MALABAR COAL

MAXWELL PROJECT

APPENDIX T

Preliminary Hazard Analysis

MAXWELL PROJECT

PRELIMINARY HAZARD ANALYSIS

JULY 2019
Project No. SHM-18-03
Document No. 00940420-004

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1 INTRODUCTION

Maxwell Ventures (Management) Pty Ltd, a wholly owned subsidiary of Malabar Coal Limited (Malabar), is seeking consent to develop an underground coal mining operation, referred to as the Maxwell Project (the Project).

The Project is in the Upper Hunter Valley of New South Wales (NSW), east-southeast of Denman and south-southwest of Muswellbrook (Figure 1).

Underground mining is proposed within Exploration Licence (EL) 5460, which was acquired by Malabar in February 2018. Malabar also acquired the existing infrastructure within Coal Lease (CL) 229, Mining Lease (ML) 1531 and CL 395 (known as the 'Maxwell Infrastructure') (Figure 2). The Maxwell Infrastructure includes an existing coal handling and preparation plant (CHPP), train load-out facilities and other infrastructure and services (including water management infrastructure, administration buildings, workshops and services). The Project would include the use of the substantial existing Maxwell Infrastructure, along with the development of some new infrastructure (Figure 2).

This Preliminary Hazard Analysis (PHA) forms part of an Environmental Impact Statement (EIS), which has been prepared to accompany a Development Application for 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). 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).

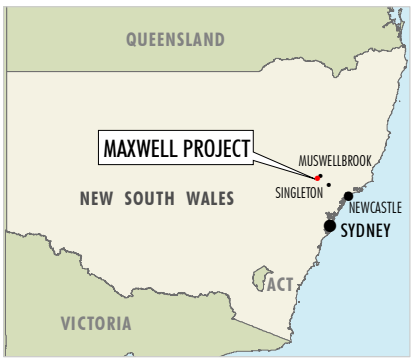
Assessed risks are compared to qualitative risk assessment criteria developed in accordance with International Organisation for Standardisation (ISO) 31000:2018 *Risk Management – Guidelines,* and in *HIPAP No. 4: Risk Criteria for Land Use Safety Planning* (DoP, 2011b).

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 off-site transportation by pipeline, road, rail, air or sea.

The 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 failures, operator error and external events), with specific focus on fixed installations on-site. This assessment does not consider risks to Malabar employees or Malabar-owned property, or risks that are not atypical or abnormal (e.g. long-term effects of typical dust emissions).

SHM-18-03 Maxwell_EIS_App_Figure 1_Rev D



LEGEND

- Mining Operation
- Proposed Mining Operation
- Railway
- Local Government Boundary
- State Forest
- National Parks and Wildlife Service Estate
- Maxwell Project Exploration Licence Boundary
- Maxwell Project Mining and Coal Lease Boundary
- Indicative Extent of Underground Development

Source: © NSW Department of Planning and Environment (2019); NSW Department of Finance, Services and Innovation (2019); Office of Environment and Heritage NSW (2019)

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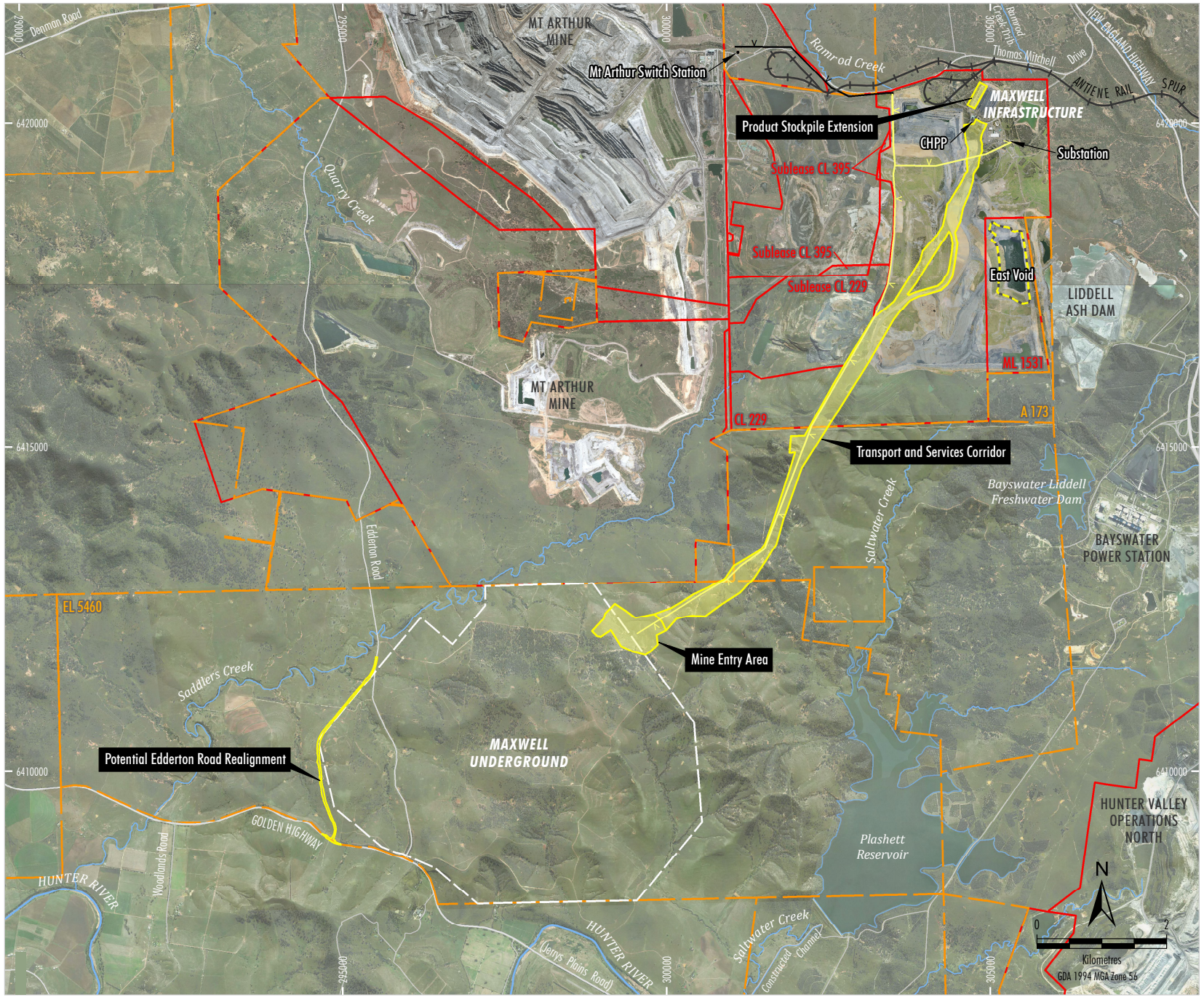
Regional Location

Figure 1



LEGEND

- Railway
- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Indicative Extent of Underground Development
- Indicative Surface Development Area
- CHPP Reject Emplacement Area
- Proposed 66 kV Power Supply
- Proposed Ausgrid 66 kV Power Supply Extension#

Subject to separate assessment and approval.

Source: © NSW Department of Planning and Environment (2019); NSW Department of Finance, Services & Innovation (2019) Orthophoto Mosaic: 2018, 2016, 2011

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MAXWELL PROJECT

Project General Arrangement

Figure 2

SHM-18-03 Maxwell_EIS_PHA_201B

On-site environmental risks and potential long-term impacts are considered in the Environmental Risk Assessment (Appendix S of the EIS) and, where relevant, in the following studies included in the EIS:

- Appendix A – Subsidence Assessment.
- Appendix B – Groundwater Assessment.
- Appendix C – Surface Water Assessment.
- Appendix D – Geomorphology Assessment.
- Appendix E – Biodiversity Development Assessment Report.
- Appendix F – Aquatic Ecology and Stygofauna Assessment.
- Appendix G – Aboriginal Cultural Heritage Assessment.
- Appendix H – Historic Heritage Assessment.
- Appendix I – Noise Impact Assessment.
- Appendix J – Air Quality and Greenhouse Gas Assessment.
- Appendix K – Road Transport Assessment.
- Appendix L – Social Impact Assessment.
- Appendix M – Economic Assessment.
- Appendix N – Landscape and Visual Impact Assessment.
- Appendix O – Land Contamination Assessment.
- Appendix P – Geochemistry Assessment.
- Appendix Q – Agricultural Impact Statement.
- Appendix R – Human Health Risk Assessment.
- Appendix U – Preliminary Rehabilitation and Mine Closure Strategy.
- Appendix V – Integrated Assessment of Potential Impacts on Groundwater Dependent Ecosystems.

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 possible off-site effects or consequences from hazardous materials present on-site and their locations. “Potentially hazardous industry” is defined by the 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 that may be affected. 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 consequences 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

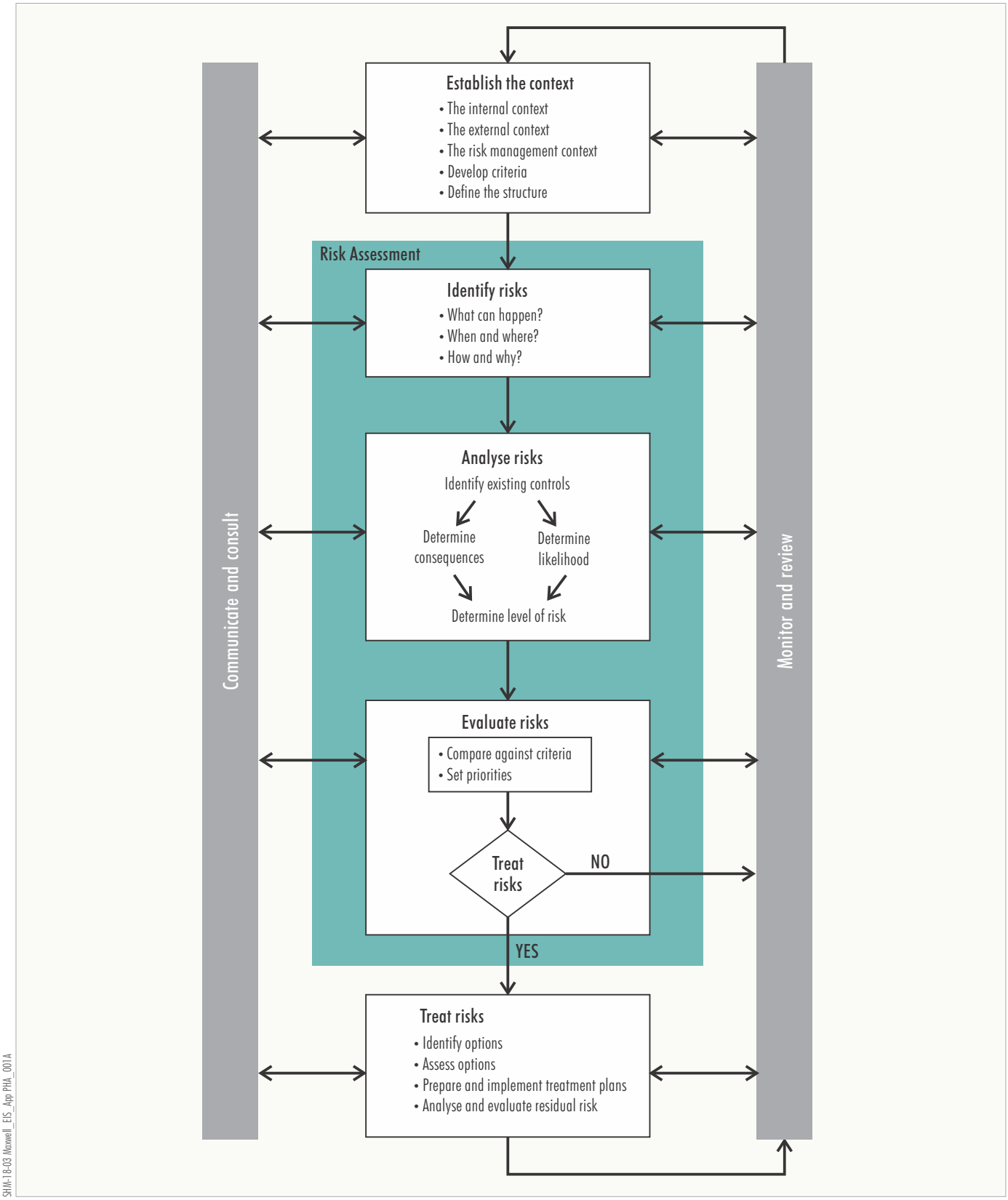
The above methodology was implemented during a PHA multi-disciplinary team-based risk review in October 2018. The review participants included technical advisors from Malabar, including:

- William Dean, Project General Manager.
- Donna McLaughlin, Environment and Community Manager.
- Rob Hayes, Operations Manager.
- Linda Benson, Safety/Training Coordinator.

1.3.2 Risk Management Process

This PHA has been undertaken with regard to 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 – 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.



SHM-18-03 Maxwell_EIS_App PHA_001A

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

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Risk Management Process

Figure 3

1.3.3 Risk Criteria

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

(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.*

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 consequences 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 ISO 31000:2018.

In accordance with ISO 31000:2018, Tables 1, 2 and 3 were reviewed by Malabar 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: Operational Risk Mentoring (2019).

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 loss 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: Operational Risk Mentoring (2019).

Table 3
Risk Ranking Matrix

		Likelihood				
		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:

	Low – Tolerable
	ALARP – As low as reasonably practicable
	Intolerable

Source: Operational Risk Mentoring (2019).

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

2 PROJECT OVERVIEW

The Project would involve an underground mining operation that would produce high quality coals over a period of approximately 26 years.

At least 75% of coal produced by the Project would be capable of being used in the making of steel (coking coals). The balance would comprise export thermal coals suitable for the new-generation High Efficiency, Low Emissions power generators.

The Project would involve extraction of run-of-mine (ROM) coal from four seams within the Wittingham Coal Measures using the following underground mining methods:

- underground bord and pillar mining with partial pillar extraction in the Whynot Seam; and
- underground longwall extraction in the Woodlands Hill Seam, Arrowfield Seam and Bowfield Seam.

The substantial existing Maxwell Infrastructure would be used for handling, processing and transportation of coal for the life of the Project. The Maxwell Infrastructure includes an existing CHPP, train load-out facilities, and other infrastructure and services (including water management infrastructure, administration buildings, workshops and services).

A mine entry area would be developed for the Project in a natural valley in the north of EL 5460 to support underground mining and coal handling activities and provide for personnel and materials access.

ROM coal brought to the surface at the mine entry area would be transported to the Maxwell Infrastructure area. Early ROM coal would be transported via internal roads during the construction and commissioning of a covered overland conveyor system. Subsequently, ROM coal would be transported to the Maxwell Infrastructure area via the covered overland conveyor system.

The existing product coal stockpile area at the Maxwell Infrastructure would be extended to allow for better management of different product coal blends. An additional ROM stockpile would also be developed adjacent to the CHPP to cater for delivery of ROM coal via the covered overland conveyor.

The Project would support continued rehabilitation of previously mined areas and overburden emplacements areas within CL 229, ML 1531 and CL 395. The volume of the East Void would be reduced through the emplacement of reject material generated by Project coal processing activities and would be capped and rehabilitated at the completion of mining.

An indicative Project general arrangement showing the underground mining area and key infrastructure is provided on Figure 2. A detailed description of the Project is provided in the main document of the EIS.

3 HAZARD IDENTIFICATION

3.1 DESCRIPTION OF HAZARDOUS MATERIALS

The potential hazards for the Project include the handling of hydrocarbons, chemicals, and explosives. 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 during construction and operation would include fuels (diesel and petrol), liquid petroleum gas (LPG), oils, greases, degreaser, kerosene and minor quantities of other hydrocarbons (e.g. acetylene).

Diesel

Diesel is classified as a combustible liquid by Australian Standard (AS) 1940:2017 *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* (ADG Code) (National Transport Commission, 2017). 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. Currently one 860 kilolitre (kL) tank near the main fuelling area and two 110 kL tanks at the in-pit refuelling area are used to store diesel at the Maxwell Infrastructure.

A facility capable of storing up to 50 kL would be established at the mine entry area for the refuelling of underground support and transport vehicles.

All 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 such, is classified as a dangerous good according to the criteria of the ADG Code (National Transport Commission, 2017). On-site petrol usage would be minor and petrol engine vehicles would be fuelled off-site.

Oils, Greases, Degreaser and Kerosene

Oil is classified as a combustible liquid (Class C2) by AS 1940:2017. 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 1940:2017.

Waste oil is currently stored in a 20 kL tank in the main workshop area of the Maxwell Infrastructure. Hydraulic oils and greases are currently stored in two 30 kL tanks and two 10 kL tanks in the main workshop area, and three 2.4 kL tanks at the in-pit refuelling area.

Workshop hydrocarbon spills and leaks would also be contained by impervious flooring/bunding, and spill response equipment would be maintained on-site.

Liquefied Petroleum Gas

LPG is classified as a flammable gas (Class 2.1) by AS 1940:2017 and, as such, is classified as a dangerous good according to the criteria of the ADG Code (National Transport Commission, 2017). On-site LPG usage would be minimal and limited to workshop requirements. Procedures would be developed at the Project for the handling, storage and containment of LPG.

Other Hydrocarbons

Minor quantities of other hydrocarbons may be used at the Project for construction, development and maintenance activities (such as acetylene). The handling and storage of other hydrocarbons on-site would be conducted in accordance with Australian Standards and relevant codes.

3.1.2 Chemicals

The management and storage of chemicals at the Project would be conducted in accordance with Australian Standards and relevant codes.

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.

3.1.3 Explosives

Explosive materials required for the Project would include initiating products and bulk explosives.

Explosives storage would 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, land transport and handling, and disposal of the explosive, with reference to AS 2187.2:2006 *Explosives – Storage and Use – Use of Explosives* for specific guidelines.

Explosives are stored in a licensed explosives magazine (licence XSTR100017) in accordance with Workcover requirements and applicable Australian Standards. The current maximum capacity of ammonium nitrate stored at the Maxwell Infrastructure is 80 tonnes. Given the future limited requirement for blasting, the quantity of explosives stored at the Maxwell Infrastructure would be sustainably less than this maximum capacity.

3.1.4 Liquid and Non-Liquid Wastes

At the Maxwell Infrastructure, the existing wastewater treatment plant would continue to be used to treat effluent on-site, with the treated water discharged to a rehabilitation area. Effluent disposal at the Maxwell Infrastructure area would continue to be regulated under Environmental Protection Licence (EPL) No. 1323.

Sewage and wastewater from the mine entry area ablution facilities would be collected and treated in a biocycle sewage treatment system and serviced by a licensed waste disposal contractor on an as-needed basis. Treated effluent would be irrigated in accordance with the *Environmental Guidelines: Use of Effluent by Irrigation* (NSW Department of Environment and Conservation, 2004).

Waste hydrocarbons would be collected and stored on-site prior to being removed by licensed contractor(s).

3.2 HAZARD IDENTIFICATION PROCESS

3.2.1 Project Components

As this assessment specifically covers risk from fixed installations (in accordance with *Multi-level Risk Assessment* (DP&I, 2011) [Section 1.1]), the main focus of this assessment was on-site storage. In addition, some additional risks relating to mining operations (e.g. unplanned/unauthorised movement of mobile plant off-site) were identified and included in this PHA. Further discussion on the objectives and scope of the assessment are described in Section 1.1.

3.2.2 Incident Classes

The following generic classes of incidents were identified:

- leak/spill;
- fire;
- explosion;
- theft;
- unplanned/unauthorised movement of mobile plant;
- release of noxious gases to atmosphere; and
- equipment/mine infrastructure malfunction.

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

Malabar 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*. Malabar would continue to meet these obligations for the Project.

In addition, a number of hazard controls, including mitigation and management measures, would be described in management plans for the Project, for example:

- Water Management Plan.
- Pollution Incident Response Management Plan.
- Bushfire Management Procedure.

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

- **Maintenance** – Maintenance of all mobile and fixed plant equipment consistent with the maintenance schemes required by legislation and the original equipment manufacturer.
- **Staff Training** – Only those personnel authorised to undertake skilled or 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, Malabar would obtain the necessary licences and permits for engineering structures.
- **Contractor Management** – All contractors engaged by Malabar would be required to operate in accordance with the relevant Australian Standards and NSW legislation.
- **Water Management** – As reported in Appendix C of the EIS, water management structures would be constructed to generally separate runoff from undisturbed areas and disturbed areas and in accordance with the *Dams Safety Act, 1978* and/or *Dams Safety Act, 2015*.
- **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 (e.g. fuels, oils, greases) would be developed in accordance with Australian Standards and relevant legislation.
- **Emergency Response** – Fire-fighting and spill management equipment would be kept on-site in appropriate locations. Emergency response training, 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, with focus on fixed installations (Section 1.1).

For this PHA, the “site” was considered to be the underground mining area, mine entry area, transport corridor, and Maxwell Infrastructure.

Hazard treatment measures have been proposed, where required, to produce a tolerable 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 Environment and Conservation (2004) *Environmental Guidelines: Use of Effluent by Irrigation NSW*.

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.

Operational Risk Mentoring (2019) *Maxwell Project – Environmental Risk Assessment.*

ATTACHMENT A

HAZARD IDENTIFICATION AND ANALYSIS TABLE

Table A-1
Hazard Identification and Analysis Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage Hydrocarbons (i.e. diesel, petrol, oils, greases, liquefied petroleum gas [LPG], oils, degreaser and kerosene), explosives and chemicals.	Leak/Spill	Failed tank or associated fittings, pump or pipework or operator error, leading to off-site impacts such as chemical or fuel contamination.	• Design and construction of storage facilities (including bunding, locked valves) and structures/tanks/pipes to relevant standards and legislation. • Storage tanks and facilities positioned to minimise potential impacts of leaks/spills. • Area around above-ground tanks bunded. • Regular inspections and maintenance (where required). • Operator training and operational procedures. • Spill management equipment (i.e. spill kits), procedures and training. • Emergency Response Systems. • Pollution Incident Response Management Plan. • Spill Response Procedure. • Runoff controlled and captured (closed water management system designed to handle major rainfall or spill event).	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage (Continued) Hydrocarbons (i.e. diesel, petrol, oils, greases, LPG, oils, degreaser and kerosene), explosives and chemicals.	Leak/Spill (Continued)	Failed storage vessel due to mechanical impact or corrosion, leading to off-site impacts such as chemical or fuel contamination.	• Design and construction of storage facilities (including bunding, locked valves) and structures/tanks/pipes to relevant standards and legislation. • Storage tanks and facilities positioned to minimise potential impacts of leaks/spills. • Area around above-ground tanks bunded. • Regular inspections and maintenance (where required). • Protection of storage facilities from collision (e.g. bollards). • Escort/induction of off-site delivery vehicles. • Operator training and operational procedures. • Spill management equipment (i.e. spill kits), procedures and training. • Emergency Response Systems. • Pollution Incident Response Management Plan. • Spill Response Procedure. • Runoff controlled and captured (closed water management system designed to handle major rainfall or spill event).	B	5	19(L)

Table A-1 (Continued)
Hazard Identification and Analysis Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage (Continued) Hydrocarbons (i.e. diesel, petrol, oils, greases, LPG, oils, degreaser and kerosene), explosives and chemicals.	Fire Spreading to Off-site Areas	Poor maintenance, poor design, collision, human error or incorrect storage of chemicals, leading to off-site fire-related impacts.	• Appropriate storage of fuel, gas, explosives, chemicals, and dangerous substances as required by relevant standards and legislation. • Storage tanks and facilities positioned to minimise potential impacts of leaks/spills and fire. • Protection of storage facilities from collision (e.g. bollards). • Emergency Response Systems. • Fire-fighting equipment and spill kits located in on-site vehicles and infrastructure where required. • Regular inspections and maintenance of fire-fighting equipment. • Regular maintenance of fire breaks to slow fire spread. • Liaison with Rural Fire Service for quick response. • Bushfire Management Procedure. • Hot work permits. • Safety Data Sheets. • Controlled grazing on buffer land. • Designated non-smoking areas.	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage (Continued) Hydrocarbons (i.e. diesel, petrol, oils, greases, LPG, oils, degreaser and kerosene), explosives and chemicals.	Theft/Vandalism Leading to Misuse of Chemicals/Explosives Off-site	Theft or a malicious act resulting in off-site impacts.	• Installation of adequate lighting around storage facilities. • Perimeter fencing to reduce ease of access to the mine entry area. • Restriction of access to storage facilities. • CCTV camera surveillance on-site. • Restricted access to authorised personnel. • Emergency Response Systems. • On-site security when site not in operation.	D	5	24(L)
On-Site Storage (Continued) Run-of-mine (ROM) and product coal.	Fire	Operator error or spontaneous combustion event leading to off-site fire-related (i.e. fume/emissions) impacts.	• Design and management of coal stockpiles (i.e. size, shape and age tracking of stockpiles). • Regular monitoring and communication of stockpile status and active management. • Stockpile and belt dust suppression. • Spontaneous combustion propensity testing to inform management decisions and measures. • Operator training and operational procedures. • Regular cleaning around the site.	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-Site Storage (Continued) ROM and product coal.	Equipment Malfunction	Malfunction of dust suppression equipment combined with unfavourable weather conditions resulting in significant off-site dust emissions.	• Regular inspections of stockpiles. • Regular maintenance of dust suppression equipment. • Air quality monitoring program.	C	5	22(L)
Construction/ Development On-site transport/installations.	Fire	Vehicle fire or electrical fire leading to off-site bushfire.	• Regular inspections and maintenance of fire-fighting equipment. • Regular inspections and maintenance of site infrastructure, equipment and machinery. • Fire-fighting equipment and spill kits located in on-site vehicles and infrastructure where required. • Regular maintenance of fire breaks to slow fire spread. • Operator training and operational procedures. • Liaison with Rural Fire Service for quick response. • Bushfire Management Procedure. • Introduction to site standards.	C	5	22(L)

Table A-1 (Continued)
Hazard Identification and Analysis Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Underground Mining Operations	Fire	Malfunction of gas management facilities resulting in off-site fire-related impacts.	• Maintenance of sufficient fire breaks around gas management facilities. • Regular inspections and maintenance of site infrastructure and equipment. • Regular inspections and maintenance of fire-fighting equipment. • Operator training and operational procedures. • Dedicated on-site fire response equipment and team. • Emergency Response Systems. • Bushfire Management Procedure.	E	5	25(L)
	Release of Noxious Gases into Atmosphere	Failure of gas drainage/ventilation infrastructure or an underground fire/explosion producing emissions causing off-site impacts.	• Adequate gas testing and design of ventilation and gas management infrastructure. • Regular inspections and maintenance of site infrastructure and equipment. • Continuous monitoring of gas levels/alarm. • Pollution Incident Response Management Plan.	E	5	25(L)

Table A-1 (Continued)
Hazard Identification and Analysis Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Other Infrastructure and Supporting Systems	Leak/Spill	Leak or spill from water management system leading to impacts on surrounding watercourses.	• Design of water management structures in accordance with relevant standards and guidelines. • Regular inspections of water containment structures and pipelines for structural integrity, effectiveness and maintenance to maintain their function. • Operator induction and ongoing training. • Water Management Plan. • Pollution Incident Response Management Plan. • Flow meters with a real-time monitoring. • Pre-commissioning testing. • Pipe located in highly visible location.	C	5	22(L)
		Unplanned off-site discharge of tailings or reject.	• Design of water management structures in accordance with relevant standards and guidelines. • Regular inspections and maintenance of site infrastructure, equipment and machinery. • Operator induction and ongoing training. • Pollution Incident Response Management Plan. • Pre-commissioning testing. • Tailing Management Plan. • Flow meters with real-time monitoring.	E	4	23(L)

Table A-1 (Continued)
Hazard Identification and Analysis Table

Project Component	Incident Type	Scenario	Existing and Proposed Preventative Measures	Likelihood[1]	Consequence[2]	Risk[3]
Other Infrastructure and Supporting Systems (Continued)	Leak/Spill (Continued)	Failure of Liddell Ash Dam.	• Management of the Liddell Ash Dam under the NSW *Dams Safety Act, 1978* and/or *Dams Safety Act, 2015*, including construction and inspection requirements. • Any spill contained within East Void.	E	3	20(L)

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