



MACHEnergy

Mount Pleasant Operation

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Appendix P

Environmental Risk Assessment



Mount Pleasant Optimisation Project

Environmental Risk Assessment

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EXECUTIVE SUMMARY

This Environmental Risk Assessment (ERA) identifies risks associated with key potential environmental issues associated with the Mount Pleasant Optimisation Project (the Project).

The Mount Pleasant Operation is a major operating open cut coal mine and associated infrastructure, located approximately 3 kilometres north-west of Muswellbrook in the Upper Hunter Valley of New South Wales. The Project proposes extraction of additional coal reserves within Mount Pleasant Operation Mining Leases, and an increase in the rate of coal extraction, without significantly increasing the total disturbance footprint. The extraction of additional Project coal reserves would be supported by the use and augmentation of existing and approved infrastructure at the Mount Pleasant Operation.

On 27 November 2019, a team consisting of representatives from MACH Energy Australia Pty Ltd (MACH) and specialist consultants participated in a facilitated ERA workshop. The scope of the ERA workshop was:

To identify key Project environmental assessment issues for further analysis.

Key potential environmental issues were identified by the ERA team using a voting system, whereby team members were assigned a number of “votes” to put towards the issues they considered to be the key potential environmental issues for the Project. The key potential environmental issues identified by the ERA team were considered to warrant further assessment in the Project Environmental Impact Statement (EIS). The key potential environmental issues identified in the ERA workshop will be addressed in the EIS and in the specialist reports included as appendices to the EIS.

The planned controls were considered for all identified risks, including management measures currently implemented at the Mount Pleasant Operation. With the application of the identified controls, the team consensus was that potential environmental risks associated with the Project could be managed to a tolerable level of risk.

Recommendations made by the team in the ERA workshop are included in Table ES1. The team understood that MACH will track and review these actions and confirm the adequacy of the identified controls.

Table ES1 – Consolidated Action Plan

Ref	Subject Area	Issue	Action(s)	Status
MPOP-020	Air Quality	Impacts of dust emissions from the mine operating at proposed full capacity (incrementally or cumulatively with other mining projects) affects amenity and, potentially, health of nearby private residents and communities in Muswellbrook, Kayuga and Aberdeen – potentially exacerbated by elevated background dust levels (e.g. drought conditions/climate change).	Continue to apply best practice dust controls and investigate innovative methods to reduce dust emissions from the Mount Pleasant Operation.	Ongoing – MACH continues to investigate potential dust emission reduction technologies in collaboration with air quality specialists and the University of Newcastle.
MPOP-060	Health	Cumulative impacts (from all mines in the local area), and extended impacts (over a long period of time) of dust emissions on the amenity and health of the surrounding community.		
MPOP-027	Social/Economic	The continuation of the mine and increase in production leads to continuation or increase in social impacts related to cumulative air quality and noise emissions (e.g. community perceptions of noise and dust impacts result in increased levels of stress and anxiety within the community).	Continue to implement the stakeholder engagement programme beyond submission of the Project EIS. Preparation of a Social Impact Management Plan if the Project is approved.	Ongoing – MACH has developed an ongoing engagement programme for near neighbours, equine enterprises in the region, and the wider community (Section 6 of the EIS). Engagement with the community would continue following EIS submission. A provisional Social Impact Management Plan has been developed as part of the Social Impact Assessment.
MPOP-037	Social/Economic	Poor consultation or engagement with neighbours and other stakeholders result in poor social outcomes and/or a poor relationship (e.g. mistrust) between MACH and its neighbours and stakeholders.		
MPOP-045	Agricultural Enterprises	Activities associated with mine construction and operations negatively affect horse studs' customers' perceptions, impacting these businesses and their contributions to the Equine Critical Industry Cluster.		
MPOP-070	Visual	Unanticipated visual impacts to horse studs through cumulative impacts and dynamic impacts.		
MPOP-026	Air Quality	Water supply availability for dust suppression in dry times, insufficient water available to mitigate dust leading to potential impacts on health of nearby residents.	Detailed site water balance modelling, including low rainfall periods, to inform on-site water management. Continue to engage with neighbouring mines regarding potential water sharing. Application of suitable dust suppressants that reduce water demand, as required.	Completed as part of the Project Surface Water Assessment. To be completed as part of EIS engagement programme. Dust suppressants to be applied as required to reduce water demand.

Ref	Subject Area	Issue	Action(s)	Status
MPOP-007	Biodiversity	Incremental and cumulative loss of vegetation and fauna habitat and potential impact on listed threatened species, or impacts to downstream aquatic ecology or groundwater dependent ecosystems (vegetation and stygofauna), as a result of groundwater drawdown or direct disturbance.	Biodiversity Development Assessment Report and Aquatic Ecology Assessment to assess potential incremental impacts in consideration of Project Additional Disturbance and Relinquishment Area values.	Completed as part of the Biodiversity Development Assessment Report and Aquatic Ecology Assessment.
MPOP-036	Social/Economic	Cumulative incremental impacts with other mining projects on community infrastructure (roads, accommodation, services).	Engage with Muswellbrook Shire Council and other relevant authorities regarding potential community infrastructure demands.	Completed as part of EIS engagement programme, to be ongoing post-approval.
MPOP-068	Road Transport	Increased traffic on the public road network leads to safety or efficiency issues.		
MPOP-073	Rehabilitation/ Closure	Failure to meet rehabilitation criteria (e.g. due to seasonal or soil limitations).	Continue to investigate innovative methods to implement rehabilitation and geomorphological design of the final landform of the Mount Pleasant Operation in collaboration with the University of Newcastle.	Ongoing – MACH continues to investigate potential methods to improve landform stability and rehabilitation at the Mount Pleasant Operation in collaboration with the University of Newcastle.
MPOP-075	Rehabilitation/ Closure	Stability of final landform (erosion) and maintenance of stable drainage paths.		
MPOP-043	Soil and Land Resource	Insufficient soil management and storage for future use in rehabilitation.		

1 INTRODUCTION

The Mount Pleasant Operation is a major operating open cut coal mine and associated infrastructure, located approximately 3 kilometres north-west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW) (Figure 1).

MACH Mount Pleasant Operations Pty Ltd is the manager of the Mount Pleasant Operation as agent for and on behalf of the unincorporated Mount Pleasant Joint Venture between MACH Energy Australia Pty Ltd (MACH Energy) (95 per cent [%] owner) and J.C.D. Australia Pty Ltd (5% owner)¹.

The Mount Pleasant Optimisation Project (the Project) proposes extraction of additional coal reserves within Mount Pleasant Operation Mining Leases (MLs), and an increase in the rate of coal extraction, without significantly increasing the total disturbance footprint. The extraction of additional Project coal reserves would be supported by the use and augmentation of existing and approved infrastructure at the Mount Pleasant Operation.

This document is an Environmental Risk Assessment (ERA) that identifies potential losses associated with key potential environmental issues associated with the Project.

1.1 AIM AND OBJECTIVES

Aim: To identify key Project environmental assessment issues for further analysis.

Proponent: MACH Energy (95% owner) and J.C.D. Australia Pty Ltd (5% owner).

Mandate: To focus on the identification of key environmental issues to be addressed in the Environmental Impact Statement (EIS):

- To confirm adequate risk treatment measures are identified.
- To confirm risk would be tolerable following implementation of the risk treatment measures.

The ERA team identified the following items as desired outcomes from the process:

1. Identification of key potential environmental issues to be addressed in the EIS; and
2. A document suitable for inclusion in the Project EIS and prepared in accordance with Australian Standard/ New Zealand Standard International Organization for Standardization (AS/NZS ISO) 31000:2018 *Risk management – Guidelines* (AS/NZS ISO 31000:2018).

A list of terms and their definitions is provided in Attachment A.

¹ Throughout this report, MACH Mount Pleasant Operations Pty Ltd and the unincorporated Mount Pleasant Joint Venture will be referred to as MACH.



Figure 1 - Project Location

1.2 OVERVIEW OF THE MOUNT PLEASANT OPERATION

The Mount Pleasant Operation Development Consent DA 92/97 was granted on 22 December 1999. The Mount Pleasant Operation was also approved under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) in 2012 (EPBC 2011/5795).

MACH acquired the Mount Pleasant Operation from Coal & Allied Operations Pty Ltd on 4 August 2016. MACH commenced construction activities at the Mount Pleasant Operation in November 2016 and commenced mining operations in October 2017, in accordance with Development Consent DA 92/97 and EPBC 2011/5795.

The approved Mount Pleasant Operation includes the construction and operation of an open cut coal mine and associated rail spur and product coal loading infrastructure.

The mine is approved to produce up to 10.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. Up to approximately nine trains per day of thermal coal products from the Mount Pleasant Operation are transported by rail to the Port of Newcastle for export, or to domestic customers for use in electricity generation.

1.3 OVERVIEW OF THE PROJECT

The Project would include the following development:

- increased open cut coal extraction within Mount Pleasant Operation MLs by mining of additional coal reserves, including lower coal seams in North Pit;
- staged increase in extraction, handling and processing of ROM coal up to 21 Mtpa (i.e. progressive increase in ROM coal mining rate from 10.5 Mtpa over the Project life);
- staged upgrades to the existing Coal Handling and Preparation Plant (CHPP) and coal handling infrastructure to facilitate the handling and processing of additional coal;
- rail transport of up to approximately 17 Mtpa of product coal to domestic and export customers;
- upgrades to workshops, electricity distribution and other ancillary infrastructure;
- relocation of existing infrastructure to facilitate mining extensions (e.g. Castlerock Road, powerlines and water pipelines);
- construction and operation of new water management and water storage infrastructure in support of the mine;
- CHPP reject dewatering facilities to allow co-disposal of fine rejects with waste rock as part of ROM waste rock operations;
- development of an integrated waste rock emplacement landform that incorporates geomorphic drainage design principles for hydrological stability, and varying topographic relief to be more natural in exterior appearance;
- construction and operation of new ancillary infrastructure in support of mining;
- extension to the time limit on mining operations to 22 December 2048;
- an average Project workforce of approximately 600 people, with a peak operational workforce of approximately 830 people;
- additional deliveries of equipment and consumables and additional workforce movements on the public road network;
- ongoing exploration activities; and
- other associated infrastructure, plant, equipment and activities.

A general arrangement of the Project is provided on Figure 2.

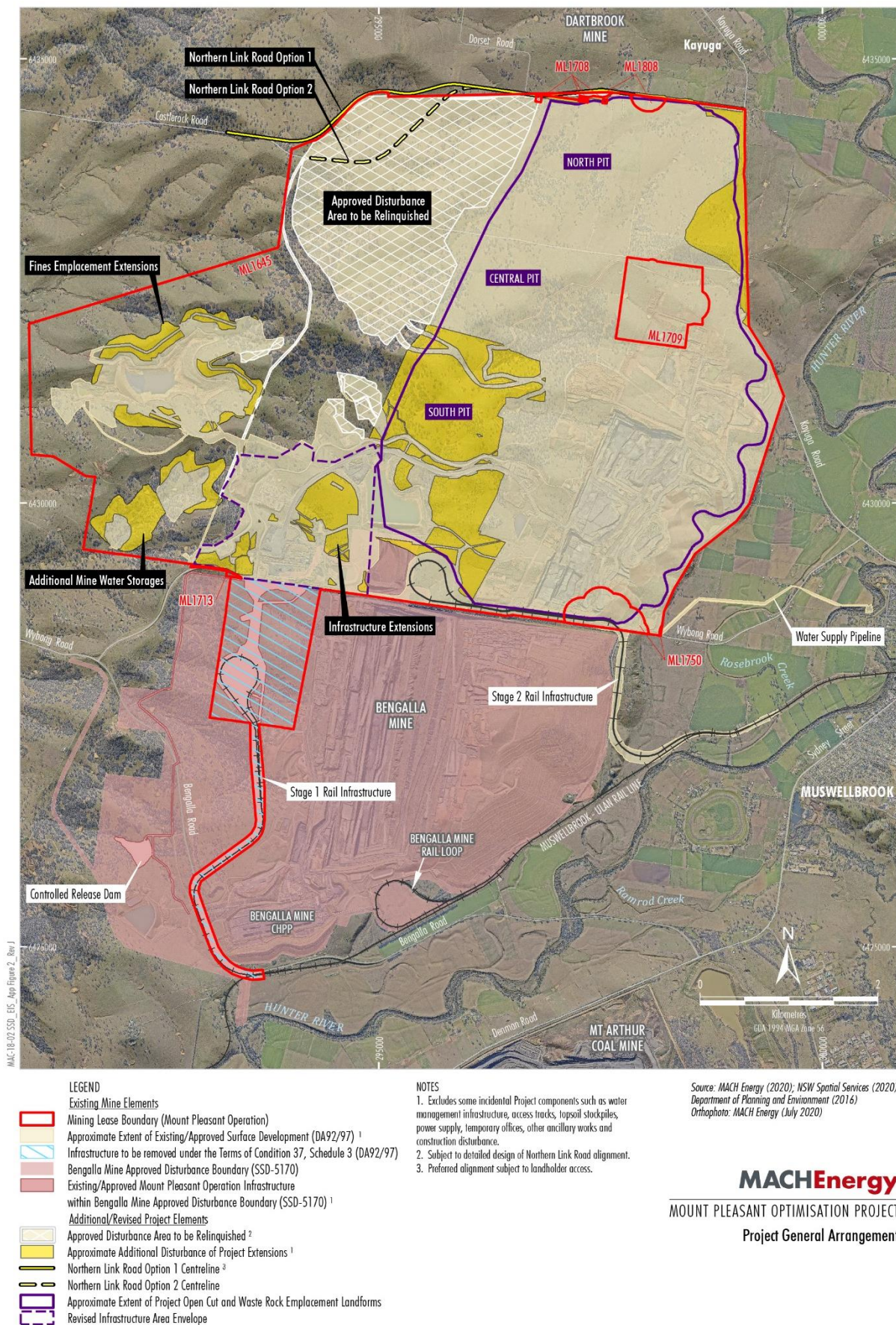


Figure 2 - Project General Arrangement

1.4 CLIENT

The client for the ERA is MACH.

1.5 SCOPE

The scope of the ERA was:

To identify key Project environmental assessment issues for further analysis.

1.6 CLARIFYING POINTS

The following clarifying points regarding the scope were made:

- Level of analysis of any management objective should be commensurate with:
 - o the level of risk, as determined by considering probability and potential consequences; and
 - o the value and condition of the asset.
- An iterative process – the results of risk assessment inform conceptual models and plans for mitigation and monitoring.
- Should consider all components of the Project.
- Should consider cumulative impacts of past, present and reasonably foreseeable actions.
- Risks to water should be considered in the context of Water Sharing Plans.
- Should consider relevant Bioregional Assessments.
- In the absence of Secretary's Environmental Assessment Requirements (SEARs) for the Project at the time of the ERA workshop, the risk assessment should cover all aspects of the SEARs for similar recent projects.

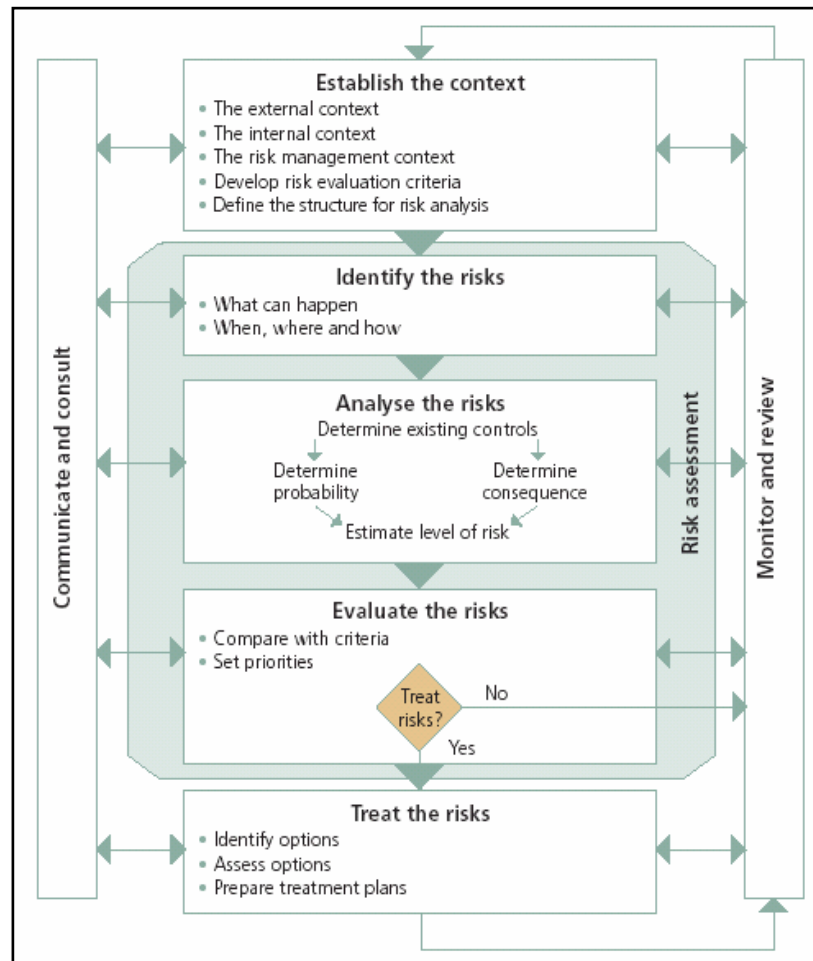
1.7 RISK ASSESSMENT PROCESS

The risk assessment process was based on the framework provided on Figure 3 (based on AS/NZS ISO 31000:2018, MDG1010 *Minerals Industry Safety and Health Risk Management Guideline* [NSW Department of Trade and Investment, 2011] and HB 203:2012 *Managing environment-related risk* [HB 2003:2012]).

1.8 RESOURCING, SCHEDULE AND ACCOUNTABILITIES

The following resources were allocated in order to effectively conduct the ERA:

1. A team of personnel with suitable experience and knowledge of coal mining operations and environmental issues in the area associated with the Project;
2. A team of subject matter experts available to contribute to, and review, the draft report;
3. An external facilitator for the risk assessment and documentation of the results; and
4. Aerial photographs, drawings, SEARs for similar recent projects and other supporting information.



Source: After HB 203:2012.

Figure 3 - Risk Management Process (HB 203:2012)

The team understood that the outcomes of the ERA and associated accountabilities are intended to be integrated into the EIS and overall MACH management systems so that they are effectively reviewed, implemented and monitored.

1.9 METHODOLOGY

1.9.1 Framework

Figure 3 outlines the overall framework utilised for the ERA. This framework is further discussed in Section 1.9.2 with respect to the subject area.

1.9.2 Key Steps

The key steps in the process included:

1. Confirming the scope of the ERA;
2. Listing the key assumptions on which the ERA is based;
3. Reviewing available data on the Project including reports, plans, maps and aerial photos (both prior to and during the workshop);
4. Conducting a team-based risk assessment that:
 - a) provided detailed descriptions of the tasks to be undertaken and the proposed method;
 - b) identified hazards and assessed the level of risk; and
 - c) developed a list of recommended controls to treat the risk (through prevention, monitoring, management and rehabilitation strategies);
5. Reviewing documents related to the Mount Pleasant Operation in light of the planned changes associated with the Project - undertaken with a team of suitably experienced and qualified personnel;
6. Preparing a draft report in accordance with AS/NZS ISO 31000:2018 and MDG1010 *Minerals Industry Safety and Health Risk Management Guideline* (Department of Trade and Investment, 2011) for review by MACH personnel and ERA team members;
7. Incorporating comments from MACH and the ERA team; and
8. Finalising the report and issuing as controlled copy for ongoing use.

With respect to the overall framework (Figure 3), steps 1 to 3 above represent the “establish the context” phase and steps 4 and 5 represent the “identify risks”, “analyse risks”, “evaluate risks” and “treat risks” phases.

As described in Section 1.1, the outcomes of the ERA and associated accountabilities will be integrated into the EIS and overall company management systems so that they are effectively reviewed, implemented and monitored.

1.9.3 External Facilitation

The team was facilitated through the process by **Risk Mentor Pty Ltd** – a company specialising in Risk Assessment and risk management programmes. The facilitator, Dr Peter Standish, is experienced with open cut coal mining and many aspects of environmental monitoring and rehabilitation.

The team was encouraged and “challenged” to identify a wide range of environmental impacts or hazards.

It is important to understand that the outcomes of this ERA:

1. Are process driven;
2. Challenge current thinking and may not necessarily appear appropriate or reflect “pre-conceived” ideas; and
3. Are the work of the team assembled to review the topic and not the work of any one individual or organisation.

2 ESTABLISH THE CONTEXT

2.1 PROJECT SUMMARY

The main activities associated with the development of the Project would include (as above):

- increased open cut coal extraction within Mount Pleasant Operation MLs by mining of additional coal reserves, including lower coal seams in North Pit;
- a staged increase in extraction, handling and processing of ROM coal up to 21 Mtpa (i.e. progressive increase in ROM coal mining rate from 10.5 Mtpa over the Project life);
- staged upgrades to the existing CHPP and coal handling infrastructure to facilitate the handling and processing of additional coal;
- rail transport of up to approximately 17 Mtpa of product coal to domestic and export customers;
- upgrades to workshops, electricity distribution and other ancillary infrastructure;
- existing infrastructure relocations to facilitate mining extensions (e.g. local roads, powerlines and water pipelines);
- construction and operation of new water management and water storage infrastructure in support of the mine;
- additional reject dewatering facilities to allow co-disposal of fine rejects with waste rock as part of ROM waste rock operations;
- development of an integrated waste rock emplacement landform that incorporates geomorphic drainage design principles for hydrological stability, and varying topographic relief to be more natural in exterior appearance;
- construction and operation of new ancillary infrastructure in support of mining;
- extension to the time limit on mining operations to 22 December 2048;
- an average operational workforce of approximately 600 people, with a peak operational workforce of approximately 830 people;
- ongoing exploration activities; and
- other associated infrastructure, plant, equipment and activities.

The Project general arrangement is shown on Figure 2 earlier in this report. A description of the Project is provided in the main text of the EIS.

2.2 RISK MANAGEMENT CONTEXT

This ERA has been conducted in consideration of the SEARs for other similar, recent projects (Section 1.6).

In addition, the ERA was prepared cognisant of the following documents:

- AS/NZ ISO 31000:2018;
- HB 203:2012; and
- MDG1010 *Minerals Industry Safety and Health Risk Management Guideline* (Department of Trade and Investment, 2011).

2.3 RISK CRITERIA

The risk criteria utilised is to reduce the risk to As Low As Reasonably Practicable (ALARP) or lower. Figure 4 schematically shows the three risk management zones, viz. intolerable, ALARP and tolerable. The middle zone is referred to as the ALARP region.

The purpose of risk criteria is to allow an organisation to clearly define unacceptable levels of risk or, conversely, the level of risk that is acceptable or tolerable. Through the use of the risk criteria, an organisation can prioritise proposed actions to control the risk during the risk assessment.

The ALARP principle, as represented in the diagram presented in Figure 4, was developed to assist in the definition of the acceptability of risk and to demonstrate that an organisation has done all that is considered to be practical to reduce the level of exposure to a risk. This is most often completed qualitatively rather than as a quantitative probability, as shown on the right-hand side of the diagram presented in Figure 4. Note that risk criteria may differ depending on the subject area (e.g. health risk criteria may have more stringent acceptability criteria). A risk may be tolerable in the ALARP zone if the cost of removing the risk is disproportionate to the benefits gained.

The risk ranking matrices used during the ERA workshop are presented in Section 4.

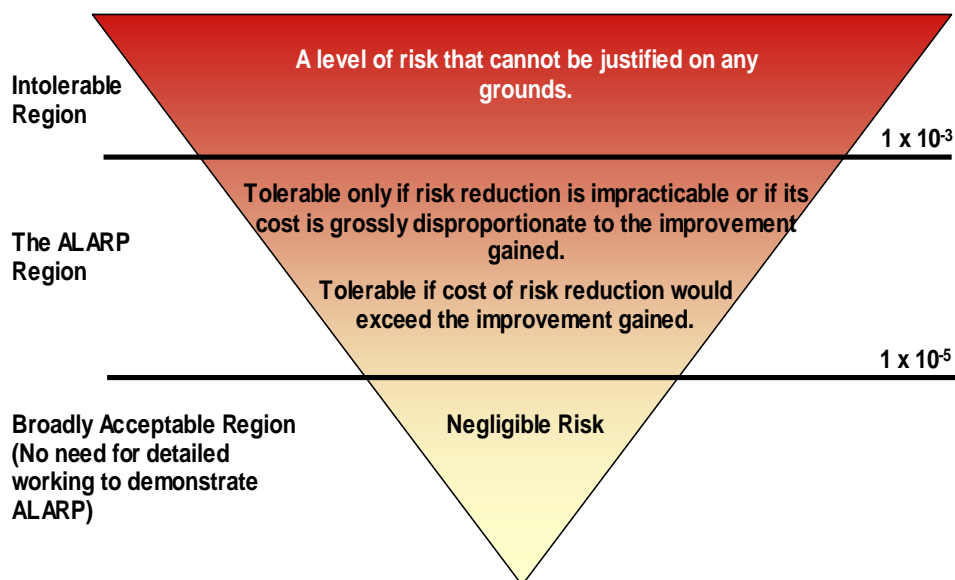


Figure 4 - Risk Criteria "ALARP"

3 IDENTIFY RISKS

3.1 OVERVIEW

The identification of risks involved the use of risk assessment “tools” appropriate for identifying potential loss scenarios associated with the Project. The tools used were:

- Introduction – before the potential issues were brainstormed it was important that the whole team had a good understanding of the Project, and this was confirmed by the facilitator.
- Brain-writing/storming – this was used to draw out the main issues using the team’s understanding, relevant experience and knowledge. This session also used prompt words to build on the experience base of the team and identify any potential environmental issues and potential loss scenarios.
- Modified Hazard and Operability (HAZOP) analysis – this involved the review of keywords (drawn from the SEARs for similar recent projects) and aerial photographs, and the consequent identification of potential environmental issues at each location during each phase of operation.

3.2 ENVIRONMENTAL RISK ASSESSMENT TEAM

The review team met for the ERA workshop in Newcastle on 27 November 2019. A team-based approach was utilised in order to have an appropriate mix of skills and experience to identify the potential environmental issues and potential loss scenarios. Details of the team members and their relevant qualifications and experience are included in Table 1.

Table 1 – ERA Team

Name	Role/Affiliation	Experience, Training and Skills I bring to the team session
Peter Standish	Facilitator, RM	Formal mining qualifications (PhD, B.Eng), statutory manager qualifications and over 25 years’ industrial experience. Facilitator for over 30 environmental and approval risk analyses.
Chris Lauritzen	General Manager Resource Development, MACH	B Sc (Geol), F AusIMM, GAICD and over 35 years’ industrial experience.
Dr Jackie Wright	Principal/Director, EnRiskS	PhD in Public and Environmental Health, and 30 years’ experience in human health and environmental toxicology and risk assessment.
Rachel Maas	Principal - Social Scientist, Just Add Lime	B Env Sc, Post Grad Diploma in social impact assessment and a Masters in Evaluation, CEnvP, Impact assessment specialist. Over 20 years’ social impact assessment experience.
Aleks Todoroski	Director, Todoroski Air Sciences	B Eng, over 25 years’ experience in air quality and noise analysis, assessment and management.
Roman Haverkamp	Senior Engineer, Wilkinson Murray	BA (Hons) and over 15 years of industrial experience in environmental noise and construction noise and vibration assessment.
Paul Ryall	Senior Consultant - Hydrogeologist, AGE Consultants	B Sc (Hydrology) and over 10 years’ experience in mine water management, impact assessment, mine planning and design.
Tony Marszalek	Director, Hydro Engineering & Consulting	B Eng (Civil), M Eng Sc, over 30 years’ experience as a consulting Water Resources Engineer.
Dr Colin Driscoll	Environmental Biologist, Hunter Eco	PhD, BSc and over 40 years’ scientific and environmental assessment experience.
Stirling Bartlam	Senior Environmental Manager, Resource Strategies	B Sc (Geographical Sciences), over 20 years’ experience as an environmental project management and approvals consultant in the resource industry.
Mitch Kelly	Environmental Project Manager, Resource Strategies	B Eng (Chemical), over 10 years’ experience as an air quality consultant and environmental project management and approvals consultant in the resource industry.

3.3 RISK IDENTIFICATION

3.3.1 *Brainstorming*

The brainstorming process is intended to allow for a relatively unstructured, free-flowing series of issues and ideas to be generated. It is enhanced through the use of keyword association processes based on work by Edward de Bono and is intended to generate a wide range of data on losses, controls and general issues related to the Project area.

No “filtering” of the data is allowed during the process – the reader should be conscious of the intent of not missing a potential “left field” issue/loss scenario when reading through the material.

Issues identified during the brainstorming session are presented in the consolidated listing of issues identified in Attachment B.

3.3.2 *Modified HAZOP*

The next “tool” applied with the team was that of a modified HAZOP. In this process, aerial photographs of the site were referred to along with consideration of the phases of operation and the potential impacts that could arise.

The generic keywords used in the HAZOP process representing environmental issue subject areas (generally based on the headings in the SEARs for other similar recent projects) were:

- Air Quality;
- Noise;
- Health Risk;
- Social;
- Groundwater;
- Surface Water;
- Biodiversity;
- Aquatic Ecology;
- Final Landform;
- Geochemistry;
- Aboriginal Cultural Heritage;
- Historic Heritage;
- Road Transport;
- Rail Transport;
- Agricultural Enterprises;
- Land Contamination;
- Economic;
- Visual Landscape;
- Soil Resources; and
- Waste Management.

In addition, the causal pathway groups presented in the Bioregional Assessment for the Hunter subregion were also considered during the Modified HAZOP process (Figure 7 in Herron et al. 2018).

3.3.3 *Identification of Key Environmental Issue Types*

In general accordance with the SEARs for other similar, recent projects, the key potential environmental issues were identified through a “voting” system, whereby team members were assigned a number of “votes” to allocate to what they considered to be the key environmental issues. Key potential environmental issues are those issues with larger numbers of assigned “votes”, indicating that the team considers the issue is a high priority to consider for the Project; these are listed in Table 2.

Table 2 – Key Potential Environmental Issues

Ref	Subject Area	Description of Issue/Loss Scenario	Priority
MPOP-020	Air Quality	Impacts of dust emissions from the mine operating at proposed full capacity (incrementally or cumulatively with other mining projects) affects amenity and potentially health of nearby private residents and communities in Muswellbrook, Kayuga and Aberdeen – potentially exacerbated by elevated background dust levels (e.g. drought conditions/climate change).	280
MPOP-027	Social/Economic	The continuation of the mine and increase in production leads to continuation or increase in social impacts related to cumulative air quality and noise emissions (e.g. community perceptions of noise and dust impacts result in increased levels of stress and anxiety within the community).	125
MPOP-017	Groundwater	Potential contamination of groundwater affects water quality and environmental values of Sandy Creek or the Hunter River, or long-term changes to groundwater levels or flow direction in the vicinity of the final void.	76
MPOP-060	Health	Cumulative impacts (from all mines in the local area), and extended impacts (over a long period of time) of dust emissions on the amenity and health of the surrounding community.	60
MPOP-050	Surface Water	Dam embankment failure (of any dam), with potential effects on water quality and environmental values and risk to life.	50
MPOP-001	Noise and Blasting	Noise emissions from open cut operations at the northern extent of the mine results in changes to amenity in Aberdeen, and/or noise emissions from open cut operations at the southern extent of the mine results in changes to amenity in Muswellbrook.	36
MPOP-061	Health	Night-time noise results in increased sleep disturbance within the local community.	26
MPOP-026	Air Quality	Water supply availability for dust suppression in dry times, insufficient water available to mitigate dust leading to potential impacts on health of nearby residents.	22
MPOP-007	Biodiversity	Incremental and cumulative loss of vegetation and fauna habitat and potential impact on listed threatened species, or impacts to downstream aquatic ecology or groundwater dependent ecosystems (vegetation and stygofauna) as a result of groundwater drawdown or direct disturbance.	20
MPOP-057	Surface Water	Seepage/runoff from incremental mine disturbance areas bypassing water management system and migrating off-site, with subsequent downstream impacts.	15
MPOP-048	Surface Water	Poor water quality in waste rock emplacement sediment dams (as a result of poor-quality runoff/seepage from waste rock emplacement or contaminant spills) affecting water quality and environmental values of Rosebrook Creek, the Hunter River and/or Hunter River alluvium.	15
MPOP-014	Groundwater	Project-related impacts to stream baseflow and groundwater drawdown at private groundwater users.	11
MPOP-036	Social/Economic	Cumulative incremental impacts with other mining projects on community infrastructure (roads, accommodation, services).	11
MPOP-040	Soil and Land Resource	Impacts on agricultural resources disturbed as a result of mining activities.	11
MPOP-030	Social/Economic	Potential to further the divide between members of the community - those who benefit from mining and those who experience negative impacts from mining.	10
MPOP-053	Surface Water	Controlled water releases having an impact on water quality and environmental values of the Hunter River (water quality constituents other than salinity).	10
MPOP-054	Surface Water	Impacts to downstream water supply due to catchment excision.	6
MPOP-016	Groundwater	Cumulative impacts as the result of changes in the magnitude or nature of operational activities at nearby mines.	5
MPOP-035	Social/Economic	Socio-economic benefits to the region and State.	5
MPOP-062	Health	Increased levels of noise from the Project result in increased levels of annoyance and potential health impacts within the surrounding community.	5
MPOP-063	Health	Cumulative noise impacts from all sources of noise that may affect community health.	5
MPOP-088	Aboriginal Cultural Heritage	Incremental "loss of country" as part of Aboriginal cultural values.	5

During preparation of this report, the Project SEARs were issued by the NSW Department of Planning, Industry and Environment. The team reviewed the key potential environmental issues identified during the ERA workshop in light of the Project SEARs and considered that no changes to the identified key environmental issues were required.

The key potential environmental issues identified in the ERA workshop will be addressed in appropriately detailed assessments in the main text of the EIS and the specialists' reports (where relevant) included as appendices to the EIS, provisionally listed as follows:

- Appendix A – Noise and Blasting Assessment;
- Appendix B – Air Quality Assessment;
- Appendix C – Groundwater Assessment;
- Appendix D – Surface Water Assessment;
- Appendix E – Biodiversity Development Assessment Report;
- Appendix F – Aquatic Ecology Assessment;
- Appendix G – Aboriginal Cultural Heritage Assessment;
- Appendix H – Historical Heritage Assessment;
- Appendix I – Agricultural and Land Resources Assessment;
- Appendix J – Road Transport Assessment;
- Appendix K – Geochemistry Assessment;
- Appendix L – Land Contamination Assessment;
- Appendix M – Visual and Landscape Assessment;
- Appendix N – Social Impact Assessment;
- Appendix O – Economic Assessment;
- Appendix P – Environmental Risk Assessment;
- Appendix Q – Preliminary Hazard Analysis;
- Appendix R – Human Health Assessment; and
- Appendix S – Greenhouse Gas Assessment.

3.3.4 Referred Issues

Where issues raised during the ERA workshop brainstorming were: outside the scope of the ERA; outside of the Project scope; and/or beyond the control of MACH and, therefore, not considered to be key potential environmental issues, these “referred issues” were documented as they may warrant some consideration in the development of the EIS.

In addition, any key environmental issues that were considered by the team to be positive/beneficial (e.g. social-economic benefits to the region and State) and, therefore, did not warrant further consideration in regard to potential risks, were also designated as “referred issues”.

The “referred issues” are listed in Attachment C.

4 ANALYSE RISKS

4.1 PROBABILITY AND MAXIMUM REASONABLE CONSEQUENCE

Potential loss scenarios (primarily based on the identified key potential environmental issues) were described and then ranked for risk by the ERA team. A tabular analysis was used for this risk ranking process, based on the probability and consequence of a loss scenario occurring as decided by the ERA team.

The following definition of risk was used:

- the combination of the probability of an unwanted event occurring; and
- the maximum reasonable consequences should the event occur.

Tables 3 to 7 present the ERA matrix tools that were utilised for ranking risks.

Table 3 – Qualitative Measures of Probability

Rank (P)	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

Table 4 – Qualitative Measures of Maximum Reasonable Consequence for General Environmental Issues

Ref (C)	Consequence	Example
1	Extreme environmental harm	Widespread catastrophic impact on environmental values of an area.
2	Major environmental harm	Widespread substantial impact on environmental values of an area.
3	Serious environmental harm	Widespread and considerable impact on environmental values of an area.
4	Material environmental harm	Localised and considerable impact on environmental values of an area.
5	Minimal environmental harm	Minor impact on environmental values of an area.

Note: Maximum Reasonable Consequence: The worst-case consequence that could reasonably be expected, given the scenario and based upon experience at the operation and within the mining industry.

Table 5 – Qualitative Measures of Maximum Reasonable Consequence for Social Issues

Rank	Consequence	Example
1	Extreme social harm	Widespread catastrophic impact on social values of an area.
2	Major social harm	Widespread substantial impact on social values of an area.
3	Serious social harm	Widespread and considerable impact on social values of an area.
4	Material social harm	Localised and considerable impact on social values of an area.
5	Minimal social harm	Localised and minor impact on social values of an area.

Table 6 – Qualitative Measures of Maximum Reasonable Consequence for Community Health Issues

Rank	Consequence	Example
1	Severe or very high	Death or significant injury likely to result in death.
2	High	Permanent health effects that require extended medical treatment and/or permanent disability.
3	Moderate	Transient effects that may require medical treatment such as respiratory effects, more significant irritation.
4	Low	Minor transient health effects or odour.
5	Negligible	No adverse long-term health effects associated with low level environmental exposures.

Table 7 – Risk Ranking Table

		Probability				
		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:

	Intolerable
	ALARP – As low as reasonably practicable
	Low – Tolerable

4.2 RISK RANKING

Risk ranking was undertaken by the team on loss scenarios based on the identified key potential environmental issues (provided in Table 8).

Table 8 – Risk Ranking Results

Area	Risk Ranking Basis and Planned Controls	Probability	Consequence	Risk Score
Air Quality	<p><i>Risk ranking basis:</i> The potential for cumulative air quality levels to exceed criteria at proximal private receiver(s).</p> <p><i>Planned controls:</i> Mine planning (e.g. staged increases in ROM coal extraction rate, minimisation of haul distances, etc.), air quality modelling to identify predicted performance (Project Air Quality Assessment) and existing management measures described in the Air Quality and Greenhouse Gas Management Plan, including: dust controls, monitoring (including real-time monitoring), a Trigger Action Response Plan (TARP) based on weather conditions and measured dust levels (including Environment Protection Licence shutdown requirements), predictive modelling and training.</p>	C	5	Low (22)
Noise	<p><i>Risk ranking basis:</i> Noise levels exceed criteria at proximal private receiver(s), including sleep arousal at night.</p> <p><i>Planned controls:</i> Mine planning (e.g. staged increases in ROM coal extraction rate, working in less exposed areas at night, etc.), noise modelling to identify predicted performance (Project Noise and Blasting Assessment) and existing management measures described in the Noise Management Plan, including: noise attenuation on fixed and mobile plant and other noise management measures, monitoring (including real-time monitoring), a TARP based on weather conditions and measured noise levels, predictive modelling, training and installation of noise mitigation on relevant houses (on request) in accordance with the Development Consent.</p>	C	4/5	Low (18/22)
Health Risk	<p><i>Risk ranking basis:</i> The potential for health impacts on neighbours associated with air/noise/water emissions - acute or long-term.</p> <p><i>Planned controls:</i> Mine planning (e.g. staged increases in ROM coal extraction rate), consideration of potential health impacts (Project Human Health Assessment) and the mitigation and management measures and monitoring programmes described in the Air Quality and Greenhouse Gas Management Plan, Noise Management Plan and Water Management Plan.</p>	D	4	Low (21)
Social	<p><i>Risk ranking basis:</i> The potential for impacts on the social values of the community (e.g. due to mining-related environmental effects) at the local level (i.e. mainly within the Muswellbrook Shire Council Local Government Area [LGA] but also the Upper Hunter Shire Council LGA and Singleton Shire LGA). Quantifying potential impacts is difficult, due to: the complex and highly sensitive social environment; the range of stakeholders; the difficulty in disaggregating cumulative and incremental impacts (for either the Mount Pleasant Operation or the Project); and the potential impacts for both perceived or realised environmental impacts.</p> <p><i>Planned controls:</i> Ongoing consultation/dialogue regarding the Mount Pleasant Operation and the Project (including opportunities for the community to provide feedback), identification of potential social impacts (Project Social Impact Assessment), the staged increases in Project workforce, continued community support and funding and the development of a Social Impact Management Plan that addresses potential social impacts of the Project.</p>	C	4	Low (18)

Area	Risk Ranking Basis and Planned Controls	Probability	Consequence	Risk Score
Groundwater – contamination leading to off-site effects	<p><i>Risk ranking basis:</i> The potential for contamination of groundwater due to water storages (including the Fines Emplacement Area) releasing mine water into aquifers, which then discharge to the surrounding environment.</p> <p><i>Planned controls:</i> The design of the Fines Emplacement Area (e.g. minimising permeability) and other water storages on-site (with varying levels of engineering applied to reduce the potential for release), groundwater modelling to identify predicted performance (Project Groundwater Assessment) and continued implementation of the existing management measures described in the Water Management Plan (which includes a Groundwater Management Plan and Surface and Ground Water Response Plan).</p>	C	4	Low (18)
Groundwater – loss of groundwater for nearby users	<p><i>Risk ranking basis:</i> The potential for Project-related impacts to stream baseflow and groundwater drawdown at private groundwater users.</p> <p><i>Planned controls:</i> The ability to monitor water levels and react to excessive levels of drawdown, groundwater modelling to identify predicted performance (Project Groundwater Assessment), make good provisions in accordance with the <i>NSW Aquifer Interference Policy (AIP)</i> (NSW Government, 2012) and continued implementation of the existing management measures described in the Water Management Plan (which includes a Groundwater Management Plan and Surface and Ground Water Response Plan- including TARPs that would be implemented during mine operations).</p>	C	5	Low (22)
Surface Water – dam embankment failure	<p><i>Risk ranking basis:</i> The potential for dam embankment failure (of any dam), with potential effects on water quality and environmental values and risk to life.</p> <p><i>Planned controls:</i> Engineering design and construction control measures applied, including provision of cut-off drains, Dams Safety NSW requirements and oversight of major dams and the existing management measures described in the Water Management Plan (which includes a Surface Water Management Plan and Surface and Ground Water Response Plan).</p>	E	2	Low (16)
Surface Water – catchment excision	<p><i>Risk ranking basis:</i> The potential for impacts to downstream water supply due to catchment excision.</p> <p><i>Planned controls:</i> Engineering of cut-off/diversion drains to allow runoff from upslope undisturbed areas to pass around disturbed areas, rehabilitation of waste rock emplacements as soon as practicable to allow these areas to drain off-site, and surface water assessment (including updated site water balance) to identify predicted performance (Project Surface Water Assessment).</p>	A	4	Moderate (10)
Surface Water – contamination leading to off-site effects	<p><i>Risk ranking basis:</i> The potential for poor water quality in waste rock emplacement sediment dams (as a result of poor-quality runoff/seepage from waste rock emplacement or contaminant spills) to affect water quality and environmental values of Rosebrook Creek, the Hunter River and/or Hunter River alluvium.</p> <p><i>Planned controls:</i> Surface water assessment (including updated site water balance) and geochemical testwork and assessment to identify predicted performance (Project Surface Water Assessment and Project Geochemistry Assessment) and management of any water released in accordance with the Water Management Plan (which includes a Surface Water Management Plan and Surface and Ground Water Response Plan).</p>	D	5	Low (24)

Area	Risk Ranking Basis and Planned Controls	Probability	Consequence	Risk Score
Final Landform	<p><i>Risk ranking basis:</i> The potential for failure to meet final landform requirements (e.g. due to poor geochemistry) that lead to the site not being stable or consistent with surrounding land uses and causing releases of contaminants with acute impacts or long-term, low-level releases.</p> <p><i>Planned controls:</i> Ongoing rehabilitation projects (including micro-relief rehabilitation), geochemical testwork and assessment to identify predicted performance (Project Geochemistry Assessment), modelling of geomorphological stability of Project landforms to identify predicted performance (Project Rehabilitation and Mine Closure Addendum [Attachment 8 to the main text of the EIS]), and ongoing management until a stable landform is achieved.</p>	D	4	Low (21)
Aboriginal Cultural Heritage	<p><i>Risk ranking basis:</i> The potential for incremental "loss of country" as part of the Aboriginal cultural values, potential impact of the Project on Aboriginal heritage items, and interaction with provisional Aboriginal Conservation Areas, including development of infrastructure.</p> <p><i>Planned controls:</i> Continued liaison with traditional owners, avoidance of impacts where practicable, surveys and assessments prior to disturbance and as an input into mine design processes (including the Project Aboriginal Cultural Heritage Assessment), investigation and assessment of alternative conservation measures for the provisional Aboriginal Conservation Areas, and operational controls related to ground disturbance (including the Ground Disturbance Permit process) in accordance with the Aboriginal Heritage Management Plan.</p>	D	4	Low (21)
Historic Heritage	<p><i>Risk ranking basis:</i> The potential for impact on historical heritage items.</p> <p><i>Planned controls:</i> Assessment of potential impacts on historical heritage items (Project Historical Heritage Assessment), archival recording and/or test excavation for select heritage items prior to disturbance and blast monitoring and potentially amend blast design to reduce vibration impacts on sensitive historical heritage items.</p>	D	5	Low (24)
Biodiversity (terrestrial and aquatic)	<p><i>Risk ranking basis:</i> The potential for incremental and cumulative loss of vegetation and fauna habitat (including loss of biodiversity and habitat attributes, leading to fragmentation/loss of connectivity), and potential impacts to listed threatened species.</p> <p><i>Planned controls:</i> Assessment of Project-related vegetation and habitat disturbance (Project Biodiversity Development Assessment Report and Aquatic Ecology Assessment), baseline and operational monitoring (in accordance with the Project Biodiversity Management Plan) and provision of offsets for residual impacts, if applicable, following consideration of the Project Relinquishment Area (in accordance with the <i>Biodiversity Conservation Act, 2016</i>).</p>	A	5	Moderate (15)
Road Transport – impacts of increased traffic	<p><i>Risk ranking basis:</i> The potential for increased traffic on the public road network leading to safety or efficiency issues.</p> <p><i>Planned controls:</i> The staged increases in Project workforce, the existing engineering design of roads near the site, assessment of potential traffic movements to identify predicted performance (Project Road Transport Assessment) and management/mitigation measures for required site transport of people and consumables, including Mount Pleasant Operation requirements regarding place of residence and/or fatigue management to address employee driving distances.</p>	C	3	Moderate (13)
Road Transport – impacts of Project infrastructure	<p><i>Risk ranking basis:</i> The potential for impacts on the safety or amenity of the road network as a result of the development of the Northern Link Road.</p> <p><i>Planned controls:</i> Engineering design of the revised Northern Link Road alignment to maximise safety and amenity, and assessment of potential traffic movements to identify predicted performance (Project Road Transport Assessment).</p>	B	5	Low (22)

Area	Risk Ranking Basis and Planned Controls	Probability	Consequence	Risk Score
Agricultural Enterprises	<p><i>Risk ranking basis:</i> The potential for impacts on the amenity or productivity of surrounding agricultural operations arising from site activities (e.g. the Aboriginal Conservation Areas reduce the agricultural productivity of adjoining properties), and the presence of mine operations to impact regional horse studs' customers' perceptions, impacting these businesses and their contributions to the Equine Critical Industry Cluster.</p> <p><i>Planned controls:</i> Ongoing consultation/dialogue regarding the Mount Pleasant Operation and the Project (including opportunities for the community to provide feedback), purchase agreements for the most-affected near neighbours, geomorphological landform design and progressive rehabilitation to address visual concerns and management strategies for water, noise, dust and control of weeds/feral species.</p>	C	4	Low (18)
Site Rehabilitation	<p><i>Risk ranking basis:</i> The potential for activities related to the Project to lead to impacts on land capability and agricultural suitability (final land use), loss of land and soil capability, insufficient long-term geotechnical stability of final landforms, rehabilitation failure due to deficient soil nutrients or seasonal conditions, and/or land contamination.</p> <p><i>Planned controls:</i> Modelling of geomorphological stability of Project landforms to identify predicted performance (Project Rehabilitation and Mine Closure Addendum [Attachment 8 to the main text of the EIS]), assessment of potential land contamination (Project Land Contamination Assessment), progressive rehabilitation of the final landform and management strategies for soil and water management.</p>	D	4	Low (21)
Visual Landscape	<p><i>Risk ranking basis:</i> The potential for night-lighting impacts on surrounding receivers and Muswellbrook, newly exposed receivers due to more elevated final landform, and/or unanticipated visual impacts arising from the Project, including impacts to horse studs through cumulative impacts and dynamic impacts.</p> <p><i>Planned controls:</i> Ongoing consultation/dialogue regarding the Mount Pleasant Operation and the Project (including opportunities for the community to provide feedback), geomorphological landform design and progressive rehabilitation, modelling of geomorphological stability of Project landforms to identify predicted performance (Project Rehabilitation and Mine Closure Addendum [Attachment 8 to the main text of the EIS]), viewshed modelling and visual impact assessment to identify predicted performance (Project Visual and Landscape Assessment) and the existing management measures described in the Visual Impact Management Plan.</p>	C	5	Low (22)
Waste Management	<p><i>Risk ranking basis:</i> The potential for on-site waste disposal (e.g. waste tyre disposal) to lead to unwanted impacts on the local environment.</p> <p><i>Planned controls:</i> The design, monitoring and response measures detailed in the Waste Management Plan.</p>	D	4	Low (21)

Risk - Ranking basis 1 (highest risk) to 25 (lowest risk).

Risk rankings defined as 1 to 6 – High; 7 to 15 - Medium (or ALARP) and 16 to 25 - Low.

5 MONITOR AND REVIEW

5.1 NOMINATED CO-ORDINATOR

The nominated client review facilitator is Chris Lauritzen, General Manager Resource Development, MACH.

It is understood the nominee will co-ordinate the inclusion of the key potential environmental issues into the various studies undertaken as part of the EIS and the overall MACH management systems.

5.2 COMMUNICATION AND CONSULTATION

Consultation, involvement of personnel (including MACH and their specialists) and communication of the process and outcomes of the ERA are intended to be achieved by the inclusion of this report and the relevant specialist assessments addressing the key potential environmental issues in the EIS, and consideration of the report's outcomes in the overall company management systems.

5.3 CONCLUDING REMARKS

The risk assessment process conducted by the team was aligned with AS/NZS ISO 31000:2018, HB 203:2012 and MDG1010 *Minerals Industry Safety and Health Risk Management Guideline* (Department of Trade and Investment, 2011), with the intention of identifying the key potential environmental issues for the Project.

The risk rankings indicate that the loss scenarios ranked were within the "Medium - ALARP" or the "Low" range.

Appropriately detailed assessments of the key potential environmental issues will be included as appendices to the EIS, and would be summarised in the main text of the EIS.

RM would like to thank all of the personnel who contributed to the risk assessment, in particular those personnel from MACH and Resource Strategies who prepared source material for the team session.

Peter Standish, December 2019

6 REFERENCES

Department of Trade and Investment (2011) *MDG1010 Minerals Industry Safety and Health Risk Management Guideline*.

Herron et al. (2018) *Impact and risk analysis for the Hunter subregion*. Product 3-4 for the Hunter subregion from the Northern Sydney Basin Bioregional Assessment, Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia, Australia.

New South Wales Government (2012) *NSW Aquifer Interference Policy – NSW Government Policy for the licensing and assessment of aquifer interference activities*.

ATTACHMENT A – DEFINITIONS

Term	Explanation
ALARP	“As Low as Reasonably Practicable”. The level of risk between tolerable and intolerable levels that can be achieved without expenditure of a disproportionate cost in relation to the benefit gained.
AS/NZS ISO 31000:2018	Australian Standard/New Zealand Standard on Risk Management.
Cause	A source of harm.
Control	An intervention by the proponent intended to either prevent a cause from becoming an incident or to reduce the outcome should an incident occur.
CHPP	Abbreviation - Coal Handling and Preparation Plant.
HB 203:2012	Handbook on managing environment-related risk.
ERA	Environmental Risk Assessment.
MACH	Represents MACH Mount Pleasant Operations Pty Ltd or the unincorporated Mount Pleasant Joint Venture between MACH Energy Australia Pty Ltd and J.C.D. Australia Pty Ltd.
MDG1010	Department of Primary Industries guideline on risk management (see references in Section 6).
Outcome	The end result following the occurrence of an incident. Outcomes are analogous to impacts and have a risk ranking attached to them.
Personnel	Includes all people working in and around the site (e.g. all contractors, sub-contractors, visitors, consultants, project managers, etc.).
Practicable	The extent to which actions are technically feasible, in view of cost, current knowledge and best practice in existence and under operating circumstances of the time.
Review	An examination of the effectiveness, suitability and efficiency of a system and its components.
Risk	The combination of the potential consequences arising from a specified hazard together with the likelihood of the hazard actually resulting in an unwanted event.
RM	Abbreviation - Risk Mentor Pty. Ltd.
SEARs	Secretary’s Environmental Assessment Requirements.

ATTACHMENT B - ISSUE IDENTIFICATION RESULTS

The output from the team's analyses of risks are presented below. The table is ordered by priority and subject area.

Table 9 – Issues Register (Grouped by Subject Area)

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-020	Air Quality	Impacts of dust emissions from the mine operating at proposed full capacity (incrementally or cumulatively with other mining projects) affects amenity and potentially health of nearby private residents and communities in Muswellbrook, Kayuga and Aberdeen – potentially exacerbated by elevated background dust levels (e.g. drought conditions/climate change).	280	<p>Mine planning (e.g. staged increases in run-of-mine [ROM] coal extraction rate, minimisation of haul distances, etc.).</p> <p>Air quality modelling to identify predicted performance (Project Air Quality Assessment).</p> <p>Existing management measures described in the Air Quality and Greenhouse Gas Management Plan, including:</p> <ul style="list-style-type: none"> dust controls (e.g. use of water carts); monitoring (including real-time monitoring); a Trigger Action Response Plan (TARP) based on weather conditions and measured dust levels (including Environment Protection Licence shutdown requirements); predictive modelling; and training. 	Continue to apply best practice dust controls and investigate innovative methods to reduce dust emissions from the Mount Pleasant Operation.
MPOP-027	Social/Economic	The continuation of the mine and increase in production leads to continuation or increase in social impacts related to cumulative air quality and noise emissions (e.g. community perceptions of noise and dust impacts result in increased levels of stress and anxiety within the community).	125	<p>Ongoing consultation/dialogue regarding the Mount Pleasant Operation and the Project (including opportunities for the community to provide feedback).</p> <p>Air quality and noise modelling to identify predicted performance (Project Air Quality Assessment and Noise and Blasting Assessment), and identification of potential social impacts (Project Social Impact Assessment).</p> <p>Continued implementation of the Air Quality and Greenhouse Gas Management Plan and Noise Management Plan.</p> <p>Development of a Social Impact Management Plan that addresses potential social impacts of the Project.</p>	Continue to implement the stakeholder engagement programme beyond submission of the Project Environmental Impact Statement (EIS). Preparation of a Social Impact Management Plan if the Project is approved.

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-017	Groundwater	Potential contamination of groundwater affects water quality and environmental values of Sandy Creek or Hunter River, or long-term changes to groundwater levels or flow direction in the vicinity of the final void.	76	<p>Design of the Fines Emplacement Area in accordance with relevant guidelines and requirements (e.g. Australian National Committee on Large Dams [ANCOLD] guidelines and Dams Safety NSW requirements) and design of other water storages on-site (with varying levels of engineering applied to reduce the potential for release).</p> <p>Groundwater modelling to identify predicted performance (Project Groundwater Assessment).</p> <p>Continued implementation of existing management measures and monitoring, including the periodic review of monitoring results against modelling predictions, described in the Water Management Plan (which includes a Groundwater Management Plan and Surface and Ground Water Response Plan - including TARPs that would be implemented during mine operations).</p>	
MPOP-060	Health	Cumulative impacts (from all mines in the local area), and extended impacts (over a long period of time) of dust emissions on the amenity and health of the surrounding community.	60	<p>Continued implementation of the Air Quality and Greenhouse Gas Management Plan (refer to MPOP-020).</p> <p>Air quality modelling to identify predicted performance (Project Air Quality Assessment) and consideration of potential health impacts (Project Human Health Assessment).</p>	Continue to apply best practice dust controls and investigate innovative methods to reduce dust emissions from the Mount Pleasant Operation.
MPOP-050	Surface Water	Dam embankment failure (of any dam), with potential effects on water quality and environmental values and risk to life.	50	<p>Engineering design and construction control measures applied, including provision of cut-off drains.</p> <p>Dams Safety NSW requirements and oversight of major dams.</p> <p>Existing management measures described in the Water Management Plan (which includes a Surface Water Management Plan and Surface and Ground Water Response Plan).</p>	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-001	Noise and Blasting	Noise emissions from open cut operations at the northern extent of the mine result in changes to amenity in Aberdeen, and/or noise emissions from open cut operations at the southern extent of the mine results in changes to amenity in Muswellbrook.	36	<p>Mine planning (e.g. staged increases in ROM coal extraction rate, working in less exposed areas at night, etc.).</p> <p>Noise modelling to identify predicted performance (Project Noise and Blasting Assessment).</p> <p>Existing management measures described in the Noise Management Plan, including:</p> <ul style="list-style-type: none"> noise attenuation on fixed and mobile plant and other noise management measures; monitoring (including real-time monitoring); a TARP based on weather conditions and measured noise levels; predictive modelling; training; and installation of noise mitigation on relevant houses (on request) in accordance with the Development Consent. 	
MPOP-061	Health	Night-time noise results in increased sleep disturbance within the local community.	26	<p>Noise modelling and health risk assessment to identify predicted performance (Project Noise and Blasting Assessment and Project Human Health Assessment).</p> <p>Mine planning and continued implementation of the Noise Management Plan (refer to MPOP-001), including installation of noise mitigation on relevant houses (on request) in accordance with the Development Consent.</p>	
MPOP-026	Air Quality	Water supply availability for dust suppression in dry times, insufficient water available to mitigate dust leading to potential impacts on health of nearby residents.	22	<p>Development of an updated site water balance for the Project, which considers water usage for dust suppression (Project Surface Water Assessment).</p> <p>Continued implementation of the Air Quality and Greenhouse Gas Management Plan (refer to MPOP-020) and Water Management Plan.</p>	<p>Detailed site water balance modelling, including low rainfall periods, to inform on-site water management.</p> <p>Continue to engage with neighbouring mines regarding potential water sharing.</p> <p>Application of suitable dust suppressants that reduce water demand, as required.</p>

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-007	Biodiversity	Incremental and cumulative loss of vegetation and fauna habitat and potential impact on listed threatened species, or impacts to downstream aquatic ecology or groundwater dependent ecosystems (vegetation and stygofauna) as a result of groundwater drawdown or direct disturbance.	20	Assessment of Project-related vegetation and habitat disturbance (Project Biodiversity Development Assessment Report and Aquatic Ecology Assessment). Baseline and operational monitoring (in accordance with the Project Biodiversity Management Plan) and provision of offsets for residual impacts, if applicable, following consideration of the Project Relinquishment Area (in accordance with the <i>Biodiversity Conservation Act, 2016</i>).	Biodiversity Development Assessment Report and Aquatic Ecology Assessment to assess potential incremental impacts in consideration of Project Additional Disturbance and Relinquishment Area values.
MPOP-057	Surface Water	Seepage/runoff from incremental mine disturbance areas bypassing water management system and migrating off-site, with subsequent downstream impacts.	15	Design of water management system to minimise the potential for seepage/runoff to bypass collection systems and migrate off-site. Surface water assessment (including updated site water balance) to identify predicted performance (Project Surface Water Assessment). Existing management measures described in the Water Management Plan (including TARPs that would be implemented during mine operations).	
MPOP-048	Surface Water	Poor water quality in waste rock emplacement sediment dams (as a result of poor-quality runoff/seepage from waste rock emplacement or contaminant spills) affecting water quality and environmental values of Rosebrook Creek, the Hunter River and/or Hunter River alluvium.	15	Surface water assessment (including updated site water balance) and geochemical testwork and assessment to identify predicted performance (Project Surface Water Assessment and Project Geochemistry Assessment). Existing management measures described in the Water Management Plan (including TARPs that would be implemented during mine operations).	
MPOP-014	Groundwater	Project-related impacts to stream baseflow and groundwater drawdown at private groundwater users.	11	The ability to monitor water levels and implement make good provisions in accordance with the NSW <i>Aquifer Interference Policy</i> (AIP) (New South Wales Government, 2012) and Water Management Plan. Groundwater modelling to identify predicted performance (Project Groundwater Assessment). Existing management measures described in the Water Management Plan (including TARPs that would be implemented during mine operations).	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-036	Social/Economic	Cumulative incremental impacts with other mining projects on community infrastructure (roads, accommodation, services).	11	The staged increases in Project workforce. Identification of potential social impacts (Project Social Impact Assessment). Continued community support and funding. Development of a Social Impact Management Plan that addresses potential social impacts of the Project.	Engage with Muswellbrook Shire Council and other relevant authorities regarding potential community infrastructure demands.
MPOP-040	Soil and Land Resource	Impacts on agricultural resources disturbed as a result of mining activities.	11	Purchase agreements for the most affected near neighbours. Geomorphological landform design and progressive rehabilitation to address visual concerns. Management strategies for water, noise, dust and control of weeds/feral species – as documented in existing environmental management plans.	
MPOP-030	Social/Economic	Potential to further the divide between members of the community - those who benefit from mining and those who experience negative impacts of mining.	10	Continued community support and funding. Identification of potential social impacts (Project Social Impact Assessment). Development of a Social Impact Management Plan that addresses potential social impacts of the Project.	
MPOP-053	Surface Water	Controlled water releases having an impact on water quality and environmental values of the Hunter River (water quality constituents other than salinity).	10	Compliance with the relevant Environment Protection Licence and the Hunter River Salinity Trading Scheme. Surface water assessment (including updated site water balance) to identify predicted performance (Project Surface Water Assessment). Existing management measures described in the Water Management Plan (including TARPs that would be implemented during mine operations).	
MPOP-054	Surface Water	Impacts to downstream water supply due to catchment excision.	6	Engineering of cut-off/diversion drains to allow runoff from upslope undisturbed areas to pass around disturbed areas. Rehabilitation of waste rock emplacements as soon as practicable to allow these areas to drain off-site. Surface water assessment (including updated site water balance) to identify predicted performance (Project Surface Water Assessment) and confirm appropriate water licences are held.	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-016	Groundwater	Cumulative impacts as the result of changes in the magnitude or nature of operational activities at nearby mines.	5	Groundwater modelling to identify predicted performance (Project Groundwater Assessment). Continued implementation of existing management measures described in the Water Management Plan (including TARPs that would be implemented during mine operations and periodic review of monitoring results against modelling predictions).	
MPOP-062	Health	Increased levels of noise from the Project result in increased levels of annoyance and potential health impacts within the surrounding community.	5	Mine planning and continued implementation of the Noise Management Plan (refer to MPOP-001), including installation of noise mitigation on relevant houses (on request) in accordance with the Development Consent. Noise modelling to identify predicted performance (Project Noise and Blasting Assessment) and consideration of potential health impacts (Project Human Health Assessment).	
MPOP-063	Health	Cumulative noise impacts from all sources of noise that may affect community health.	5	Mine planning and continued implementation of the Noise Management Plan (refer to MPOP-001), including installation of noise mitigation on relevant houses (on request) in accordance with the Development Consent. Noise modelling to identify predicted performance (Project Noise and Blasting Assessment) and consideration of potential health impacts (Project Human Health Assessment).	
MPOP-088	Aboriginal Cultural Heritage	Incremental "loss of country" as part of Aboriginal cultural values.	5	Continued liaison with traditional owners. Avoidance of impacts where practicable. Investigation and assessment of alternative conservation measures for the provisional Aboriginal Conservation Areas. Surveys and assessments prior to disturbance and as an input into mine design processes, including the Project Aboriginal Cultural Heritage Assessment. Operational controls related to ground disturbance (including the Ground Disturbance Permit process) in accordance with the Aboriginal Heritage Management Plan.	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-037	Social/Economic	Poor consultation or engagement with neighbours and other stakeholders results in poor social outcomes and/or a poor relationship (e.g. mistrust) between MACH and its neighbours and stakeholders.	2	Ongoing consultation/dialogue regarding the Mount Pleasant Operation and the Project (including opportunities for the community to provide feedback).	Continue to implement the stakeholder engagement programme beyond submission of the Project EIS.
MPOP-032	Social/Economic	Economic benefits of mining not realised in the local area, because mine workers and their families do not reside in the local area.	1	Identification of potential social impacts (Project Social Impact Assessment). Development of a Social Impact Management Plan that addresses potential social impacts of the Project.	
MPOP-024	Air Quality	Increased greenhouse gas emissions, including off-site end user impacts from coal combustion.	1	Development of an updated greenhouse gas emission inventory to identify predicted performance (Project Greenhouse Gas Assessment). Continued implementation of the greenhouse gas mitigation measures described in the Air Quality and Greenhouse Gas Management Plan. Controls managed by others, including State, Federal and international authorities, agencies and organisations.	
MPOP-005	Noise and Blasting	Noise from increased rail movements potentially impacting on amenity of nearby properties.	1	Rail transport noise assessment (Project Noise and Blasting Assessment). Liaison with rail operators regarding potential measures to reduce rail noise.	
MPOP-071	Visual	Night-lighting impacts on surrounding receivers and Muswellbrook township.	1	Mine planning (e.g. development of the Eastern Out-of-Pit Emplacement). Viewshed modelling and visual impact assessment to identify predicted performance (Project Visual and Landscape Assessment). Continued implementation of existing night-lighting management measures described in the Visual Impact Management Plan.	
MPOP-072	Visual	Newly exposed receivers due to more elevated final landform.	1	Geomorphological landform design and progressive rehabilitation. Ongoing rehabilitation projects (including micro-relief rehabilitation). Viewshed modelling and visual impact assessment to identify predicted performance (Project Visual and Landscape Assessment). Implementation of existing management measures described in the Visual Impact Management Plan.	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-065	Aboriginal Cultural Heritage	Potential impact of the Project on Aboriginal heritage items.		Continued liaison with traditional owners. Avoidance of impacts where practicable. Surveys and assessments prior to disturbance and as an input into mine design processes, including the Project Aboriginal Cultural Heritage Assessment. Operational controls related to ground disturbance (including the Ground Disturbance Permit process) in accordance with the Aboriginal Heritage Management Plan.	
MPOP-066	Aboriginal Cultural Heritage	Interaction with provisional Aboriginal Conservation Areas, including development of infrastructure.		Continued liaison with traditional owners. Avoidance of impacts where practicable. Investigation and assessment of alternative conservation measures for the provisional Aboriginal Conservation Areas. Surveys and assessments prior to disturbance and as an input into mine design processes, including the Project Aboriginal Cultural Heritage Assessment. Operational controls related to ground disturbance (including the Ground Disturbance Permit process) in accordance with the Aboriginal Heritage Management Plan.	
MPOP-045	Agricultural Enterprises	Activities associated with mine construction and operations negatively affect horse studs' customers' perceptions, impacting these businesses and their contributions to the Equine Critical Industry Cluster.		Ongoing consultation/dialogue regarding the Mount Pleasant Operation and the Project (including opportunities to provide feedback). Geomorphological landform design and progressive rehabilitation to address visual concerns. Viewshed modelling and visual impact assessment to identify predicted performance (Project Visual and Landscape Assessment). Implementation of existing management measures described in the Visual Impact Management Plan.	Continue to implement the stakeholder engagement programme beyond submission of the Project EIS.
MPOP-022	Air Quality	Blasting fumes and dust generation.		Air quality modelling and blast assessment to identify predicted performance (Project Air Quality Assessment and Noise and Blasting Assessment). Continued implementation of existing management measures described in the Air Quality and Greenhouse Gas Management Plan and Blast Management Plan.	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-023	Air Quality	Diesel exhaust emissions from combustion of fuel.		Air quality modelling to identify predicted performance (Project Air Quality Assessment). Continued implementation of existing management measures described in the Air Quality and Greenhouse Gas Management Plan.	
MPOP-025	Air Quality	Potential for odorous emissions associated with coal self-heating (spontaneous combustion).		Continued implementation of existing management measures described in the Air Quality and Greenhouse Gas Management Plan and Spontaneous Combustion Management Plan.	
MPOP-092	Air Quality	Dust from transported bypass coal.		Continued implementation of existing management measures described in the Air Quality and Greenhouse Gas Management Plan.	
MPOP-012	Biodiversity	Potential for increased incidence of bushfires.		Continued implementation of existing management measures described in the Bushfire Management Plan.	
MPOP-013	Groundwater	Migration of mine-affected groundwater (e.g. from open cut or waste rock emplacements) to receiving environment, resulting in loss of use for local water users or impacts to downstream biota as the result of impaired groundwater quality.		Groundwater modelling to identify predicted performance (Project Groundwater Assessment). Continued implementation of existing management measures described in the Water Management Plan, including periodic review of monitoring results against modelling predictions.	
MPOP-067	Heritage	Potential impact of the Project on historical heritage items.		Assessment of potential impacts on historical heritage items (Project Historical Heritage Assessment). Archival recording and/or test excavation for select heritage items prior to disturbance. Blast monitoring and potentially amend blast design to reduce vibration impacts on sensitive historical heritage items.	
MPOP-003	Noise and Blasting	Ground vibration and airblast effects associated with blasting used for removal of overburden material may potentially impact on amenity of nearby properties.		Blast assessment to identify predicted performance (Project Noise and Blasting Assessment). Continued implementation of existing management measures described in the Blast Management Plan.	
MPOP-004	Noise and Blasting	Noise from additional road traffic movements on local roads (e.g. Kayuga Road) potentially impacting on amenity of nearby properties.		The staged increases in Project workforce. Road transport noise assessment (Project Noise and Blasting Assessment). The inclusion of management/mitigation measures for required site transport of people and consumables (e.g. construction workforce controls such as buses from Muswellbrook).	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-081	Noise and Blasting	Low frequency noise - and potential to exacerbate perceived noise levels.		Noise modelling to identify predicted performance (Project Noise and Blasting Assessment). Continued implementation of the Noise Management Plan (refer to MPOP-001), including installation of noise mitigation on relevant houses (on request) in accordance with the Development Consent.	
MPOP-073	Rehabilitation/ Closure	Failure to meet rehabilitation criteria (e.g. due to seasonal or soil limitations).		Ongoing rehabilitation projects (including micro-relief rehabilitation and revegetation). Ongoing monitoring of rehabilitation and continued management in accordance with the Mining Operations Plan and Rehabilitation Management Plan.	Continue to investigate innovative methods to implement rehabilitation and geomorphological design of the final landform of the Mount Pleasant Operation in collaboration with the University of Newcastle.
MPOP-074	Rehabilitation/ Closure	Geochemical properties of waste rock and/or fine rejects material require additional management to avoid off-site impacts.		Geochemical testwork and assessment to identify predicted performance (Project Geochemistry Assessment). Ongoing geochemical testwork of selected materials. Implementation of management measures described in the Fines Emplacement Plan.	
MPOP-075	Rehabilitation/ Closure	Stability of final landform (erosion) and maintenance of stable drainage paths.		Modelling of geomorphological stability of Project landforms to identify predicted performance (Project Rehabilitation and Mine Closure Addendum [Attachment 8 to the main text of the EIS]). Ongoing rehabilitation projects (including micro-relief rehabilitation and revegetation). Ongoing management until a stable landform is achieved.	Continue to investigate innovative methods to implement rehabilitation and geomorphological design of the final landform of the Mount Pleasant Operation in collaboration with the University of Newcastle.
MPOP-076	Rehabilitation/ Closure	Availability of soil resources to develop required growth media (characterisation of soil resources).		Assessment of soil resources to identify predicted availability (Project Agricultural and Land Resources Assessment).	
MPOP-077	Rehabilitation/ Closure	Failure to establish the required plant community types under the EPBC Act Approval.		Continued management in accordance with the Mining Operations Plan and Rehabilitation Management Plan.	
MPOP-087	Rehabilitation/ Closure	Challenges in rehabilitating the Fines Emplacement Area.		Continued management in accordance with the Mining Operations Plan and Rehabilitation Management Plan.	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-089	Rehabilitation/ Closure	Land contamination associated with long-term infrastructure areas.		Assessment of potential land contamination as part of mine closure. Continued management in accordance with the Mining Operations Plan and Rehabilitation Management Plan.	
MPOP-090	Rehabilitation/ Closure	Potential off-site impacts of on-site waste disposal (e.g. waste tyre disposal).		Continued implementation of management measures described in the Waste Management Plan.	
MPOP-069	Road Transport	Impacts on safety or amenity of the road network as a result of the development of the Northern Link Road.		Engineering design of the revised Northern Link Road alignment to maximise safety and amenity. Assessment of potential traffic movements to identify predicted performance (Project Road Transport Assessment).	
MPOP-068	Road Transport	Increased traffic on the public road network leads to safety or efficiency issues.		The staged increases in Project workforce. The existing engineering design of roads near the site. Assessment of potential traffic movements to identify predicted performance (Project Road Transport Assessment). Management/mitigation measures for required site transport of people and consumables, including Mount Pleasant Operation requirements regarding place of residence and/or fatigue management to address employee driving distances.	
MPOP-029	Social/Economic	Further change to rural/agricultural communities and towns due to population changes, e.g. loss of self-identified rural/agricultural communities and/or change in population of Muswellbrook from permanent families to Drive-in-Drive-Out workers.		Identification of potential social impacts (Project Social Impact Assessment). Development of a Social Impact Management Plan that addresses potential social impacts of the Project.	
MPOP-031	Social/Economic	Cumulative increased pressure on affordable and available housing.		Identification of potential social impacts (Project Social Impact Assessment). Development of a Social Impact Management Plan that addresses potential social impacts of the Project.	
MPOP-033	Social/Economic	Cumulatively, economic benefits of mining are not evenly distributed in the community (e.g. the portion of Muswellbrook on low incomes may miss out).		Identification of potential social impacts (Project Social Impact Assessment). Development of a Social Impact Management Plan that addresses potential social impacts of the Project.	
MPOP-034	Social/Economic	Perception of surrounding landholders that their land value would decrease as a consequence of ongoing mining operations.		Identification of potential social impacts (Project Social Impact Assessment). Development of a Social Impact Management Plan that addresses potential social impacts of the Project.	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-038	Social/Economic	New mining technologies, including equipment automation, lead to the social and economic benefits of the mine in terms of employment not being realised.		MACH does not currently have any intention to utilise equipment automation due to the complexity of the deposit. In the event future technological advances make automation viable, MACH would develop mitigation and management measures in consultation with relevant authorities to revise the Social Impact Management Plan.	
MPOP-039	Soil and Land Resource	Potential for loss of land and soil capability.		Assessment of soil resources to identify predicted availability (Project Agricultural and Land Resources Assessment).	
MPOP-043	Soil and Land Resource	Insufficient soil management and storage for future use in rehabilitation.		Assessment of soil resources to identify predicted availability (Project Agricultural and Land Resources Assessment). Continued management in accordance with the Mining Operations Plan and Rehabilitation Management Plan.	
MPOP-047	Soil and Land Resource	Additional biodiversity offset areas, if required, and the Aboriginal Conservation Areas, reducing the agricultural productivity of the region or adjoining properties.		Purchase agreements for the most-affected near neighbours. Review and amendment of Aboriginal Conservation Areas. Consideration of agricultural productivity in the selection of Project biodiversity offset areas, if required.	
MPOP-046	Soil and Land Resource	Land contamination results in impacts on future use of mined land.		Assessment of potential land contamination as part of mine closure. Continued management in accordance with the Mining Operations Plan and Rehabilitation Management Plan.	
MPOP-052	Surface Water	Contaminant spills that do not drain to mine water storages affect downstream water quality and environmental values.		Design of surface water controls, including the Erosion and Sediment Control Plan, and management of disturbed areas. Surface water assessment (including updated site water balance) to identify predicted performance (Project Surface Water Assessment). Existing management measures described in the Water Management Plan (including TARPs that would be implemented during mine operations).	
MPOP-056	Surface Water	Uncontrolled mine water discharge in the event of extreme weather events.		Surface water assessment (including updated site water balance) to identify predicted performance (Project Surface Water Assessment). Existing management measures described in the Water Management Plan (including TARPs that would be implemented during mine operations).	

Ref ¹	Subject Area	Issue Requiring Consideration	Priority	Planned Controls	Action(s)
MPOP-058	Surface Water	Increased total suspended solids in waterways from soil eroded off-site; changes in stream salinity (due to mine infrastructure).		Surface water assessment (including updated site water balance) to identify predicted performance (Project Surface Water Assessment). Existing management measures described in the Water Management Plan (including TARPs that would be implemented during mine operations).	
MPOP-055	Surface Water	Risk of final void overflows.		Integration between surface water and groundwater assessments (including updated site water balance) to identify predicted performance (Project Surface Water Assessment and Project Groundwater Assessment). Final void water balance assessment to determine final void behaviour under varying climatic conditions. Design of final landform to limit the potential for final void overflows.	Coordination between surface water and groundwater assessments to establish final void lake behaviour and groundwater inflows.
MPOP-070	Visual	Unanticipated visual impacts to horse studs through cumulative impacts and dynamic impacts.		Ongoing consultation/dialogue regarding the Mount Pleasant Operation and the Project (including opportunities to provide feedback). Geomorphological landform design and progressive rehabilitation. Viewshed modelling and visual impact assessment to identify predicted performance (Project Visual and Landscape Assessment). Implementation of existing management measures described in the Visual Impact Management Plan.	Continue to implement the stakeholder engagement programme beyond submission of the Project EIS.

¹ Issue reference number prior to risk ranking analyses – some issues, deemed to be similar, were merged during risk ranking.

ATTACHMENT C – REFERRED ISSUES

Referred issues identified during the ERA team's "brainstorming" are presented below.

Table 10 – Consolidated List of Referred Issues

Ref	Aspect Type	Issue
MPOP-082	Air Quality	Political perception of impacts - with potential for different interpretations of what constitutes cumulative impacts (made worse by the drought - which is already leading to dust levels exceeding criteria in some locations without mining occurring).
MPOP-083	Air Quality	Perception of mine dust – how it can be unpacked and communicated – measurements (including from Government monitoring stations) are different to community perceptions (i.e. mining contributions are measured to be lower than the community expects).
MPOP-080	Approvals	Sydney basin water licences – may be difficult to obtain, as tightly held by other mining companies.
MPOP-085	Approvals	Down time due to visible dust (exceeding TARP values) – could be a perception that Project mine plan cannot be achieved.
MPOP-094	Approvals	Potential to under-predict cumulative impacts if sufficient publicly available information for other proposed projects is not available.
MPOP-091	Approvals	Perceived impacts of the Project during the application phase - construction of the approved Stage 2 rail infrastructure and other already approved activities occurring at the same time as the EIS is being viewed/assessed.
MPOP-095	Health	Increases in employment have a positive community health benefit.
MPOP-079	Rehabilitation/Closure	Micro-relief rehabilitation – if the Mount Pleasant Operation does not demonstrate this kind of landform can be achieved prior to assessment of the Project, it may negatively impact assessment by the relevant Government agencies.
MPOP-035	Social/Economic	Socio-economic benefits to the region and State.

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