BENGALLA Mining Company

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Preliminary Hazards Analysis

CONTINUATION OF BENGALLA MINE ENVIRONMENTAL IMPACT STATEMENT

PRELIMINARY HAZARD ANALYSIS

Prepared by

HANSEN BAILEY
PO Box 473
SINGLETON NSW 2330

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For

BENGALLA MINING COMPANY PTY LIMITED
LMB 5
MUSWELLBROOK NSW 2333

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PRELIMINARY HAZARD ANALYSIS

for
Bengalla Mining Company Pty Limited

1 OVERVIEW

1.1 INTRODUCTION

Hansen Bailey has been commissioned on behalf of Bengalla Mining Company (BMC), to undertake a Preliminary Hazard Analysis (PHA) for the Continuation of Bengalla Mine Project (the Project). This PHA will form part of the Environmental Impact Statement (EIS) supporting an application for Development Consent under Part 4, Division 4.1 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act).

BMC operates the existing Bengalla Mine (Bengalla) in the Upper Hunter Valley of NSW. Bengalla is situated approximately 130 km north-west of Newcastle, and 4 km west of the township of Muswellbrook. It is generally bounded by Wybong Road to the north, Roxburgh Road to the west, Overton Road to the east, and the Bengalla Link Road and Muswellbrook-Ulan Rail Line to the south (see **Figure 1**).

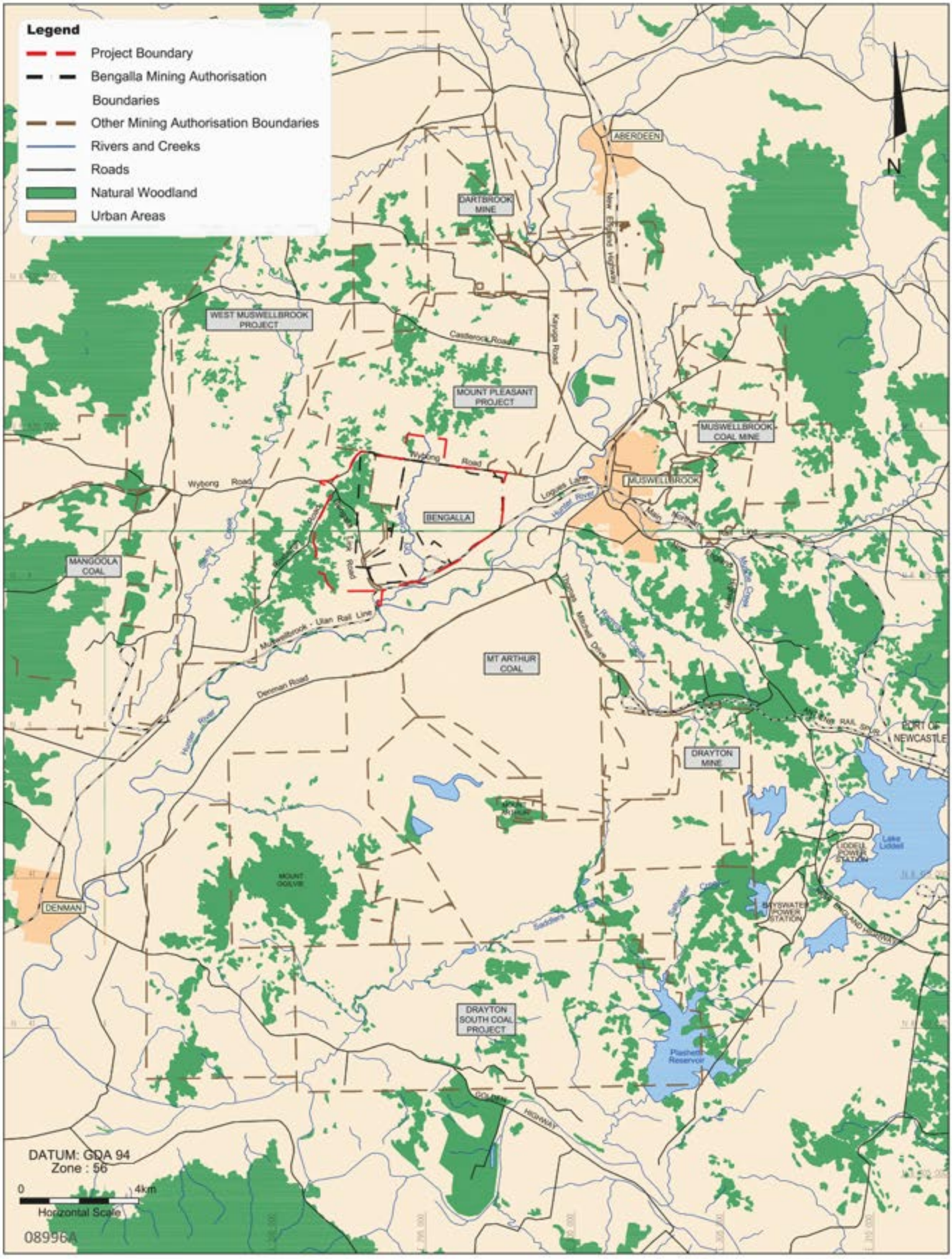
On 7 August 1995, BMC was granted Development Consent (DA 211/93) by the then Minister for Urban Affairs and Planning. This consent authorised the construction and operation of a surface coal mine, coal preparation plant, rail loop, loading facilities and associated facilities. There have since been four approved modifications to DA 211/13. Bengalla is now approved to produce up to 10.7 Mtpa of Run of Mine (ROM) coal. Approximately 6.7 Mtpa of ROM was extracted at Bengalla in 2010 (BMC 2011).

1.2 PROJECT DESCRIPTION

BMC is seeking Development Consent under Part 4, Division 4.1 of the EP&A Act to facilitate the continuation of open cut coal mining largely within current mining authorities within the Project Boundary. The mining will largely be conducted within current mining leases. The Project will enable the extraction of an additional 316 Mt of ROM coal from the Whittingham Coal Measures.

An indicative layout for the Project is provided in **Figure 2** and generally comprises the following:

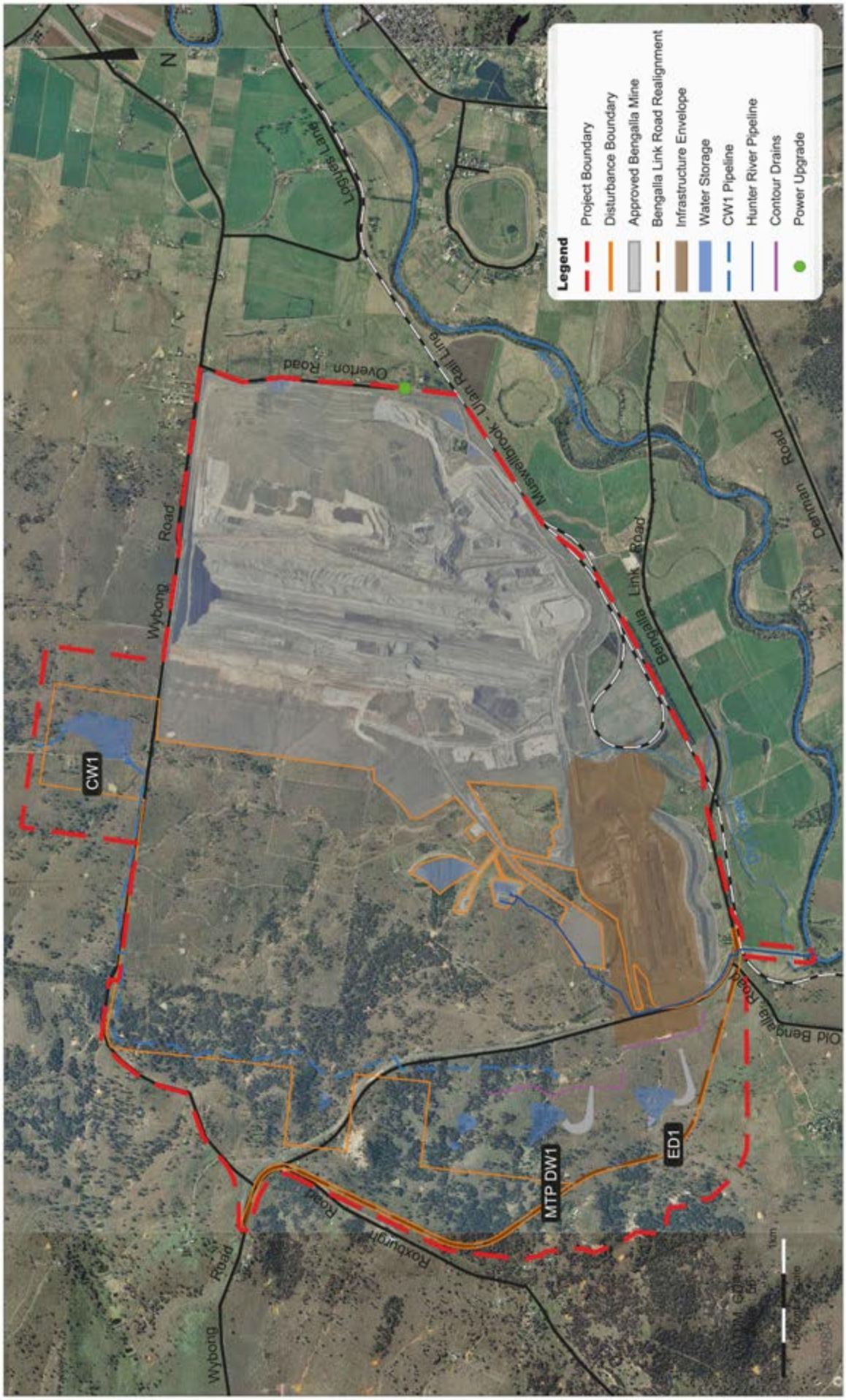
- Open cut mining towards the west at a rate of up to 15 Mtpa ROM coal for 24 years to a total of 316 Mt;
- Continued use of the existing dragline, truck fleet and excavator fleet (with progressive replacement or substitution with equivalent);



BENGALLA MINE

Regional Locality

FIGURE 1



BENGALLA MINE

Conceptual Project Layout

FIGURE 2

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ENVIRONMENTAL CONSULTANTS

BENGALLA

- An out of pit OEA to the west of Dry Creek which may be utilised for excess spoil material until it is intercepted by mining;
- Continued use, extension or relocation to existing infrastructure, including administration and parking facilities, in-pit facilities (including dragline shut down and erection pad), helipad, tyre laydown area, explosives and reload storage facility, core shed workshop, roads, reject bin, ROM Hopper, stockpiles, conveyors, water management infrastructure, bioremediation area, supporting power infrastructure and ancillary infrastructure;
- Construction and use of various items of new infrastructure (including radio tower, extensions to the MIA, Mount Pleasant Staged Discharge Dam and associated water reticulation infrastructure, additional Raw coal stockpile and upgrade to the ROM coal stockpile (along with associated conveyor network) generally as shown on the infrastructure plans;
- Processing, handling and transportation of coal via the (upgraded) CHPP and rail loop for export and domestic sale;
- Continued rejects and tailings co-disposal in the Main OEA and temporary in pit reject emplacement;
- Relocation of a 3 km section of Bengalla Link Road after Year 15 near the existing mine access road to facilitate coal extraction;
- The diversion of Dry Creek via dams and pipe work with a later permanent alignment of Dry Creek through rehabilitation areas when emplacement areas are suitably advanced;
- Relocation of water storage infrastructure as mining progresses through existing dams (including the Staged Discharge Dam and raw water dam); and
- A workforce of approximately 900 full time equivalent personnel (plus contractors) at peak production.

1.3 BACKGROUND

The results of Bengalla's environmental performance are published in the Annual Review (formerly the Annual Environmental Management Report). BMC currently maintains compliance with its 'Licence to Store' (formerly termed Dangerous Goods Licence) 07-100151-001 issued by Work Cover NSW. BMC also maintains compliance with its 'Licence to Store Explosives' XSTR100151 (the details of which are provided in **Section 3.2**) and Environmental Protection Licence (EPL) 6538.

BMC operates in accordance with the Rio Tinto Coal Australia Health, Safety, Environment and Quality (HSEQ) management system which provides a framework and reporting requirements for health, safety and environment standards and quality. This group-wide system ensures that all Rio Tinto Coal Australia operations work consistently within internationally recognised health, safety and environment frameworks and requirements.

The Bengalla Environmental Management System (EMS), accredited to the International Standards Organisation 14001 (ISO 14001), is designed in order that BMC can effectively manage its environmental issues, ensure compliance with regulatory requirements, continually improve its environmental performance and satisfy the expectations of stakeholders.

To drive the operation's performance, each BMC department has in place a documented Health, Safety and Environmental Action Plan, which outlines projects that will aid in achieving the mine's environmental objectives and targets. Existing management systems, standards, procedures and plans will be updated and continue to be implemented throughout the Project and will include:

- Rio Tinto Coal Australia HSEQ System – Management Standards;
- Rio Tinto Environmental Performance Standards;
- Current Coal and Allied EMS Procedures; and
- Current BMC management plans.

Due to the operation of the Project, some proposed changes will occur to the hazardous materials storage locations, and types and quantities of materials stored to that which is currently held on site. This includes:

- The relocation of the Explosives Magazine and Reload Facilities;
- An additional 880,000 L of diesel storage capacity, to be constructed adjacent to the existing diesel storage tanks in the workshop infrastructure area. Diesel will continue to be stored in above ground, self-bunded tanks constructed in accordance with relevant Australian Standards, including but not limited to *AS 1940, The Storage and Handling of Flammable and Combustible Liquids*;
- Construction of new light and heavy vehicle wash stations and associated solids removal system and hydrocarbon treatment; and
- Additional smaller volumes of other hazardous materials required for storage in the MIA workshop areas.

1.4 DOCUMENT PURPOSE

This PHA was undertaken in accordance with *SEPP 33 – Hazardous and Offensive Development Application Guidelines* (DUAP 1994) (SEPP 33 Guidelines). The Hazardous Industry Planning Advisory Papers (HIPAPs) developed under SEPP 33 were also considered throughout the assessment. HIPAPs of particular relevance to the Project PHA included:

- The *Hazardous Industry Planning Advisory Paper No 3 – Risk Assessment* (HIPAP No. 3);
- *The Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Planning* (HIPAP No. 4); and
- *The Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis* (HIPAP No 6).

The specific objectives of this PHA were to:

- Provide a clear hazard analysis which satisfies any relevant legislative requirements and existing BMC management procedures, standards and plans;
- Identify any additional hazards and risks including hazardous materials, storage areas, transportation and other activities that may relate to the Project;
- Analyse the significance of each hazard in terms of likelihood of occurrence and potential off-site consequences; and
- Quantify where appropriate and assess the off-site levels of risk due to the Project hazards and operations.

2 METHODOLOGY

The PHA requires the key components of the Project are reviewed against the threshold SEPP 33 Guidelines and HIPAP No. 6.

The methodology applied as per HIPAP Guidelines included:

1. Identification of potentially hazardous materials and events associated with the Project;
2. Examine the potential consequences of identified hazards;
3. Qualitatively estimate the likelihood of Project hazards occurring;
4. Examine any proposed mitigation measures;
5. Qualitatively assess the risks to the environment, safety of members of the public and their property arising from sudden and unexpected incidents and compare these to the applicable qualitative criteria;
6. Recommend any further risk mitigation, management or remedial measures as required for the Project in consideration of the relevance and adequacy of proposed safeguards; and
7. Determine the acceptability and level of risk associated with the Project to allow industry classification and the implementation of appropriate management procedures.

3 POTENTIAL HAZARD IDENTIFICATION

The PHA identified a number of Project related activities which may require the use of potentially hazardous materials. The Project will continue to require the transport and storage of diesel, materials for explosives and other substances, which may be considered potentially hazardous and are discussed further below. BMC will continue to improve and implement environmental management and remedial measures for any hazardous events including the handling, storage and transport of any hazardous substances.

3.1 POTENTIALLY HAZARDOUS MATERIALS

The key hazardous materials required for the Project include explosives, hydrocarbons and other hazardous chemicals. The key hazardous chemicals are predicted to include, although not limited to, fuels such as diesel and petrol, degreaser, kerosene, greases and explosives.

Potentially hazardous materials identified in this PHA are stored in a number of areas within the Project Boundary. A description of each of the bulk storage locations for existing operations and the Project is provided below location is shown on **Figure 3**.

3.1.1 Explosives

The Project will continue to require the continued use of explosives and other related materials. As noted in **Section 1.2**, the existing explosives storage facility will be required to be relocated and this work is anticipated to be completed during quarter 1 of Year 2 of the Project. The current and proposed locations for explosives storage at Bengalla are presented on **Figure 3**.

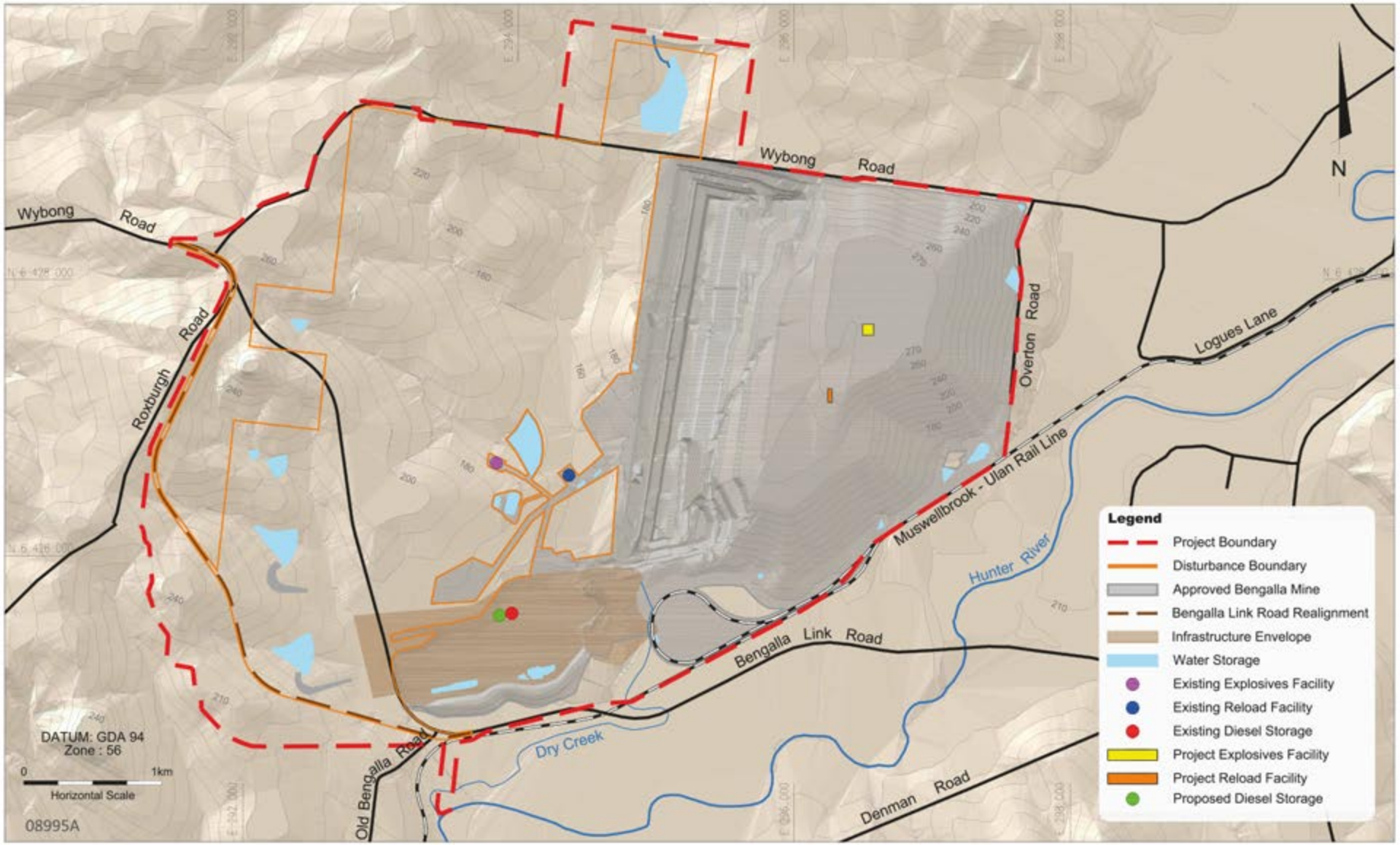
This new facility will be designed in accordance with the relevant Standards and Guidelines including *AS 2187.1 – 1998: Explosives – Storage, Transport and Use – Storage*, *AEISG Code of Practice – Precursors for Explosives* (1999) and the BMC relevant management plans and procedures.

The key potential hazards associated with explosives include the on-site storage facility, transportation of potentially hazardous materials, the proximity to fuel and workshop and possible explosions as a result of mixed materials.

3.1.2 Fuels

Diesel is a combustible liquid as classified by *AS 1940 – 2004: The Storage and Handling of Flammable and Combustible Liquids* (Class C1) for the purposes of storage and handling. However, this hazardous material is not classified as a dangerous good under the ADG Code.

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. Only very small volumes of petrol will be required for Project-related activities, such as some site maintenance equipment (i.e. mowers) and in workshop areas.



BENGALLA MINE

Hazardous Materials Storage

FIGURE 3

The key potential hazards associated with fuels required by the Project include diesel storage, spills and fires. Diesel has a flashpoint of approximately 61.5ºC and has the potential to result in a fire if ignited. Diesel can be damaging to the surrounding environment if a significant spill is experienced. If the spill leaves site, it has the potential to damage soils and/or aquatic environments.

3.1.3 Other Hazardous Materials

Some other hazardous materials will also be utilised and stored within the workshop areas. The Project will require the use of a number of hazardous chemicals, which will include however not limited to, the use of oil, degreaser and kerosene. Oil is classified as a combustible liquid (Class C2) by AS 1940:2004. All hazardous materials will continue to be managed in accordance with AS 1940:2004 and the relevant BMC management plans and procedures.

3.2 POTENTIALLY HAZARDOUS ACTIVITIES

This PHA includes a detailed assessment of any potentially hazardous activities as summarised below, and is provided in full in **Appendix A**. In order to identify and assess risks associated with the Project, activities were subdivided into the following areas:

- Storage of hazardous materials on-site;
- Transportation of materials including on-site and off-site handling;
- Spill, leakage or runoff causing land contamination;
- Project operations; and
- Natural events.

Potentially hazardous materials identified in this PHA are stored in a number of areas within the Project Boundary.

A description of each of the materials handling and bulk storage locations for existing operations and the Project is provided in the following sections. Key storage facilities for the Project include:

- Explosives and related materials storage facilities;
- Diesel storage facilities; and
- Other potentially hazardous materials storage.

Each location is shown on **Figure 3**.

3.2.1 Explosives Storage Facility

BMC currently holds two licences to store explosives and associated materials, being 07-100151-001 and XSTR100151 for the existing Bengalla explosive precursor storage facility and explosives storage facility respectively. These facilities were approved under DA 273/2006 granted by Muswellbrook Shire Council.

Under the existing 'Licence to Store' 07-100151-001, the precursor facilities are approved to store the following materials:

- 20,000 units of 11B.1B explosives;
- 100,000 kg of 11D1.1D explosives; and
- 1,000 kg of 0025.1 oxidizing substance.

Under the existing 'Licence to Store Explosives' XSTR100151, maximum volumes of the following materials are approved to be stored:

- 9,500 kg of boosters;
- 9,500 kg of detonating cord;
- 20,000 non-electric detonator assemblies;
- 20,000 electric detonators;
- 20,000 non-electric detonator assemblies;
- 20,000 electric detonators;
- 20,000 non-electric detonator assemblies;
- 60,000 kg of Ammonium Nitrate;
- 80,000 kg of Ammonium Nitrate Emulsion; and
- 80,000 kg of Ammonium Nitrate Emulsion.

The products stored at these facilities are stored and handled in accordance *AS 2187.2-2006 – Explosives – Storage, Transport and Use* and internal BMC management plans and procedures. Detonators are stored in a separate, earth-bunded compound, which is fully fenced and locked from general access.

The continuation of mining operations for the Project will require ongoing blasting to achieve suitable fracturing and fragmentation of hard rock overburden to enable efficient removal of these materials. A review of the material proposed to be mined has confirmed that the desired powder factor for blasting is likely to be approximately 0.57 kg of explosive per bcm of material.

Mine planning has predicted that approximately 4 blast events per day, or up to 11 blast events per week will be required for the Project. Blasting will continue to be undertaken during the hours 7:00 am to 5:00 pm Monday to Saturday, with a maximum of four blasts per day. Blasting will be limited to up to one blast per day, between 10:00 am and 3:00 pm on Sundays, when a scheduled blast is within 500 metres of infrastructure areas (including the approved but not yet constructed Mount Pleasant Project infrastructure area) in accordance with the Blast Management Plan, to be revised for the Project.

Initially, the storage of explosives and other related materials for the Project will continue to occur within the existing explosives storage facility. However, the explosives storage facility will be required to be relocated and it is anticipated that this work will be completed during quarter 1 of Year 2 of the Project. The new location for this facility will be on the eastern side of the Main OEA, as illustrated on **Figure 3**. This facility and will be designed in accordance with the relevant Standards and Guidelines (listed previously) and BMC will ensure the explosives storage facility is securely fenced and enclosed by an earthen safety bund.

All existing drill rigs at Bengalla have a contemporary High Precision GPS system installed to maintain accuracy of drill positioning and hole depth within the blasting pattern to minimise potential impacts. Computer modelling software will also continue to be utilised to simulate the blast patterns and reduce associated impacts.

Existing management plans will continue to be utilised and updated regularly to manage the operation of this facility for the Project, with only appropriately qualified and licensed contract personnel, familiar with site procedures to access the area and handle explosive materials and explosive precursors.

3.2.2 Fuel Storage Facilities

BMC holds an 'Acknowledgement of Notification of Dangerous Goods on Premises' 35/033746 for the diesel storage on-site. The existing Bengalla diesel storage facilities are shown on **Figure 3** and include:

- 3 x 110,000 L bunded diesel storage tanks in pit; and
- 2 x 110,000 L bunded diesel storage tanks adjacent to the store and workshop area.

Small volumes of petrol will also be required for some site maintenance equipment (i.e. mowers, etc.) and in workshop areas. Small volumes of diesel, fuels, oils, flammables and hydrocarbons are also stored in the CHPP workshop. Some volumes of petrols, fuels oils and hydrocarbons are also stored in a service trailer and self bunded Hazardous Substance Bins for maintenance purposes.

Additional fuel and lubricant storage facilities will be required for the Project, with a 550,000 L self-bunded storage facility proposed to be constructed in Year 2 adjacent to the existing diesel storage tanks in the workshop infrastructure area. In Year 3 of the Project, there will be a further upgrade to increase the additional diesel refuelling facilities required for the Project to a total maximum storage volume of 1,320,000 L.

The location of the additional fuel storages proposed is illustrated on **Figure 3**. The fuel storage areas will be constructed, with bunding, in accordance with the relevant Australian Standards including (however not limited to) NSW OH&S Regulations and AS1940-2004.

3.2.3 Storage of Other Hazardous Materials

Any hazardous materials required for the Project will be stored within infrastructure areas in accordance with relevant Australian Standards and Guidelines. Substances will continue to be stored on-site in above ground facilities in the Main Infrastructure Area (MIA), at a distance from any diesel or explosive storage areas to minimise any potential risks. These substances will be located in a bunded area in accordance with the NSW OH&S Regulations, which will minimise the risk and consequence should a fire or explosion occur and prevent any toxic contamination of the surrounding environment.

Activities undertaken in the CHPP require the use of Sodium Hypochlorite, which is classed as a red hazard material. BMC stores a maximum of 2,000 L on-site in a fully bunded storage facility at the waste water treatment plant as shown on **Figure 3**.

Approximately 135,000 L of undiluted anionic flocculent is also stored in three 45,000 L bunded tanks and 30,000 L of cationic flocculent stored in two 15,000 litre bunded tanks located to the east of the washery in the CHPP area. A total of approximately 100 t of magnetite is stored in two sumps located in the washery structure and the magnetite pit located to the east of the washery building.

Smaller quantities of other chemicals including paints, oils, solvents, glues and degreasers are required in the CHPP and for maintenance activities. These are predominantly stored in the hazardous chemicals storage cabinet in the CHPP Workshop area. No licence is required for the maximum storage volumes needed. The maximum storage capacity for storage tanks and cabinets within the CHPP workshop includes:

- 6,000 L of storage for waste coolant;
- 6,000 L for coolant;
- 2 x 10,000 L tanks for oil;
- 2 x 25,000 L tanks for oil;
- 2 x 15,000 L for coolant;
- 3 x 6,560 L hydrocarbon cabinets;
- 4 x 1,000 L gas cabinets;
- 7 x 250 L flammables cabinet; and
- 2,500 kg bulk grease.

3.2.4 Transport of Hazardous Materials

All bulk materials will continue to be transported to Project by a licensed contractor in accordance with the relevant contractor transport codes and standards and site operation procedures. Diesel will be delivered on a daily basis with up to six B-Double (50,000 L) trucks per day. The vehicles used for the transport of hazardous substances will continue to have appropriate signage displayed in accordance with the *Australian Code for the Transport of Dangerous Goods*, *Australian Code for the Transport of Explosives* and relevant NSW legislation.

3.2.5 Spills / Leakage and Contaminated Runoff

Any hazardous material releases will be managed in accordance with BMC emergency response procedures. These procedures implement techniques and handling requirements that assist in preventing spills and leakages from occurring and ensure prompt and effective clean-up practices are employed should any spills occur.

BMC will continue to implement an emergency spill response procedure, which will incorporate appropriate training, implementation of best practice procedures and the undertaking appropriate remediation measures.

Emergency Oil Spill Response Kits are readily available; particularly in areas where work involving activities that require the use of hydrocarbons. BMC also maintains a contaminated sites register in accordance with Bengalla Environmental Procedure EP13.1. The register will maintained for the Project and will record at a minimum:

- The locations on any areas used for the storage of hydrocarbons, chemicals, wastes and other potential contaminants;
- Any areas routinely used for vehicle and plant re-fuelling and servicing;
- The location of any contamination events and the remediation works that were undertaken;
- Type and quantities of the contaminating materials; and
- Recommended remediation works and performance criteria required to be undertaken.

Bengalla's oil / water separator is currently utilised to treat runoff from the MIA, specifically the administration building, vehicle wash bay and workshop areas prior to water being recycled through Bengalla's water management system. A new solids removal system and hydrocarbon treatment will be constructed adjacent to the new heavy and light vehicle wash bays to ensure any runoff continues to be captured and appropriately treated.

3.2.6 Natural Events

Natural events such as floods, bushfires and landslides can also create hazardous conditions. Consideration of these natural hazards and their management has been included as part of this assessment.

The potential risk of fires will continue to be managed in accordance with the existing Landscape Management Plan. A Bushfire Risk Assessment and associated review of the existing Landscape Management Plan will be undertaken for the Project.

It is possible that the Project and its associated activities may increase the risk of fires occurring and spreading to the surrounding environment.

The bushfire danger period in NSW runs from 1 October to 31 March (inclusive) of the following year depending upon the seasonal weather conditions. BMC will continue to monitor fuel supplies and climatic conditions to determine if there is a high risk of a fire occurring. Severe conditions may result from:

- Wet, late summer and autumn promoting heavy fuel accumulation;
- Dry and windy winters with heavy frosts;
- Dry springs and the early onset of summer conditions; or
- An extended drought period.

BMC will continue to implement control measures for the Project to minimise any potential hazards including:

- Grazing of pastures to minimise fuel build-up;
- Slashing grass around infrastructure;
- Maintaining fire breaks as required; and
- Ongoing communications with the NSW Rural Fire Service.

BMC has installed and maintained fire control infrastructure, with fire fighting equipment at key points, and an emergency response team.

The Project is located in an area with no recorded history of landslides and exhibits no evidence of instability. Slope angles and shapes are negligible across the development area. On this basis the geological and geomorphological conditions indicate very low risk of landslide occurrence.

All components of the Project are located outside the 1 in 100 year flood extent of the Hunter River and therefore the flood risks are considered low.

4 IMPACT ASSESSMENT

The potential hazards and risks identified during the hazard identification process for the Project were assessed according to qualitative risk assessment criteria. This was achieved through a consideration of the various levels of consequences of an event should it occur and the likelihood of such an event occurring. Predicted impact risk ratings associated with the Project are detailed in **Appendix A**, which details:

- A consequence analysis; and
- The estimated likelihood of a potential hazard occurring;
- The consequences, in particular to the surrounding environment should a potential hazard occur; and
- The subsequent risk rating for each potential hazard identified specific to the Project.

4.1 CONSEQUENCE ANALYSIS

The consequence criteria and descriptors were developed based on the Rio Tinto Health Safety and Environment Qualitative Risk Analysis Handout v 2.1 (September 2010). A qualitative scale of consequences for potential hazardous events is provided in **Table 1**.

The qualitative risk assessment criteria are based on the following principles:

- All 'avoidable' risks associated with the Project should be avoided. This may require the investigation of alternative locations and technologies;
- The level of risk from a significant hazard should be reduced wherever possible, irrespective of the level of cumulative risk from the Project as a whole; and
- The consequences of the more likely hazardous events should, wherever possible be contained within the Project Boundary.

Table 1
RTCA HSEQ Qualitative Consequence Descriptors

Consequence	Definition
Minor	Low level short term impact which is easily confined and promptly reversible. Low level or short term subjective inconvenience or symptoms typically only requiring first aid.
Medium	Near-source confirmed and short-term reversible impact (typically one week). Reversible injuries requiring treatment but does not lead to restricted duties.

Consequence	Definition
Serious	Near source confined and medium – term recovery impact. Reversible injury or moderate irreversible damage or impairment to one or more persons.
Major	Impact that is unconfined and requiring long-term recovery leaving residual damage (typically months to years). Single fatality and/or severe irreversible damage or severe impairment to one or more persons.
Catastrophic	Impact that is widespread, unconfined and requiring long-term recovery, leaving major residual damage. Multiple fatalities or permanent damage to multiple people.

4.2 LIKELIHOOD OF HAZARDOUS EVENTS OCCURRING

The likelihood and risk acceptability criterion for potential hazardous events was developed based on the Rio Tinto Health Safety and Environment Qualitative Risk Analysis Handout v 2.1 (September 2010). A qualitative scale of likelihood for potential hazardous events is provided below in **Table 2**.

Table 2
Qualitative Likelihood Scale

Descriptor	Definition
Almost Certain	Occurs more than twice per year. Recurring event during the lifetime of the Project.
Likely	Typically occurs once or twice per year. Event that may occur frequently during the lifetime of an operation/project.
Possible	Typically occurs once every 10 years. Event that may occur during the lifetime of an operation/project.
Unlikely	Typically occurs once every 100 years. Event that is very unlikely to occur during the lifetime of the Project.
Rare	Greater than 1:100 year event. Event is extremely unlikely to occur during the lifetime of the Project.

4.3 RISK ASSESSMENT CRITERIA

The level of risk for each hazardous activity identified was determined using the risk levels provided below by combining the consequence and likelihood of the event from **Table 1** and **Table 2** above and identifying the level of risk associated with potential hazards identified in **Section** 3. The final critical qualitative risk classification was determined using the Bengalla Risk Matrix as presented in **Table 3**.

The levels of risk presented below as rated by the Risk Matrix, may be described by the following:

- Low: Manage by routine procedures, implementing corrective action where practicable;
- Moderate: Manage by corrective action and specific monitoring or response mechanism, with management responsibilities specified;
- High: Senior management attention required. Action plans and responsibility required to eliminate or reduce risk to lower level through introduction of additional risk controls; and
- Critical: As per the High Risk ranking category; however immediate action to reduce risk level is required.

Table 3
Bengalla Risk Matrix

Likelihood	Consequence				
	Minor	Medium	Serious	Major	Catastrophic
Almost Certain	Moderate	High	Critical	Critical	Critical
Likely	Moderate	High	High	Critical	Critical
Possible	Low	Moderate	High	Critical	Critical
Unlikely	Low	Low	Moderate	High	Critical
Rare	Low	Low	Moderate	High	High

5 RISK ASSESSMENT ANALYSIS

The risk assessment presented in **Appendix A** presents a qualitative risk assessment of the hazards associated with the Project. These will continue to be managed in accordance with management measures and procedures in place for existing Bengalla operations.

The risk assessment identified a need for the following preventative measures:

- Personnel entering the explosive precursor and explosives storage facilities will be authorised to do so and trained in relevant procedures for the loading, transport and preparation of hazardous substances. Any visitors entering this area must be site inducted and will need to 'sign on';
- At no time will the use of unapproved substances be permitted within the Project site. All chemicals must be assessed according to their MSDS as supplied by the Manufacturer/Supplier and the National Occupational Health and Safety Commission (NOHSC) criteria prior to use. In addition, the chemicals are to be approved by the Department Manager, the Environmental Specialist and the Health & Safety Specialist, for use in a specific area;
- All storage facilities will satisfy the following requirements:
    - Facilities will be designed, constructed, inspected and maintained in accordance with the requirements of the Dangerous Goods Act and the relevant Australian Standards;
    - All facilities will be secure and protected from damage and theft;
    - Designs will ensure easy access for fire fighting should a fire occur;
    - Where possible any chemical containers and storage facilities will be designed to minimise any physical damage due to temperature extremes, moisture, corrosive mists or vapours and vehicles; and
    - All substances shall be stored in the areas or facilities provided.

BMC will update the relevant management plans in place for existing Bengalla operations to improve performance and manage any additional hazards and risks that may be associated with the Project.

Explosives will continue to be utilised in accordance with site procedures and the requirements of *AS/NZS 2187 – 1998: Explosives – Storage, Transport and Use* (Standards Australia, 1998), the *Explosive Act 2003*, the *Explosive Regulations 2005*, the *Coal Mines Health and Safety Act 2002* (CMH&S), the *CMH&S Regulations 2006* and other relevant codes.

6 CONCLUSION

The qualitative risk assessment presented in **Appendix A** identifies potential hazards associated with the Project and ensures that adequate risk mitigation and response measures will be implemented.

This risk assessment has confirmed that the Project will not impose an unacceptable level of risk, with appropriate management and is therefore not a hazardous or offensive development.

* * *

for
HANSEN BAILEY

Dorian Walsh
Environmental Scientist

Dianne Munro
Principal

7 REFERENCES

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- NSW DoP (2011b), *Hazardous Industry Planning Advisory Paper No. 6 – Hazard Analysis*.
- DUAP (1994), *SEPP 33 – Hazardous and Offensive Development Application Guidelines.*
- National Transport Commission (2011), *Australian Code for the Transport of Dangerous Goods by Road and Rail*. Seventh Edition.

APPENDIX A

Project Hazards and Risk Assessment Summary

Table A1
Project Hazards & Risk Assessment Summary

Operational Activity / Hazard	Incident Type	Scenario	Proposed Management Measures	Likelihood	Consequence	Risk
Transport to Site	Spill	Vehicle collision, poor maintenance, or human error leading to off-site impacts	• Approved contractors to transport and operate in accordance with Australian Codes & Standards; • Spill kit stored in transport vehicles; • Fire fighting equipment to be stored in vehicle; • Transport vehicles to have communication (e.g. mobile, radio etc.).	Likely	Medium	High
	Fire	Material ignited following spill		Unlikely	Serious	Moderate
	Explosion			Unlikely	Serious	Moderate
	Theft	Theft of dangerous goods during transport, leading to off-site impacts	• Transportation in accordance with the *Australian Code for Transport of Dangerous Goods and Explosives*; • Follow specified route to the Project.	Unlikely	Major	High
Delivery to Site (filling storages)	Spill	Vehicle collision, overfill of storages, leaking pipeline, human error, leaking storage container	• Storage facility, containers, bunding, drainage and pipelines designed in accordance with Australian Standard; • Approved contractors to fill storages following operating procedures; • Contractor 'sign-on' prior to entering site to fill storages;	Likely	Medium	High
	Fire	Material catching on fire, with possible spread to other		Unlikely	Medium	Low

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Operational Activity / Hazard	Incident Type	Scenario	Proposed Management Measures	Likelihood	Consequence	Risk
		hazardous materials	• Regular inspections of storages and daily before delivery.			
	Explosion	Explosion as a result of mixed materials		Unlikely	Serious	Moderate
On-Site Storage (Explosives Facility, Fuel and Workshop Storages)	Leak/Spill	Failed storage tank / facility / pipeline	• Storage facility, containers, bunding, drainage and pipelines designed in accordance with Australian Standard; • Operating procedures followed; • Maintenance activities as required.	Possible	Medium	Moderate
	Theft	Unauthorised personnel removing product from facility, which could lead to off-site impact	• Explosives Facility designed for compliance with NSW legislation; • Explosives storages to be securely fenced.	Unlikely	Major	High
	Fire	Flammable or combustible materials ignited causing a fire which has potential to spread	• Storage facility, containers, bunding, drainage and pipelines designed in accordance with Australian Standard; • Regular inspections of storages; • Maintenance activities; • Fire fighting equipment available on site and at storage locations; • All spillage cleaned up following operating procedures; and • Emergency response procedure in place.	Unlikely	Serious	Moderate
	Explosion	Possible explosion if fire spreads		Unlikely	Serious	Moderate

Operational Activity / Hazard	Incident Type	Scenario	Proposed Management Measures	Likelihood	Consequence	Risk
General Project Operations	Spill	Vehicle collision, poor maintenance, procedures absent	• Storage facility, containers, bunding, drainage and pipelines designed in accordance with Australian Standard; • Daily inspections of facilities; • Maintenance when required; • Operating procedures followed for spill response.	Likely	Medium	High
	Fire	Flammable or combustible materials ignited causing a fire which has potential to spread	• Storage facility, containers, bunding, drainage and pipelines designed in accordance with Australian Standard; • Regular inspections of storages; • Maintenance activities as required; • Fire fighting equipment available on site; • All spillage cleaned up in accordance with response procedures; and • Emergency response procedure in place.	Unlikely	Serious	Moderate
	Explosion	Possible explosion if fire spreads		Unlikely	Major	High
Natural Events	Bushfire	Bushfire spreading to operational areas and wider area	• Bushfire Management Plan; • Grazing of pastures to minimise fuel build-up; • Slashing grass around storage areas; • Maintaining fire breaks as required; and • Ongoing communications with the NSW Rural Fire Service.	Unlikely	Serious	Moderate
	Flooding	Flooding of hazardous materials storage areas	• Storage facility design in accordance with Australian Standard; • Storage facility location outside of 1:100 year flood limit of Hunter River • Surface Water Management Plan.	Unlikely	Serious	Moderate