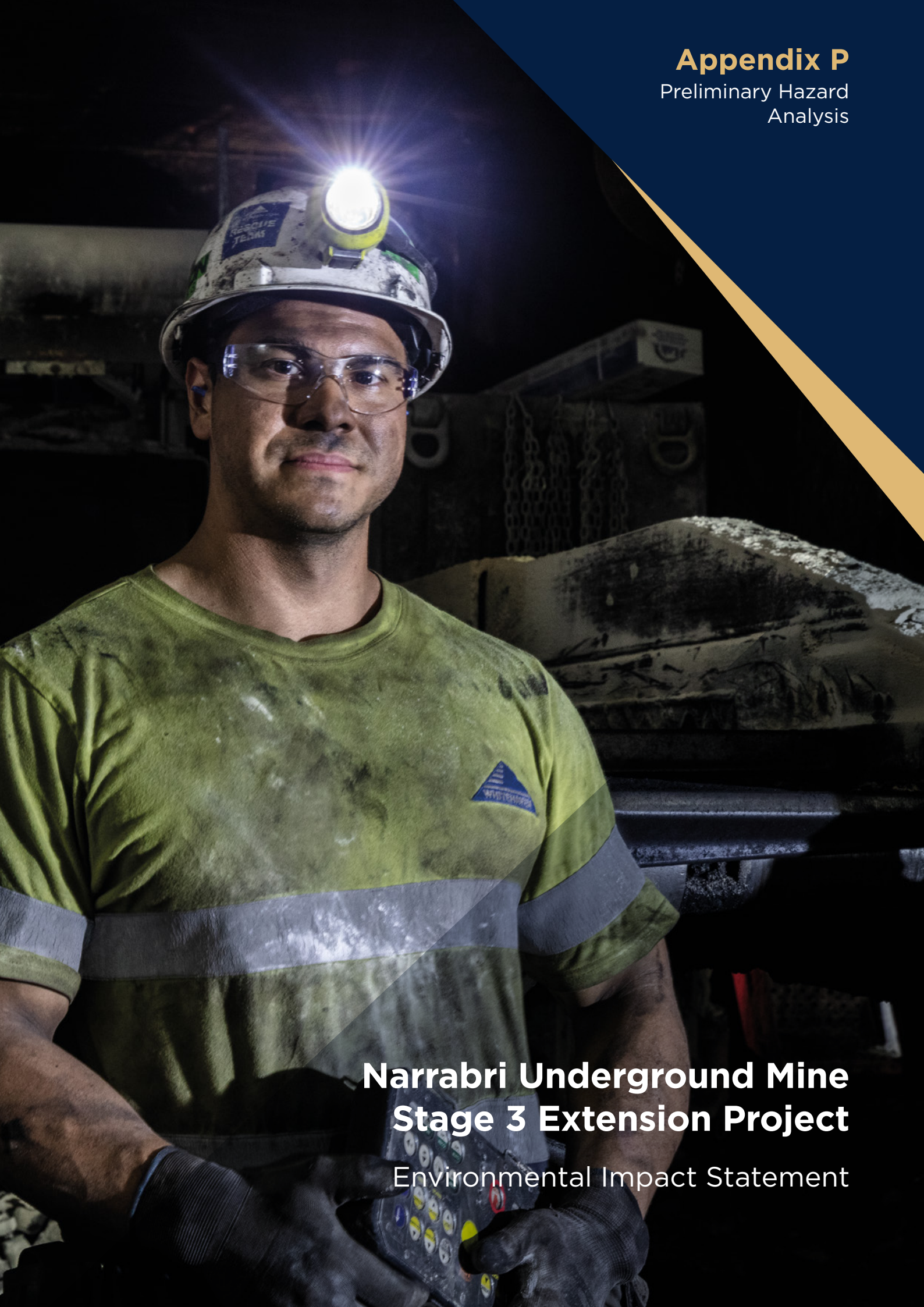

Appendix P

Preliminary Hazard Analysis

Narrabri Underground Mine Stage 3 Extension Project

Environmental Impact Statement

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1 INTRODUCTION

The Narrabri Mine is located approximately 25 kilometres (km) south-east of Narrabri and approximately 60 km north-west of Gunnedah within the Narrabri Shire Council Local Government Area of New South Wales (NSW) (Figure 1). The Narrabri Mine is operated by Narrabri Coal Operations Pty Limited (NCOPL).

NCOPL is seeking a new Development Consent under the State Significant Development provisions of Part 4 of the NSW *Environmental Planning and Assessment Act 1979* for the Narrabri Underground Mine Stage 3 Extension Project (the Project). This Preliminary Hazard Analysis (PHA) forms part of the Environmental Impact Statement (EIS) which has been prepared to accompany the Development Application for the Project. The Secretary's Environmental Assessment Requirements (SEARs) states the following requirement in regard to the risk assessment:

> *Including an assessment of the likely risks to public safety, paying particular attention to potential subsidence risks, bushfire risks and the handling of any dangerous goods.*

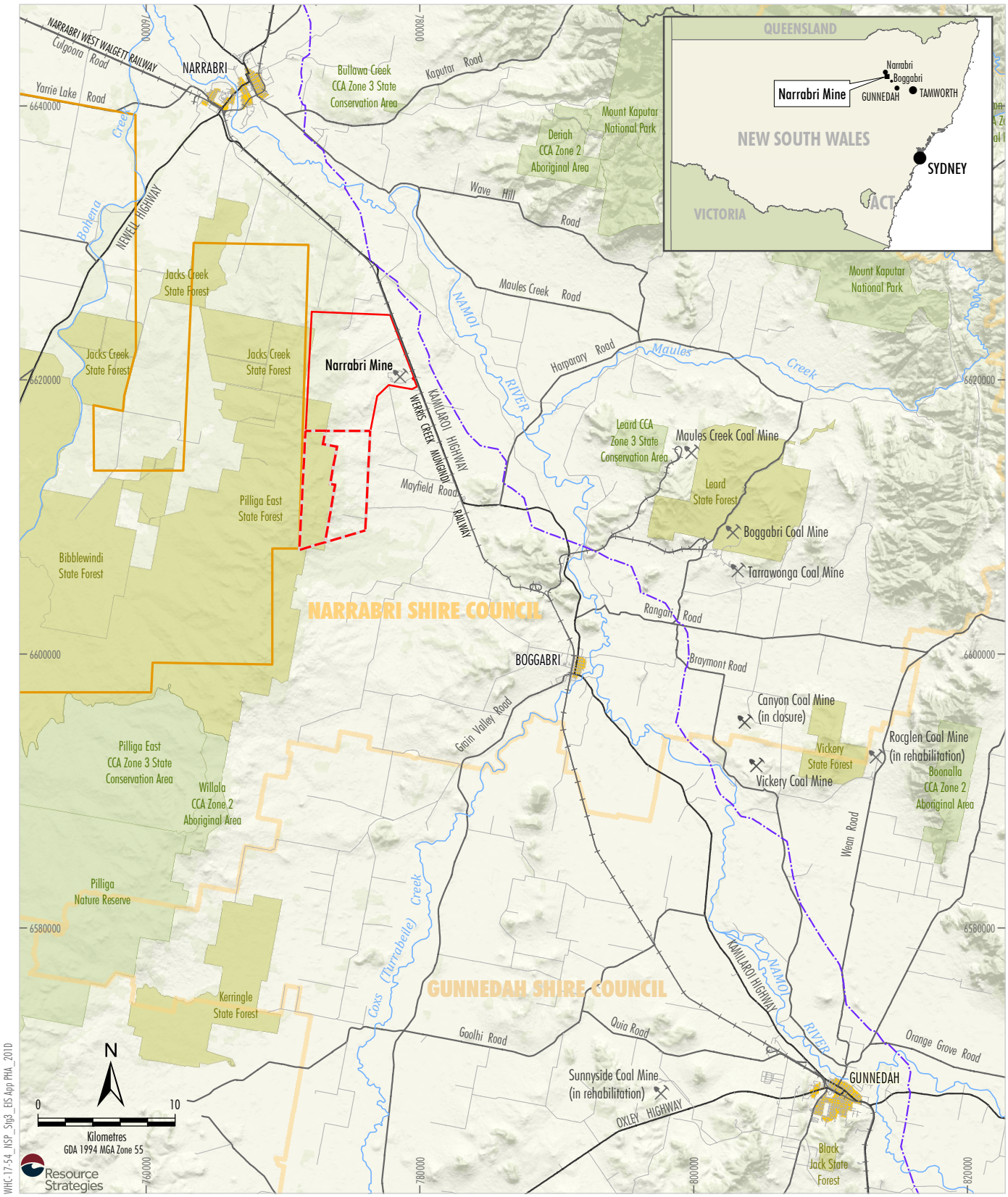
In accordance with the NSW *State Environmental Planning Policy No.33 – Hazardous and Offensive Development* (SEPP 33), this PHA has been prepared to accompany the Development Application for the Project and forms part of the EIS.

The following guidelines, policies and standards have been considered during preparation of this PHA:

- NSW Government *Multi-level Risk Assessment* guideline (Department of Planning and Infrastructure [DP&I], 2011);
- NSW SEPP 33;
- *Applying SEPP 33: hazardous and offensive development application guidelines* (NSW Department of Planning [DoP], 2011a);
- *Hazardous Industry Planning Advisory Paper No. 4: Risk Criteria for Land Use Safety Planning* (HIPAP No. 4) (DoP, 2011b);
- *Hazardous Industry Planning Advisory Paper No. 6. Hazard Analysis* (DoP, 2011c);
- International Organisation of Standardisation (ISO) 31000:2018 *Risk Management – Guidelines*; and
- *Planning for Bush Fire Protection 2019* (NSW Rural Fire Service, 2019).

1.1 OBJECTIVE AND SCOPE

The objective of this PHA is to identify off-site risks that the Project poses 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).



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LEGEND

- Mine Site
- Mining Lease (ML 1609)
- Provisional Mining Lease Application Area
- Local Government Boundary
- State Forest
- State Conservation Area, Aboriginal Area
- Narrabri Gas Project (Santos NSW [Eastern] Pty Ltd)
- Queensland Hunter Gas Pipeline

Source: Geoscience Australia (2011); NSW Spatial Services (2019)

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NARRABRI STAGE 3 PROJECT

Regional Location

Figure 1

Based on this, and in consideration of the SEARs, the PHA considers risks associated with:

- fixed installations;
- subsidence;
- bushfire; and
- the handling and use of any dangerous goods.

Furthermore, this assessment does not consider:

- risks to NCOPL employees;
- NCOPL-owned property;
- risks that are not atypical or abnormal (e.g. long-term effects of typical dust emissions); or
- off-site risks such as those which may arise from road, rail, air or sea.

Other environmental risks, including potential long-term impacts that may arise from fixed installations on-site, are considered in the Environmental Risk Assessment (Appendix O of the EIS) and within the following studies presented as part of the Project EIS:

- Appendix A – Subsidence Assessment.
- Appendix B – Groundwater Assessment.
- Appendix C – Surface Water Assessment.
- Appendix D – Biodiversity Development Assessment Report.
- Appendix E – Aboriginal Cultural Heritage Assessment.
- Appendix F – Historic Heritage Assessment.
- Appendix G – Agricultural Impact Statement.
- Appendix H – Noise and Blasting Assessment.
- Appendix I – Air Quality and Greenhouse Gas Assessment.
- Appendix J – Road Transport Assessment.
- Appendix K – Social Impact Assessment.
- Appendix L – Economic Assessment.
- Appendix M – Land Contamination Assessment.
- Appendix N – Environmental Geochemistry Assessment.
- Appendix O – Environmental Risk Assessment.

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 off-site consequences from hazardous materials present on-site and their locations. 'Potentially hazardous industry' is defined by SEPP 33 as a development for the purposes of industry that, if it were to not to apply the necessary controls to minimise the overall effect on the surrounding environment, it would pose significant risk on people, property and the biophysical environment.

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 (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 2019. The review participants included technical advisors from NCOPL and Whitehaven Coal Limited (Whitehaven), including:

- Director – NCO Stage 3 Project.
- Coordinator – NCO Stage 3 Project.

- Group Manager Approvals and Environment – Whitehaven.
- General Manager Health, Safety and Environment – Whitehaven.

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 2 and includes the following components:

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

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.

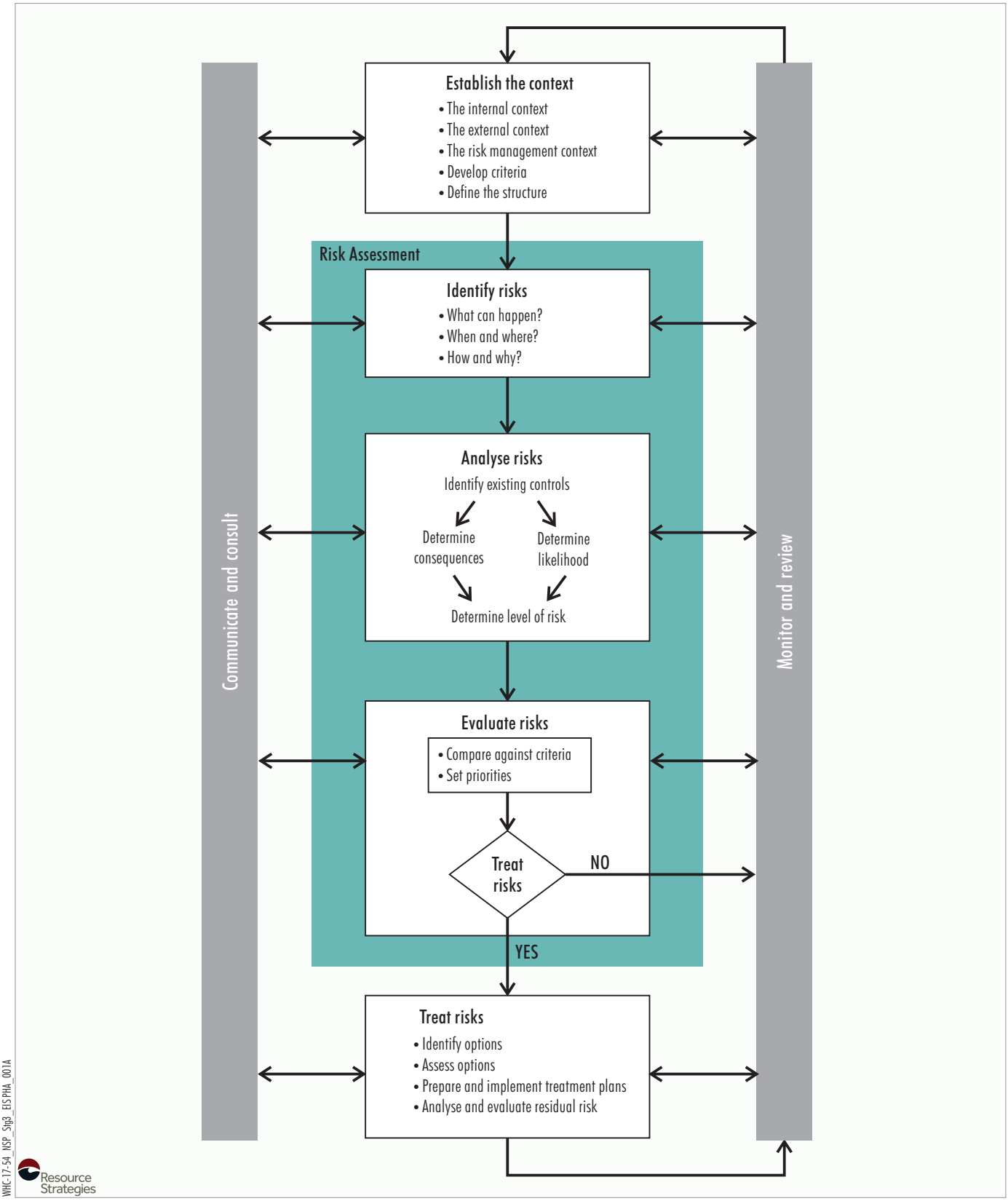
(b) The risks from a major hazard should be reduced wherever practicable, irrespective of the value of the cumulative risk level from the whole installation. In all cases, if the consequences (effects) of an identified hazardous incident are significant to people and the environment, then all feasible 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.



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Resource Strategies

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

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NARRABRI STAGE 3 PROJECT

Risk Management Process

Figure 2

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

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

Table 1
Measures of Probability

Event	Likelihood	Description	Quantification
A	Almost Certain	The event is expected to occur in most circumstances	Typically occurs once per day to one week
B	Likely	The event will probably occur in most circumstances	Typically occurs once per week to one month
C	Occasional	The even should occur at some time	Typically occurs once per month to one year
D	Unlikely	The even could occur at some time	Typically occurs once in one to five years
E	Rare	The event may only occur in exceptional circumstances	Typically occurs once in five to ten years

Source: Whitehaven.

Table 2
Measures of Maximum Reasonable Consequence

Level	Description	Health	Environment	Community	Economics
5	Catastrophic	Exposure to health hazards (significantly exceeding the occupational exposure limit [OEL]) resulting in single or multiple fatalities	Unconfined detrimental impact requiring long term recovery leaving major residual damage (typically years)	Widespread mistrust / opposition among stakeholders setting the agenda for key decision makers	>$50M
4	Major	Exposure to health hazards (significantly exceeding the OEL) resulting in irreversible impact on health with loss of quality of life (typically a permanent disability illness)	Unconfined detrimental impact requiring medium term recovery leaving residual damage (typically months)	Tangible mistrust / opposition among stakeholders with significant influence on key decision makers Irreparable damage to site or item of high cultural significance	$10M - $50M
3	Medium	Exposure to health hazards (exceeding the OEL) resulting in reversible impact on health, or permanent change with no disability or loss of quality of life (typically a restricted work day or lost time illness)	Near source confined detrimental impact requiring medium term recovery (typically months) Unconfined detrimental impact requiring short term recovery (typically weeks)	Mistrust / opposition among some stakeholders with moderate influence on public opinion and decision makers Reparable damage to site or item of high cultural significance	$2M - $10M
2	Minor	Exposure to health hazard resulting in symptoms requiring medical intervention and full recovery with no restrictions or lost time (typically a medical treatment illness)	Near source confined reversible impact requiring short term recovery (typically a week)	Tangible mistrust / opposition among a few stakeholders with some influence on public opinion and decision makers Irreparable damage to site or item of low cultural significance	$100K - $2M
1	Insignificant	Exposure to health hazard resulting in temporary and reversible discomfort (typically a first aid or no treatment illness)	Near source confined negligible or temporary impact (typically a shift)	Tangible mistrust / opposition among individual stakeholders with minimal influence on public opinion and decision makers Reparable damage to site or item of low cultural significance	<$100K

Source: Whitehaven.

Table 3
Risk Ranking Matrix

		Consequence Level				
		Insignificant (1)	Minor (2)	Medium (3)	Major (4)	Catastrophic (5)
Likelihood	Almost Certain (A)	Moderate	High	High	Critical	Critical
	Likely (B)	Moderate	Moderate	High	High	Critical
	Occasional (C)	Low	Moderate	High	High	High
	Unlikely (D)	Low	Low	Moderate	Moderate	High
	Rare (E)	Low	Low	Moderate	Moderate	High

Legend – Risk Levels:

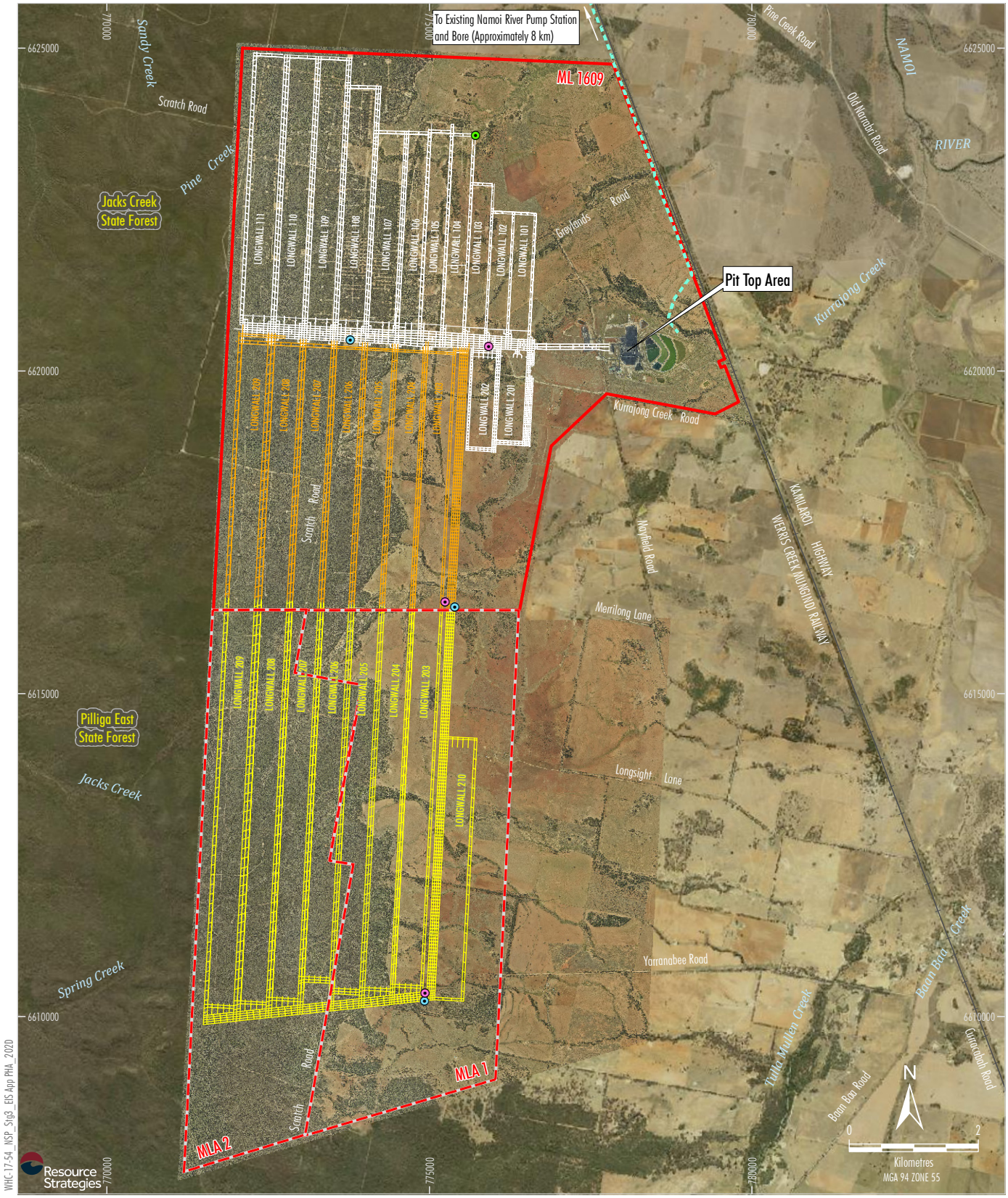
Critical	Risks that significantly exceed the risk acceptance threshold. Immediate attention needed, stop the job.
High	Risks that exceed the risk acceptance threshold. Additional risk control measures required. If further risk control measures are not practicable the responsible Manager must sign off.
Moderate	Risks acceptance threshold. Additional control measures could be implemented to control risks further. Active monitoring of risk control measures required.
Low	Risks that are below the risk acceptance threshold. No additional control measures required. Monitoring of risks may be needed.

Source: Whitehaven.

2 PROJECT OVERVIEW

The Project involves an extension to the south of the approved underground mining area to gain access to additional coal reserves within Mining Lease Applications 1 and 2 (Figure 3), an extension of the mine life to 2044 and development of supporting surface infrastructure. ROM coal production would occur at a rate of up to 11 million tonnes per annum, consistent with the currently approved limit.

A detailed description of the Project is provided in Section 2 in the Main Report of the EIS.



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LEGEND

- Mining Lease (ML 1609)
- Provisional Mining Lease Application Area
- Existing Namoi River Pipeline (Buried)
- Approved Underground Mining Layout
- Indicative Underground Mining Layout to be Extended for Project
- Indicative Underground Project Mining Layout
- Indicative Ventilation Complex (Downcast)
- Indicative Ventilation Complex (Upcast)
- Indicative Ventilation Complex (Upcast - Decommissioned)

Source: NCOPL (2019); NSW Spatial Services (2019)

WHITEHAVEN COAL

NARRABRI STAGE 3 PROJECT

Approved and Project General Arrangement

Figure 3

3 HAZARD IDENTIFICATION

3.1 DESCRIPTION OF HAZARDOUS MATERIALS

The potential hazards for the Project include the handling of hydrocarbons, chemicals, explosives and liquid and non-liquid wastes. A brief description of these materials is presented below, and a further description of these materials and related matters can be found in Section 2 of the Main Report of the EIS.

In addition, the stockpiling of coal has also been considered in this PHA (Attachment A).

3.1.1 Hydrocarbons

Hydrocarbons used on-site for the Project would be consistent with current operations and would include fuels, oils, greases, degreaser, kerosene and liquefied petroleum gas (LPG).

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 specified in 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 potentially 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, two self-bunded fuel tanks, each with a 68 kilolitre (kL) maximum capacity and nominal capacity of 60 kL, are located near the workshop and store area. Additionally, three 34 kL diesel tanks in containers are associated with the generators for the mobile gas extraction units. Two diesel fuel pods are also available for underground use and are on rotation with a diesel fuel pod on standby on the surface.

Hydrocarbon storage facilities are constructed and operated in accordance with AS 1940:2017 *The storage and handling of flammable and combustible liquids* and the NSW *Work Health and Safety Regulation 2011*.

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.

Used oil containers would be drained into bulk containers and temporarily stored prior to collection by a licensed contractor for processing off-site. All containers would be stored in appropriately bunded areas.

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).

A 3,000 litre tank is located near the gate inside the administration and workshop complex. On-site LPG usage would be minimal and limited to bathhouse requirements. Procedures for the handling, storage and containment of LPG are in accordance with AS 1940:2017.

3.1.2 Chemicals

The management and storage of chemicals for the Project would be conducted in accordance with NCOPL's prescribed management procedures, and relevant Australian Standards and Codes.

Spill kits would be available onsite and contaminated soil would be rehabilitated in accordance with NCOPL procedures.

NCOPL would continue to assess new substances before their use on-site by completing a substance evaluation and risk assessment. Safety Data Sheets and substance evaluations would be available to site personnel.

3.1.3 Explosives

Explosives may be used during development of ventilation shafts, boreholes and underground activity. 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 would be stored at the Narrabri Pit Top Area in a licensed explosives magazine in accordance with SafeWork NSW requirements and applicable Australian Standards.

3.1.4 Liquid and Non-liquid Wastes

Waste management at the Narrabri Mine is conducted in accordance with the approved Waste Management Plan.

Solid and hazardous waste generated by the mine is removed from the site and disposed of by a licensed contractor.

Waste materials are collected and sorted for recycling of paper, cardboard, metals, glass, air filters and oil filters.

Waste water from the site offices, bathhouse and other amenities is treated using a self-irrigating eco-cycle septic sewage system and re-used as irrigation water on grassed areas within the Pit Top Area in accordance with *Environmental Guidelines: Use of Effluent by Irrigation* (NSW Department of Environment and Conservation, 2004).

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 Potential Interaction with Queensland Hunter Gas Pipeline Project

The approved Queensland Hunter Gas Pipeline Project will involve the construction and operation of an approximate 825 km long gas transmission pipeline from the Queensland border to Newcastle (Hunter Gas Pipeline Pty Ltd, 2008).

The approved pipeline is located approximately 1.3 km east of the Narrabri Mine. Given this, the EIS for the pipeline includes mitigation measures for situations where the pipeline will be constructed and operated near a mining lease including:

- *liaison with local mining company to establish extent and timing of mining activities near pipeline;*
- *conducting regular pipeline surveillance; and*
- *implementation of an emergency response plan with regular drills.*

On the basis of the above, potential hazards involving the Project and the Queensland Hunter Gas Pipeline Project are not considered further.

3.2.3 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.

3.2.4 Project Risk Treatment Measures

NCOPL 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*. NCOPL 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 (within the Rehabilitation Management Plan) (generally in accordance with the *Planning for Bush Fire Protection 2019* [NSW Rural Fire Service, 2019]).

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 established by NCOPL, and based on legislation obligations and the original equipment manufacturer requirements.
- **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, NCOPL would obtain the necessary licences and permits for engineering structures.
- **Contractor Management** – All contractors engaged by NCOPL would be required to operate in accordance with the site processes, relevant Australian Standards and NSW legislation.
- **Surface 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.
- **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).

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) *Applying SEPP 33: hazardous and offensive development application guidelines.*

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

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

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

Hunter Gas Pipeline Pty Ltd (2008) *Queensland Hunter Gas Pipeline Environmental Assessment.*

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

NSW Rural Fire Service (2019) *Planning for Bush Fire Protection 2019*.

Operational Risk Mentoring (2019) *Narrabri Underground Mine Stage 3 Extension 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 Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-site Storage Hydrocarbons (i.e. fuels [diesel], 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 hydrocarbon 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. ▪ Self-bunded tanks. ▪ 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).	D	2	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-site Storage (Continued) Hydrocarbons (i.e. fuels [diesel], oils, greases, degreaser and kerosene) and chemicals (Continued)	Leak/spill (Cont.)	Failed storage vessel due to mechanical impact or corrosion leading to off-site impacts including 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. ▪ Self-bunded tanks. ▪ 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).	D	2	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-site Storage (Continued) Hydrocarbons (i.e. fuels [diesel], oils, greases, degreaser and kerosene) and chemicals (Continued)	Fire or Explosion	Poor maintenance, poor design, collision or human error leading to off-site bushfire/explosion/fume emissions-related impacts.	▪ Design of structures/tanks/pipes/blasts in accordance with relevant standards and legislation. ▪ Protection of storage facilities (e.g. bollards). ▪ Fire-fighting equipment and spill kits located in on-site vehicles. ▪ Regular inspections and maintenance of fire-fighting equipment. ▪ Regular maintenance of fire breaks to slow fire spread. ▪ Operator training and operational procedures. ▪ Emergency Response Systems.	E	2	Low
	Theft/Vandalism	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	1	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-site Storage ROM and product coal	Fire	Operator error or spontaneous combustion event leads to off-site bushfire-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.	E	2	Low
	Explosion	Coal dust explosion at coal stockpiles or coal handling infrastructure leads to off-site explosion related impacts.	▪ Removal of hazardous items and regular cleaning around the site, including: – fuel load assessments; – controlled burns; – established access roads; and – established fire breaks. ▪ Water carts with water cannon available for stockpile dust suppression if required, as well as use of fixed stockpile sprays. ▪ Fire-fighting equipment and spill kits in appropriate locations. ▪ Regular inspections and maintenance of fire-fighting equipment. ▪ Operator training. ▪ Emergency Response System.	E	2	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
On-site Storage (Continued) ROM and product coal (Continued)	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	1	Low
Construction/Development Activities On-site transport/installations	Leak/Spill	Spill of diesel, oils, lubricants, solvents, sewage wastes or domestic wastes leading to off-site impacts on nearby watercourses or land.	▪ Water Management Plan. ▪ Fuels, oils and lubricants managed in accordance with relevant standards and legislation. ▪ Spill management equipment (i.e. spill kits), procedures and training. ▪ Dangerous goods register. ▪ Ground Disturbance Permit includes site construction runoff control (drains and sumps). ▪ Construction-specific environmental controls identified in the NCOPL environmental management plans. ▪ Operator training and operational procedures. ▪ Emergency Response System. ▪ Pollution Incident Response Management Plan.	D	1	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
Construction/Development Activities (Continued) On-site transport/installations (Continued)	Fire	Construction activity near diesel/chemicals storage results in a fire leading to off-site impacts (i.e. bushfire).	▪ Removal of hazardous items and regular cleaning around the site. ▪ Fire-fighting equipment in appropriate locations. ▪ Regular inspections and maintenance of fire-fighting equipment. ▪ On-site emergency response team. ▪ Operator training and operational procedures. ▪ 'Hot work' permits. ▪ Emergency Response System.	D	2	Low
	Fire	Poor storage of chemicals/fuel results in fire, leading to off-site bushfire.	▪ Fuels, oils, lubricants and chemicals stored in accordance with relevant standards and legislation. ▪ Removal of hazardous items and regular cleaning around the site. ▪ Fire-fighting equipment and spill kits located in on-site vehicles. ▪ Regular inspections and maintenance of fire-fighting equipment. ▪ Regular maintenance of fire breaks to slow fire spread. ▪ Operator training and operational procedures. ▪ Emergency Response Systems. ▪ Bushfire Management Procedure.	D	2	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
Construction/Development Activities (Continued) On-site transport/installations (Continued)	Fire (Cont.)	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. ▪ Bushfire Management Procedure. ▪ Introduction to site standards.	C	1	Low
	Explosion	Malicious act, operator error or lightning strike ignites stored chemicals/fuel/gas cylinders.	▪ Appropriate storage of fuel, gas, explosives, chemicals, and dangerous substances as required by relevant standards and legislation. ▪ Access only for authorised personnel with appropriate licence, and display of restricted area signage. ▪ Fire-fighting equipment and spill kits located in on-site vehicles. ▪ Operator training and operational procedures. ▪ Emergency Response Systems. ▪ Bushfire Management Procedure.	E	2	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
Construction/Development Activities (Continued) On-site transport/installations (Continued)	Theft	Theft of construction material or equipment, leading to an off-site event causing injury.	▪ Restricted access to authorised personnel. ▪ Installation of adequate lighting around construction activities. ▪ Site security procedures (i.e. restricted access).	C	1	Low
	Uncontrolled/ Unauthorised Movement	Unauthorised access to site, leading to personal injury.	▪ Restricted access to authorised personnel. ▪ Installation of adequate lighting around construction activities. ▪ Site security procedures (i.e. restricted access).	C	1	Low
Underground Mining Operations	Leak/Spill	Spill of oils, diesel or chemicals, leading to off-site impacts.	▪ Underground operations restricted to minor maintenance and services. ▪ Fuels, oils and lubricants managed in accordance with relevant standards and legislation. ▪ Operator training and operational procedures. ▪ Spill management equipment (i.e. spill kits), procedures and training. ▪ Emergency Response Systems. ▪ Pollution Incident Response Management Plan.	D	1	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
Underground Mining Operations (Continued)	Fire	Malfunction of gas management/flaring 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. ▪ Emergency Response Systems. ▪ Bushfire Management Procedure. ▪ Gas flares (if required) would be enclosed with a refractory shell that is internally isolated to reduce heat radiance.	E	1	Low
	Subsidence in excess of predictions and safety factors causing off-site impacts	Impacts in excess of predictions and safety factors on: ▪ other roads; ▪ powerlines, telecommunications, water mains; ▪ causing impacts on people and/or property off-site.	▪ Subsidence Management Plan. ▪ Specialist subsidence engineers develop predictions based on upper bound prediction methodology. ▪ Monitoring of subsidence impacts from existing mining on an on-going basis. ▪ Monitoring of specific infrastructure items. ▪ Roads and Maritime Services and Australian Rail Track Corporation requirements. ▪ Mitigation of existing infrastructure to account for subsidence. ▪ Work Health and Safety (Mines and Petroleum Sites) legislation. ▪ Mines Subsidence Act.	E	2	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
Underground Mining Operations (Continued)	Release of Noxious Gases to Atmosphere	Failure of gas drainage/ventilation infrastructure or an underground fire/explosion produces 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. ▪ Gas management and monitoring. ▪ Ventilation system (design and maintenance). ▪ Continuous monitoring of gas levels/alarm. ▪ Work Health and Safety (Mines and Petroleum Sites) legislation. ▪ Gas drainage. ▪ Emergency Response Systems. ▪ Bushfire Management Procedure. ▪ Pollution Incident Response Management Plan.	E	1	Low

Project Component	Incident Type	Scenario	Existing and Proposed Control 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 training and operational procedures. ▪ Spill management equipment (i.e. spill kits), procedures and training. ▪ Emergency Response Systems. ▪ Pollution Incident Response Management Plan. ▪ Water Management Plan. ▪ Flow meters with a real-time monitoring. ▪ Pre-commissioning testing. ▪ Pipe located in highly visible location.	C	2	Moderate

Project Component	Incident Type	Scenario	Existing and Proposed Control Measures	Likelihood[1]	Consequence[2]	Risk[3]
Other Infrastructure and Supporting Systems (Continued)	Leak/Spill (Cont.)	Unplanned off-site discharge of rejects.	▪ Design of water management structures in accordance with relevant standards and guidelines. ▪ Regular inspections and maintenance of site infrastructure, equipment and machinery. ▪ Operator training and operational procedures. ▪ Spill management equipment (i.e. spill kits), procedures and training. ▪ Emergency Response Systems. ▪ Pollution Incident Response Management Plan. ▪ Pre-commissioning testing. ▪ Flow meters with real-time monitoring.	E	2	Low
	Fire	Malfunction of on-site power reticulation resulting in off-site fire.	▪ Power reticulation designed to Australian Standards and legislation. ▪ Removal of hazardous items and regular cleaning around the site. ▪ Fire-fighting equipment in appropriate locations. ▪ Regular inspections and maintenance of fire-fighting equipment. ▪ Power usage monitoring and alarms. ▪ On-site emergency response team. ▪ Operator training and operational procedures. ▪ Emergency Response System.	D	2	Low

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