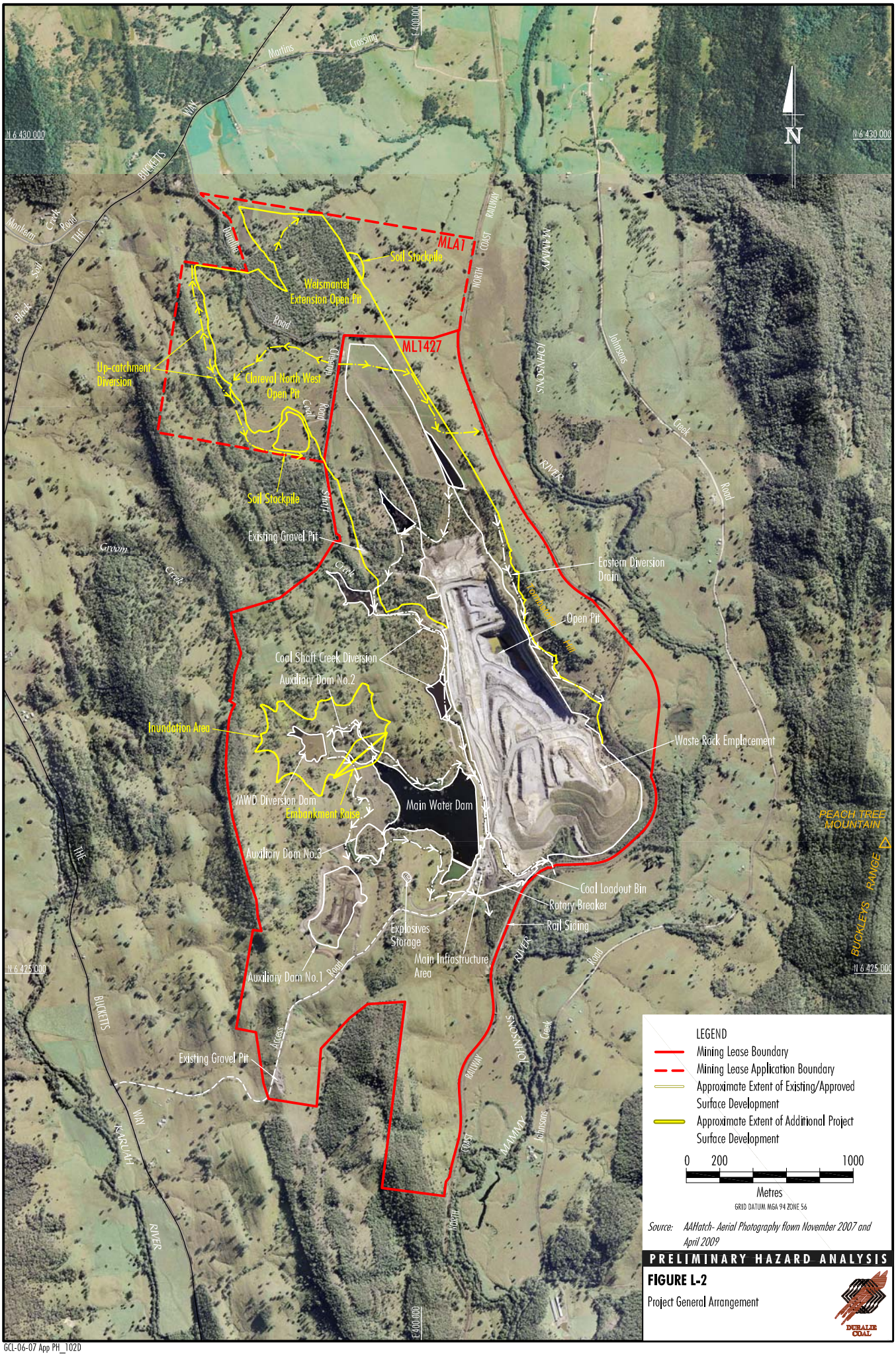

PRELIMINARY HAZARD ANALYSIS

FIGURE L-2

Project General Arrangement

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ATTACHMENT LA

DURALIE EXTENSION PROJECT
HAZARD IDENTIFICATION TABLE

Duralie Extension Project Hazard Identification Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Transport to Site (Explosives, Fuel, Chemicals and General Goods, Mobile and Fixed Plant)	Spill[4] Fire[4] Explosion[4]	Poor maintenance, poor design, collision, human error or malicious act leading to off-site impacts.	• Contractors licensed and operate in accordance with Australian Standards and New South Wales (NSW) legislation. • On-board fire fighting equipment (where appropriate). • Spill management procedures and training. • Co-ordination of deliveries to site. • Fitness for Work Management Plan. • Contractor Management Plan.	C D	4 3	18(L) 17(L)
	Theft	Malicious act resulting in off-site impacts.	• Contractors licensed and operate in accordance with Australian Standards and NSW legislation. • Co-ordination of deliveries to site. • Contractor Management Plan.	D	3	17(L)
On-Site Storage (Explosives, Fuel, Chemicals, Compressed Gases and General Goods)	Leak/Spill	Failed tank or pipe 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 as part of the Inspection Programme and maintenance (where required). • Spill management procedures and training. • Operator training. • Operational procedures. • Emergency Management Plan. • Contractor Management Plan.	E	3	20(L)

Duralie Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage (Explosives, Fuel, Chemicals, Compressed Gases and General Goods) (continued)	Leak/Spill (continued)	Failed storage vessel leading to off-site impacts.	• Design of structures/tanks/pipes to relevant standards. • Bunding of storage facilities. • Spill management procedures and training. • Regular inspections as part of the Inspection Programme and maintenance (where required). • Operator training. • Operational procedures. • Emergency Management Plan. • Contractor Management Plan.	D	4	21(L)
		Runoff from explosive magazine leading to off-site impacts (water).	• Storage structures and containers designed to relevant standards and legislation. • Operator training. • Operational procedures. • Emergency Management Plan. • Contractor Management Plan.	D	4	21(L)
	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. • Site policies, management plans and procedures. • Regular inspections and maintenance where required. • Operator training. • Emergency Management Plan. • Surface Transport Management Plan. • Explosives Management Plan.	D	4	21(L)

Duralie Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage (Explosives, Fuel, Chemicals, Compressed Gases and General Goods) (continued)	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. • Explosive Magazine designed to appropriate standards and legislation - including security measures. • Inspection programme. • Installation of a perimeter fence to reduce ease of access to Duralie Coal Mine (DCM) site. • Contractor Management Plan. • Emergency Management Plan.	D	3	17(L)
Transport On-Site (Explosives, Fuel, Chemicals and General Goods)	Spill Fire Explosion	Poor maintenance, poor design, collision or human error leading to off-site impacts.	• Contractors licensed and operate in accordance with Australian Standards and NSW legislation. • On-board fire fighting equipment (where appropriate). • Radio/mobile telephone communications and on-board fire fighting equipment. • Spill management procedures and training. • Fitness for Work Management Plan. • Contractor Management Plan. • Emergency Management Plan.	C	4	18(L)
	Theft	Malicious act resulting in off-site impacts.	• Contractors licensed and operate in accordance with Australian Standards and NSW legislation. • Contractor Management Plan.	D	3	17(L)

Duralie Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Transport Off-Site (Rail Operations)	Leaks/Spills	Wagon gate failure, derailment or collision leading to coal or fuel spillage off-site.	• Rail operators licensed and operate in accordance with Australian Standards and NSW legislation. • Development of operating procedures and training to minimise the potential for overloading. • Regular inspections of train loading activities and rail infrastructure and intervention/maintenance where required. • Spill management procedures and training. • Contractor Management Plan.	C	4	18(L)
	Leaks/Spills	Poor maintenance or human error leading to spills during refuelling locomotives at the DCM siding resulting in off-site impacts.	• Contractors licensed and operate in accordance with Australian Standards and NSW legislation. • Radio/mobile telephone communications and on-board fire fighting equipment. • Spill management procedures and training. • Fitness for Work Management Plan. • Contractor Management Plan. • Emergency Management Plan.	C	4	18(L)
Transport from Site (Waste hydrocarbons, general waste)	Spill[4]	Poor maintenance, poor design, collision, human error or malicious act leading to off-site impacts.	• Contractors licensed and operate in accordance with Australian Standards and NSW legislation. • On-board fire fighting equipment (where appropriate). • Spill management procedures and training. • Co-ordination of deliveries to site. • Fitness for Work Management Plan. • Contractor Management Plan.	C D	4 3	18(L) 17(L)

Duralie Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Mining Operations (Mining, drilling and blasting operations)	Excessive vibration	Vibration causing damage to natural or man-made features.	• Explosives Management Plan (incorporating monitoring). • Operational procedures- blasting undertaken by appropriately licensed and competent personnel. • Planning and design of blast events to ensure adequate control and buffer distances. • Site-specific blast design included in blast planning. • Monitoring to validate blast design and performance. • Contractor Management Plan. • Emergency Management Plan.	C	5	22(L)
		Interference (collision, excessive vibration) with electricity transmission line resulting in off-site impacts.	• Explosives Management Plan (incorporating monitoring). • Operational procedures- blasting undertaken by appropriately licensed and competent personnel. • Planning and design of blast events to ensure adequate control and buffer distances. • Site-specific blast design included in blast planning. • Monitoring to validate blast design and performance. • Transgrid Inspection Programme. • Mining Operation Plans. • Contractor Management Plan. • Emergency Management Plan.	E	3	20(L)

Duralie Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Mining Operations (Mining, drilling and blasting operations) (continued)	Unplanned movement off-site	Blasting leading to flyrock damaging property/persons off-site.	• Explosives Management Plan (incorporating monitoring). • Operational procedures- blasting undertaken by appropriately licensed and competent personnel. • Planning and design of blast events to ensure adequate control and buffer distances. • Site-specific blast design included in blast planning. • Monitoring to validate blast design and performance.	D	4	21(L)
	Pit slope failure	Slump or collapse of open pit walls resulting in damage to rail or road infrastructure.	• Open pit walls designed to appropriate geotechnical standards. • Establishment of appropriate buffer zones from open pits. • Slope Stability Management Plan. • Regular geotechnical inspections and maintenance (as required).	D	4	21(L)
General Operations (Irrigation, agriculture and exploration activities)	Fire	Mobile plant, powerlines, fixed plant or human action leading to off-site fire related impacts.	• Regular inspections of mobile and fixed plant, fire fighting equipment and fire breaks. • On-board fire fighting equipment (where appropriate). • Regular maintenance of mobile plant and fire fighting equipment. • Training and competency assessment of plant operators. • Liaison with local Bushfire Brigade. • Bushfire Management Plan. • Irrigation Management Plan. • Fitness for Work Management Plan. • Contractor Management Plan. • Emergency Management Plan.	D	4	21(L)

Duralie Extension Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Water Management (Irrigation and general water management)	Spill	Failed water storage dam leading to off-site contamination.	• Design of dam structures to relevant standards (including the Dams Safety Committee). • Water from the Main Water Dam (MWD) would be transferred to the open pit. • Regular inspections and maintenance (where required). • Emergency Management Plan.	E	3	20(L)
		Water supply, creek diversion, containment structure, irrigation pipeline or first flush system not adequately built or maintained leading to off-site discharge of silt or mine water.	• Design of dam structures to relevant standards and required containment capacities. • Water from the MWD would be transferred to the open pit. • Regular inspections and maintenance (where required). • Emergency Management Plan.	C	5	22(L)
		Extreme rainfall event and incorrect operational practices leading to off-site discharge of silt or mine water.	• Design of dam structures to relevant standards (including the Dams Safety Committee). • Maintenance of appropriate freeboard in the MWD in accordance with the Dam Safety Committee approval. • Water from the MWD would be transferred to the open pit. • Regular inspections and maintenance (where required). • Emergency Management Plan.	D	4	21(L)

1 Refer to Table L-1.

2 Refer to Table L-2.

3 Refer to Table L-3.

4 Risk was determined for two different levels of consequence (i.e. a scenario with a higher consequence was considered to be less likely).