MACHEnergy

Mount Pleasant Operation

A JOINT VENTURE WITH JCDA Japan Coal Development Australia

MOUNT PLEASANT OPTIMISATION PROJECT

Resource Strategies

Submissions Report

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EXECUTIVE SUMMARY

The Mount Pleasant Operation is an 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). MACH Mount Pleasant Operations Pty Ltd (ACN 625 627 723) 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 (95 per cent [%] owner) and J.C.D. Australia Pty Ltd (5%owner)[1].

In 2020, MACH submitted the *Mount Pleasant Optimisation Project Environmental Impact Statement* (the EIS) for assessment under the NSW *Environmental Planning and Assessment Act 1979*.

The EIS describes and assesses the potential impacts of the Mount Pleasant Optimisation Project (the Project), which 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 of the mine. The Project is located in the Muswellbrook Local Government Area.

The EIS was placed on public exhibition by the Department of Planning, Industry and Environment from 3 February 2021 until 17 March 2021. A total of 268 submissions on the Project were received from Government agencies, non-government organisations and members of the public.

Some 18 submissions were received from NSW regulatory agencies and local Councils, the majority of which were in the form of comments, or suggested conditions. The Muswellbrook Shire Council provided comments on the Project. The Upper Hunter Shire Council objected to the Project (consistent with its position statement on coal mining and coal seam gas development).

A total of 27 submissions were received from non-government organisations. Of these, 11 supported the Project, one provided comment, and 15 objected to the Project.

A total of 223 submissions were received from members of the public. Of these public submissions, 95 supported the Project, three provided comments and 125 objected to the Project. A large proportion of the public objections were from the Upper Hunter Local Government Area. A large proportion of the public supporting submissions were from the Muswellbrook and Singleton Local Government Areas.

On 19 March 2021, the Department of Planning, Industry and Environment requested that MACH prepare and submit a Submissions Report for the Project (this report). Accordingly, this report provides MACH's responses to issues raised in submissions.

Consistent with the draft *Preparing a Submissions Report - State Significant Development Guide*, MACH has categorised the issues raised in submissions generally into the following broad categories:

- submissions relating to the Project layout, design or activities;
- submissions relating to procedural matters;
- environmental matters;
- evaluation of the Project or Project justification; and
- other issues that are beyond the scope of the Project assessment (e.g. broader policy issues) or are not relevant to the Project.

[1] Throughout this Response to Submissions Report, MACH Mount Pleasant Operations Pty Ltd and the unincorporated Mount Pleasant Joint Venture will be referred to as MACH.

The majority of submissions raised environmental matters, including a broad range of subjects such as socio-economic matters, air quality, human health and water resources.

In support of this report, MACH has commissioned additional specialist advice to assist in responding to some regulatory or public submissions. None of the additional advice or assessment clarification has materially altered the findings of any key environmental assessment matters.

No material amendments to the Project description have been required to address the submissions of agencies, Councils, organisations and the public. Notwithstanding, MACH has volunteered some incidental additional management measures to address some specific concerns raised. MACH is also conducting ongoing consultation with the Department of Planning, Industry and Environment and Department of Planning, Industry and Environment Biodiversity and Conservation Division with respect to the Project biodiversity offset obligations and strategy, and local Councils with respect to Voluntary Planning Agreements.

The EIS provides an evaluation of the Project, inclusive of consideration of the objects of the *Environmental Planning and Assessment Act 1979*, the objects of the Federal *Environment Protection and Biodiversity Conservation Act 1999* and the principles of Ecologically Sustainable Development. This evaluation concluded that the Project would comply with applicable statutory requirements and relevant strategic planning policy objectives and was, on balance, considered to be in the public interest of the State of NSW.

Since lodgement of the Project EIS, MACH has reviewed the submissions on the Project and has continued to consult with members of the community, local Councils and government agencies, and has also sought some additional advice from its independent experts. Based on this further consideration and analysis MACH has concluded that the key potential impacts of the Project, the key potential benefits of the Project, the strategic context and consequences of not carrying out the Project remain consistent with the conclusions presented in the EIS.

In weighing up the main environmental impacts (costs and benefits) associated with the proposal as assessed and described in the EIS and this Submissions Report, the Project therefore remains, on balance, in the public interest of the State of NSW.

1 INTRODUCTION

The Mount Pleasant Operation is an open cut coal mine and associated infrastructure, located approximately 3 kilometres (km) north-west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW) (Figures 1 and 2).

MACH Mount Pleasant Operations Pty Ltd (ACN 625 627 723) 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 (95 per cent [%] owner) and J.C.D. Australia Pty Ltd (5% owner)[2].

In 2020, MACH submitted the *Mount Pleasant Optimisation Project Environmental Impact Statement* (the EIS) for assessment under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The EIS describes and assesses the potential impacts of the Mount Pleasant Optimisation Project (the Project), which 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 EIS was placed on public exhibition by the Department of Planning, Industry and Environment (DPIE) from 3 February 2021 until 17 March 2021. During and following the exhibition period, submissions on the Project were received from government agencies, organisations and members of the public.

On 19 March 2021, the DPIE requested that MACH prepare and submit a Submissions Report (herein referred to as a Response to Submissions [RTS]) for the Project (this report). Accordingly, the RTS provides MACH's responses to issues raised in submissions. It has been prepared in consideration of the draft *Preparing a Submissions Report - State Significant Development Guide* (DPIE, 2020a).

The remainder of this Submissions Report is structured as follows:

Section 1 Provides an introduction and overview of the Project.

Section 2 Provides an analysis of the submissions received by DPIE during the public exhibition period.

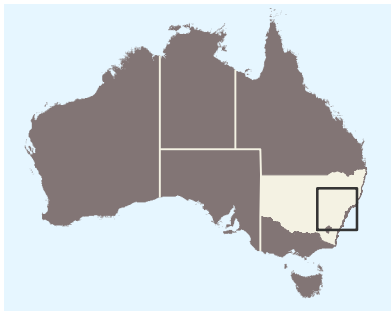
Section 3 Summarises the actions taken since lodgement of the EIS, including additional engagement activities and further refinements and assessment of the Project.

Section 4 Provides responses to aspects raised in submissions.

Section 5 Provides an updated evaluation of the Project.

Section 6 Lists the documents referenced in the Submissions Report.

[2] Throughout this Response to Submissions Report, MACH Mount Pleasant Operations Pty Ltd and the unincorporated Mount Pleasant Joint Venture will be referred to as MACH.



LEGEND
- Highway
- Major Railway
- Coalfield

Source: Geoscience Australia (2020)

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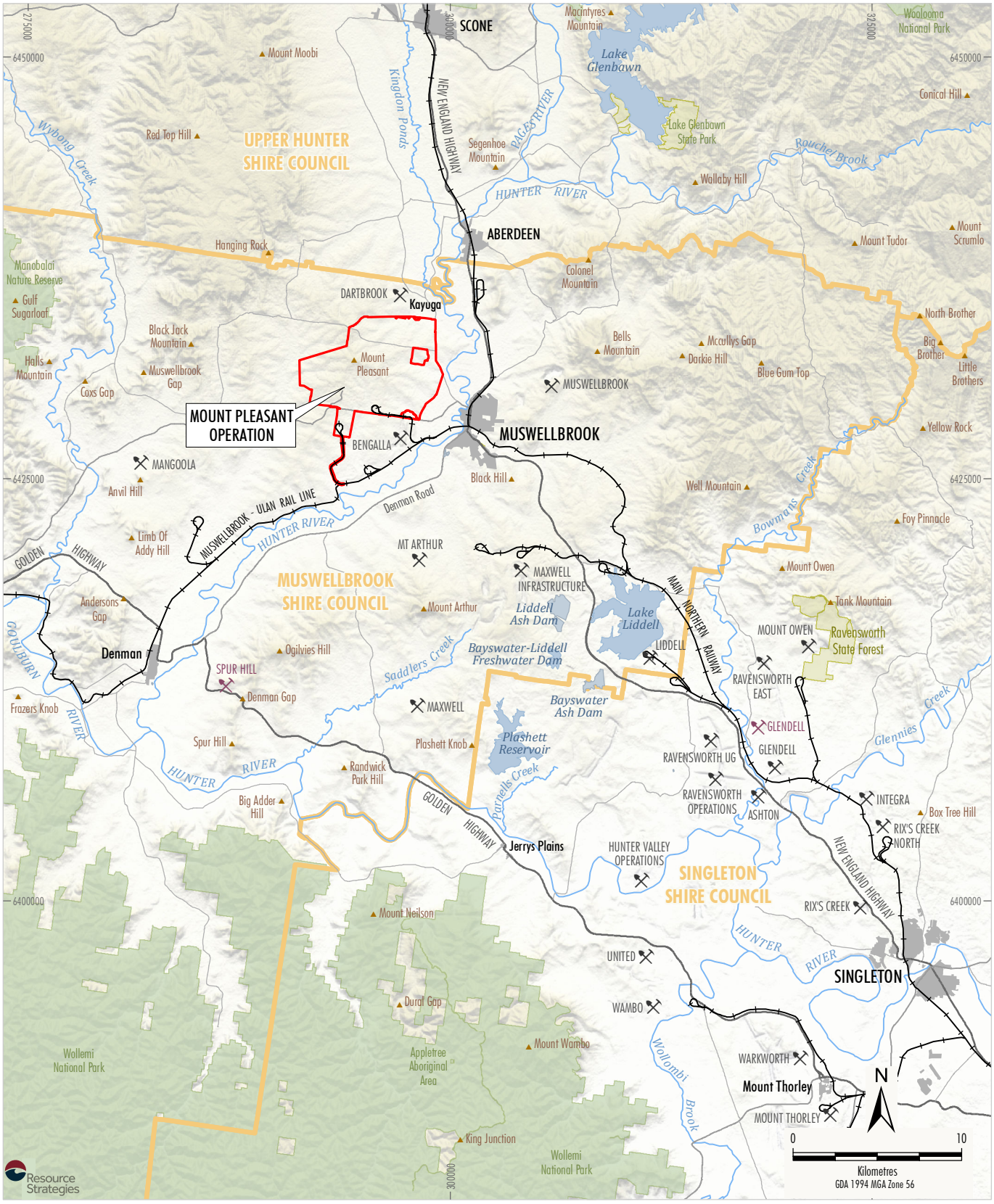
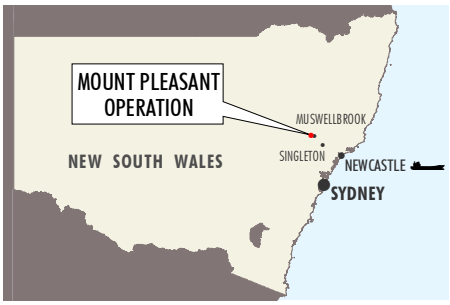
MOUNT PLEASANT OPTIMISATION PROJECT

Regional Location

Figure 1





LEGEND

- Mining Operation
- Proposed Mining Operation (Application Lodged)
- Railway
- Local Government Boundary
- State Forest/Reserve
- National Parks and Wildlife Estate
- Mining Lease Boundary (Mount Pleasant Operation)

Source: NSW Spatial Services (2021)

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MOUNT PLEASANT OPTIMISATION PROJECT

Project Location

MAC-18-02 SSD_RIS_211A

Figure 2

1.1 OVERVIEW OF THE PROJECT

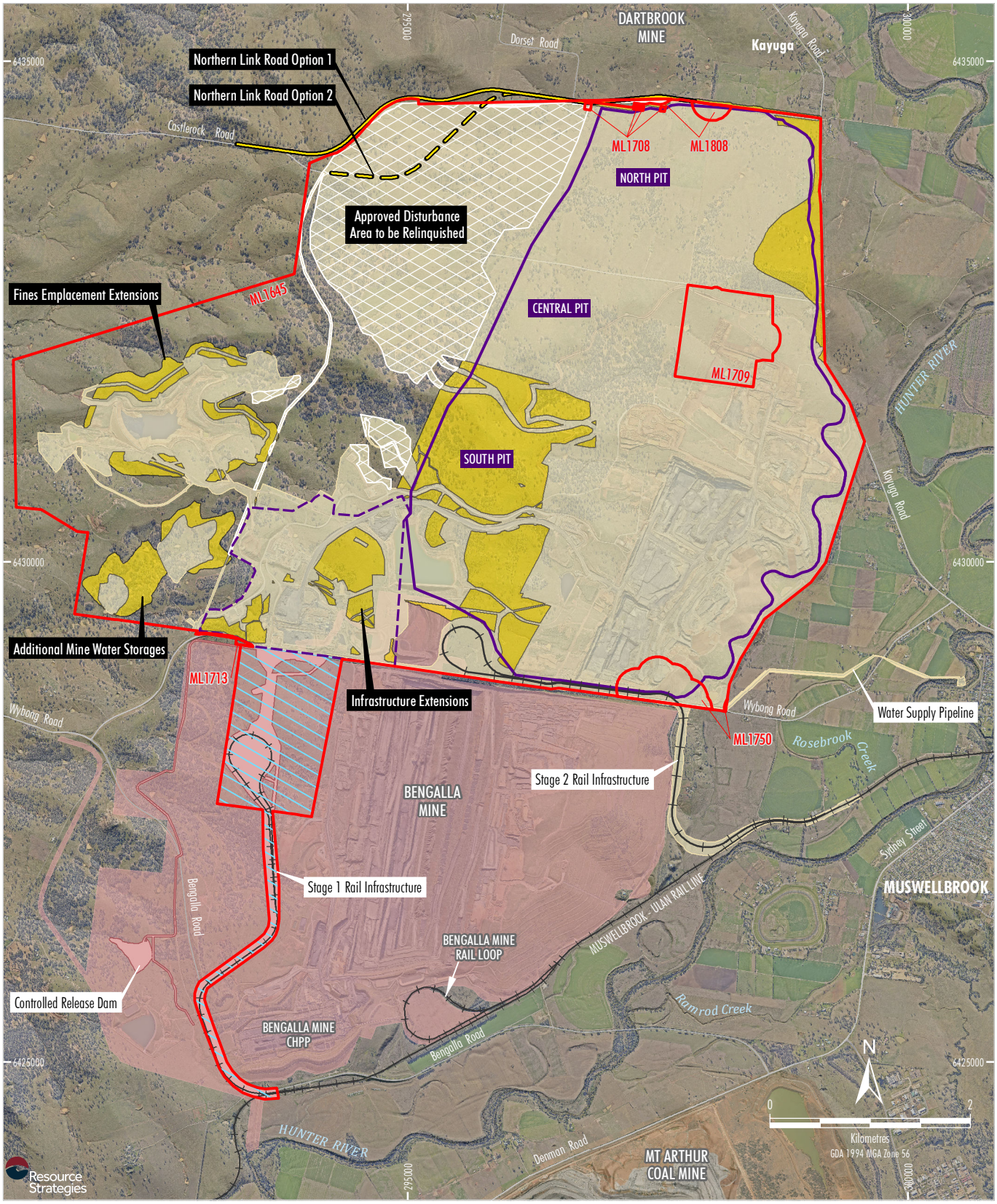
The Project includes the extraction of additional coal, including optimisation of the mining within ML 1645, ML 1708, ML 1709, ML 1750 and ML 1808 (Figure 3), and extension of the life of the Mount Pleasant Operation. The extraction of additional Project coal reserves would be supported by the use and augmentation of existing and approved infrastructure at the Mount Pleasant Operation.

The Project would recover approximately 406 million tonnes (Mt) of run-of-mine (ROM) coal from the target coal seams. In total, the Mount Pleasant Operation incorporating the Project would recover approximately 444 Mt of ROM coal. The proposed life of the Project is approximately 26 years and would extend the life of the approved Mount Pleasant Operation by approximately 22 years (i.e. providing for open cut mining operations to 22 December 2048).

As described in the EIS, the Project would include the following activities:

- increased open cut 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 million tonnes per annum (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;
- 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 of approximately 830 people;
- ongoing exploration activities; and
- other associated infrastructure, plant, equipment and activities.

Table 1 provides a comparative summary of the activities associated with the Project compared to the approved Mount Pleasant Operation.



LEGEND

Existing Mine Elements

- Mining Lease Boundary (Mount Pleasant Operation)
- Approximate Extent of Existing/Approved Surface Development (DA92/97) [1]
- Infrastructure to be removed under the Terms of Condition 37, Schedule 3 (DA92/97)
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)
- Existing/Approved Mount Pleasant Operation Infrastructure within Bengalla Mine Approved Disturbance Boundary (SSD-5170) [1]

Additional/Revised Project Elements

- Approved Disturbance Area to be Relinquished [2]
- Approximate Additional Disturbance of Project Extensions [1]
- Northern Link Road Option 1 Centreline [3]
- Northern Link Road Option 2 Centreline
- Approximate Extent of Project Open Cut and Waste Rock Emplacement Landforms
- Revised Infrastructure Area Envelope

NOTES

1. Excludes some incidental Project components such as water management infrastructure, access tracks, topsoil stockpiles, power supply, temporary offices, other ancillary works and construction disturbance.
2. Subject to detailed design of Northern Link Road alignment.
3. Preferred alignment subject to landholder access.

Source: MACH (2021); NSW Spatial Services (2021); Department of Planning and Environment (2016) Orthophoto: MACH (2020)

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MOUNT PLEASANT OPTIMISATION PROJECT

Project General Arrangement

Figure 3

Table 1
Summary Comparison of the Approved Mount Pleasant Operation and the Project

Component	Approved Mount Pleasant Operation DA 92/97	Project
Mine Life	Originally 21 years from the date of grant of Development Consent DA 92/97 (22 December 2020). Extended to 22 December 2026 (Modification 3).	Until 22 December 2048 (i.e. extension of 22 years, allowing for 31 years of mining operations overall).
Mining Method	Open cut mining method incorporating truck and excavator and dragline operations (dragline not envisaged prior to 2026).	Unchanged. Use of dragline subject to feasibility studies.
Resource and Pit Floor	Extraction of Wittingham Coal Measures to the Edderton Seam floor in South Pit and Vaux Seam floor in North Pit.	Extraction of Wittingham Coal Measures to the Edderton Seam floor throughout (deepening North Pit by approximately 85 metres [m]).
ROM Coal Production	ROM coal production at a rate of up to 10.5 Mtpa.	ROM coal production at a rate of up to 21 Mtpa.
Waste Rock Production	Waste rock removal at a rate of up to approximately 53 million bank cubic metres (Mbcm) per annum.	Waste rock removal at a rate of up to approximately 89 Mbcm per annum.
Waste Emplacements	Waste rock emplaced both in-pit, and in the Eastern, South West[^] and North West Out-of-Pit Emplacement areas (elevations up to approximately 320 metres Australian Height Datum [m AHD]).	Relinquishment of the North West Out-of-Pit Emplacement area. Waste rock emplaced both in-pit and in the Eastern Out-of-Pit Emplacement area. Emplacement elevations increasing to above 360 m AHD.
Coal Beneficiation	Beneficiation of ROM coal in the on-site CHPP.	Unchanged. Staged upgrades to the CHPP to allow the handling and processing of additional ROM coal.
Coal Transport	Coal transported along the Muswellbrook–Ulan Rail Line and then the Main Northern Railway to the Port of Newcastle for export, or to domestic customers.	Unchanged.
	An average of three, and a maximum of nine, laden trains per day leaving the mine.	An average of 6.5, and a maximum of 10, laden trains per day leaving the mine at peak.
Coal Rejects	Coarse rejects are placed within mined out voids and out-of-pit emplacements, and used to build walls of the Fines Emplacement Area. Fine rejects are stored in the Fines Emplacement Area.	As approved, plus fine reject dewatering infrastructure would also be installed on new Coal Processing Plant modules so dewatered fine rejects can be co-disposed with coarse rejects.
Water Supply and Disposal Methods	Water requirements are met from pit groundwater inflows, catchment runoff and make-up water from the Hunter River and the Bengalla or Dartbrook Mines. Surplus water will be discharged in compliance with the Hunter River Salinity Trading Scheme (HRSTS) and Environment Protection Licence (EPL) 20850.	Unchanged.
Approximate Disturbance Area	Approximately 2,800 hectares (ha) of surface development, exclusive of some incidental components such as water management infrastructure.	Effectively unchanged. Relinquishment Area (approximately 497 ha) compensates for Project additional disturbance areas (approximately 498 – 504 ha).[#]
Final Landform and Land Use	A final landform that incorporates macro-relief and micro-relief concepts so it does not look “engineered” when viewed from Muswellbrook. One final void would remain if mining was to cease in 2026. The full 21-year mine life indicative final landform includes two final voids associated with the North Pit and South Pit open cuts and a smaller third final void.	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. One final void would remain.
	Rehabilitation with a mixture of pasture and forest, with increased revegetation with native tree species on the eastern face of the final landform.	Unchanged.
Hours of Operation	Operations are approved to be undertaken 24 hours per day, seven days per week.	Unchanged.
Operational Workforce	Average operational workforce throughout the life of the mine of approximately 330 people, and an estimated peak of approximately 380* people.	An average workforce of approximately 600 people, with a peak of approximately 830 full-time equivalent operational personnel (including MACH staff and on-site contractors).
Construction Workforce	Construction workforce is expected to peak at approximately 350 people.	Construction workforce may have short-term peaks of up to 500 people.

[^] Parts of the South West Out-of-Pit Emplacement were relinquished in previous Modifications 3 and 4.

[#] Additional disturbance areas would vary, based on the Northern Link Road option selected.

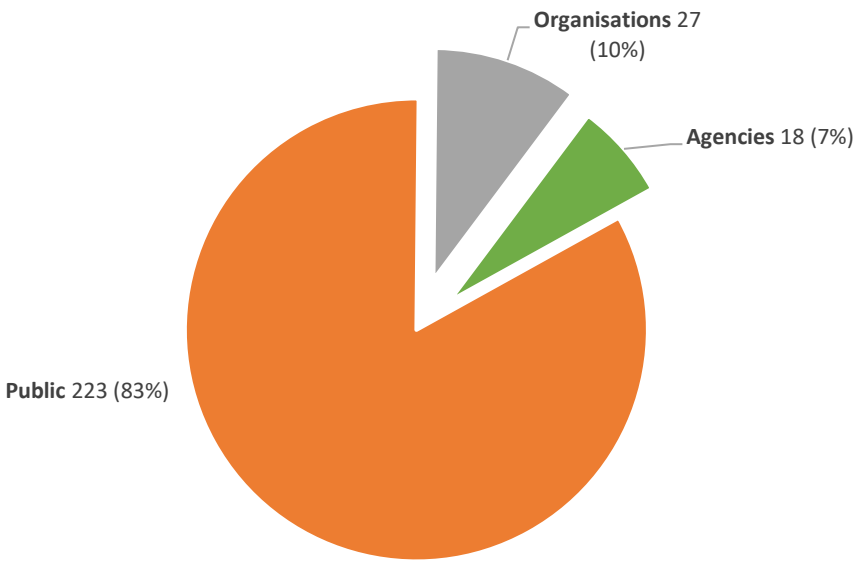
* As at mid-2020, the full-time equivalent operational workforce of the Mount Pleasant Operation was approximately 440 people.

2 ANALYSIS OF SUBMISSIONS

2.1 BREAKDOWN OF SUBMISSIONS

A total of 268 submissions on the Project were received from Government agencies, non-government organisations (NGOs) and members of the public. Chart 1 presents a summary of the total number of submissions by submitter category. The key aspects raised in submissions are summarised in Section 2.2.

Chart 1
Summary of All Submissions



A register of submitters is provided in Attachment A.

2.1.1 Agency and Council Submissions

A total of 18 submissions were received from NSW regulatory agencies and local councils, the majority of which were in the form of comments, or suggested conditions. The Project is located in the Muswellbrook Local Government Area (LGA). The Muswellbrook Shire Council provided comments on the Project. The Upper Hunter Shire Council objected to the Project (consistent with its position statement on coal mining and coal seam gas development).

The following agencies had little or no comment on the proposed Project, and hence no formal response from MACH is required:

- Subsidence Advisory NSW (commenting submission);
- Department of Regional NSW – Primary Industries (Animal Welfare Unit) (commenting submission)[3];

[3] The Department of Regional NSW - Primary Industries (Animal Welfare Unit) and the Department of Regional NSW - Primary Industries (Agriculture) provided a single submission.

- Crown Lands NSW (commenting submission); and
- Australian Rail Track Corporation (commenting submission).

The following agencies made a small number of comments on the proposal, or recommended post-approval management requirements:

- Transport for NSW (commenting submission);
- Dams Safety NSW (commenting submission);
- Ausgrid (commenting submission);
- NSW Rural Fire Service (commenting submission); and
- Department of Regional NSW – Mining, Exploration & Geoscience (MEG) (commenting submission).

The following agencies requested some more information, or had more comprehensive comments/concerns regarding the Project:

- Environment Protection Authority (EPA) (commenting submission);
- Department of Planning, Industry and Environment – Water Group (DPIE – Water) (commenting submission);
- Department of Regional NSW – Primary Industries (Agriculture) (commenting submission)[2];
- Department of Regional NSW – Resources Regulator (NSW Resources Regulator) (commenting submission);
- Department of Planning, Industry and Environment - Biodiversity and Conservation Division (BCD) (commenting submission);
- Heritage NSW – Aboriginal Cultural Heritage Regulation (commenting submission);
- Heritage NSW – as delegate to the Heritage Council of NSW (commenting submission);
- NSW Health (commenting submission);
- Muswellbrook Shire Council (commenting submission); and
- Upper Hunter Shire Council (objecting submission).

2.1.2 Non-Government Organisation Submissions

A total of 27 submissions were received from NGOs. Of these, 11 supported the Project, one provided comment, and 15 objected to the Project (Chart 2).

2.1.3 Public Submissions

A total of 223 submissions were received from members of the public, including a number of near neighbours and mine employees. Of these, 95 supported the Project, three provided comments and 125 objected to the Project (Chart 3).

Chart 2
Summary of Non-Government Organisation Submissions

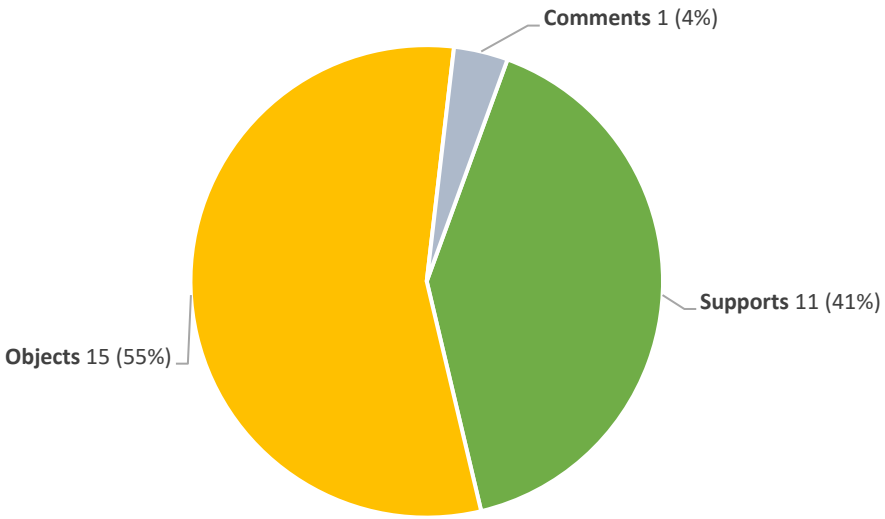
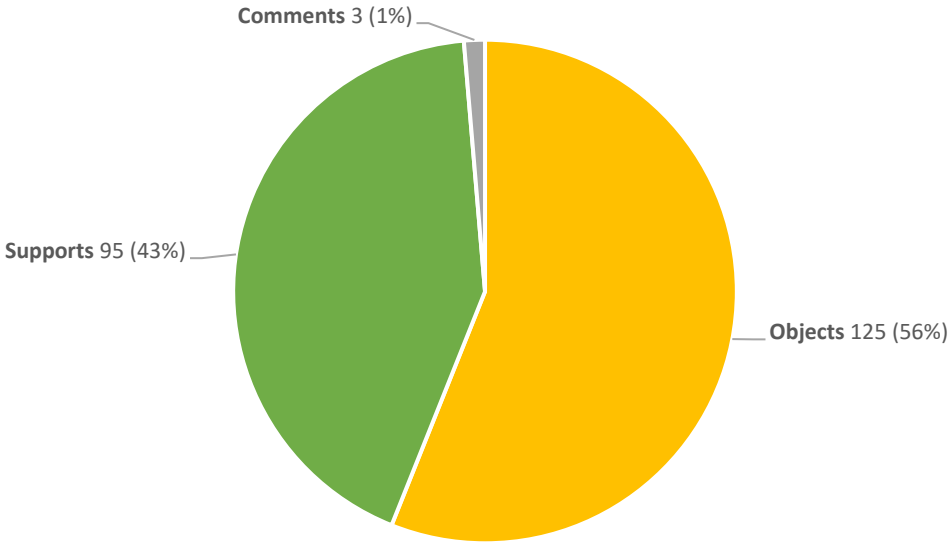


Chart 3
Summary of Public Submissions



Public submissions were received from a range of locations, including the three nearest LGAs (i.e. Muswellbrook LGA, Upper Hunter LGA and Singleton LGA), NSW more generally or interstate locations. It is noted that these three LGAs were adopted as the relevant region to assess the Project in the Social Impact Assessment (SIA) and Economic Assessment conducted for the Project (Appendices N and O of the EIS). Further analysis of the distribution of objecting and supporting public submissions between these LGAs, the rest of NSW and other states is provided in Charts 4 and 5 below.

Chart 4
Summary of Public Objecting Submissions by Location

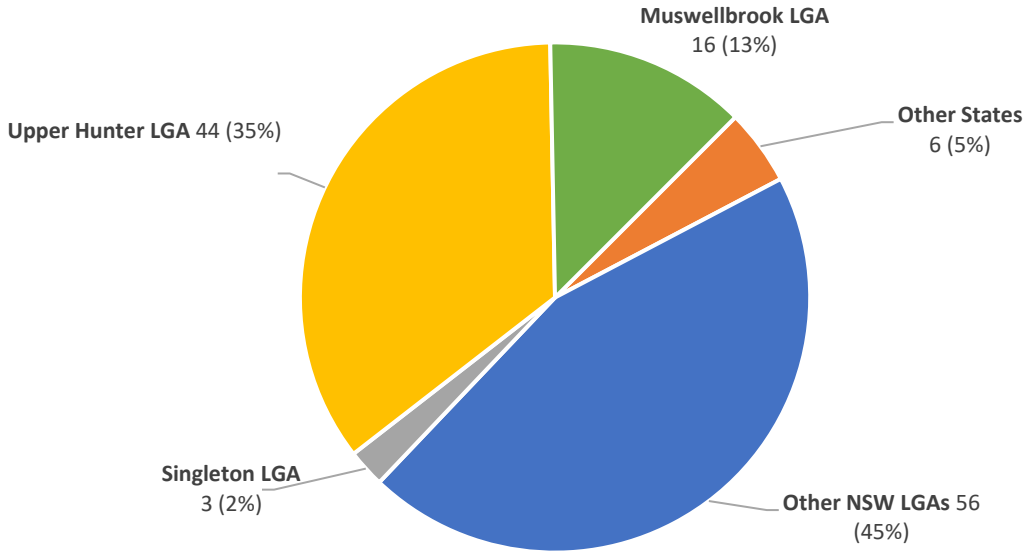
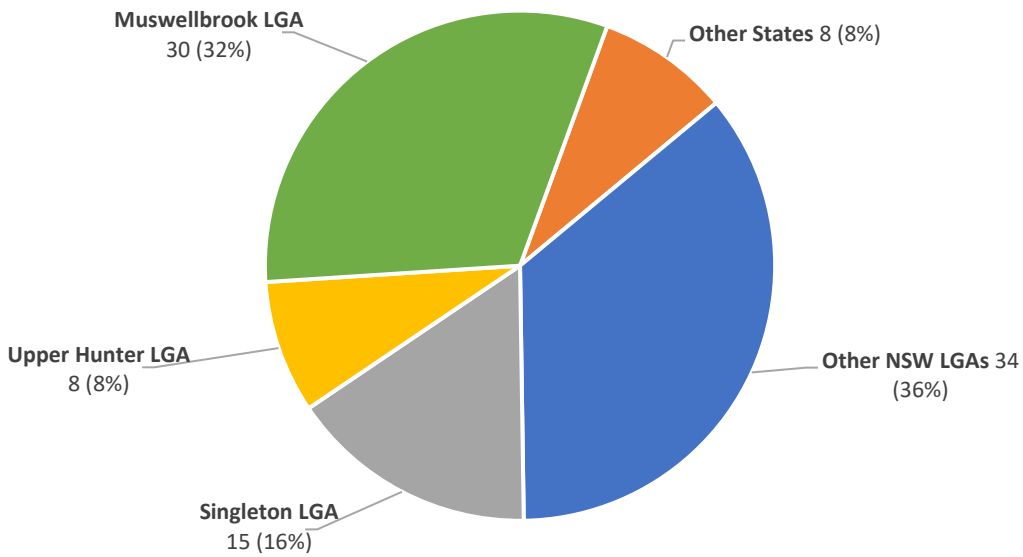


Chart 5
Summary of Public Supporting Submissions by Location



A large proportion of the objections received on the Project were from the Upper Hunter LGA, or elsewhere in NSW (Chart 4). A large proportion of the supporting submissions were from the Muswellbrook and Singleton LGAs (Chart 5).

Review of the spatial distribution of objections, comments and supporting public submissions within the three local LGAs shows a clear dichotomy between the towns of Muswellbrook and Singleton (more supporting) and the village of Aberdeen and the town of Scone in the Upper Hunter LGA (more objecting) (Figure 4).

2.2 CATEGORISING ISSUES

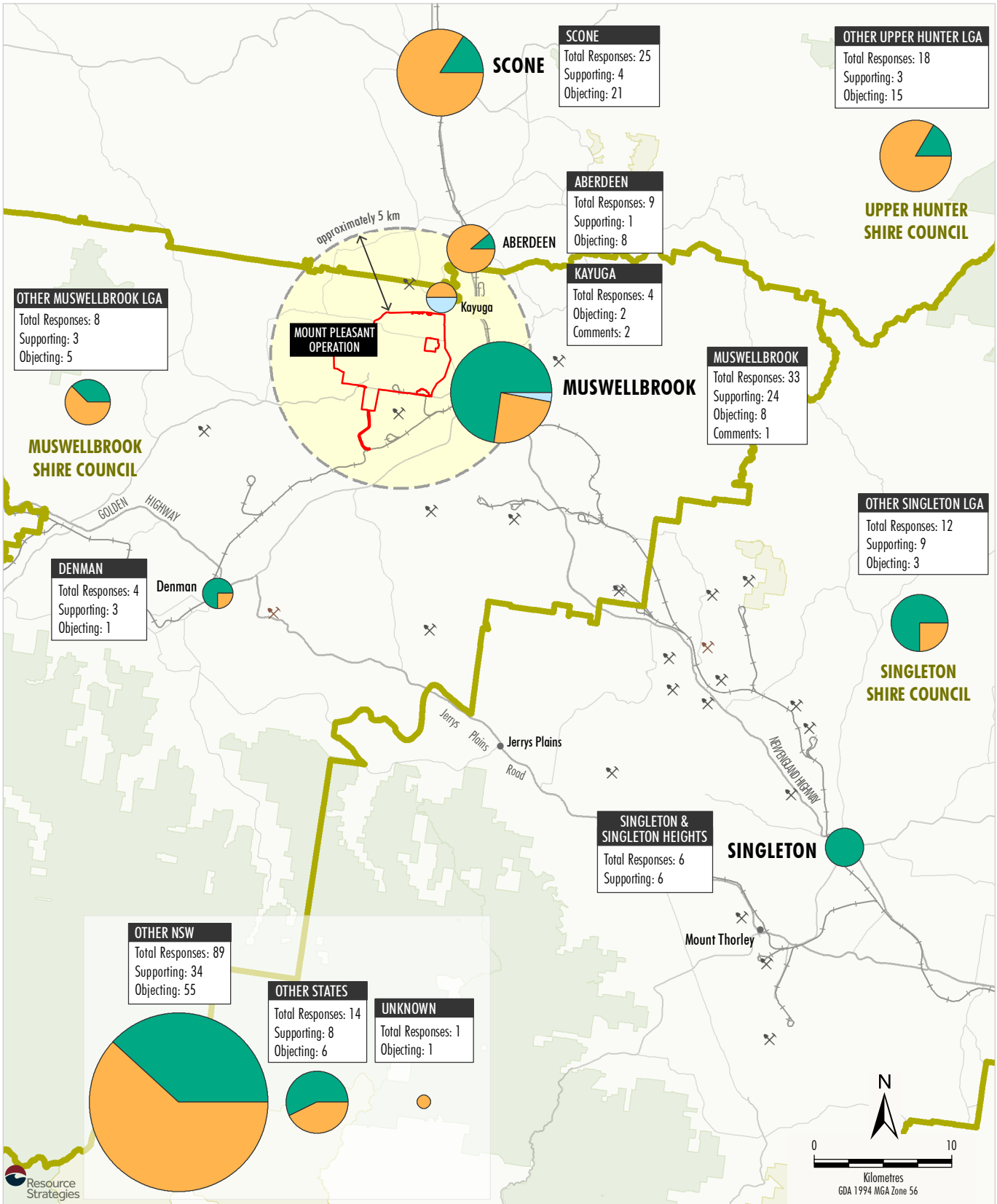
Consistent with the draft *Preparing a Submissions Report - State Significant Development Guide* (DPIE, 2020a), MACH has categorised the issues raised in submissions generally into the following broad categories:

- submissions relating to the Project layout, design or activities;
- submissions relating to procedural matters;
- environmental matters;
- evaluation of the Project or Project justification; and
- other issues that are beyond the scope of the Project assessment (e.g. broader policy issues) or are not relevant to the Project.

The majority of submissions raised environmental matters, including a broad range of subjects.

The most commonly raised matters in relation to the Project are illustrated in Chart 6. As shown, the most comments pertained to the following matters:

- socio-economic matters;
- air quality;
- Project justification;
- human health;
- greenhouse gas emissions and climate change;
- rehabilitation and final landform;
- cumulative impacts; and
- water resources.



Source: NSW Spatial Services (2021)

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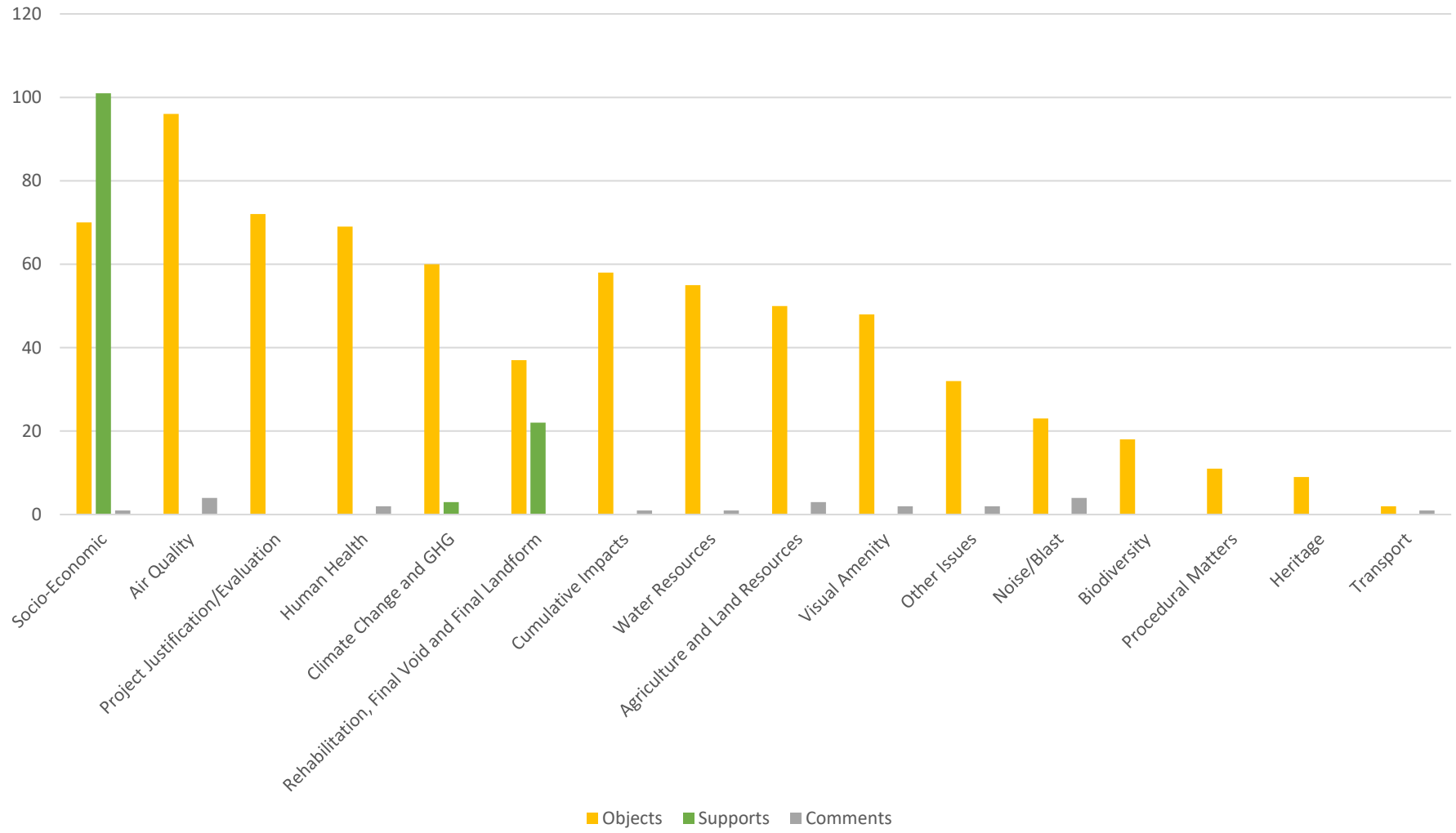
MOUNT PLEASANT OPTIMISATION PROJECT

Nature of Public Submissions by Location

Figure 4

Chart 6
Key Matters Raised in Submissions



3 ACTIONS TAKEN SINCE SUBMISSION OF THE EIS

3.1 AMENDMENTS TO THE PROJECT

No amendments to the Project description have been required to address the submissions of agencies, Councils, organisations and the public. For simplicity, the Relinquishment Area has been conservatively set at the smaller area (497 ha) of the two relinquishment area options presented in the EIS and the Project additional disturbance area has been adjusted accordingly (remains approximately 500 ha in size) (refer Table 1).

Staging has also been introduced in the Biodiversity Development Assessment Report (BDAR) to reflect the timing of some development activities. Credit requirements associated with Mine Water Dam 3 (MWD3) have been calculated as a separate stage to the other general development areas associated with the Project. MWD3 would be developed later in the mine life, if required, when the mine intersects the existing mine water dam. The Northern Link Road options remain assessed as separate Development Footprints.

3.2 ENGAGEMENT

Since the lodgement of the State Significant Development (SSD) application, MACH has continued to consult with key NSW Government agencies, Councils and the public regarding the Mount Pleasant Operation and the Project.

An overview of key recent consultation is provided below.

Department of Planning, Industry and Environment

MACH has met with the DPIE Planning & Assessment Branch to discuss the Project on multiple occasions. These meetings were to discuss assessment issues raised in submissions, the status of MACH's preparation of the Submission Report, participation in joint meetings, and briefings on the outcomes of MACH's consultation with key regulatory agencies.

Environment Protection Authority

MACH provided a written response to the EPA's submission on noise, air quality and water matters on 19 May 2021, and subsequently met with the EPA to discuss the responses on 22 June 2021.

Subject to review of the finalised Submission Report, the EPA indicated the majority of its concerns had been addressed, however, some residual concerns remained with respect to air quality in particular. MACH anticipates consultation with the EPA will be ongoing throughout the NSW Government assessment of the Project.

Heritage NSW and Heritage Council of NSW

MACH provided written responses to Heritage NSW's submission on Aboriginal heritage and historic heritage on 22 April 2021 and 6 June 2021, respectively.

MACH subsequently met with Heritage NSW to discuss the responses to Aboriginal heritage matters on 10 June 2021. At this meeting, Heritage NSW indicated its general support for the Project Aboriginal Cultural Heritage Assessment (ACHA) (Appendix G of the EIS) methodology and findings, but indicated its preference for some ACHA post-approval management recommendations to be undertaken pre-determination.

DPIE – Water

MACH met with DPIE – Water on 3 June 2021 to update the Department on the findings of additional groundwater modelling to address the fracturing scenario posed by DPIE – Water, and key responses to other issues raised.

Subject to review of the finalised Submission Report, DPIE – Water indicated it was generally satisfied with the additional modelling that had been conducted to address its queries.

DPIE – Biodiversity and Conservation Division

MACH provided written responses to the BCD submission on 1 June 2021. MACH has also met with the BCD on a number of occasions since the exhibition of the EIS to discuss the BDAR findings, BCD's requests for additional information, MACH's responses, and the status of the existing biodiversity offsets at the Mount Pleasant Operation.

It is anticipated that consultation with the BCD will be ongoing throughout the NSW Government assessment of the Project.

Muswellbrook Shire Council

MACH has an ongoing consultation program with the Muswellbrook Shire Council associated with the approved Mount Pleasant Operation. MACH has consulted with the Muswellbrook Shire Council with respect to the issues raised in its submission on the Project, and the Muswellbrook Shire Council's position with respect to potential updates to the existing Mount Pleasant Operation Voluntary Planning Agreement (VPA), should the Project proceed. MACH has formally tabled a VPA offer with the Muswellbrook Shire Council for its consideration.

MACH anticipates that consultation with the Muswellbrook Shire Council will be ongoing throughout the NSW Government assessment of the Project.

Upper Hunter Shire Council

MACH has an ongoing consultation program with the Upper Hunter Shire Council associated with the approved Mount Pleasant Operation. MACH has consulted with the Upper Hunter Shire Council with respect to its objections to the Project, and Council's request for a VPA, should the Project proceed.

MACH anticipates that consultation with the Upper Hunter Shire Council will be ongoing throughout the NSW Government assessment of the Project.

Public Consultation

MACH has continued to consult with nearby landholders and members of the public during the EIS exhibition phase, and post-exhibition of the EIS.

Key additional public consultation conducted since the commencement of the EIS exhibition period is outlined in Table 2.

Table 2
Key Public Consultation Activities

Date of Consultation	Consultation Context
3 February 2021	Public EIS drop-in session in Muswellbrook, including display of the Project overview posters and discussions regarding any queries the participants had.
16 February 2021	Public EIS drop-in session in Muswellbrook, including display of the Project overview posters and discussions regarding any queries the participants had.
February – June 2021	Ongoing consultation with proximal local landholders, including provision of a Project overview, discussions regarding acquisition and mitigation rights at relevant properties, and impacts of the existing Mount Pleasant Operation.
23 April 2021	Community Consultative Committee (CCC) meeting, including: • Recap of the Project. • Outcomes of the EIS public exhibition process. • Update on the EIS Assessment Process.

3.3 ENVIRONMENTAL MATTERS AND ASSOCIATED MANAGEMENT MEASURES

In responding to the environmental matters raised in submissions (Section 4.3), MACH has first addressed the regulatory submissions, and then responded to NGO and public submissions under a separate heading. In order to reduce duplication, where an issue raised by a NGO or public submission has already been addressed in response to regulatory submissions, the reader is referred to the earlier response.

In support of this RTS, MACH has commissioned additional specialist advice to assist in responding to some regulatory or public submissions. This additional advice is appended as Attachments B to H. None of the additional advice or assessment clarification has materially altered the findings of any key environmental assessment matters.

Notwithstanding, MACH has volunteered some incidental additional management measures to address specific concerns raised, as follows:

- MACH has confirmed it would be agreeable to a consent condition requiring make-good provisions, should the increased elevation of the Mount Pleasant Operation integrated waste rock emplacement result in adverse terrain effects on Rossgole Tower transmission facilities.
- MACH has confirmed it would be agreeable to a consent condition requiring a Construction Traffic Management Plan that would include, among other matters, a requirement to use employee shuttle buses during major construction activities.
- MACH has confirmed that the Department of Regional NSW – Primary Industries would be invited to participate in consultation regarding the post-mining use of the Project site.
- MACH would accept a consent condition requiring preparation of a Historic Heritage Management Plan (HHMP) prepared in consultation with Heritage NSW, that includes consideration of the management of unexpected finds, if DPIE is of the view that this would be required.

MACH is also conducting ongoing consultation with the BCD and DPIE with respect to the Project biodiversity offset obligations and strategy. Consistent with BCD advice, MACH has separately appended the revised BDAR (Attachment G) and also a Biodiversity Impact Reduction and Offset Report (Attachment H).

4 RESPONSE TO SUBMISSIONS

4.1 THE PROJECT

4.1.1 Rehabilitation and Associated Objectives

Regulatory Submissions

Project Rehabilitation

The NSW Resources Regulator requested some additional information on objectives for final land use/rehabilitation, the timing of Project rehabilitation (e.g. of the Eastern Out-of-Pit Emplacement), and the spatial distribution of vegetation communities that are targeted in Project rehabilitation.

Response

Proposed final land uses for the Mount Pleasant Operation area include permanent water infrastructure and storage areas, agricultural land, native woodland and grassland areas and the final void (Figure 3-18 of the EIS).

MACH has identified provisional rehabilitation domains and final land use objectives for the Project as follows (Attachment 8 of the EIS):

- Domain 1C – Infrastructure Area - rehabilitated to Agricultural Land;
- Domain 1D – Infrastructure Area - rehabilitated to Native Woodland/Grassland;
- Domain 2C – Fines Emplacement Area - rehabilitated to Agricultural Land;
- Domain 3B – Water Infrastructure and Storage retained post-mining;
- Domain 3D – Water Management Area - rehabilitated to Native Woodland/Grassland;
- Domain 4A – Final Void;
- Domain 5C – Overburden Emplacement Area - rehabilitated to Agricultural Land; and
- Domain 5D – Overburden Emplacement Area - rehabilitated to Native Woodland/Grassland.

Provisional domain rehabilitation objectives for the Project are described in Table 3. It is noted that these provisional rehabilitation objectives would be updated by MACH as required to address applicable Development Consent conditions, should the Project be approved.

MACH also recognises that government and community stakeholders may identify final land uses that provide greater net benefits to the locality. MACH would encourage and be supportive of other community and government proposals or initiatives for the use of MACH land or infrastructure that can co-exist with the Project. These alternative final land uses would be subject to separate assessments and approval, and do not form part of the Project.

Table 3
Provisional Domain Rehabilitation Objectives

Code	Domain	Objectives
All Domains		
N/A	All primary domain areas	Final landforms are safe, stable and non-polluting. Final landforms are stable and sustainable for the intended post-mining land use/s. Final landforms are integrated with surrounding natural landforms. Ensure public safety.
Primary Domains		
1	Infrastructure Area	Surface infrastructure not required for future use post-mining is decommissioned and removed (as agreed with relevant regulatory authorities). Area to be rehabilitated in accordance with relevant Secondary Domain rehabilitation objectives.
2	Fines Emplacement Area	Decommission and remove Fines Emplacement Area infrastructure (e.g. pumps, pipelines). Area to be rehabilitated in accordance with relevant Secondary Domain rehabilitation objectives.
3	Water Management Areas	Clean water will be diverted around operational areas, where practical. Mine water dams and sediment dams are to be decontaminated and decommissioned and removed from the final landform (except for permanent water management structures and storages agreed to be retained in the final landform). Sediment dams and associated water management structures will remain in place until the catchment is rehabilitated and discharge water quality is suitable for receiving waters and fit for aquatic ecology and riparian vegetation. Area to be rehabilitated in accordance with relevant Secondary Domain rehabilitation objectives.
4	Active Void	Backfilled open cut void is safe, profiled for long-term stability and non-polluting.
5	Overburden Emplacement Area	Overburden Emplacement Areas are safe, stable, and non-polluting. Constructed slopes to be consistent with geomorphic design principles. Mining plant and equipment associated with the construction of the Eastern Out-of-Pit Emplacement will be dismantled, decommissioned and removed from site. Maximise surface water drainage to the natural environment (excluding final void catchment).
Secondary Domains		
A	Final Void	Final void is safe, stable and non-polluting. Final void design to ensure the final void does not spill. Final void land use to be developed in consultation with relevant stakeholders. Final void shaped to be consistent with the surrounding natural environment and to avoid an engineered profile. Final void designed as long-term groundwater sink to maximise groundwater flows across back filled pits to the final void. Minimise to the greatest extent practicable: • the size and depth of final voids; • the drainage catchment of final voids; • any high wall instability risk; and • the risk of flood interaction.

Table 3 (Continued)
Provisional Domain Rehabilitation Objectives

Code	Domain	Objectives
Secondary Domains (Continued)		
B	Water Infrastructure and Storage	Clean water diversion banks on the Eastern Out-of-Pit Emplacement will be retained to divert water away from fill areas. Permanent water management structures will be designed and constructed prior to disturbance, in accordance with best practice guidelines, including Landcom (2004) *Managing Urban Stormwater, Soils and Construction* and the NSW Department of Environment and Climate Change (DECC) (2008) *Managing Urban Stormwater: Soils and Construction – Volume 2*. Water retained on the site is fit for the intended post-mining land use/s, including potential long-term source of water for nearby intensive land uses (subject to obtaining relevant regulatory approvals). Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation.
C	Rehabilitated Area – Agricultural Land	Infrastructure would be decommissioned and removed (unless the NSW Resources Regulator agrees otherwise). Landform is functional and indicative of a landscape on a self-sustaining trajectory. Establish/restore grassland areas to support sustainable agricultural activities. Achieve the nominated land capability classification.
D	Rehabilitated Area – Native Woodland/ Grassland	Establish native vegetation comparable to suitable reference/analogue sites. Landform is functional and indicative of a landscape on a self-sustaining trajectory. Habitat features are salvaged and re-used in rehabilitation areas to provide fauna habitat resources. Restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area. Establish areas of self-sustaining: • riparian habitat, within any diverted and/or re-established creek lines and retained water features; and • potential habitat for threatened flora and fauna species.

Source: Attachment 8 of the EIS.

In rehabilitation, MACH would target reshaping to final surface level and initial revegetation seeding of the majority of outer emplacement batter lifts of the Eastern Out-of-Pit Emplacement within six months of each subsequent dump panel lift being completed (subject to potential delays associated with localised design constraints or climatic extremes when soil placement and revegetation works may need to be delayed) (Attachment 8 of the EIS).

Plates 1 to 3 below illustrate how MACH is applying this progressive geomorphic landform construction and rehabilitation methodology at the Mount Pleasant Operation.

Plate 1 – Oblique View of Eastern Out-of-Pit Emplacement June 2020

Plate 2 – Oblique View of Eastern Out-of-Pit Emplacement October 2020

Plate 3 – Oblique View of Eastern Out-of-Pit Emplacement March 2021

This approach to landform design and rehabilitation acts to minimise the potential visual impacts of the Project Eastern Out-of-Pit Emplacement construction when viewed from Muswellbrook, and integrates the mine landform with the adjoining unmined landscape.

Rehabilitation of woodland at the Project would continue to focus on flora species endemic to the local area. Subject to seed and seedling supply availability and suitability, flora species to be used in rehabilitation would aim to include those typical of the *Box-Gum Woodland CEEC*[4].

MACH has commenced rehabilitation and revegetation activities at the Mount Pleasant Operation (Plates 1 to 3), including seeding/planting of initial rehabilitation areas to target specific Plant Community Types (PCTs).

The selection of PCTs for each area is guided by the final aspect and slopes set out in the construction level geomorphic landform design. This level of detail is not suitable for inclusion in documentation at the EIS stage. However, MACH implements this additional level of detail in the secondary approval stage. This detail is typically documented in the mining contractor's annual rehabilitation plan, and would be developed iteratively, based on the outcomes of rehabilitation performance monitoring.

An example construction-level PCT distribution plan for some initial rehabilitation areas at the Mount Pleasant Operation is provided on Plate 4.

Where relevant, management practices described in the *National Recovery Plan – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Department of Environment, Climate Change and Water [DECCW], 2011) would continue to be used as the basis for the re-establishment of grassy woodland areas on-site.

NGO and Public Submissions

MACH Rehabilitation Practices and Project Rehabilitation Progress

Some submissions raised concerns regarding the status of rehabilitation practices at the approved Mount Pleasant Operation, or questioned the assumed Project rehabilitation/revegetation progress, or topsoil availability required to restore the landscape to pre-mining conditions, and hence mitigate potential visual impacts.

Response

The Mount Pleasant Operation has been an operational mine since October 2017, and MACH initiated initial areas of rehabilitation within months of mining commencing. MACH's proactive approach to implementation of a geomorphic landform and rapid rehabilitation of the Eastern Out-of-Pit Emplacement from the commencement of the Mount Pleasant Operation is being increasingly recognised by members of the community, Muswellbrook Shire Council and NSW regulatory agencies.

This approach to landform design and rehabilitation acts to minimise the potential visual impacts of the Project Eastern Out-of-Pit Emplacement construction when viewed from Muswellbrook, and integrates the mine landform with the adjoining unmined landscape (Plates 1 – 3).

[4] Equivalent to the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions Critically Endangered Ecological Community listed under the NSW Biodiversity Conservation Act, 2016 and the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community listed under the Commonwealth Environment Protection and Biodiversity Conservation Act, 1999.

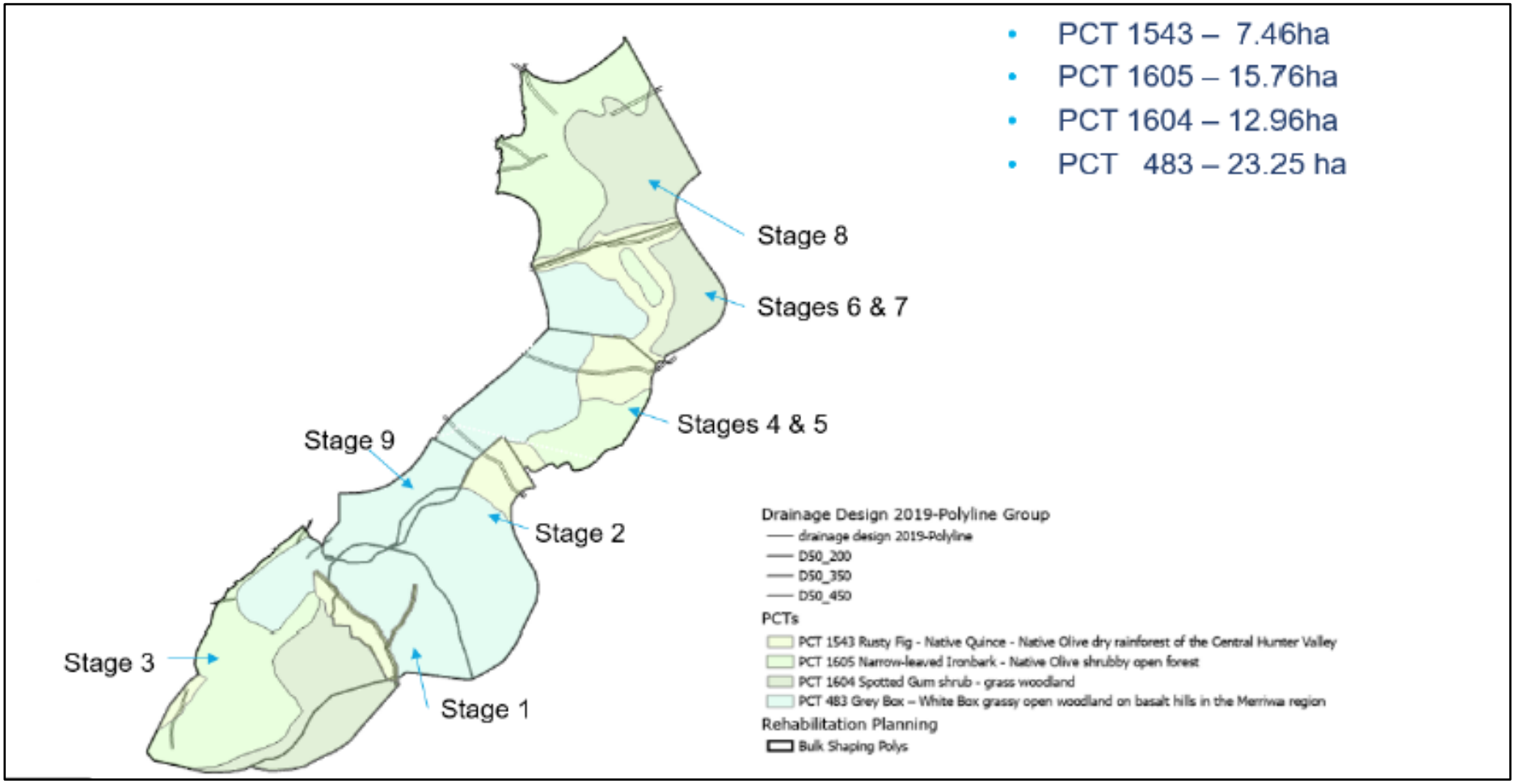


Plate 4 – Illustration of Planned Target Rehabilitation PCTs on Initial Rehabilitation Areas

Attachment 8 of the EIS provides a comprehensive description of the stages of rehabilitation and the availability of soil resources to conduct rehabilitation. The response to the NSW Resources Regulator above also provides plates illustrating the effectiveness of the methodology in minimising visual impacts by integrating rehabilitation and unmined surroundings. Section 4.3.9 provides further discussion on the Project visual mitigation measures.

Landform Compatibility of the Integrated Waste Rock Emplacement

Some submitters raised concerns regarding the Project integrated waste emplacement design's compatibility with the surrounding land uses, including potential impacts on landscape character, or the potential for micro-climate effects in Muswellbrook.

Response

The Project waste emplacement geomorphic design and rehabilitation to maximise integration with surrounding land uses, meet existing requirements to establish native vegetation and maintain long-term hydrological stability is provided in Attachment 8 of the EIS, Appendix M of the EIS, other responses in this section and Section 4.3.9. With the implementation of these measures, the potential visual impacts of the Project Eastern Out-of-Pit Emplacement construction when viewed from Muswellbrook are reduced, and the mine landform is integrated with the adjoining unmined landscape (Plate 3).

Given the distance of the Project from Muswellbrook (i.e. located on the other side of the Hunter River floodplain), no observable climatic effects are anticipated to arise in Muswellbrook due to the Mount Pleasant Operation, or the Project.

Rehabilitation Obligations/Bond

A concern was raised that the Mount Pleasant Operations is owned by a foreign company and the profit of the Project would only be realised by the owners. Further, it was suggested that should the mine be forced to close early, or should the company go bankrupt, NSW taxpayers would be left with large rehabilitation costs, or the mine would be left unrehabilitated.

Response

The Economic Assessment conducted for the Project (Appendix O of the EIS) has considered the foreign ownership of MACH. In accordance with the *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015), the net benefit of the Project to NSW has been calculated as $855 million in net present value terms, without including any producer surplus (i.e. profit) that would be attributed to MACH.

Section 4.3.11 provides further information with respect to the rehabilitation bonding process implemented by the NSW Government. MACH complies with this process as part of the Mining Operation Plan, inclusive of providing increased or decreased security deposits based on changes to the facilities on-site and the area of land disturbed or rehabilitated in each Mining Operation Plan period. The rehabilitation bonding process has been specifically developed by the NSW Government to preclude the scenario raised in this submission from occurring.

4.1.2 Fines Emplacement Area

Regulatory Submissions

Fines Emplacement Area Closure Concepts

The NSW Resources Regulator requested some additional information on the rehabilitation objectives for the Fines Emplacement Area, including rehabilitation methodology and capping, the source of capping material, and post-mining runoff drainage from the emplacement.

Response

The overarching objective for rehabilitation of the Fines Emplacement Area is to establish a safe, stable and non-polluting landform with a sustainable surface cover that minimises erosion (to prevent exposure of the underlying fines material) and sustains grassland vegetation in the long-term. The final land use objective for the upper surface of the Fines Emplacement Area is use for agriculture (Section 4.1.1).

MACH operates the Fines Emplacement Area using sub-aerial deposition, which involves an extended period of air drying that maximises in-situ fine rejects densities and in turn maximises the storage efficiency of the facility as well as providing a more competent fines surface for future rehabilitation purposes. Other advantages of sub-aerial deposition include earlier facilitation of final rehabilitation due to a more competent fines surface and rapid recovery of water for reuse in the plant process. Secondary flocculation of fine rejects would also continue to occur, in order to improve fine coal reject density at the Fines Emplacement Area.

The current conceptual closure design is for the Fines Emplacement Area to be capped with a layer of inert overburden material from the open cut operations, and then a layer of topsoil. Notwithstanding, MACH would continue to develop the final landform rehabilitation concepts which will be guided by relevant industry guidelines, including the Australian National Committee on Large Dams (ANCOLD) *Guidelines on Tailings Dams* (2019). To support this process, MACH will continue to undertake periodic analysis of emplaced fines (e.g. in-situ geotechnical properties) and would consult with the NSW Resources Regulator on the findings of these analyses. Such a review is currently being conducted as part of ongoing consultation with the NSW Resources Regulator with respect to Stage 1 of the Fines Emplacement Area, which includes evaluation of potential fines capping options and requirements.

MACH has also entered into a collaboration agreement with the University of Newcastle on the Australian Coal Association Research Program (ACARP) Project “Tailings to topsoil” (#C29042) which commenced in January 2020 and is anticipated to be completed by December 2022. The outcomes of this study may also lead to some variation to final land use objectives, or rehabilitation techniques for the Fines Emplacement Area.

Based on the current closure concepts, post-mining drainage off the Fines Emplacement Area would be established following the progressive placement of capping material, topsoiling and rehabilitation. The final surface of the Fines Emplacement Area prior to capping would reflect the deposition strategy employed over the life of the Project. As the fine rejects deposit at a relatively low angle (Section 3.5.4 of the EIS), the facility fines surface and capping material would be gently sloping away from the primary locations of fine rejects deposition, effectively filling the majority of the valley in which the facility is located. By altering the location of fine rejects deposition within the facility over the life of the Project, MACH could alter the location of the decant pond on the fines surface, and minimise materials handling to establish its preferred post-mining drainage features.

The post-mining drainage design for the Fines Emplacement Area would be developed to maintain the facility in a manner that is safe, stable and non-polluting. Consistent with the Project Surface Water Assessment (Appendix D of the EIS), drainage from the Fines Emplacement Area surface would be directed back into the Sandy Creek catchment post-mining, to re-instate catchment excised during operation of the facility.

MACH's current conceptual post-mining drainage design for the Fines Emplacement Area includes:

- Placement of some additional inert overburden material at the toe of the embankment to facilitate an overall concave outer embankment slope varying from approximately 1:3 to 1:6 and designed to minimise concentration of incident runoff on the embankment.
- Placement of inert overburden material on the surface of the emplacement to facilitate rehabilitation capable of supporting low intensity agricultural use, with micro-relief installed as required to direct runoff to drainage channels.
- The final surface of the Fines Emplacement Area would be free-draining, with water only ponding during significant storm events to limit peak flows off the facility.
- Establishment of low gradient drainage features, bunds or other structures on the surface of the facility to direct incident rainfall off the facility at low velocity.
- Construction of an outlet channel for runoff collected on the surface of the facility through natural ground (e.g. a short cutting through in-situ rock) into the adjoining natural catchment, including the construction of any stilling or flow retention structures that may be required to minimise the potential for erosion, but still avoid development of a perched phreatic surface within the emplaced fines.

Based on the above, Golder Associates Pty Ltd has developed an initial conceptual post-mining design for the Project Fines Emplacement Area for MACH, that is illustrated on Plate 5. This initial design concept would be periodically revisited over the life of the Project in consultation with the NSW Resources Regulator as more data is collected on fines physical properties, and any updates would be documented in the Mount Pleasant Operation Rehabilitation Strategy and Rehabilitation Management Plan. This would include provision for settlement of the final surface based on consolidation observed during fines emplacement construction.

NGO and Public Submissions

Fines Emplacement Area Design and Water Management

One public submission raised concerns regarding the design of the Fines Emplacement Area, including:

- the ultimate height of the embankment relative to the elevation of the upstream valley;
- the need for a review of the fines emplacement strategy in accordance with Condition 52(d), Schedule 3 of Development Consent DA 29/97 (formerly Condition 5.1);
- whether the Fines Emplacement Area should be a declared dam under the *Dams Safety Act 2015*; and
- potential downstream impacts in the event of a dam failure (e.g. due to earthquake).

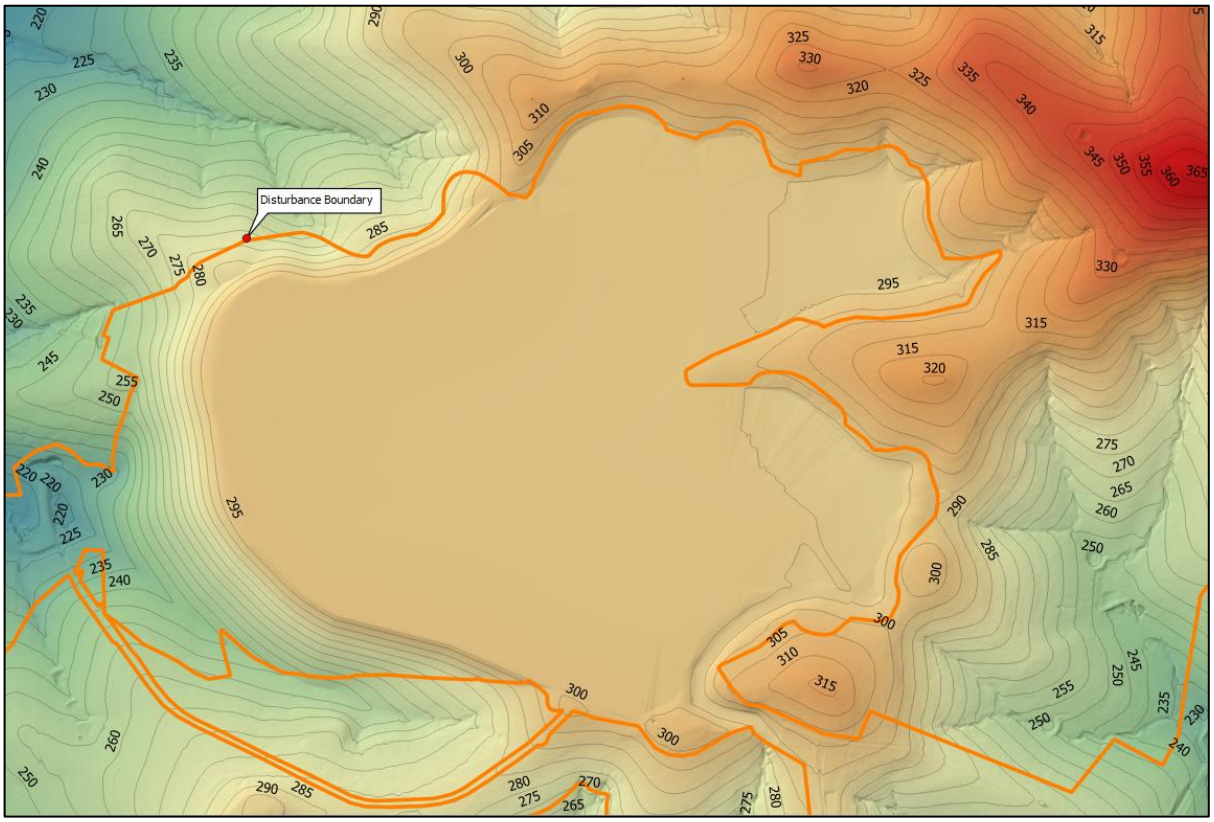


Plate 5 – Plan View of Post-Mining Concept - Fines Emplacement Area

Response

The Fines Emplacement Area described in the 1997 EIS consisted of a number of small storages in two separate valleys. Prior to development of the Fines Emplacement Area, the design was contemporised by MACH and currently comprises a single storage facility located in the northern area.

The Fines Emplacement Area is being constructed progressively in a series of stages (lifts) throughout the life of the operation, using the downstream embankment method. The downstream method involves construction of embankment lifts over the compacted downstream side of the embankment, as opposed to construction of lifts over deposited fine rejects (i.e. the upstream method). The Fines Emplacement Plan will be progressively updated with details of each stage.

The existing Fines Emplacement Area would continue to be progressively raised, using the downstream construction methodology, to increase the site fine reject storage capacity throughout the life of the Project. Six embankment raises would be required over the life of the Project, which would result in an ultimate crest height of approximately 299 m AHD to provide a full supply level of approximately 292 m AHD. The full supply level of 292 m AHD remains below the elevation of the valley upstream of the embankment (approximately 295 m AHD at its lowest point where the embankment joins the natural ridgeline).

The Fines Emplacement Area is a declared dam under the NSW *Dams Safety Act 2015*. MACH would continue to operate the Fines Emplacement Area under the NSW *Dams Safety Act 2015* for the Project, including construction and inspection requirements. MACH would also continue to consult with Dams Safety NSW regarding the management of the Fines Emplacement Area.

The design and operation of the Fines Emplacement Area is described in the Fines Emplacement Plan (Appendix 1 of the approved Waste Management Plan [MACH, 2019c]). The Fines Emplacement Area has been designed and is operated in accordance with the following guidelines (MACH, 2019c):

- *Guidelines on Tailings Dams Planning, Design, Construction, Operation and Closure* (ANCOLD, 2012a);
- *Guidelines on the Consequence Categories for Dams* (ANCOLD, 2012b);
- *Guidelines on Selection of Acceptable Flood Capacity for Dams* (ANCOLD, 2000);
- *Guidelines on Dam Safety Management* (ANCOLD, 2012c);
- *Guidelines for Design of Dams for Earthquakes* (ANCOLD, 1998);
- *Dam Safety Management Systems DSC2A* (NSW Dam Safety Committee [DSC], 2010a);
- *Surveillance Reports for Dams DSC2C* (NSW DSC, 2010b);
- *Operation and Maintenance for Dams DSC2F* (NSW DSC, 2010c);
- *Emergency Management for Dams DSC2G* (NSW DSC, 2010d);
- *Consequence Categories for Dams DSC3A* (NSW DSC, 2010e);
- *Acceptable Flood Capacities for Dams DSC3B* (NSW DSC, 2010f);
- *Acceptable Earthquake Capacities for Dams DSC3C* (NSW DSC, 2010g);
- *Tailings Dams DSC3F* (NSW DSC, 2010h); and
- *General Dam Safety Considerations DSC3G* (NSW DSC, 2010i).

Accordingly, the potential downstream risks of the Fines Emplacement Area have been appropriately managed in accordance with the NSW *Dams Safety Act 2015*. Periodic review of the fines emplacement strategy would continue to be undertaken over the life of the Project, consistent with any Development Consent conditions set by the consent authority.

4.1.3 Final Void

Regulatory Submissions

Relationship Between Waste Rock Emplacement Height and Void Size

The Muswellbrook Shire Council noted that the elevation of the integrated waste rock emplacement could have been lower, and therefore have lesser effects on local topography, if more of the Project waste rock material was used to backfill the final void.

The Muswellbrook Shire Council further stated that it considers MACH has not sufficiently considered the potential socio-economic effects on the community, and the objects of the EP&A Act, in the Project landform design.

Response

The originally approved Mount Pleasant Operation final landform included two final voids associated with the North Pit and South Pit open cuts and a smaller third final void located in a low-lying area between the two larger final voids. Initial mine planning completed for the Project resulted in a residual final void that spanned the full length of the western side of the Project open cut. The initial final void was based on full mined-out strips to the base of the Edderton Seam and was rectangular in shape.

However, in response to feedback from regulatory and community stakeholders, MACH has re-designed the final void to:

- backfill approximately 1.5 km of the northern part of the final void;
- reduce the depth of the final void in the North and Central Pit areas and decrease the slope of the internal batters;
- apply geomorphic design concepts to parts of the Project landform that drain to the final void; and
- push down the western highwall to an overall angle of approximately 18°.

As a result of the above, the final void is considered safe, geotechnically stable and minimises the catchment reporting to the void whilst maintaining geomorphic design concepts (i.e. providing sufficient slope length to improve post-mining stability and reduce long-term erosion risk).

In comparison, the rehabilitation costs for a no-void mine plan would increase by over $1 billion relative to the rehabilitation costs associated with the Project final landform. These additional rehabilitation costs would render the Project uneconomic. In addition to the significant additional rehabilitation costs, the no-void scenario would result in the following:

- Re-handling of a significant proportion of the Project integrated waste rock emplacement (i.e. over 400 million cubic metres of waste rock), which would extend air and noise emissions over a significantly longer duration.
- Mining inefficiencies and environmental risks associated with rehandling emplaced coal rejects and potentially acid forming (PAF) material associated with the Wynn Seam.
- Delays to the establishment of woodland rehabilitation until emplacement areas reach the final landform surface, or disturbing significant areas of Project native woodland rehabilitation that would be well-established (i.e. up to approximately 20 years old).
- Storage of topsoil for extended periods of time, reducing its value for rehabilitation.

Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) (2020a) has also assessed the implications on the groundwater system if the void were to be backfilled (Plate 6). The groundwater modelling indicates that, if the void were to be backfilled, the increased recharge associated with the spoil is expected to result in groundwater mounding in the backfilled spoil material and groundwater migrating away from the Mount Pleasant Operation final landform (i.e. increased seepage of water from the backfilled waste rock material to the Hunter River alluvium). This would be inconsistent with the current rehabilitation objectives for final voids, which require Mount Pleasant Operation final voids to be designed as long-term groundwater sinks to maximise groundwater flows across backfilled pits to the final void.

It is also noted that the MEG stated the following with respect to the landform design and final void:

> *The Proponent is very conscious of the visual aspects of the mine due to the proximity of the mine to Muswellbrook. This in part has affected the mining design and order of operations to date. The final landform has been designed to look natural through the implementation of geomorphic landform design and the final void will be hidden behind from view.*

MACH would continue to consider final void land use options over the life of the Project, including potential beneficial uses of the final void (e.g. for off-river storage of supplementary water flows in the Hunter River).

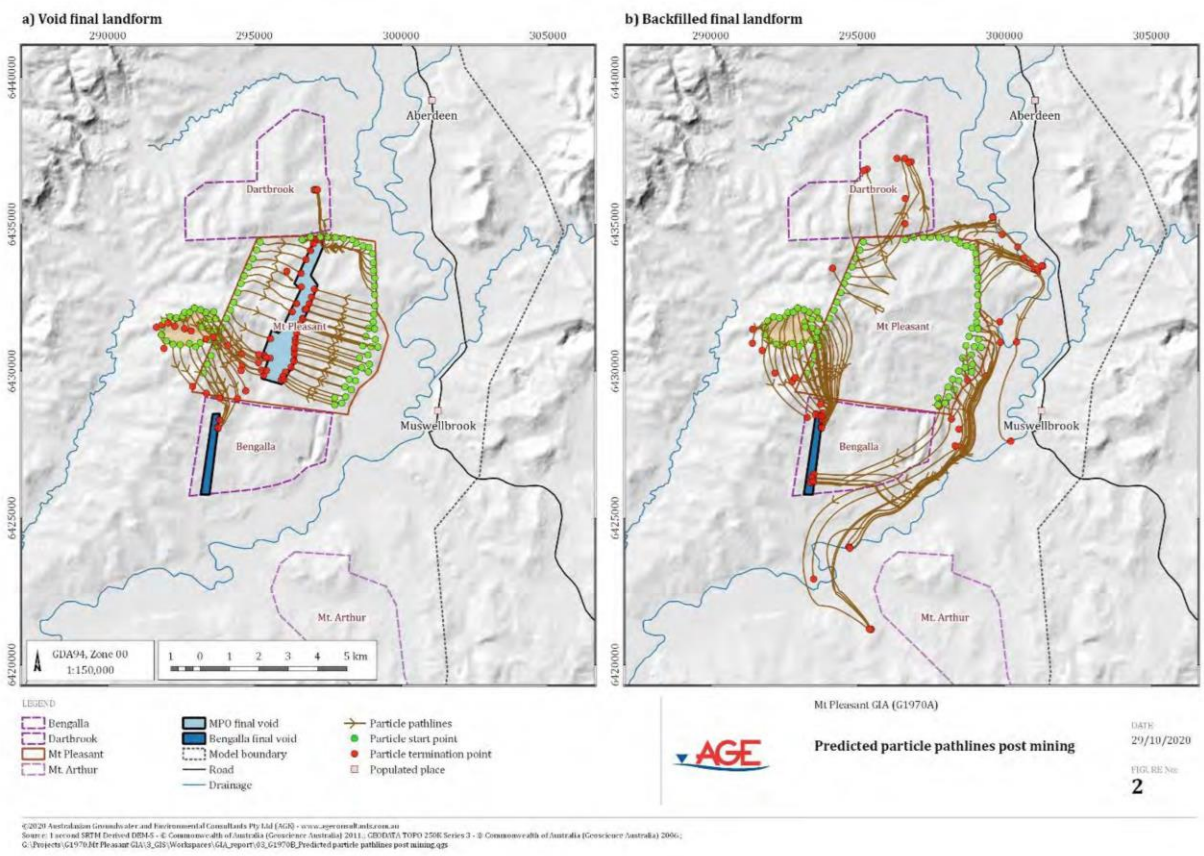


Plate 6 – Comparative Particle Pathline Analysis Post-Mining
Source: Attachment 8 of the EIS.

Public and NGO Submissions

Project Final Landform Incorporating a Void

Some concerns were raised in public and organisation submissions regarding the justification for the final void in the Project final landform, rather than fully backfilling the void as part of site rehabilitation, or potential cumulative impacts with the Bengalla Mine void.

Response

The potential cumulative effects of mining on water resources, including the approved Bengalla Mine and Mt Arthur Coal Mine final voids and the single Mount Pleasant Operation final void as proposed for the Project has been conducted and is presented in Appendices C and D of the EIS.

The currently approved final landform (based on mining to December 2026 only) includes one final void in South Pit (Section 2.2.10 of the EIS). The originally approved Mount Pleasant Operation final landform includes two final voids associated with the North Pit and South Pit open cuts and a smaller third final void located in a low-lying area between the two larger final voids (Section 2.2.10 of the EIS).

Please refer to the response to the Muswellbrook Shire Council submission above, with respect to the justification of inclusion of a final void in the Project final landform.

Final Void Water Quality and Levels

Concerns were raised in a number of submissions regarding the potential for concentration of dissolved salts and contaminants in the final void over time, the long period required for the pit lake to reach a water level equilibrium, or the accuracy of long-term final void modelling.

Response

Once mining operations cease, groundwater inflows to the final void would no longer be collected and pumped out, and as a result, the void would gradually begin to fill with water. Water in other on-site operational storages may also be transferred to the final void to facilitate decommissioning and rehabilitation. Without further management, inflows into the final void would comprise incident rainfall, runoff within the final void catchment area and groundwater.

At the equilibrium water level (90 m AHD) (Figure 7-16 of the EIS), the void would act as a groundwater sink (Appendix C of the EIS). The Project involves the deepening and continued operation of the open cut in a westerly direction. As a result, the final void would be located closer to the Fines Emplacement Area, drawing seepage towards the void as opposed to the Sandy Creek alluvium. The increased depth of the final void would also increase the hydraulic gradient from the Eastern Out-of-Pit Emplacement towards the final void, reducing the potential for seepage towards the Hunter River alluvium.

The accumulation of surface runoff combined with groundwater inflows would result in the formation of a pond of water in the void which would rise until the average rate of inflow is balanced by evaporation from its surface. Equilibrium levels would be reached slowly over a period of more than 500 years. Final void salinity levels would thereafter increase slowly as a result of evapo-concentration.

It is noted that the post-mining final void equilibrium water level and quality of the final void could be highly influenced by the post-mining use of the site. The EIS water resources assessments have conservatively modelled the behaviour of the void if no further management of the void waterbody was undertaken post-mining. However, the significant storage capacity of the void and the potential availability of the Project's Hunter River pump station and associated water pipeline may also provide opportunities for alternative uses of the void post-mining (e.g. off river floodwater storage). Such opportunities could involve the ongoing management of water inputs and outputs to minimise, or delay, long-term concentration of salts occurring in the final void waterbody.

MACH also recognises that government and community stakeholders may identify final land uses that provide greater net benefits to the locality. MACH would encourage and be supportive of other community and government proposals or initiatives for the use of MACH land or infrastructure that can co-exist with the Project. These alternative final land uses would be subject to separate assessments and approval, and do not form part of the Project. A Mine Closure Plan would be developed for the Project in consultation with relevant regulatory authorities and community stakeholders. It is anticipated that this would include further consideration of planned post-mining uses of the final void, and would utilise additional data collected over the life of the operation to review and update final void water quality modelling to reflect post-mining uses that are proposed at that time.

Final Void Topography

Some public submissions raised a concern that the final void may trap wildlife.

Response

The range of slopes in the Project final void would be consistent with natural landforms in the region, and therefore would not be expected to form a material barrier to wildlife movement post-mining.

4.2 PROCEDURAL MATTERS

NGO and Public Submissions

EIS Exhibition Period

A number of submitters raised concerns regarding the time allocated for the public to review and consider the EIS considering its length and comprehensiveness, and/or limited access to EIS hard copies.

Response

The NSW Government determines the assessment requirements for SSD EIS's by setting the Secretary's Environmental Assessment Requirements (SEARs), and also sets the requirements for, and manages the public exhibition of, EISs for major projects.

MACH understands that the minimum time required for public exhibition of EISs is defined by statutory requirements, and the DPIE exhibited the Project EIS for longer than the period required. The NSW Government has also implemented a range of measures to adapt to the COVID-19 pandemic, including phasing out the availability of hard copies of EIS's at exhibition locations.

Adequacy of the Biodiversity Conservation Act to Address Impacts of Mining

Some submitters questioned the adequacy of the new Biodiversity Offset Policy to address the impacts of mining projects.

Response

MACH understands that the purpose of the NSW *Biodiversity Conservation Act 2016* (BC Act) under which the Project is assessed is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of Ecologically Sustainable Development (ESD). Under this Act, the Minister for the Environment has set out a Biodiversity Assessment Method that adopts a standard that will result in no net loss of biodiversity in NSW.

MACH is required to assess the Project in accordance with NSW Government assessment requirements as set out in the SEARs and comply with applicable NSW or Federal legislation, including the Biodiversity Assessment Method. Further detail on the assessment of the Project under the Biodiversity Assessment Method is provided in the BDAR (Attachment G).

Consultation and Advertising in Aberdeen

Some submissions suggested there had been insufficient consultation or advertising regarding the Project in Aberdeen.

Response

MACH has implemented a range of measures to inform the local community (including, where relevant, the Aberdeen community) regarding the Project, including:

- Regular Project updates through MACH Community Newsletters, included in December 2019, May 2020 and December 2020 issues distributed in the local community (refer Section 6 of the EIS).
- Letterbox drop of a flyer in July 2020, which included a brief overview of the Project and a link to MACH's website, and an invitation to participate in the community survey for the SIA.

- Public notification advertisement of the Project Development Application in January/February 2021 through the following:
  - Aberdeen Whisper;
  - Singleton Argus;
  - Muswellbrook Chronicle; and
  - Newcastle Herald.
- Advertisement of the public EIS drop-in sessions held in Muswellbrook (refer Section 3.2) in January/February 2021 through the following:
  - Aberdeen Whisper;
  - Hunter River Times;
  - a letterbox drop of flyers; and
  - local AM radio.
- Ongoing consultation with proximal potentially affected landholders who wish to be consulted (Section 3.2).

Project overview information has also been publicly available on MACH's website since June 2020.

4.3 ENVIRONMENTAL MATTERS

4.3.1 Air Quality

Regulatory Submissions

Clarification of Proactive/Reactive Mitigation Measures Modelled

The EPA requested additional information regarding the proactive/reactive air quality mitigation measures that were adopted in the cumulative 24-hour average $PM_{2.5}$[5] and PM_{10}[6] assessment, including the:

- activities modified;
- number of hours/days modified and associated meteorological conditions;
- monitoring data utilised; and
- sensitive receivers that would benefit from the modelled mitigation measures.

The EPA also requested evidence of the historic use of the proactive/reactive mitigation measures adopted to successfully mitigate air quality emissions, and details of any required changes to the existing operational conditions within EPL 20850 that trigger the implementation of similar measures.

[5] Particulate matter with an equivalent aerodynamic diameter of 2.5 micrometre (µm) or less.
[6] Particulate matter with an equivalent aerodynamic diameter of 10 µm or less.

Response

The proactive/reactive dust mitigation measures adopted in the cumulative 24-hour average analysis of $PM_{2.5}$ and PM_{10} in the Project Air Quality Assessment (Appendix B of the EIS) involved pausing mining activities in open cut and overburden emplacement areas. As such, the results presented with the implementation of the proactive/reactive dust mitigation measures include the continuation of CHPP-related activities, as well as emission sources that cannot be paused under adverse conditions (e.g. wind erosion of exposed areas).

The analysis included implementing the proactive/reactive dust mitigation measures only on days when an exceedance of the relevant criterion was predicted in the absence of such measures. As the intent of the assessment was to confirm whether the application of feasible proactive/reactive mitigation measures would address the predicted exceedances, the measures were simply applied on each of the applicable days (rather than for only the period required in the day to achieve compliance).

MACH currently operates a real-time dust monitoring and management system at the Mount Pleasant Operation, which includes various triggers for management actions that are unique to each real-time air quality monitor. That is, when relevant meteorological conditions (i.e. winds toward receivers) occur, various levels of dust management actions are implemented based on the levels of dust recorded. The temporary operational changes implemented include relocating operations to less exposed areas, increasing watering rates and progressively shutting down mobile equipment.

To demonstrate how existing proactive/reactive triggers would continue to operate over the life of the Project, Todoroski Air Sciences (2021a) has undertaken some additional analysis to incorporate the Mount Pleasant Operations' existing dust management triggers into the modelling results at a number of representative receivers to review their effectiveness.

The results of this analysis are described in Attachment B. The analysis indicates that the existing monitoring and management system would be effective at mitigating elevated dust at nearby receptors with minor augmentations later in the Project life (e.g. relocating monitoring sites as the mining operations move further west).

With respect to the receivers that would benefit from proactive/reactive mitigation measures, the nature of such dust mitigation measures means that most receivers would benefit to some degree, even if they are not downwind of activities that are modified, or a significant distance from activities.

MACH currently implements proactive/reactive mitigation measures both when required in accordance with Conditions O3.4 to O3.9 of EPL 20850, as well as during other very adverse conditions. As reported in the *Mount Pleasant Operation 2020 Annual Review & Annual Rehabilitation Report* (MACH, 2021a), MACH shut down all items of major mobile fleet for 86 hours each in 2020 as per Conditions O3.4 to O3.9 of EPL 20850, and operations were also ceased due to the generation of visible dust for a total of 617 hours across the mining fleet.

The dust management triggers within the Air Quality and Greenhouse Gas Management Plan (MACH, 2019a) and Conditions O3.4 to O3.9 of EPL 20850 were designed to protect residents of Muswellbrook from potential adverse air quality impacts and maintain compliance at the nearest private residences.

The relevant meteorological conditions and dust trigger levels would be reviewed and updated as the mine progresses as part of regular reviews of the Air Quality and Greenhouse Gas Management Plan, which would allow for ongoing adaptive management.

Todoroski Air Sciences (2021a) has also provided some further advice to address the EPA's query, including clarifying the background monitoring data used at each assessed location, and reviewing the number of days with elevated PM_{10} levels at the Muswellbrook NW monitor since the commencement of the Mount Pleasant Operation (to confirm the effectiveness of MACH's dust mitigation strategy). The additional information is provided in Attachment B.

Expansion of Cumulative 24-hour $PM_{2.5}$ and PM_{10} Analysis

The EPA requested the documentation of potential cumulative 24-hour $PM_{2.5}$ and PM_{10} results be expanded to include some additional sensitive receivers, including receptors in Muswellbrook and isolated rural receivers that are not currently subject to acquisition upon request for potential air quality or noise impacts (i.e. to review results for a selection of receivers more distant from the Project).

Response

The cumulative 24-hour PM_{10} and $PM_{2.5}$ analysis conducted for the Project Air Quality Assessment (Appendix B of the EIS) covered more sensitive receivers than would typically be included in such an assessment. Receivers were selected in all directions surrounding the Project, with the receivers most likely to exceed the applicable criterion (i.e. closest to the Mount Pleasant Operation) selected.

Notwithstanding, Todoroski Air Sciences (2021a) has further expanded the analysis as per the EPA's request. The analysis includes five additional receivers, with one isolated rural receptor to the north (169), one isolated rural receptor to the north-east (86b), one isolated rural receiver to the east (86a), a receiver near the racecourse area of Muswellbrook (225) and a receiver on the western outskirts of Muswellbrook (783). It is noted that this analysis for $PM_{2.5}$ is inherently conservative, in that it applies $PM_{2.5}$ measured levels from Muswellbrook as the daily background $PM_{2.5}$ level for all of these receivers, irrespective of their location.

The expanded analysis indicates the receivers modelled may experience a small number of additional exceedances of the applicable criteria in the absence of the proactive/reactive mitigation that is currently applied by the Mount Pleasant Operation. However, the implementation of proactive/reactive dust mitigation measures would avoid the predicted exceedances of the cumulative criteria.

The expanded analysis confirms that the implementation of proactive/reactive dust mitigation measures is effective and therefore the findings of the Project Air Quality Assessment remain unchanged. Todoroski Air Sciences' additional analysis is provided in Attachment B.

It is noted that the dust management triggers within the Air Quality and Greenhouse Gas Management Plan (MACH, 2019a) include temporary operational measures such as relocating operations to less exposed areas, increasing watering rates and progressively shutting down equipment as well as the application of reactive controls under Conditions O3.4 to O3.9 of EPL 20850 as described above.

Derivation of Annual Average Background Air Quality Levels

The EPA requested additional details of the past mining activities modelled to determine residual (non-mining) annual average background levels, including:

- confirmation that the emission estimation and model setup is consistent with that used to model the Project, or justification for any differences;
- clarification of, and justification for, the activity rates used to model past mining activities; and
- additional discussion regarding the representativeness of the non-mining background air quality levels.

The EPA also requested clarification of the air quality monitoring stations and particulate concentration data used in the analysis.

Response

Todoroski Air Sciences (2021a) has confirmed that the methodology used to model the past mining activities of other operations was consistent with that used to predict the potential impacts of the Project. Further, the methodology is the same approach as that used in the *Mount Pleasant Operation Mine Optimisation Modification Air Quality and Greenhouse Gas Assessment* (Todoroski Air Sciences, 2017) for the Mine Optimisation Modification (Mod 3). A similar methodology has also been adopted for other recent SSD projects, such as the approved Maxwell Underground Project. This approach to determine background air quality has been subject to previous regulatory scrutiny for these assessments, and deemed to be appropriate to account for varying mining contributions over time.

With regard to the activity rates used to model past mining activities, extraction rates were drawn from the available annual review documentation for each mine, rather than relying on the approved levels of activity (which is required when considering future scenarios). Given the actual (documented) activity rates and monitoring data across a number of years was used, the derived non-mining background levels are considered representative and appropriate for modelling. A summary of the measured levels of PM_{10}, total suspended particulates (TSP) and dust deposition and the associated model prediction at each air quality monitor in 2012 to 2015 (i.e. the data underpinning the non-mining background air quality levels adopted) is provided in Attachment B.

Clarification of Monitoring Stations used to Establish 24-hour Average Background PM_{10} Levels

The EPA requested confirmation of the background air quality monitoring stations used at each receiver for the cumulative 24-hour average PM_{10} analysis, and discussion of the representativeness of the background levels used.

Response

Todoroski Air Sciences (2021a) has clarified which monitoring stations were used for each sensitive receiver included in the cumulative 24-hour $PM_{2.5}$ assessment, as well as documenting the same for the additional receivers assessed in response to the EPA's request. These details are provided in Attachment B.

Clarification of Receivers Subject to Acquisition upon Request Rights due to PM_{10}

The Project Air Quality Assessment (Appendix B of the EIS) describes eight sensitive receivers that are predicted to exceed the Project-only 24-hour average PM_{10} criterion, which would therefore be afforded acquisition upon request rights for the Project. For these receivers, the EPA requested confirmation of the current acquisition upon request status, noting a potential discrepancy between the description provided in Section 7.1.2 of the assessment (predicted Project-only 24-hour average impacts) and Appendix A of the assessment (receiver location figure that shows the existing acquisition/mitigation upon request rights status under Development Consent DA 92/97).

Response

Section 7.1.2 of the Project Air Quality Assessment (Appendix B of the EIS) notes that receivers 154 and 154b are not currently subject to acquisition upon request under Development Consent DA 92/97, however, receiver 154 is subject to mitigation upon request rights for approved noise impacts. The other six receivers with predicted Project-only 24-hour average PM_{10} exceedances are noted as being subject to acquisition upon request for approved noise impacts. This is consistent with the presentation of receivers in Appendix A of the Project Air Quality Assessment. Section 7, Figure 7-9 of the EIS presents an overview of the private receivers predicted to exceed the relevant criteria for either air quality or noise impacts for the Mount Pleasant Operation incorporating the Project.

Upper Hunter Air Quality

The Upper Hunter Shire Council stated that air quality in the Upper Hunter has declined since the commencement of the Mount Pleasant Operation, specifically referring to the number of air quality alerts and exceedance days of the 24-hour average PM_{10} criterion at Aberdeen in 2019 and 2020. The Upper Hunter Shire Council also suggested that dust emissions from the Project would exacerbate existing air quality issues.

Response

Review of Upper Hunter Air Quality Monitoring Network (UHAQMN) data recorded at Aberdeen (24-hour average PM_{10} concentrations) does not indicate a decline in air quality since the commencement of the Mount Pleasant Operation (refer to Table 2 of Attachment B). However, regional air quality did markedly deteriorate during the extended drought conditions from 2017 to Summer 2019 and bushfire activity in Spring and Summer 2019, as described in the DPIE's UHAQMN reports (DPIE, 2020b-c).

Some recorded exceedances in recent years have also been attributed to long-range transport of dust by major weather events (e.g. from South Australia) (DPIE, 2020d). Since the spike in recorded exceedances during 2019 and early 2020 due to the drought conditions and bushfires, air quality exceedance days in Aberdeen have fallen dramatically. Notably, no exceedances of the 24-hour average PM_{10} criterion of 50 micrograms per cubic metre ($\mu g/m^3$) have been recorded in the period January to May 2021.

The Project Air Quality Assessment (Appendix B of the EIS) modelled a number of receivers in Aberdeen, and the results indicated that the Project would not contribute to any predicted exceedances of applicable air quality criteria at modelled residences in the Village of Aberdeen, which is approximately 5 km north of the Project.

NGO and Public Submissions

General Air Quality Impacts

Some submitters raised concerns regarding the potential air quality impacts of the Project generally, particularly concerns regarding Muswellbrook air quality, due to the prevailing meteorological conditions and proximity of the Mount Pleasant Operation, and the potential for increased ROM coal extraction to increase dust levels.

Response

MACH acknowledges that, given the prevailing meteorological conditions, the Mount Pleasant Operation has the potential to generate dust emissions that could impact the township of Muswellbrook, if appropriate management actions are not utilised. In consideration of this, the Mount Pleasant Operation employs a wide range of best practice dust avoidance and minimisation strategies, including real-time monitoring, predictive modelling and proactive/reactive mitigation measures (e.g. watering haul roads and stockpiles, temporarily ceasing operations).

As described above in response to an EPA query regarding the dust mitigation methods modelled, MACH currently implements proactive/reactive mitigation measures (including ceasing operations) both when required in accordance with Conditions O3.4 to O3.9 of EPL 20850, as well as during other very adverse conditions. As reported in the *Mount Pleasant Operation 2020 Annual Review & Annual Rehabilitation Report* (MACH, 2021a), MACH shut down all items of major mobile fleet for 86 hours each in 2020 as per Conditions O3.4 to O3.9 of EPL 20850, and operations were also ceased due to the generation of visible dust for a total of 617 hours across the mining fleet. Todoroski Air Sciences' (2021a) review of UHAQMN monitors near the Mount Pleasant Operation indicates these measures have been effective in minimising the impact of the mine on the township of Muswellbrook. The Project would involve the continuation of these proactive/reactive mitigation measures.

It is also acknowledged that, in the absence of further mitigative actions or change in source location, increasing ROM coal extraction and overburden handling rates would logically increase Mount Pleasant Operation dust emissions. However, the Project mine plan incorporates gradual, staged increases to the ROM coal extraction rate to 15.75 Mt in 2028 and 21 Mt in 2034, based on the proximity of mining activities to sensitive receivers and the presence of topographic shielding. The staged increases to ROM coal extraction and continued application of proactive and reactive dust mitigation measures would be effective in controlling dust emissions to minimise potential impacts on sensitive receivers in Muswellbrook.

Impacts on Proximal Rural Properties

Concerns were raised in some submissions regarding potential air quality impacts on proximal rural properties, in particular amenity impacts such as increased cleaning requirements and impacts on tank water.

Response

Amenity impacts associated with air quality, such as the potential for increased cleaning requirements, are due to the deposition of larger particles of particulate matter, referred to as dust. The Project Air Quality Assessment (Appendix B of the EIS) included an assessment of potential dust deposition levels. The assessment indicated that the Project would not contribute to an exceedance of the relevant dust deposition level criteria for Project-only impacts or cumulative impacts at any sensitive receivers. Notwithstanding, it is anticipated that any Development Consent for the Project would include conditions that afford acquisition and mitigation upon request rights to the owners of the most proximal privately-owned properties with predicted Project exceedances of relevant air quality criteria (i.e. PM_{10} and $PM_{2.5}$ criteria).

Existing Mount Pleasant Operation Air Quality Management

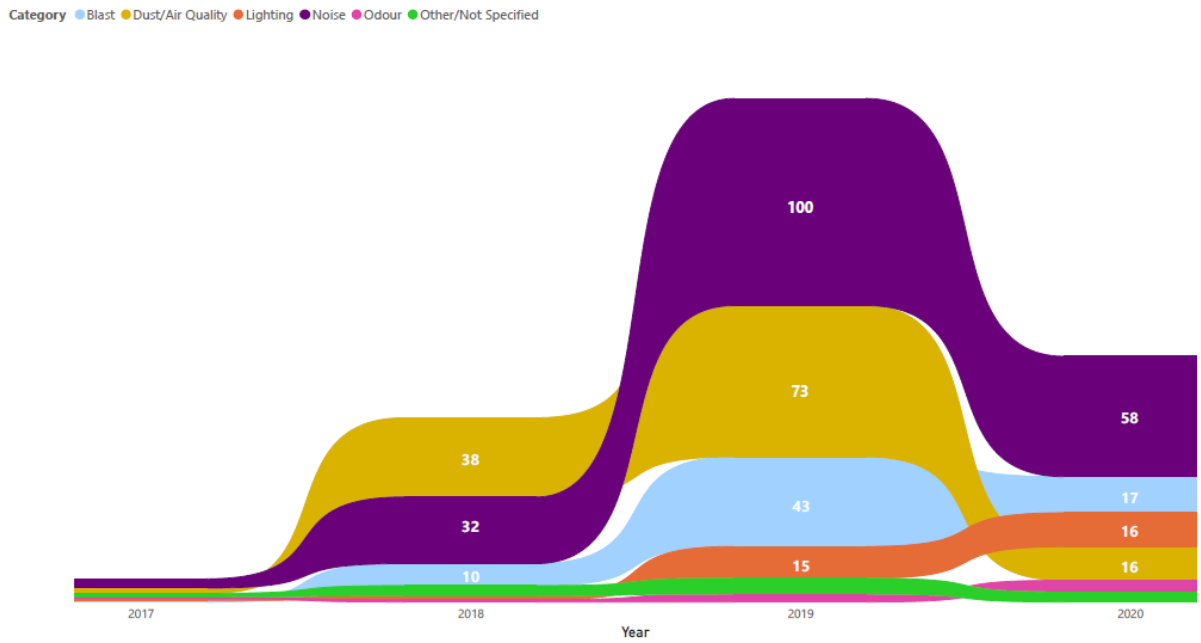
Some submitters raised concerns regarding air quality management at the existing Mount Pleasant Operation, with specific reference to an increase in air quality-related complaints from 2018 to 2019, as well as the findings of the 2020 Independent Environmental Audit.

Response

As described above in response to general concerns regarding air quality, MACH currently implements a wide range of best practice dust avoidance and minimisation strategies, including real-time monitoring, predictive modelling and proactive/reactive mitigation measures (e.g. watering haul roads and stockpiles, temporarily ceasing operations), and these strategies are effective in minimising the impact of the Mount Pleasant Operation on dust levels in Muswellbrook.

In regard to the 2020 Independent Environmental Audit, it is acknowledged the auditor considered that additional dust management measures could have been implemented during the relevant site visit. However, as described in the *Mount Pleasant Operation 2020 Annual Review & Annual Rehabilitation Report* (MACH, 2021a), the auditor's comments are in relation to a subjective visual trigger, and the personnel on the ground considered no further action was required at the time based on the level of dust observed. Of note, the auditor included commentary that the activities in question were a significant distance from the site boundary and sensitive receivers, with light winds that were not toward key receivers, and thus they considered the likelihood of off-site impacts was low.

As highlighted in some submissions, air quality-related complaints received at the Mount Pleasant Operation did materially increase in 2019. However, complaints received on-site can be reflective of regional or national dust events. Air quality-related complaints received by the Mount Pleasant Operation increased during the extended drought conditions experienced in 2017-2019. Since the drought conditions broke in 2020, air quality-related complaints received have materially reduced (Graph 1). An example of complaints being reflective of regional events, rather than local mining operations, occurred on 8 and 9 August 2019. On these days, all operations at the Mount Pleasant Operation were ceased in response to real-time monitoring and associated dust management protocols. A number of air quality-related complaints were received after all mining activities in the open cut and overburden emplacement areas were ceased on these days. However, the DPIE's UHAQMN report for Winter 2019 (DPIE, 2020d) indicated that elevated air quality levels on these days were an exceptional event which arose due to long-range transport of dust from South Australia.



Graph 1 – Complaints Analysis 2017 - 2020

Existing Airshed Constraints

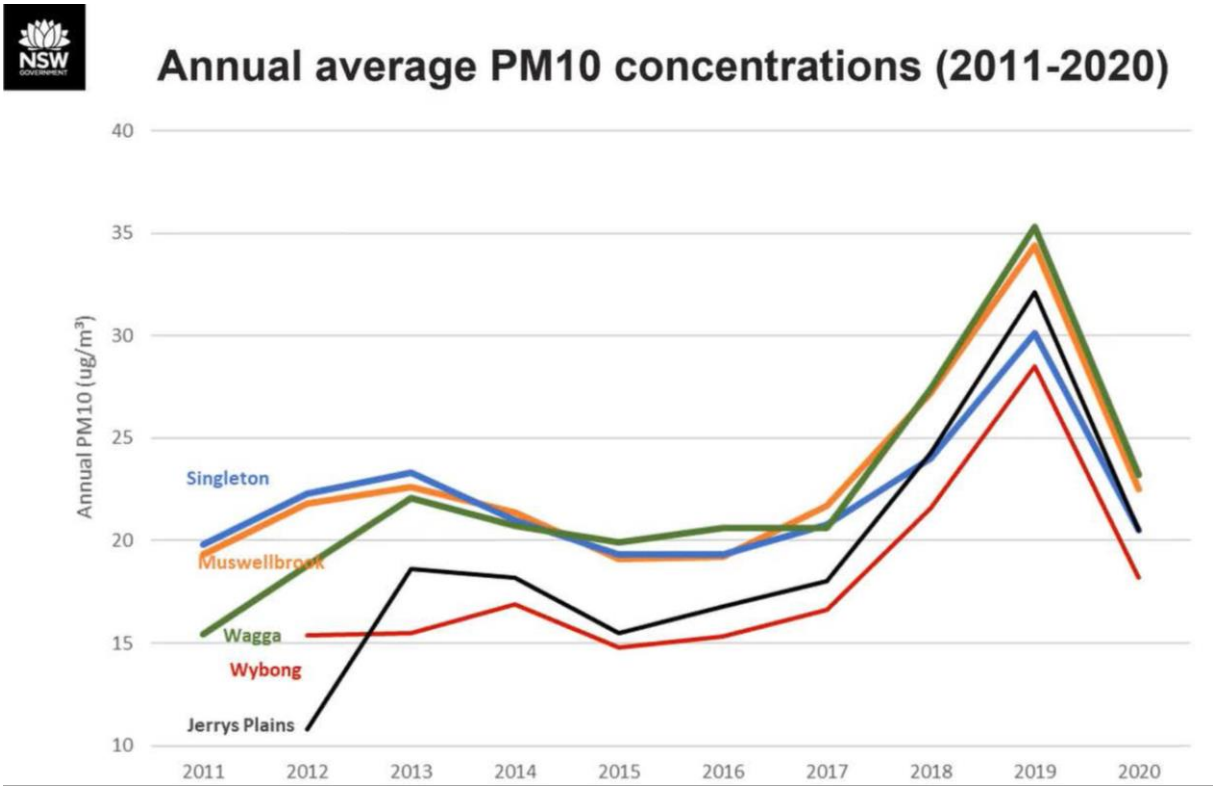
Concerns were raised that air quality in the region is poor, with cumulative emissions from mining operations already perceived to be unacceptable, with particular reference to recorded particulate matter levels in Muswellbrook or Aberdeen.

Response

Reference to recorded elevated particulate matter levels out of context can be problematic. This is particularly true when referencing regional particulate levels recorded at the height of the 2017-2019 drought, and during the major bushfires of the Summer 2019-2020 period.

The DPIE, in a recent presentation to the Independent Planning Commission (IPC) for the Mangoola Coal Continued Operations Project, presented the trends in recorded PM_{10} levels in areas with various levels of perceived impact from mining (DPIE, 2021). This included areas in the Hunter Valley perceived to be materially impacted by mining (Muswellbrook, Singleton and Jerrys Plains), along with an area in the Hunter Valley with little impact from mining (Wybong) and a regional location not impacted by mining, but subject to agricultural activities and continental dust (Wagga Wagga) (Graph 2). The representative of the DPIE highlighted that the trends were very similar across the various locations that were and were not in mining localities, and climatic factors such as temperature and rainfall were explored (DPIE, 2021; IPC, 2021).

The downward trend in recorded particulate matter levels following the break in drought conditions during 2020, while mining operations in the region continued to operate, indicates air quality in the region is not in a highly constrained state, as asserted in some submissions.



Graph 2 – Trends in recorded PM_{10} levels at various locations
Source: DPIE, 2021.

Please refer to the responses above with respect to predicted Project air quality levels in Muswellbrook and Aberdeen.

Background Air Quality

Concerns were raised in some submissions that the background air quality levels used in the assessment did not account for elevated levels in Muswellbrook, which are above national standards.

Response

The Project Air Quality Assessment (Appendix B of the EIS) included a robust analysis of background air quality levels for modelling purposes, consistent with other similar projects. This involved estimating the contribution of existing mining operations to historical air quality levels, to determine a 'non-modelled' background level. For the Project, the annual average 'non-modelled' background PM_{10} levels were based on a large number of monitoring locations (including monitoring stations in Muswellbrook), and therefore a spatially-varying background level was applied, as shown on Figure 6-10 of the Project Air Quality Assessment (Appendix B of the EIS). Further, a conservative, elevated annual average 'non-modelled' background $PM_{2.5}$ level was adopted for a large number of receivers on the edge of Muswellbrook.

With regard to potential 24-hour average impacts, the Project Air Quality Assessment (Appendix B of the EIS) summed the estimated contribution from the Project with the recorded levels from the nearest UHAQMN monitor. For some receivers, this included the use of monitoring data recorded in Muswellbrook. Further detail regarding the background air quality levels used for the Project Air Quality Assessment is included above in response to a request for clarification from the EPA (Attachment B).

Mine-owned Properties

A submission raised concern regarding a perceived lack of assessment of potential air quality impacts on mine-owned receivers.

Response

The Project Air Quality Assessment (Appendix B of the EIS) included estimating potential air quality impacts at a number of mine-owned receivers, with results included in Appendix D of the Project Air Quality Assessment (Appendix B of the EIS).

Application of the Voluntary Land Acquisition and Mitigation Policy

A submission queried the application of the Voluntary Land Acquisition and Mitigation Policy (VLAMP) air quality criteria in the Project Air Quality Assessment (Appendix B of the EIS), and in particular, that each individual year over the life of the development was not assessed explicitly.

Response

Todoroski Air Sciences has confirmed that the VLAMP air quality criteria have been applied correctly for the Project. That is, the assessment accounts for 'extraordinary events' that result in very high background levels on particular days. The assessment also assesses a number of scenarios across the Project life, with a focus on those scenarios most likely to cause the greatest impacts at sensitive receivers. Todoroski Air Sciences' detailed response on this matter is provided in Attachment B.

Justification for Silt Contents and Haul Road Dust Control Factors Adopted

A submission queried the haul road silt content factor and haul road control factors adopted in the emission inventory for the Project.

Response

Todoroski Air Sciences has clarified that the silt content adopted for haul roads is consistent with that used in previous assessments, and the value is based on measurements commissioned at an adjacent mine prior to the commencement of the Mount Pleasant Operation. Todoroski Air Sciences also reviewed the Pollution Reduction Programs for the Bengalla Mine, Muswellbrook Coal Mine, Mount Thorley Wakworth Mine and the Hunter Valley Operations, and noted that the value adopted is greater (more conservative) than the average measured silt level of those operations (Attachment B).

With regard to the haul road control factors adopted, the emission inventory tables within Appendix C of the Project Air Quality Assessment (Appendix B of the EIS) describe that a control factor of 80% was adopted for overburden haul routes, while a control factor of 90% was applied for main coal haul routes. This reflects the fact that overburden haul routes are temporary and change as the mine progresses, whereas the main coal haul routes are typically permanent and a higher level of dust control can be achieved through regular maintenance and the type of construction methods used (Attachment B).

Activity Rates Adopted for 24-hour Average Impacts

A submission raised a concern that the assessment of 24-hour average impacts is based on annual emission inventories, rather than on potential peak activity rates.

Response

Given the Mount Pleasant Operation is a large-scale coal mine, activity rates do not significantly change day-to-day, unlike small quarries and batching operations, where the daily activity rates can be heavily influenced by market demands (Attachment B). The emission estimation and dispersion modelling methodologies applied are consistent with those applied for other major coal mine air quality assessments and are considered reliable and appropriate.

Adequacy of the Project Air Quality Assessment

A submission raised a concern regarding the adequacy of the Project Air Quality Assessment (Appendix B of the EIS) generally, as well as specific reference to:

- the emission sources modelled (implying not all proposed mining plant and equipment were assessed);
- cumulative assessment; and
- proposed mitigation measures, including for off-road diesel emissions.

Response

The Project Air Quality Assessment (Appendix B of the EIS) was prepared in accordance with the relevant NSW Government policies and guidelines by a well-regarded air quality consultancy, Todoroski Air Sciences, and was peer-reviewed by another well-regarded air quality consultancy, Katestone Environmental. The assessment is comprehensive, including quantifying potential air quality levels at more than 900 receivers across six operational scenarios. The outcomes of the assessment are therefore considered reliable and appropriate for use by the determining authority in assessing the Project.

With regard to the sources modelled, the author of the submission did not clarify which items of proposed mining equipment and plant were considered not to be included in the assessment. Todoroski Air Sciences assessed a large number of emission sources for the Project, representing both existing mining equipment and plant, as well as proposed plant and equipment for the Project.

Further discussion of the cumulative assessment completed for the Project Air Quality Assessment (Appendix B of the EIS) is included in Attachment B and in the response above to queries raised by the EPA.

Appendix C of the Project Air Quality Assessment (Appendix B of the EIS) describes the emission factors, control factors and other assumptions adopted for the assessment, including for off-road diesel emissions. The Project's proposed dust mitigation measures are further described in Attachment B and above in response to queries raised by the EPA.

Potential Dust-related Impacts on Animal Health

Concerns were raised in some submissions regarding potential impacts on animal health associated with air quality emissions of the Project.

Response

As described in the Project Agricultural and Land Resources Assessment (Appendix I of the EIS), the Project's contribution to air quality at adjoining agricultural properties would be broadly consistent with that of the approved Mount Pleasant Operation. As described above, the wide range of best practice dust avoidance and minimisation strategies currently implemented at the Mount Pleasant Operation, including real-time monitoring, predictive modelling and proactive/reactive mitigation measures (e.g. watering haul roads and stockpiles, temporarily ceasing operations), are effective in minimising the impact of the mine on surrounding land uses, and these strategies would continue to be implemented for the Project.

The submission made by the Department of Regional NSW – Primary Industries (Animal Welfare) did not raise any concerns regarding the Project proposal.

4.3.2 Noise

Regulatory Submissions

Modelled Meteorological Conditions

The EPA noted the meteorological conditions modelled, particularly during the sensitive night-time period, were acceptable for modelling purposes. Notwithstanding, the EPA noted compliance with the applicable noise limits would be required under other adverse meteorological conditions.

Response

The EPA's endorsement of the meteorological conditions modelled is noted. MACH expects any Development Consent or EPL for the Project would specify noise criteria developed consistent with the methodology described in the NSW *Noise Policy for Industry* (NPfI) (EPA, 2017a). It is understood the alternative conceptual approach described by the EPA's submission is not consistent with the NPfI, which specifies application of the meteorological conditions used in the environmental assessment process.

Annoying Noise Characteristics – Tonality and Intermittency

The EPA noted that annoying noise characteristics such as tonality and intermittency are unlikely to be relevant for a large-scale mine. Notwithstanding, the EPA requested consideration of these characteristics in the Project Noise and Blasting Assessment (Appendix A of the EIS).

Response

Given tonality and intermittency are unlikely to be relevant for large-scale mining operations, as highlighted by the EPA, noise assessments for such operations typically focus on the potential for dominant low-frequency noise, which is relevant for some operations. RWDI Australia (RWDI) (formerly Wilkinson Murray) has provided some additional discussion of tonality and intermittency in the context of the Project's noise emissions in Attachment C.

Annoying Noise Characteristics – Low Frequency

The EPA noted the methodology used to assess the potential for the Project's noise emissions to include dominant low-frequency noise content was acceptable. Notwithstanding, the EPA requested clarification regarding:

- the magnitude of low-frequency noise content determined, which is less than some other large-scale mining operations; and
- why noise measurements from the existing Mount Pleasant Operation in April 2020 were not used in the low-frequency analysis.

Response

RWDI (2021) has provided additional information regarding low-frequency noise assessment in Attachment C. RWDI notes the April 2020 noise monitoring undertaken for the Project was not conducted for the purposes of analysing low-frequency noise, and therefore these measurements did not include data suitable to inform an additional low-frequency assessment as described by the EPA.

Notwithstanding, site-specific measurements were used to adjust the noise spectrum for some key noise sources (Attachment C).

As described in the Project Noise and Blasting Assessment (Appendix A of the EIS), the assessment findings that the Project is unlikely to result in dominant low-frequency noise at surrounding receivers is consistent with the findings of Mount Pleasant Operation on-site operational noise monitoring. Further, noise monitoring over the life of the Project would be conducted in accordance with an approved Noise Management Plan, including consideration of low-frequency noise in accordance with the requirements of the NPfI.

Clarification of Receivers Subject to Mitigation Upon Request Rights for Intrusive Noise

The EPA noted sensitive receivers 35 and 35b were predicted to experience 'moderate' exceedances of the applicable assessment criteria, and these receivers are currently not subject to acquisition or mitigation upon request rights under Development Consent DA 92/97. However, some text in the Project Noise and Blasting Assessment (Appendix A of the EIS) describes that all receivers predicted to experience 'moderate' exceedances of the applicable criteria due to the Project are already subject to acquisition or mitigation upon request rights under Development Consent DA 92/97.

Response

The discrepancy correctly noted by the EPA is a typographical error in the paragraph preceding Table 6-12 of the Project Noise and Blasting Assessment (Appendix A of the EIS), which summarises the noise results in that table. However, Table 6-12 in the Project Noise and Blasting Assessment and the corresponding summary in Section 7 of the main text of the EIS do indicate these receivers are predicted to experience 'moderate' exceedances of the applicable assessment criteria, and are not currently subject to acquisition or mitigation rights under Development Consent DA 92/97.

Intrusive Noise Limits

The EPA suggested that, where daytime noise levels less than 40 A-weighted decibels (dBA) but greater than or equal to 35 dBA are predicted, those levels should be applied as the compliance noise criteria, citing the *Implementation and transitional arrangements for the Noise Policy for Industry (2017)* (EPA, 2017b).

Response

In preparing the Noise and Blasting Assessment for the Project, MACH considered the note to Item 6 of the *Implementation and transitional arrangements for the Noise Policy for Industry (2017)* (EPA, 2017b). That is, the investigation into reasonable and feasible noise mitigation measures incorporated additional noise controls in an effort to minimise any increases in predicted noise levels during the sensitive evening and night-time periods in comparison to the current noise limits within Development Consent DA 92/97 (i.e. consistent with community expectations). As described in the EIS, this meant that more than 90% of the modelled privately-owned residences would have Project noise limits during the evening and night time that are equal to, or less than, the current Mount Pleasant Operation noise criteria – with the bulk of sensitive receivers on the western outskirts of Muswellbrook having criteria 1 to 3 dBA lower (i.e. more stringent).

However, with regard to daytime noise limits, the NPfI's supporting documentation (i.e. *A guide to the Noise Policy for Industry* and *Industrial Noise Policy – Frequently asked questions and answers*) highlights that a key difference between the NPfI and the policy it superseded (the *Industrial Noise Policy*) is an increase in the minimum background noise level for the daytime period to 'better reflect the science when assessing industrial noise impacts during this less sensitive time.' The Project's reasonable and feasible mitigation measures account for the typically less sensitive nature of the daytime period. Therefore, setting Project daytime noise criteria below the new minimum criterion of 40 dBA would be inconsistent with the intent of the NPfI.

Further, given the very large number of privately-owned receivers modelled, setting the daytime noise criteria in such a manner would unnecessarily complicate the assessment of Project compliance as it would give rise to individual daytime noise limits for a large number of receivers. This would appear inconsistent with the EPA's support for the simplified Noise Assessment Groups defined for the Project in the EIS.

As noted in the response to the EPA's comments regarding the metrological conditions modelled, MACH expects any Development Consent or EPL for the Project would include noise criteria developed consistent with the methodology described in the NPfI.

Clarification Regarding Network Rail Noise Assessment

The EPA requested additional information in relation to the network rail noise assessment, including:

- whether sensitive receivers were identified along the section of the Main Northern Railway between Muswellbrook Junction and the Antiene Rail Spur junction that were within the offset distance required to achieve compliance with the applicable rail noise criteria; and
- confirmation of the magnitude of predicted rail noise levels at receivers within the relevant compliance offset distance, which may be overstated.

Response

RWDI identified approximately 30 noise-sensitive receivers within the offset distances described in the Project Noise and Blasting Assessment (Appendix A of the EIS) for the section of the Main Northern Railway between Muswellbrook Junction and the Antiene Rail Spur junction. These receivers were not discussed in the Project Noise and Blasting Assessment as cumulative noise levels along the Main Northern Railway are expected to decrease over time due to progressive reductions in the approved coal production rates in the Hunter Valley.

RWDI (2021) has confirmed the predicted noise levels were transcribed incorrectly into the Project Noise and Blasting Assessment, and thus the predicted noise levels at the four receivers within 83 m of the Muswellbrook-Ulan Rail Line were overstated. The corrected (reduced) predicted rail noise levels are provided in Attachment C.

Hunter River Water Pumping Noise

The Muswellbrook Shire Council stated that the potential noise impacts of pumping water from the Hunter River should be assessed, as the pumping requirements may need to be increased for the Project.

Response

The *Mount Pleasant Operation Rail Modification Noise Assessment* (Wilkinson Murray, 2017) included assessment of the operational noise of the duplicated Hunter River pump station. The assessment concluded that, due to the design of the pump station, minimal operational noise would be experienced by proximal receivers. As the Project does not propose to modify the approved pump station (e.g. the pumps would still either be submerged inside wells or enclosed inside the pump station building), further assessment of the noise emissions of the approved Hunter River pump station is not warranted for the Project.

NGO and Public Submissions

Project Noise Emissions

Concerns were raised regarding the potential noise impacts of the Project generally, including cumulative noise impacts, particularly in Muswellbrook and Aberdeen, and the potential for increased ROM coal extraction to increase noise levels experienced at sensitive receivers.

Response

MACH acknowledges that the Mount Pleasant Operation has the potential to generate noise levels that could impact the township of Muswellbrook, and potentially the village of Aberdeen, if appropriate mitigation and management actions were not implemented. In consideration of this, the Mount Pleasant Operation employs a wide range of best practice noise minimisation strategies, including the installation of contemporary technology fixed plant (including acoustic design such as cladding where reasonable and feasible), use of noise suppression on all major mobile equipment where reasonable and feasible, operating in less exposed areas during the evening and night, real-time monitoring, predictive modelling and proactive/reactive mitigation measures (e.g. temporarily ceasing operations). The Project would generally involve the continuation of these noise mitigation strategies and mitigation measures.

It is also acknowledged that, in the absence of further mitigative actions or change in source location, increasing ROM coal extraction and overburden handling rates would logically increase Mount Pleasant noise emissions. However, the Project mine plan incorporates gradual, staged increases to the ROM coal extraction rate to 15.75 Mt in 2028 and 21 Mt in 2034, based on the proximity of mining activities to sensitive receivers and the presence of topographic shielding.

As described in the Project Noise and Blasting Assessment (Appendix A of the EIS), Wilkinson Murray concluded that the proposed Project noise mitigation measures (including the staged increases to ROM coal extraction and the northern bund) would be effective in minimising potential noise impacts to the majority of receivers surrounding the Mount Pleasant Operation.

In regard to potential cumulative impacts, the Project Noise and Blasting Assessment (Appendix A of the EIS) included a comprehensive cumulative assessment of the Project and four other mines in the region, namely Bengalla Mine, Mt Arthur Coal Mine, Mangoola Coal and Dartbrook Mine. A sensitivity analysis of potential cumulative noise levels if the Mt Arthur Coal Mine was to continue operations was also included in the assessment.

Reduction in the Number of Noise Affected Neighbours

A submission sought clarification of statements that the number of landholders subject to noise affectation or moderate noise exceedances would reduce, in the context of increased production rates for the Project.

Response

As described above, the proposed noise mitigation and management measures for the Project would be effective in minimising noise impacts on surrounding sensitive receivers. These measures are generally a continuation of the existing mitigation and management measures currently implemented at the Mount Pleasant Operation. Due to reductions in the noise criteria applicable for assessment at a large number of receivers, existing proactive/reactive mitigation measures would need to be applied during different meteorological conditions, or at a higher intensity than currently required, in order to maintain compliance with the relevant noise criteria. In addition to the implementation of proactive/reactive mitigation measures, the Project's integrated waste rock emplacement landform would provide more shielding to a number of receivers than the currently approved landform, reducing received noise levels in some locations.

Existing Mount Pleasant Operation Noise Management

Concerns were raised regarding noise management at the existing Mount Pleasant Operation, with specific reference to night-time noise and a perceived current lack of sound barriers.

Response

As described above, MACH currently implements a wide range of best practice noise minimisation strategies, including the installation of contemporary technology fixed plant (including acoustic design such as cladding where reasonable and feasible), use of noise suppression on all major mobile equipment where reasonable and feasible, operating in less exposed areas during the evening and night, real-time monitoring, predictive modelling and proactive/reactive mitigation measures (e.g. temporarily ceasing operations). While these noise minimisation strategies are effective in reducing Mount Pleasant noise levels, and the site has a good record of compliance with the relevant noise criteria, some receivers may be more sensitive to noise below applicable noise criteria set by the NSW Government.

The Eastern Out-of-Pit Emplacement that is currently being developed at the Mount Pleasant Operation is effectively a major noise barrier, that will provide more shielding to receivers located to the east as it develops.

Derivation of Noise Criteria for Assessment

A concern was raised regarding the noise criteria applied in the assessment for one rural property. The submitter noted the Project Noise and Blasting Assessment (Appendix A of the EIS) described their area as having representative Rating Background Levels of less than 30 dBA, and suggested that the NPfI was not applied correctly in determining the applicable noise criteria for their property.

Response

Under the NPfI, minimum Rating Background Levels are adopted in areas of low background noise. These minimum levels are 35 dBA for day and 30 dBA for evening and night. These minimum Rating Background Levels were adopted for the property and, as such, the noise criteria applied to the property represent the minimum noise criteria that can be applied under the NPfI, as prescribed by the NSW Government.

4.3.3 Blasting

Regulatory Submissions

Potential Blasting Impacts

The Muswellbrook Shire Council requested clarification regarding the Project's potential blasting impact on headstones at the MP53 Kayuga Cemetery, which is a State Heritage Register site located to the north of Kayuga.

Response

As the Muswellbrook Shire Council did not raise any concerns regarding potential blasting impacts on private residences or public infrastructure, and the request for clarification was specifically related to potential impacts on items of heritage significance, MACH's response to this request for clarification is provided in Section 4.3.7.

NGO and Public Submissions

Potential Blasting Impacts, Including Overpressure, Vibration and Fume

Some submissions raised concerns regarding the potential blast impacts of the Project generally, particularly vibration and fume impacts, on proximal receivers.

Response

As described in the EIS, the maximum instantaneous charge (MIC) of explosives proposed for the Project is consistent with that currently used at the approved Mount Pleasant Operation. The Mount Pleasant Operation also has a track record of maintaining compliance with the applicable blast overpressure and vibration criteria at proximal receivers.

With regard to blast fume, there have been a small number of events at the Mount Pleasant Operation where blasts have generated more fume than predicted via the pre-blast planning processes. These fume events (where relevant) were self reported to the EPA and DPIE. Some of these events involved complaints from the community and/or investigation by the EPA. Following such events, the circumstances were reviewed and the pre-blast planning processes were amended to reduce the potential for similar events in future. The Project Air Quality Assessment (Appendix B of the EIS) included dispersion modelling of Project blasts. The analysis indicated a low likelihood of off-site impacts unless blasts are undertaken later in the afternoon. The outcomes of this assessment have been incorporated into the pre-blast planning processes currently in place at the Mount Pleasant Operation.

Potential Blasting Impacts on Underground Reticulation and Irrigation Infrastructure

Concerns were raised that potential blast impacts of the Project on underground reticulation and irrigation infrastructure were not assessed.

Response

The Project Noise and Blasting Assessment (Appendix A of the EIS) did not explicitly include assessment of potential blasting impacts on proximal underground reticulation and irrigation infrastructure as such infrastructure is not particularly sensitive to blasting effects. The German Standard, DIN 4150, regarding the effects of vibration on buried pipework recommends a range of criteria for various materials, including 50 millimetres per second (mm/s) for masonry and plastic pipework, 80 mm/s for concrete, reinforced concrete, clay and metal pipework, and 100 mm/s for steel pipework (Wilkinson Murray, 2018). The Project Noise and Blasting Assessment (Appendix A of the EIS) adopted the lowest of these criteria for public infrastructure (e.g. power poles), and a more stringent criteria of 5 mm/s was assessed for potential human annoyance. Blast MIC of Project blasts would be managed so that compliance is maintained with the public infrastructure and human annoyance criteria at the nearest sensitive location, therefore vibration related adverse impacts on underground reticulation and irrigation infrastructure are highly unlikely.

It is noted that Mount Pleasant Operation water management pipelines and reticulation infrastructure is commonly located within the MLs, and proximal to Project open cut blasts.

4.3.4 Water Resources

Regulatory Submissions

Water Licensing

DPIE – Water r and Natural Resources Access Regulator (NRAR) recommended that:

- MACH should ensure that, prior to water take, it holds sufficient Water Access Licence entitlements under the *Water Management Act 2000*.
- The existing Water Management Plan should be revised to reflect all Water Access Licences held by MACH and their conditions of approval.

Response

MACH agrees with these recommendations, which are consistent with commitments made by MACH in the EIS.

Groundwater Modelling of Pit Highwalls

DPIE – Water and NRAR requested that MACH undertake additional groundwater modelling (sensitivity testing) to investigate the potential for increased permeability in the strata immediately adjacent to the open cut, due to the effects of blasting.

Response

AGE (2021) has undertaken additional groundwater modelling to determine the potential implications if a zone of increased hydraulic conductivity occurred around the open cut due to highwall stress and rock blasting. This included (AGE, 2021):

- A literature review to determine a maximum potential distance of fracturing from the highwall in similar geological settings.
- Modelling of an enhanced conductivity zone by extending the area of mined out cells by an additional cell in a radial pattern from the open cut. This provides a conservative estimate as it assumes the conceptual enhanced conductivity zone is fully dewatered and the groundwater model cells are larger than the maximum potential distance of increased conductivity inferred from the literature review.
- Assessment of predicted incremental drawdown in the alluvium/regolith (Layer 2) and the Edderton Seam (Layer 18), which is the deepest seam targeted by the Project.
- Assessment of predicted incremental water take from the alluvium.

The results of the additional conservative modelling to address DPIE's request for sensitivity testing for this concept are provided in Attachment D and results can be summarised as follows (AGE, 2021):

- Negligible incremental change in the predicted drawdown in the Hunter River alluvium.
- Negligible additional indirect water take from the Hunter River alluvium (1.2 megalitres per year [ML/year]).
- Negligible additional indirect water take from the Sandy Creek and Dart Brook alluvium (less than 0.5 ML/year).

The sensitivity testing therefore indicates no change to the Project Groundwater Assessment (Appendix C of the EIS) findings would arise due to the additional modelling, that was conducted with conservative assumptions.

Groundwater Dependent Ecosystem Mapping

DPIE – Water and NRAR requested:

- Groundwater maps overlaid with groundwater dependent ecosystems (GDEs) showing maximum cumulative predicted drawdown during mining and post-mining.
- Figures depicting the maximum drawdown in the alluvium and Edderton Seam over time.

Response

The following potential GDEs have been identified in the vicinity of the Project (Hunter Eco, 2021; AGE, 2020b):

- The Hunter River is identified as a potential Type 2 aquatic GDE based on the Commonwealth Bureau of Meteorology (BoM) GDE Atlas.
- Approximately 3 ha of Forest Red Gum Grassy Open Forest (PCT 618) in the Project Relinquishment Area has been identified as a potential Type 3 terrestrial GDE.
- Stygofauna were collected from bores accessing the Hunter River alluvium.

Potential Project impacts on GDEs were assessed as negligible in the EIS (AGE, 2020b; Bio-Analysis, 2020). Notwithstanding, additional GDE maps requested by DPIE – Water and NRAR are presented in Attachment D.

Proximity to Alluvium

DPIE – Water and NRAR requested confirmation of the distance between the Project open cut mining activities and the nearby alluvial water sources.

Response

AGE (2021) has determined the distance between the Project open cut mining activities and nearby alluvial water sources as defined in the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*. The minimum distances to the Hunter River Regulated Alluvial Water Source, Dart Brook Water Source and Muswellbrook Water Source are 220 m, 1,170 m and 1,700 m, respectively (Attachment D). These distances all exceed the buffer distance of 100 m referenced in the Level 1 Minimal Impact Considerations under the *NSW Aquifer Interference Policy* (the AIP) (NSW Government, 2012a).

Predicted Impacts on Privately-owned Bores

DPIE – Water and NRAR requested confirmation of whether the drawdown values presented for neighbouring bores represent maximum drawdown during active mining or in the post-mining phase.

DPIE – Water and NRAR also requested that the Water Management Plan include details of all water users' bores potentially impacted by the Project, not just those predicted to experience greater than 2 m drawdown.

Response

The predicted drawdowns presented in the Project Groundwater Assessment (Appendix C of the EIS) are the maximum predicted drawdown during the life of the Project. AGE (2021) has determined the maximum post-mining drawdowns at private bores, which indicates that no additional bores would experience greater than 2 m during the post-mining phase (Attachment D).

MACH has conducted a comprehensive census of privately-owned groundwater bores in the vicinity of the Mount Pleasant Operation. The outcomes of the bore census are summarised in the approved Water Management Plan and have been used to inform the design and implementation of the groundwater monitoring program, including to monitor for potential unexpected impacts at privately-owned bores with less than 2 m of predicted drawdown.

Management of Potentially Acid Forming Materials

DPIE – Water and NRAR requested further information regarding the management of PAF materials for the Project.

Response

The Project Geochemistry Assessment (Appendix K of the EIS) concluded the waste rock materials generated from the Project would generally be expected to be non-acid forming (NAF).

The acid base accounting test work indicates, however, that a small portion of waste rock materials (the Archerfield sandstone interburden) and coal rejects generated from processing of the Edderton and Wynn Seams would be PAF.

These materials are already mined by the approved Mount Pleasant Operation and the potential for leachate drainage is managed in accordance with the approved Mining Operations Plan, with surface water and groundwater monitoring undertaken in accordance with the approved Water Management Plan.

The management of PAF materials is summarised in Sections 3.9 and 3.10 of the EIS. Further detail regarding the management of PAF materials would be documented in Mining Operations Plans for the Project, which would be periodically prepared in consultation with the Resources Regulator and other relevant government agencies over the life of the mine.

Consideration of Evaporation in the Site Water Balance

DPIE – Water and NRAR requested clarification on how evaporation is applied to modelled groundwater inflows in the site water balance (with reference to Figure 21 of the Project Surface Water Assessment [Appendix D of the EIS]).

Response

The adjustment of modelled groundwater inflows to account for evaporation from the open cut face is described in Section 5.2.5 of the Project Surface Water Assessment (Appendix D of the EIS). This process determines the net groundwater inflows that are ultimately pumped to the mine water management system.

Figure 21 of the Project Surface Water Assessment presents the average inflows and outflows to the water management system, averaged over all 121 realisations of the site water balance model. The groundwater inflows in Figure 21 are presented net of evaporation that occurs at the pit face. The evaporation presented as an outflow in Figure 21 relates to evaporation from the water management storages in the site water balance model (i.e. it is unrelated evaporation for the groundwater inflows).

Groundwater Monitoring

DPIE – Water and NRAR recommended that the additional groundwater monitoring infrastructure described in the EIS be installed as soon as practical, to enable collection of adequate baseline data.

Response

The installation and monitoring program for the additional bores described in the EIS would be documented in the Water Management Plan for the Project. Some of the bores proposed in the EIS would replace existing monitoring bores (i.e. where these are mined through) and therefore there is already a substantial baseline dataset available.

Site Water Balance Modelling – Hunter River Salinity Trading Scheme

The EPA requested that the site water balance is updated to use a different gauging station to determine when discharges can occur under the Hunter River Salinity Trading Scheme (HRSTS).

Response

As identified in the EPA submission, Hunter River flow rates at the Denman Gauging Station (210055) downstream of the Project were used to determine declared 'high' and 'flood' flow events where discharge would be permitted under the HRSTS. Releases from the approved discharge dam (DW1) were then simulated based on the modelled salinity of DW1 and the number of HRSTS credits held by MACH (41 credits).

Clause 10(3) of the HRSTS states:

> *(3) The following reference points are to be used for the purpose of predicting the rate of flow of a block as it passes through each sector:*
>
> *(a) for the upper sector—the upper sector reference point,*

The Dictionary in the FRSTS states:

> *upper sector reference point means the Hunter River gauging station number 210055 upstream of the confluence of the Hunter River and the Goulburn River at Denman, or another gauging station nominated as the upper sector reference point on the website of the EPA.*

Therefore, use of the Denman Gauging Station (210055) in the site water balance is consistent with the HRSTS requirements.

Notwithstanding, it is relevant to note that the Muswellbrook Gauging Station (210002), which is located upstream of the discharge point, was conservatively used for the purposes of assessing the potential surface water quality impacts of controlled Hunter River Salinity Trading Scheme discharges on water quality in the Hunter River (refer Section 8.2 of the Appendix D of the EIS).

Potable Water and Wastewater Management

The EPA requested further information regarding potable water use and wastewater management, including consideration of these in the site water balance modelling.

Response

Section 3.13.7 of the EIS states:

> *The potable water supply for the Project would be sourced from the Hunter River via the approved Stage 2 water supply pipeline, stored in local potable water tanks and treated on-site, as required, to the required standards. Potable water may also continue to be delivered to site via trucks by a contractor.*

Section 3.14 of the EIS states:

> *Sewage and wastewater from on-site ablution facilities would continue to be collected and treated in the site sewage treatment plant, which would be progressively expanded to accommodate the increased workforce for the Project. The sewage treatment plant would continue to be serviced by a licensed waste disposal contractor.*

These two water circuits (potable water and treated sewage) represent only minor water demand and disposal in comparison to operational water budgets, and are managed separately to the mine water management system. Therefore, it is not considered appropriate to include these in the site water balance.

Discharge and Water Supply Demand

The EPA requested that MACH size water infrastructure to eliminate discharges and minimise the need to draw water from the Hunter River using water access licences.

Response

Water requirements would continue to be met from dewatering the open cut mining areas, recycling water from the Fines Emplacement Area, licensed extraction from the Hunter River, and any agreed use of excess water from the Bengalla or Dartbrook Mines. The installation of reject dewatering facilities for the Project Stage 2 CHPP is expected to significantly increase on-site water recycling.

MACH's proposed water supply and discharge arrangements are consistent with existing NSW Government policy, as follows:

- MACH would continue to source water from the Hunter River in accordance with the *Water Management Act 2000* and the *Water Sharing Plan for the Hunter Regulated River Water Source 2016*.
- MACH would discharge surplus water to the Hunter River (or its tributaries) in compliance with the *Protection of the Environment Operations Act 1997*, HRSTS and EPL 20850.

Frequency of Overflows and Discharges

The EPA requested further information regarding the predicted frequency of overflows and controlled releases.

Response

The approved DW1 will be located to the west of Bengalla Road and is planned to be commissioned in early 2022. The approved DW1 has a maximum discharge capacity of 125 megalitres per (ML/day). No change to the design or discharge capacity of DW1 is proposed as part of the Project.

Clause 11 of the HRSTS establishes the following flow ranges for the Upper Sector of the Hunter River (in which the Project is located):

- Low flow range: Less than 1,000 ML/day (discharge not permitted).
- High flow range: 1,000 ML/day to 6,500 ML/day (discharge permitted in accordance with the number of salinity credits held under the HRSTS).
- Flood flow range: Exceeds 6,500 ML/day (discharge permitted).

Under the HRSTS, discharges are only permitted when the flow in the Hunter River exceeds 1,000 ML/day. These high flow periods coincide with periods of extended rainfall, which would dilute any constituents present in water held on-site prior to discharge.

A review of predicted discharge volumes in the Surface Water Assessment (Appendix D of the EIS) indicated (Hydro Engineering & Consulting Pty Ltd [HEC], 2020):

- The predicted maximum annual discharge volume in a median scenario represents approximately 0.26% of the recorded median annual river flow.
- The predicted maximum annual discharge volume in a 95th percentile scenario represents approximately 0.12% of the recorded 95th percentile annual river flow.
- Releases are predicted to occur on 1.3% of days in total over the simulated life of the Project.
- On average, the controlled release volumes equated to 4% of river flow on those release days.
- The 95th percentile annual release volume for the Project is comparable to the 95th percentile annual release volume predicted for the approved Mount Pleasant Operation.

The Muswellbrook Gauging Station (210002), which is located upstream of the discharge point, was conservatively used to complete the above assessment.

ED3 Storage Capacity

The EPA requested that MACH revise the proposed capacity of ED3 to demonstrate achievement of the 1% Annual Exceedance Probability (AEP) spill risk design criterion.

Response

HEC (2020) predicted a very low risk of overflow from ED3 to Dry Creek based on all model results. The percentage of annual overflow days from ED3 to Dry Creek was estimated at 1.6% based on all model realisations, which was slightly higher than the 1% AEP spill risk design criterion (i.e. in any simulated year, ED3 has a predicted spill risk of less than 1.6%).

MACH has subsequently modified ED3, which has altered the capacity and 'dead storage' volume of the dam.

MACH commissioned HEC to undertake additional site water balance modelling to determine spill risk of the modified ED3 based on its current configuration (Attachment E). HEC (2021) has confirmed the 1% AEP spill risk is met by the modified ED3 (Attachment E).

Surface Water Quality Objectives

Issue:

The EPA requested additional information regarding water quality objectives for waterways potentially impacted by the proposal.

Response

The Water Quality Objectives for watercourses in the vicinity of the Project are described in Section 3.3.2 of the Surface Water Assessment (Appendix D of the EIS), including:

- A summary of site-specific values derived in the approved Surface Water Management Plan (Table 6 of the Surface Water Assessment).
- Default guideline values for aquatic ecosystems at the 95% protection level from Australian New Zealand Guidelines (ANZG) (2018) for toxicants where a site-specific value has not been derived (Table 7 of the Surface Water Assessment).

- Default guideline values for aquatic ecosystems from the Australian and New Zealand Environmental and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) for physicochemical constituents as updated default guideline values are yet to be published for these under the ANZG (2018) Guidelines (Table 7 of the Surface Water Assessment).
- Default guideline values for primary industries from ANZECC & ARMCANZ (2000) for guideline values for protection of aquatic ecosystems are not available.

Water quality data for watercourses in the vicinity of the Project are compared to the default guideline values in Tables 11 to 15 of the Surface Water Assessment (Appendix D of the EIS). The sampling results from the Hunter River indicate (HEC, 2020):

- The Hunter River from monitoring site W1 (upstream) to monitoring site W15 (downstream) ranges from slightly acidic to alkaline. The maximum pH values recorded at sites W2 and W6A were recorded prior to commencement of operations at the Mount Pleasant Operation.
- Total aluminium concentrations recorded at various sites on the Hunter River (upstream and downstream of the Mount Pleasant Operation) exceeded the default guideline value.
- A maximum total iron concentration of 98 milligrams per litre (mg/L) was recorded at Muswellbrook (GS 210002), with 3% of all samples exceeding the total iron default guideline value for primary industries (10 mg/L).
- The maximum concentrations of total zinc and total copper recorded at all sites on the Hunter River exceeded the default guideline value.
- The maximum concentration of total lead recorded at site W2 exceeded the default guideline value and was recorded prior to the commencement of operations at the Mount Pleasant Operation.

Assessment of Potential Downstream Water Quality Impacts from Controlled Releases

The EPA requested additional information regarding potential downstream water quality impacts from controlled releases.

Response

Controlled releases undertaken for the Project under the HRSTS would comprise a very small component of the flow in the Hunter River (as governed by the discharge rules of the HRSTS) and dilution would be substantial (refer response above regarding frequency of discharges).

HEC (2020) has undertaken a detailed assessment of the concentration of key constituents in the Hunter River downstream of the discharge, based on the simulated release volumes for the Project and the water quality data available for the Mount Pleasant Operation (refer Table 35 of Appendix D of the EIS). Each of the constituents were assessed against the relevant water quality objectives derived in Table 7 of the Surface Water Assessment (as discussed in the response above).

The assessment focused on constituents with a water quality objective and constituents which were recorded above the limit of detection in the MWD. This is considered a conservative approach to assessing the presence of water quality constituents in discharge water given:

- the MWD is the only storage that is pumped directly to the approved DW1;
- the maximum recorded level in the MWD was used (e.g. rather than a median or mean);
- a prolonged drought would have increased the levels of water quality constituents in on-site water storages when the existing samples were taken;

- in practice, high flow periods under the HRSTS coincide with periods of high rainfall, which would dilute any constituents present in water held on-site prior to discharge; and
- all other water quality constituents were below the level of detection in the MWD and would therefore have negligible impact on release water quality.

For all assessed water quality constituents, the maximum observed levels in MWD are less than the median levels recorded in the Hunter River, with the exception of arsenic and lithium (Table 4). While these metals were detectable, the maximum observed levels of arsenic and lithium in the MWD are an order of magnitude less than the relevant Water Quality Objective (Table 4).

Table 4
Summary of Potential Water Quality Impacts of Controlled Releases

Water Quality Constituent	Water Quality Objective	Monitored Water Quality		
		MWD (Maximum)	Hunter River (Median)	Hunter River (Maximum)
Turbidity (NTU)	50	55	261	1,754
Total Aluminium (mg/L)	0.055	0.24	0.67	1.04
Total Arsenic (mg/L)	0.024	0.002	0.001	0.001
Total Iron (mg/L)	10	0.19	0.51	1.23
Total Lithium (mg/L)	2.5	0.009	0.005	0.005
Total Manganese (mg/L)	1.9	0.016	0.05	0.24
Total Nickel (mg/L)	0.011	0.004	0.001	0.001

Source: HEC (2020).

MACH is continuing to periodically collect metals data from the mine water management system. Additional sampling events have been conducted since the Surface Water Assessment was finalised, which indicate that metals concentrations are generally consistent with the previously collected data used in the assessment.

Review and progressive refinement of the site water balance would continue to be undertaken periodically over the life of the Project to record the status of inflows (water capture), storage and consumption and to optimise water management performance (including discharges). MACH would continue to periodically collect water quality data from the mine water management system over the life of the Project to inform the review and refinement of the site water balance model. The results of this would be reported in the Annual Review.

Potential Impacts on Sandy Creek

The BCD has requested further information regarding potential impacts on Sandy Creek, including consideration of potential impacts to:

- town water supply;
- agricultural land uses (including the Gilgai property); and
- riparian ecology and freshwater mussels.

Response

The objects of the *Water Management Act 2000* are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations and, in particular (refer section 3 of the *Water Management Act 2000*):

(a) to apply the principles of ecologically sustainable development, and

(b) to protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality, and

(c) to recognise and foster the significant social and economic benefits to the State that result from the sustainable and efficient use of water, including –

(i) benefits to the environment, and

(ii) benefits to urban communities, agriculture, fisheries, industry and recreation, and

(iii) benefits to culture and heritage, and

(iv) benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water,

(d) to recognise the role of the community, as a partner with government, in resolving issues relating to the management of water sources,

(e) to provide for the orderly, efficient and equitable sharing of water from water sources,

(f) to integrate the management of water sources with the management of other aspects of the environment, including the land, its soil, its native vegetation and its native fauna,

(g) to encourage the sharing of responsibility for the sustainable and efficient use of water between the Government and water users,

(h) to encourage best practice in the management and use of water.

It should be noted that there is more than one Sandy Creek in the Muswellbrook area, one upstream of the mine and Muswellbrook and one west and downstream of the mine. References to Sandy Creek in the EIS and this response relate to the one west and downstream of the Project.

Sandy Creek is part of the Muswellbrook Water Source (i.e. a 'Water Source' established under the *Water Management Act 2000* not a source of water for the town of Muswellbrook). The Muswellbrook Water Source is managed in accordance with the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* under the *Water Management Act 2000*.

Review of the NSW Water Register indicates that the Muswellbrook Water Source (including Sandy Creek) is not used for town water supply. Agricultural extraction from Sandy Creek is also limited, with only two unregulated river licences located downstream of the Project on Sandy Creek:

- Water access licence 18701 has a total entitlement of 28 units and is located on land owned by Mangoola Coal, approximately 9 km downstream of ML 1645.
- Water access licence 18700 has a total entitlement of 5 units and is located in Denman, approximately 23 km downstream of ML 1645.

The maximum area excised by the Project from the Sandy Creek catchment is estimated at 2.5 square kilometres (km^2) in 2041, equating to 5.3% of the total catchment area of Sandy Creek at Wybong Road (Appendix D of the EIS). This is less than the predicted maximum area excised by the original approved Mount Pleasant Operation, which included two separate staged Fines Emplacement Areas in the Sandy Creek Catchment. MACH's Fines Emplacement Area is a single storage with staged downstream lifts and upstream clean water diversions, which reduces the potential area captured.

Changes in groundwater-derived baseflow have been predicted by AGE (2020b) using a numerical groundwater model (Appendix C of the EIS). The maximum predicted reduction in baseflow in Sandy Creek due to the Project is 6 ML/year (or approximately 0.02 ML/day).

Clause 19 of the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* addresses the planned environmental water requirements for its water sources (including Sandy Creek). Subclause 19(1) relevantly states (emphasis added):

> ***19 Planned environmental water***
>
> *(1) Planned environmental water is identified and established in these water sources as follows—*
>
> *(a) water volume in excess of the respective long-term average annual extraction limit established in clause 44 of this Plan may not be taken and used for any purpose in these water sources,* ***thereby protecting a proportion of river flows for fundamental ecosystem needs from increases in long-term water extraction****, and*
>
> *(b) for all water sources,* ***the water remaining in the water source after the taking of water to meet basic landholder rights and for access licences*** *in accordance with the rules identified in subclause (3) and clause 68.*

As the predicted baseflow take would be accounted for under 'access licences' (i.e. already held by MACH), it would not affect the volume of planned environmental water established for Sandy Creek under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*. The number of licences required for the Project (i.e. to account for incidental baseflow take from Sandy Creek) represents less than 1% of the total water access licences available in the Muswellbrook Water Source. Given the small predicted baseflow reduction in the Sandy Creek alluvium relative to the catchment area of Sandy Creek, MACH does not anticipate any material impacts on riparian ecology in Sandy Creek. Notwithstanding, MACH already conducts stream health monitoring on Sandy Creek downstream of the Fines Emplacement Area, and this would continue for the Project (Section 7.11 of the EIS).

Potential impacts on downstream surface water users are managed in accordance with the Surface and Ground Water Response Plan, which is included in the Water Management Plan for the Mount Pleasant Operation (MACH, 2019b). HEC has conducted some additional analysis with respect to potential Project catchment excision for the Gilgai property, which is provided in Attachment E and described further below.

The Water Management Plan would be reviewed and revised for the Project subject to the conditions of any Development Consent for the Project. The Surface and Ground Water Response Plan would describe any additional measures and procedures that would be implemented over the life of the Project to respond to any potential exceedances of surface water related criteria and contingent mitigation, compensation, and/or offset options if downstream surface water users are adversely affected by the Project.

Modelling of Overflows to the Sandy Creek Catchment

The BCD raised concerns regarding the modelling of overflows from Sandy Creek on the basis that:

- stakeholders raised concerns regarding perceived impacts on Sandy Creek as part of the SIA consultation;
- salinity measured at surface water monitoring site W11 is higher than salinity measured at W12, which BCD suggest is indicative of seepage from Environmental Dam 2 (ED2) affecting downstream water quality;

- Section 8.5 of the Project Groundwater Assessment (Appendix C of the EIS) discusses potential water quality impacts on Sandy Creek; and
- any potential overflows from the Fines Emplacement Area and ED2 would flow to Sandy Creek.

Response

The Fines Emplacement Area and ED2 construction was completed in 2019 (MACH, 2020).

MACH monitors water quality in Sandy Creek at W11 (upstream of the Fines Emplacement Area) and W12 (downstream of the Fines Emplacement Area). Monitoring commenced at these two sites in 2017.

As identified by BCD, monitored electrical conductivity (EC) at W11 is higher than at W12. However, BCD incorrectly asserts that W11 is downstream of W12 when it is actually upstream. Therefore, the difference in EC observed by BCD actually indicates that the Fines Emplacement Area and ED2 have not affected downstream water quality in Sandy Creek. This is also consistent with MACH's records that indicate no discharges have occurred from these storages to-date.

Section 8.5 of the Project Groundwater Assessment (Appendix C of the EIS) identified the continued development of the Fines Emplacement Area as a component of the Project that could affect groundwater quality. Accordingly, a detailed assessment of potential impacts was undertaken, which concluded (AGE, 2020b) (emphasis added):

> *During operations, the fines emplacement area would be managed in accordance with the Mount Pleasant Operation Fines Emplacement Plan (ATC Williams, 2017). The plan provides for the management of seepage from the fines emplacement area as follows:*
>
> - *establishment of a foundation drain to manage potential seepage through the embankment;*
> - *a clay fill cut-off key is constructed into the bedrock underlying the embankment footprint to minimise the potential for shallow seepage beneath the fines emplacement area;*
> - *seepage water is collected, tested and recovered using a pump back system as required; and*
> - *prioritising the return of decant water to the water management system, thereby minimising the decant pond volume and seepage potential of the fines emplacement area.*
>
> ***With the implementation of the above measures, the potential impacts on groundwater quality during the operation of the fines emplacement area is predicted to be negligible.***
>
> *The Project involves the deepening and continued operation of the open cut pit in a westerly direction. As a result, the final void would be located closer to the fines emplacement area, drawing seepage towards the voids as opposed to the Sandy Creek alluvium. The increased depth of the final void would also increase the hydraulic gradient from the out-of-pit spoil towards the final void, reducing the potential for seepage towards the Hunter River alluvium.*
>
> *The potential for seepage from the proposed final landform has been assessed using groundwater model outputs and the semi-analytical particle tracking software MODPATH (Pollock, 2016) (Section 7.2). The MODPATH analysis demonstrates that seepage from the fines emplacement area and out-of-pit waste emplacement area is predicted to primarily report to the Project and Bengalla Mine final voids.*
>
> ***Based on the above, the Project is considered to have a negligible impact on groundwater quality.***

A predictive assessment of the performance of the Project water management system for a range of different climatic scenarios is presented in the Surface Water Assessment (Appendix D of the EIS). No overflows are predicted to Sandy Creek based on this surface water modelling (HEC, 2020).

Surface Water Trigger Levels Established for Sandy Creek

The BCD raised concerns regarding the existing water quality trigger levels in Sandy Creek, including that they were derived during a drought period and are inconsistent with the default EC trigger value for upland rivers in NSW.

Response

The water quality in local streams reflects both the nature of the geological strata present (e.g. Permian deposits) and pre-existing agricultural land uses. Please refer to Section 3.5 of the Project Surface Water Assessment (Appendix D of the EIS) for further detail on the range of water quality observed in the vicinity of the Project, including in the Hunter River and Sandy Creek.

ANZECC & ARMCANZ (2000) guidelines recommend that wherever possible, site-specific data is used to define trigger values for physical and chemical factors which can adversely impact the environment. The approach recommended by ANZECC & ARMCANZ (2000) for developing site-specific trigger values for slightly to moderately disturbed ecosystems, is to formulate trigger values based on the 20th and 80th percentiles of the site-specific monitoring data.

Trigger levels were established for the downstream monitoring site on Sandy Creek as part of the current Mount Pleasant Operation Water Management Plan, which was developed in consultation with DPIE – Water and the EPA, and approved by DPIE. Monitoring at sites W11 and W12 commenced in 2017 (refer discussion above), before commencement of fines emplacement activities at the Mount Pleasant Operation.

Water quality data collected in Sandy Creek in 2020 remained within the trigger levels established in the approved Water Management Plan (MACH, 2019b).

MACH would continue to collect monitoring data from sites along Sandy Creek and, if necessary, would review and update the surface water trigger levels on Sandy Creek over the life of the Project in consultation with relevant government agencies as part of ongoing periodic review of the approved Water Management Plan.

Flooding Risks from New Dams

The BCD raised concerns regarding potential flooding risks associated with the Project dams, including:

- potential for spillway overflow or failure from Mine Water Dam 2 (MWD2) and High Wall Dam 3 (HWD3);
- the applicability of design criteria used for sediment dams; and
- the design criteria for ED2.

Response

It is noted that HWD3 would be located upstream of the open cut (Figure 3-10 of the EIS). Both MWD2 and MWD3 would be located in an un-named headwater tributary valley in the Sandy Creek catchment (Figure 3-10 of the EIS).

Dams Safety NSW are responsible for managing dam safety in accordance with the *Dams Safety Act 2015* and the *Dams Safety Regulation 2019*. Dams Safety NSW did not raise any specific concerns regarding MACH's proposed Project dams in its submission on the Project (refer Dams Safety NSW letter dated 1 March 2021). As is the case for existing dam structures at the Mount Pleasant Operation, MACH would design and construct Project dams to appropriate engineering standards.

MACH would continue to consult with Dams Safety NSW regarding the management of declared dams operated by MACH (including ED3, MWDs and the Fines Emplacement Area) and also meet Dams Safety NSW requirements applicable for any Project works within Declared Dam notification areas, including the Bengalla Mine Declared Dams.

The conceptual design of the proposed sediment dams has been undertaken in accordance with *Managing Urban Stormwater, Soils and Construction* (Landcom, 2004) and *Managing Urban Stormwater: Soils and Construction – Volume 2* (DECC, 2008). These guidelines are listed in the SEARs for the Project. This approach is also consistent with the methodology used for existing sediment dams at the Mount Pleasant Operation in accordance with the approved Water Management Plan.

ED2 is located downstream of the Fines Emplacement Area and served as a sediment dam during construction of the Fines Emplacement Area embankment. Due to its location downstream of the Fines Emplacement Area, ED2 has been conservatively sized to avoid discharges to Sandy Creek. Site water balance modelling completed for the Project indicates that no overflows would occur from ED2 over the life of the Project (HEC, 2020).

NGO and Public Submissions

Potential Impacts on Flow in the Hunter River

Some organisations and public submissions raised concerns regarding potential impacts on flow in the Hunter River, including:

- potential cumulative impacts due to mining;
- potential long-term, post-mining baseflow impacts;
- potential impacts to other water users and industries; and
- potential impacts to Ramsar listed wetlands.

Response

The potential impacts of the Mount Pleasant Operation (incorporating the Project) on the Hunter River have been assessed in the Project Surface Water Assessment (HEC, 2020). Where relevant, the Project Surface Water Assessment draws on the conclusions of the Project Groundwater Assessment (AGE, 2020b).

The closest mapped important wetland, Barrington Tops Swamps, is located over 60 km from the Project (Hunter Eco, 2021).

The Hunter River is a highly regulated system with licensing of water take undertaken in accordance with the *Water Sharing Plan for the Hunter Regulated River Water Source 2016*, under the *Water Management Act 2000*. Clause 8 of the *Water Sharing Plan for the Hunter Regulated River Water Source 2016* states:

> ***Vision Statement***
>
> *The vision for this Plan is to provide for:*
>
> *(a) the health and enhancement of this water source and its water-dependent ecosystems, and*
>
> *(b) the productive and economically efficient use of water resources, and*
>
> *(c) the social and cultural benefits to urban and rural communities that result from the sustainable and efficient use of water.*

The *Water Sharing Plan for the Hunter Regulated River Water Source 2016* establishes a long-term average annual extraction limit for the Hunter River in order to maintain environmental water requirements and meet the following objectives:

- maintain and enhance the ecological condition of this water source and its dependent ecosystems (instream, riparian, alluvial and floodplain ecosystems) over the long-term;
- contribute to the maintenance and enhancement of downstream processes and habitats (including in downstream water sources); and
- contribute to the maintenance and enhancement of the water quality of this water source and downstream water sources.

A summary of the water access licences in the Hunter Regulated River Water Source is provided in Table 5.

Table 5
Hunter Regulated River Water Source – Water Access Licences

Category	Number of WALs	Total Shares
Domestic and stock	165	1,569
Domestic and stock (domestic)	60	144
Domestic and stock (stock)	21	103
Local water utility	5	10,832
Major utility	1	36,000
Regulated river (general security)	827	128,544
Regulated river	156	21,740
Supplementary water	240	48,519

Source: NSW Water Register (2020).

Note: WALs = Water Access Licences.

To provide an understanding of the use of the regulated flows of the Hunter River, the Upper Hunter Mining Dialogue (UHMD) publishes the Upper Hunter Water Balance annually. For example, in 2018, 188.1 gigalitres (GL) entered the Hunter River system upstream of Singleton, comprising 183.7 GL of environmental flows and dam releases and 4.4 GL of net rainfall runoff (i.e. rainfall runoff less evaporation). This water was used as follows (UHMD, 2018):

- 52.0 GL (28%) flowed past Singleton, including environmental flows.
- 14.6 GL (8%) was used for mining, including incidental take.
- 121.5 GL (65%) was extracted for power station use, agriculture, town water supply and other uses.

The Mount Pleasant Operation is situated adjacent to the Bengalla Mine and in the vicinity of the Muswellbrook Coal Mine, Dartbrook Mine, Mt Arthur Coal Mine and Mangoola Coal. Each of these mines are located downstream of the Glenbawn and Glennies Creek Dams and therefore would not affect the volume of water stored in, or released from, the major Hunter River dams (including environmental water or water released to other water users).

Changes in groundwater-derived baseflow have been predicted by AGE (2020b) using a numerical groundwater model. The maximum predicted reduction in baseflow due to the Project is as follows:

- 32 ML/year (or approximately 0.09 ML/day) in the Hunter River;
- 6 ML/year (or approximately 0.02 ML/day) in Sandy Creek; and
- 13 ML/year (or approximately 0.04 ML/day) in Dart Brook.

The total predicted reduction from the Hunter River water source (51 ML/year, made up of the combined baseflow loss from the Hunter River, Sandy Creek and Dart Brook) amounts to approximately 0.018% of the 287,102 ML mean annual total flow in the Hunter River at Muswellbrook (GS 210002) (HEC, 2020) or approximately 0.024% of the long-term average annual extraction limit established for the Hunter Regulated River Water Source (217,500 ML/year as defined in clause 39 of the *Water Sharing Plan for the Hunter Regulated River Water Source 2016*).

Accordingly, the potential impacts of the Project on the highly regulated Hunter River are considered negligible, including when considered cumulatively with other mining operations that are also operating in accordance with the management framework established under the *Water Management Act 2000* and associated water sharing plans.

Potential Impacts on Water Supply Works

Some organisations and public submissions raised concerns regarding potential impacts on water supply works, including potential impacts on:

- private water users;
- privately-owned bores not currently in use;
- water supply works that are potentially located within the “very unlikely” and “unlikely” zones of 2 m drawdown determined in the Project Groundwater Assessment uncertainty analysis; and
- water supply works other than privately-owned bores (i.e. MACH-owned bores).

Response

MACH conducted a census of groundwater bores in the vicinity of the Mount Pleasant Operation. The census involved:

- Characterisation of existing groundwater bores through collation and review of the WaterNSW registered bore database (i.e. registered water supply works) and other regional information (e.g. 1:25,000 topographic maps).
- Site visits with local landholders to confirm the location and use of groundwater bores on their property.
- Opportunistic collection of baseline data where practical (e.g. water levels and basic water quality parameters).

Groundwater bores, wells and springs identified on privately-owned land during the census are shown on Figure 7-18 of the EIS. A number of bores were also visited on mine-owned land during the census (e.g. monitoring bores) and these are listed in Attachment 5 of the Groundwater Management Plan (part of the approved Water Management Plan).

WaterNSW records were used as the basis for impact assessment for properties that were not visited as part of the bore census (e.g. due to distance from the Mount Pleasant Operation).

The AIP (NSW Government, 2012a) defines minimal impact considerations for water supply works as follows:

- Level 1: *"A maximum of a 2m decline cumulatively at any water supply work"*.
- Level 2: "*If more than 2m decline cumulatively at any water supply work then make good provisions should apply*".

The Project Groundwater Assessment (Appendix C of the EIS) presents potential impacts that exceed the Level 1 minimal impact consideration (i.e. greater than 2 m drawdown) at six privately-owned bores (including two bores that were determined to be dry at the bore census and an additional three bores that are not in use).

Groundwater monitoring and management at the Mount Pleasant Operation is currently undertaken in accordance with the Groundwater Management Plan and Surface and Ground Water Response Plan, which are both sub-plans of the Water Management Plan. These relevantly include:

- groundwater impact assessment criteria and triggers;
- groundwater impact investigation protocol; and
- a response plan, in the event that an investigation conclusively attributes an adverse impact to an existing groundwater supply user to the Mount Pleasant Operation.

Appropriate contingency measures for an impact on a groundwater supply user are described in the approved Water Management Plan and may include:

- deepening the affected groundwater supply bore;
- construction of a new groundwater supply bore; or
- provision of an alternative water supply.

Consistent with the requirements of the AIP, MACH would continue to implement appropriate contingency measures for Project related drawdown greater than 2 m at any relevant private or public groundwater bores. This would also apply to any unexpected impacts at more distant privately-owned bores (i.e. those with predictions of less than 2 m drawdown, including any located within the "very unlikely" and "unlikely" zones of 2m drawdown determined in the Project Groundwater Assessment uncertainty analysis).

Potential impacts at MACH-owned water supply works are not presented in the Project Groundwater Assessment given the AIP minimal impact considerations would not apply to these water supply works (i.e. in the event that drawdown were to exceed 2 m at a MACH-owned bore, MACH would not be required to make good an impact on its own land).

Potential Groundwater Drawdown in the Hunter River Alluvium

Some organisations and public submissions raised concerns regarding predicted drawdowns in the Hunter River alluvium.

Response

Groundwater modelling completed for the Project indicates minimal drawdown (less than 2 m) would occur in the 'highly productive' Hunter River alluvium as the majority of the target coal seams subcrop west of the alluvium extent. The Mount Pleasant Operation (incorporating the Project) is predicted to result in only limited drawdown in the alluvium to the north of the Project, near the existing Dartbrook Mine. This is due to the Edderton Seam subcrop, which does extend beneath the alluvium in the north (Appendix C of the EIS).

No privately-owned bores in the 'highly productive' Hunter Regulated River Alluvial Water Source are predicted to experience cumulative drawdowns greater than 2 m.

The predicted peak reduction in baseflow to the Hunter River due to the Project is 32 ML/year, which is negligible relative to the total flow in the Hunter River (Appendix C of the EIS).

Potential Impacts on Kingdon Ponds

Some organisations and public submissions raised concerns regarding potential impacts on Kingdon Ponds.

Response

Kingdon Ponds is a tributary of Dart Brook.

The confluence of Kingdon Ponds and Dart Brook is located approximately 6 km upstream of the Mount Pleasant Operation. Accordingly, Kingdon Ponds would not be affected by the Mount Pleasant Operation (incorporating the Project).

Potential Impacts on Surface Water and Groundwater Quality

Some organisation and public submissions raised concerns regarding potential impacts on surface water and groundwater quality, including perceptions that potential impacts from mine water storages, the Fines Emplacement Area and out-of-pit waste rock emplacement have not been adequately considered.

Response

Mining operations and waste emplacement activities at the Mount Pleasant Operation commenced in October 2017. The Fines Emplacement Area and MWD construction was completed in 2019 (MACH, 2020).

The Water Management Plan outlines the surface water and groundwater monitoring program, water quality trigger levels and impact assessment criteria. To date, there have been no exceedances of water quality impact assessment criteria or trigger levels in the vicinity of the Fines Emplacement Area, MWD or out-of-pit waste rock emplacement areas.

Section 8.5 of the Project Groundwater Assessment (Appendix C of the EIS) identified the continued development of the Fines Emplacement Area and out-of-pit waste rock emplacement as components of the Project that could affect groundwater quality. Accordingly, a detailed assessment of potential impacts was undertaken, which concluded (AGE, 2020b) (emphasis added):

> *During operations, the fines emplacement area would be managed in accordance with the Mount Pleasant Operation Fines Emplacement Plan (ATC Williams, 2017). The plan provides for the management of seepage from the fines emplacement area as follows:*
>
> - *establishment of a foundation drain to manage potential seepage through the embankment;*
> - *a clay fill cut-off key is constructed into the bedrock underlying the embankment footprint to minimise the potential for shallow seepage beneath the fines emplacement area;*
> - *seepage water is collected, tested and recovered using a pump back system as required; and*
> - *prioritising the return of decant water to the water management system, thereby minimising the decant pond volume and seepage potential of the fines emplacement area.*
>
> ***With the implementation of the above measures, the potential impacts on groundwater quality during the operation of the fines emplacement area is predicted to be negligible.***
>
> *The Project involves the deepening and continued operation of the open cut pit in a westerly direction. As a result, the final void would be located closer to the fines emplacement area, drawing seepage towards the voids as opposed to the Sandy Creek alluvium. The increased depth of the final void would also increase the hydraulic gradient from the out-of-pit spoil towards the final void, reducing the potential for seepage towards the Hunter River alluvium.*
>
> *The potential for seepage from the proposed final landform has been assessed using groundwater model outputs and the semi-analytical particle tracking software MODPATH (Pollock, 2016) (Section 7.2). The MODPATH analysis demonstrates that seepage from the fines emplacement area and out-of-pit waste emplacement area is predicted to primarily report to the Project and Bengalla Mine final voids.*
>
> ***Based on the above, the Project is considered to have a negligible impact on groundwater quality.***

HEC (2020) undertook site water balance modelling to assess the performance of the Project water management system for a range of different climatic scenarios (including the potential risk of overflow from each storage). HEC considered the potential impacts of the Project on surface water quality based on the outcomes of the site water balance modelling and concluded (Appendix D of the EIS):

- No overflows are predicted from the mine water dams or Fines Emplacement Area.
- The conceptual design of the proposed sediment dams has been undertaken in accordance with the Landcom (2004) and DECC (2008) guidelines.
- Controlled releases of water to the Hunter River would continue to be undertaken in accordance with the HRSTS and relevant EPL conditions. Accordingly, controlled releases would comprise a very small component of the flow in the Hunter River and dilution would be substantial.
- For all assessed water quality constituents, the maximum observed levels in the MWD (taken as a conservative representation of potential discharge water quality) are less than the median levels recorded in the Hunter River and/or less than the relevant Water Quality Objectives.
- The Project is not predicted to result in any discernible deterioration in water quality in Sandy Creek, Rosebrook Creek or the Hunter River.

Depressurisation of Permian Groundwater System

One organisation raised concerns regarding the predicted extent of groundwater depressurisation in coal seams and potential associated impacts on shallow groundwater and surface water resources.

Response

Mining results in depressurisation of the coal seams and overburden/interburden within the immediate area of mining activities. Depressurisation, that is depression in the potentiometric surface, propagates away from the mining area based on the hydraulic properties of the surrounding strata.

Depressurisation, or depression of the potentiometric surface, does not necessarily result in physical drawdown outside of constrained units (such as the deeper Permian groundwater system). Therefore, depressurisation can occur in the deeper Permian groundwater system without resulting in impacts to overlying alluvial groundwater and surface water resources (as is the case for the Mount Pleasant Operation, incorporating the Project).

Potential Impacts on Groundwater Dependent Ecosystems

One organisation raised concerns regarding potential impacts on groundwater dependent ecosystems (particularly the Forest Red Gum Grassy Open Forest).

Response

Potential impacts to groundwater dependent ecosystems were assessed in the Project Groundwater Assessment (Appendix C of the EIS).

The following potential GDEs were identified in the vicinity of the Project (Section 7.11.2 of the EIS):

- The Hunter River is identified as a potential Type 2 aquatic GDE based on the *Groundwater Dependent Ecosystem Atlas* (BoM, 2020).
- Approximately 3 ha of Forest Red Gum Grassy Open Forest (PCT 618) in the Project Relinquishment Area has been identified as a potential Type 3 terrestrial GDE by Hunter Eco (2021).
- Stygofauna were collected from bores accessing the Hunter River alluvium (Bio-Analysis, 2020).

The predicted peak reduction in baseflow to the Hunter River due to the Project is 32 ML/year, which is negligible relative to the total flows in the Hunter River (Appendix C of the EIS).

During mining, the predicted drawdown in the vicinity of the Forest Red Gum Grassy Open Forest (PCT 618) is negligible (Appendix C of the EIS). Further analysis by AGE (2021) confirms that drawdowns would remain negligible during the post-mining recovery phase (Attachment D).

All of the stygofauna taxa collected in the vicinity of the Project are prevalent elsewhere in the Hunter Valley. There is no significant drawdown predicted along the Hunter River alluvium and therefore potential impacts to these stygofauna populations are predicted to be negligible (Appendix C of the EIS).

Potential Impacts on Belgrave Bore

One public submission raised concerns regarding potential impacts on the Belgrave bore and associated properties, including that the Belgrave bore has not previously experienced the historical drawdowns discussed in the EIS, and that impacts may not have been considered at all of the other bores on the property.

Response

Potential impacts at all privately-owned bores identified during the bore census were assessed in the Project Groundwater Assessment (Appendix C of the EIS). WaterNSW records were used for properties that were not visited (e.g. due to distance from the Mount Pleasant Operation). The relevant privately-owned bores and WaterNSW records are shown on Figure 7-18 of the EIS.

The Belgrave bore in the north-west of ML 1645 (Figure 7-18 of the EIS) is the only location that is active and not dry, and predicted to experience more than 2 m drawdown due to Mount Pleasant Operation (Appendix C of the EIS).

The Belgrave bore has been monitored by Dartbrook Mine since 2000. Monitoring data collected from the Belgrave bore is reported in the *Dartbrook Mine – Annual Review 2019* (AQC Dartbrook Management, 2020). In summary (Figure 5):

- the Belgrave bore recorded a decline in groundwater levels in response to mining between 2004 and 2006;
- pH has fluctuated between 6.6 and 9.2; and
- EC has ranged from approximately 5,000 µS/cm to 12,500 µS/cm.

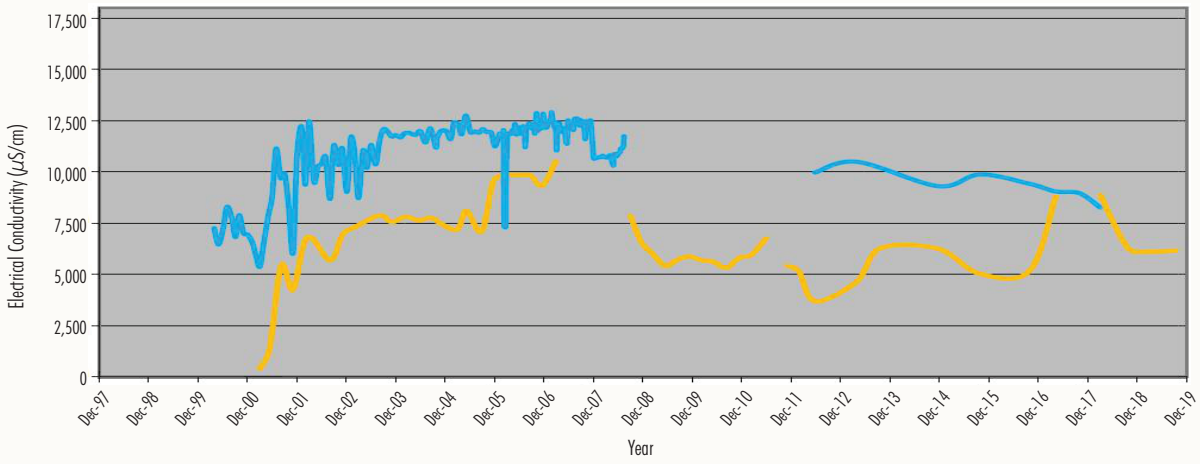
Consistent with the requirements of the AIP, MACH would continue to implement appropriate contingency measures for Project related drawdown greater than 2 m at any relevant private or public groundwater bores. The contingency measures developed for the existing/approved Mount Pleasant Operation include:

- deepening the affected groundwater supply bore;
- construction of a new groundwater supply bore; or
- provision of an alternative water supply.

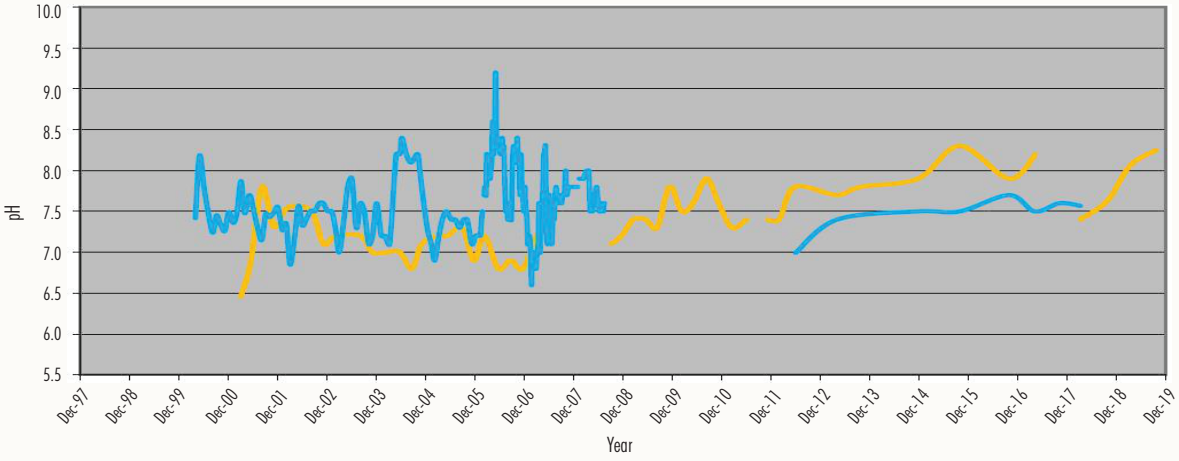
Potential Impacts on Sandy Creek

Some organisation and public submissions raised concerns regarding potential impacts on Sandy Creek, including:

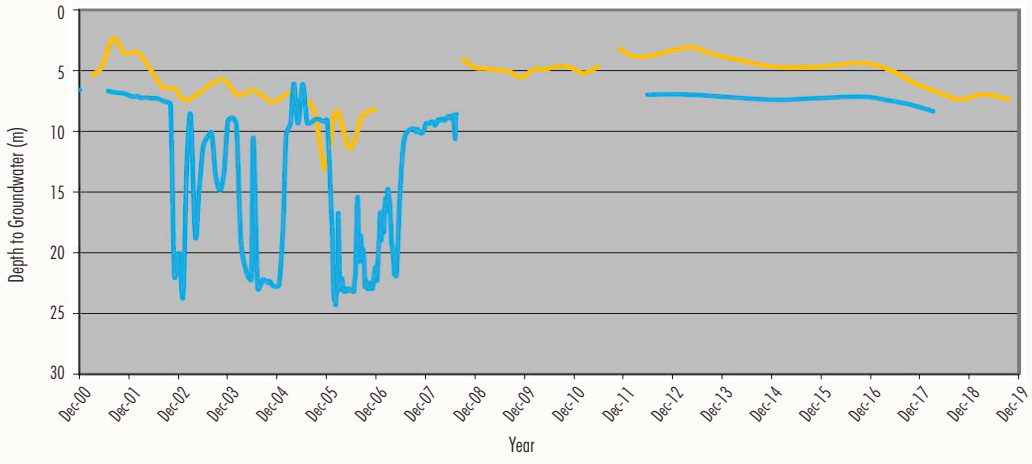
- perceived existing salinity issues in Sandy Creek;
- elevated salinity recorded in ED2;
- potential water quality impacts associated with MWD2, MWD3 and the Fines Emplacement Area; and
- reduction of flow to Sandy Creek and other adjacent properties due to the establishment of MWD2, MWD3 and the Fines Emplacement Area.



Electrical Conductivity



pH



Depth to Groundwater

MAC-18-02 SSD_RIS_003A

Resource Strategies

LEGEND
GW038582
Belgrave Bore

Source: AQC Dartbrook Management (2020)

MACHEnergy

MOUNT PLEASANT OPTIMISATION PROJECT

Data Collected from Belgrave Bore

Figure 5

Response

The Fines Emplacement Area and ED2 construction was completed in 2019 (MACH, 2020).

MACH monitors water quality in Sandy Creek at W11 (upstream of the Fines Emplacement Area) and W12 (downstream of the Fines Emplacement Area). Monitoring commenced at these two sites in 2017. MACH commenced monitoring water quality in the Fines Emplacement Area and ED2 when they were constructed (MW5a and MW9). Monitoring results indicate (Appendix D of the EIS):

- median EC at W11 (Sandy Creek upstream) is 6,320 µS/cm, with a recorded maximum of 8,410 µS/cm;
- median EC at W12 (Sandy Creek downstream) is 4,970 µS/cm, with a recorded maximum of 7,890 µS/cm;
- median EC in ED2 is 3,090 µS/cm, with a recorded maximum of 4,560 µS/cm; and
- median EC in the Fines Emplacement Area is 1,031 µS/cm, with a recorded maximum of 1,820 µS/cm.

The above monitoring indicates that salinity is naturally elevated in the Sandy Creek catchment and that the Fines Emplacement Area and ED2 have not affected downstream water quality. This is also consistent with MACH's understanding that no discharges have occurred from these storages to-date.

HEC (2020) undertook site water balance modelling to assess the performance of the Project water management system for a range of different climatic scenarios. No overflows are predicted to Sandy Creek based on the site water balance modelling (Appendix D of the EIS).

The area excised by the Project from the Sandy Creek catchment was assessed in the Project Surface Water Assessment (Appendix D of the EIS). The maximum area excised by the Project (when the Fines Emplacement Area is constructed to its full size and MWD2 and MWD3 have both been established) is estimated at 2.5 km^2 in 2041. This equates to 5.3% of the total catchment area of Sandy Creek at Wybong Road and is less than the predicted maximum area excised by the original approved Mount Pleasant Operation (PPK, 1997). This reduction in total flow volume is not considered significant given the ephemeral nature of Sandy Creek and is unlikely to be discernible from natural flow variability (Appendix D of the EIS).

There are a series of private landholder dams located on a tributary of Sandy Creek, downstream of the proposed location of MWD2 and MWD3 on the Gilgai property. These dams have an estimated catchment area of approximately 410 ha, of which MWD2 and MWD3 would excise approximately 62 ha (or 15%), which would likely be perceptible in comparison to natural variability in conditions (Attachment E).

Following rehabilitation, the catchment draining to Sandy Creek would be restored (i.e. no catchment is anticipated to be excised from Sandy Creek in the final landform) (Appendix D of the EIS).

As described in Section 7.9.5 of the EIS, the existing Surface and Ground Water Response Plan, which is included in the Water Management Plan for the Mount Pleasant Operation, would be reviewed and revised for the Project subject to the conditions of any Development Consent for the Project. The Surface and Ground Water Response Plan would describe any additional measures and procedures that would be implemented over the life of the Project to respond to any potential exceedances of surface water related criteria and contingent mitigation, compensation, and/or offset options if downstream surface water users are adversely affected by the Project.

Water Availability for Other Users

Some organisation and public submissions raised concerns regarding potential impacts of the Project on the availability of water for other users, particularly in consideration of a potential reduction in the availability of water due to climate change.

Response

Water use in the Hunter River system is regulated under the *Water Management Act 2000* and associated water sharing plans. section 3 of the *Water Management Act 2000* outlines objects for the Act, which include:

- to recognise and foster the significant social and economic benefits to the State that result from the sustainable and efficient use of water; and
- to provide for the orderly, efficient and equitable sharing of water from water sources;

Water used for mining represents a small proportion of the total water used in the Hunter Valley (UHMD, 2018).

All water take for the Project (including incidental water take) would be in accordance with Water Access Licences held under the relevant water sharing plans. Accordingly, the Project would not have any material impacts on water resources used by others.

Predicting future climate using global climate models (GCMs) is now undertaken by a large number of research organisations around the world. In Australia, much of this effort has been conducted and co-ordinated by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). CSIRO and BoM have recently published a comprehensive assessment of future climate change effects on Australia with the Climate Futures Tool (CSIRO and BoM, 2015). This is based on an understanding of the climate system, historical trends and model simulations of climate response to future global scenarios. Simulations have been drawn from an archive of more than 40 GCMs developed by groups around the world. Modelling has been undertaken for four Representative Concentration Pathways (RCPs) used in the Intergovernmental Panel on Climate Change (IPCC) assessment reports, which represent different future scenarios of greenhouse gas and aerosol emission changes and land-use change.

Predictions of future climate from these various models and RCPs have been used to formulate probability distributions for a range of climate variables including temperature, mean and extreme rainfall and potential evapotranspiration.

Adopting the RCP4.5 emissions scenario, the forecast change in annual rainfall by the year 2090 ranges from -19.8% (reduction in rainfall) to +4.4% (increase in rainfall), with a 'maximum consensus' (i.e. highest agreement between different climate models) of -10.1%.

Based on the 95th percentile site water balance modelling results, the maximum volume of water to be sourced from the Hunter River is 3,241 ML (Appendix D of the EIS), which amounts to approximately 1.1% of the 287,102 ML mean annual total flow in the Hunter River at Muswellbrook (GS 210002) (HEC, 2020) or 1.9% of the median annual total flow adjusted for the 'maximum consensus' effect of climate change (i.e. assuming a reduction of 10% results in a median annual total flow of approximately 163,000 ML).

Water Availability and Licensing for the Project

Two organisation submissions raised concerns regarding water licensing requirements and water availability for the Project, including:

- clarification regarding the specific water access licences that are available for the Project;
- sufficiency of existing water access licences to account for Project water supply requirements, including the risk of potential reduced allocations for general security water access licences due to drought and/or climate change effects; and
- the application of a harvestable rights exemption to water captured within active mining areas.

Response

As described in the Project Surface Water Assessment (Appendix D of the EIS), MACH holds the following surface water entitlements for the Project:

- 961 units of Hunter Regulated River (High Security); and
- 589 units of Hunter Regulated River (General Security) (MACH also holds 2,348 units currently assigned to MACH-owned agricultural properties around the Project; these entitlements could also be assigned to the Project if and when required).

Specific water access licences held by MACH are listed in Table 5 of the approved Water Management Plan at each Plan revision date. MACH may acquire or dispose of additional licences in the public water market or through property transactions periodically, between revisions of the Water Management Plan.

The Hunter River Integrated Quantity Quality Model (IQQM) is used by WaterNSW to make available water determinations in the Hunter Valley, in accordance with the *Water Sharing Plan for the Hunter Regulated River Water Source 2016*. The IQQM model was used to generate predictions of general security and high security available water determinations for the Project site water balance (Appendix D of the EIS). Accordingly, the site water balance modelling for the Project accounts for variability in water allocations during dry periods.

As described above, the 'maximum consensus' forecast reduction in annual rainfall due to climate change is 10.1% by 2090 (under the RCP4.5 emissions scenario). Given the Project would operate until 2048, the effect of climate change on water supply reliability during the life of the Project is expected to be within the range of existing natural inter-year variability.

The application of harvestable rights exemptions to mine affected water is consistent with the *Water Management Act 2000* and *Water Management (General) Regulation 2018* as MACH is obligated to capture and contain this water to prevent pollution of downstream water resources. It is relevant to note that the DPIE – Water and NRAR submission on the Project did not raise concerns regarding the application of harvestable rights exemptions to applicable storages.

Site Water Balance Model Calibration

One organisation submission raised concerns regarding the lack of site water balance model calibration and the range of climate data used (1892-2012).

Response

The site water balance model assumptions have been informed by significant experience of site water balance modelling at other mining operations in the Hunter Valley.

Site-specific calibration of the site water balance model was not considered appropriate, given:

- The Mount Pleasant Operation water management system has been progressively developed since construction began in October 2016 and the various water storages and their catchments evolved rapidly during this commencement phase (i.e. altering areas of natural, construction and operational surfaces within individual dam catchments).
- A prolonged drought significantly reduced the opportunity to gather additional site-specific runoff and catchment data sets.

MACH would undertake a calibration of the site water balance model once sufficient water management system data has been collected to provide useful additional calibration points under median and high rainfall conditions. The process to periodically conduct model calibration would be documented in the updated Water Management Plan for the Project.

The site water balance model simulates 121 realisations derived using the historical daily climatic record from 1892 to 2012. This period aligns with the Hunter River IQQM simulations which have been undertaken using climatic data from 1892 to 2012 to simulate available water determinations in the Hunter Valley as well as other key water supply parameters. Although the period of climatic data from 2012 to 2020 is not simulated in the water balance model, due to the need to align with the IQQM simulations, the period of climatic data from 1892 to 2012 comprises a wide range of climatic events including high, low and median rainfall periods (Appendix D of the EIS).

Flooding

One organisation submission and one public submission raised concerns regarding potential flooding impacts of the Project.

Response

The easternmost extent of the Mount Pleasant Operation mine landform is located outside of the 1% AEP flood extent for the Hunter River (Appendix D of the EIS). The potential for the mine landform to result in changes to flood depth, extent or velocity in the vicinity of the Mount Pleasant Operation is considered to be negligible (Appendix D of the EIS).

Once constructed, the approved Stage 2 rail spur would cross the Hunter River floodplain, within the 1% AEP flood extent. The approved rail infrastructure (currently under construction) has been designed to meet a range of flood risk management performance criteria, as defined in the Water Management Plan and Development Consent DA 92/97.

4.3.5 Ecology

Regulatory Submissions

Threatened Species Survey Effort

The BCD requested further details are provided on the survey effort for *Cryptostylis hunteriana, Cymbidium canaliculatum, Cynanchum elegans, Eucalyptus pumila, Ozothamnus tesselatus, Prostanthera cineolifera, Prostanthera cryptandroides* ssp. *cryptandroides, Pomaderris bodalla, P. queenslandica, P. reperta,* and *Thesium australe*.

Response

A revised BDAR has been prepared and is provided in Attachment G.

A new table in Attachment A of the BDAR (Attachment G) (Table 8) has been added in Section 6.5 to outline the assessment of habitat suitability, survey requirement and survey effort for the above listed threatened flora species.

Further details for each of these species are also provided in Appendix 2 of Attachment A of the BDAR.

Assignment of Plant Community Types

The BCD requested further detail on the PCTs considered as potential matches to on-ground vegetation and the process used to assign PCTs to vegetation communities.

Response

Table 9 in Section 7.3 of Attachment A of the BDAR has been revised to include all PCTs considered for each vegetation community, as well as the floristic composition, vegetation structure, soils, position in landscape, substrate, geographic location and overall confidence of the PCT assignment.

Expert Orchid Report

The BCD requested that the Expert Report is updated to acknowledge the persistence of the population of *Prasophyllum petilum* beside Thomas Mitchell Drive.

Response

MACH understands that BCD will contact Dr Stephen Bell regarding a potential update to the Expert Report to reflect BCD's advice.

Tree Hollows

The BCD requested that the 'number of tree hollows' for the Biodiversity Assessment Method (BAM) plot 200331P5 is changed from zero to one, and that the BAM calculation files are re-run.

Response

At the time of the BCD inspection in March 2021, it was noted there was most likely a hollow present in a large *Corymbia maculata* within the 200331P5 plot area. At the inspection it was discussed that it was possible that the potential hollow had been exposed by a falling branch after the plot data had been collected. Notwithstanding, the number of tree hollows for this plot has been changed from zero to one and the BAM-C has been re-run.

BDAR Data

The BCD requested that Figures 7a and 7b (Vegetation Maps) are presented at 1:10,000 scale instead of 1:50,000 scale.

The BCD also requested that the minimum and maximum temperatures, rainfall, and notes of any weather event that may have affected the flora survey (e.g. hail, strong winds, or frost) for each day of survey are provided.

Response

The requested scale of figures is not practical and would result in a set of 12 figures for each figure (i.e. 24 figures rather than two). As all relevant features are already clearly visible on the figures, it is considered that the development of additional figures would not improve reader comprehension. Notwithstanding, readers can also zoom in further on the PDF figures to review features at larger scales (if required).

Table 3 in Section 6 of Attachment A of the BDAR has been revised to provide the weather data and conditions at the time of each flora survey.

Protected Matters Search Results

The BCD requested that Chapter 7 of the BDAR identifies all EPBC Act-listed matters, including Matters of National Environmental Significance (MNES) Protected Matters Search results and any other EPBC Act-listed matters, such as threatened species, threatened communities and migratory species identified by the proponent from desktop analysis or site surveys.

Response

Table 28 in Section 7.2.1 of the BDAR has been revised to include all EPBC Act-listed matters identified in the Protected Matters Search results, as well as all EPBC Act-listed species with associated PCTs and those recorded in the locality of the Action area.

Survey Effort for EPBC Act Listed Species

The BCD requested further details of how survey effort for EPBC Act-listed threatened species met BAM requirements, and, where available, Commonwealth survey requirements, in particular for *Cryptostylis hunteriana, Cynanchum elegans, Eucalyptus glaucina, Ozothamnus tesselatus, Prostanthera cineolifera, Prostanthera cryptandroides* ssp. *cryptandroides*, and *Thesium australe*.

Response

A new appendix in Attachment A of the BDAR (Appendix 2) has been added to further outline survey effort for the above species. The revised BDAR is provided in Attachment G.

Statements About Potential Impacts – Referral Decision Matters

The BCD requested a statement about the potential impact (i.e. likely significant, low risk of impact or not occurring) to any of the matters listed in the Referral Decision (dated 26 August 2020).

Response

Eucalyptus glaucina and Thesium australe

Section 7.2.2 of the BDAR states:

> *Based on the information available in the EPBC Act Referral, DAWE considered (in the input into the SEARs) that there was a real chance or possibility that the Action would significantly impact the Austral Toadflax (Thesium australe) and Slaty Red Gum (Eucalyptus glaucina). Targeted surveys for these two flora species have subsequently been undertaken and neither species was recorded in the Action area and surrounds (Hunter Eco 2021) (Attachment A) or known to occur nearby (Figure 24). Therefore, it is considered unlikely that the Action would adversely (or significantly) impact either of these species.*

Box-Gum Woodland CEEC listed under the EPBC Act

Section 7.4.1 of the BDAR has been revised to state:

> *As described earlier, based on the information available in the EPBC Act Referral, DAWE considered (in the input into the SEARs) that the Action is likely to have a significant impact on the Box-Gum Woodland CEEC listed under the EPBC Act. However, the loss of between 5.6 ha and 5.7 ha of woodland and between 16.8 ha and 20.8 ha of poor quality derived native grassland of the Box-Gum Woodland CEEC listed under the EPBC Act is not considered significant in consideration of the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DotE 2013).*

No further changes are proposed to Section 7.4.1 of the BDAR, which provides justification for the above statement. Figures 8a and 8b of the BDAR show the distribution of the *Box-Gum Woodland CEEC listed under the EPBC Act* within the Project area (Attachment G).

Striped Legless Lizard

Section 7.4.2 of the BDAR states:

> *It is conservatively considered that the Action is likely to significantly impact on the Striped Legless Lizard in the short to medium-term in consideration of the Environment Protection and Biodiversity Conservation Act 1999 Referral Guidelines for the Vulnerable Striped Legless Lizard, Delma impar (DSEWPaC 2011) and Matters of National Environmental Significance Impact Guidelines 1.1 (DotE 2013). This conclusion is made considering that the local population of the Striped Legless Lizard in the Action area represents a range extension for the species and therefore could be considered an important population (as defined by DotE 2013).*

Swift Parrot

Section 7.4.3 of the BDAR states:

> *As described earlier, based on the information available in the EPBC Act Referral, DAWE considered (in the input into the SEARs) that the Action is likely to have a significant impact on the Swift Parrot. The Project may not have a material adverse impact on the Swift Parrot as this species has not been recorded in the Action area, no breeding habitat for this species is present (as it breeds in Tasmania), and DPIE (2020a) do not recognise the Subject land as important habitat for this species (negating the need for species credits).*

No change is proposed to the relevant sections of the BDAR. To summarise (as described in Section 7.4.3 of the BDAR), the Subject land is not within a Mapped Important Area designated by DPIE for the Swift Parrot. Figure 24 of the BDAR provides the landscape distribution of the Swift Parrot in relation to the Project and shows a lack of records in the immediate region. The BDAR also describes that it is unlikely that the woodland within the Development Footprint is used by the Swift Parrot because this species was not recorded during any recent or previous surveys. Regardless, impacts on any potential foraging habitat would be offset in accordance with the NSW Biodiversity Offsets Scheme.

Regent Honeyeater

Section 7.4.4 of the BDAR states:

> *As described earlier, based on the information available in the EPBC Act Referral, DAWE considered (in the input into the SEARs) that the Action is likely to have a significant impact on the Regent Honeyeater. The Project may not have a material adverse impact on the Regent Honeyeater as this species has not been recorded in the Action area, no breeding habitat for this species is present, and the DPIE (2020a) do not recognise the Subject land as important habitat for this species (negating the need for species credits). To be conservative and consistent with the DAWE input into the SEARs, the BDAR assesses the Regent Honeyeater as if the Action could significantly impact the species.*

No change is proposed to the relevant sections of the BDAR. To summarise (as described in Section 7.4.4 of the BDAR), the Subject land is not within a Mapped Important Area designated by DPIE for the Regent Honeyeater. Figure 24 of the BDAR provides the landscape distribution of the Regent Honeyeater in relation to the Project and shows only one record within approximately 30 km of the Project (observed in 1905 with an accuracy of 10,000 m). The BDAR also describes that removal of potential foraging habitat is likely to be of little consequence to the Regent Honeyeater given the occurrence of similar potential habitat in the surrounding landscape and absence of breeding habitat. Regardless, impacts on any potential foraging habitat would be offset in accordance with the NSW Biodiversity Offsets Scheme.

Summary of BAM Assessment on MNES

The BCD requested a summary of the results of the BAM assessment of the impacts or likely impacts of the project on MNES, including direct, indirect, facilitated and downstream impacts. The BCD also requested a summary of the measures to avoid and mitigate impacts.

Response

Table 33 in Section 7.5 of the BDAR has been revised to provide a summary of impacts (quantified for clearance) and mitigation measures for all identified MNES.

Assessment of Significant Impact Criteria

The BCD requested a copy of the assessment of 'significant impact criteria' for each threatened species and ecological community.

Response

Sections 7.4.1 to 7.4.7 of the BDAR have been revised to clearly outline the assessment of 'significant impact criteria' for each threatened species and ecological community.

Migratory Species

The BCD requested a description of how migratory species have been assessed in accordance with the SEARs.

Response

All EPBC Act-listed threatened species and communities relevant to the Northern Link Road have been assessed in accordance with the BAM. Migratory species are not a relevant controlling provision for the Action (EPBC 2020/8735). The *General Assessment Requirements* state that the EIS must address the matters outlined in relation to only the controlling provisions (i.e. listed threatened species and communities).

MNES Offset

The BCD requested details of any offsets proposed in relation to residual significant adverse impacts, how they provide a like-for-like outcome, and how any land-based offsets will be secured.

Response

As described in Section 7.10.6 of the EIS:

> *MACH would address the Commonwealth offset requirement* [for the Northern Link Road] *through a combination of the following options, consistent with the NSW Biodiversity Offsets Scheme under the Bilateral Agreement:*
>
> - *application of like-for-like biodiversity credits from the Western Link Road Relinquishment Area; and*
> - *retirement of residual biodiversity credits for relevant EPBC Act listed threatened species and ecological communities as required by the EPBC Act.*

The Project is being assessed under the NSW Assessment Bilateral Agreement as it will require approval under both the BC Act and the EPBC Act. Under the Bilateral Agreement, the NSW Government assesses development applications on behalf of the Commonwealth Government.

The Commonwealth Government has endorsed the NSW Biodiversity Offsets Scheme under the BC Act through the Bilateral Agreement, which means the NSW Biodiversity Offsets Scheme can be used to address Commonwealth offset requirements. As such, like-for-like credits would be retired in accordance with the BC Act. This is discussed in Section 7.10.6 of the EIS. Under this scheme, credits are generated and retired through the establishment and management of Biodiversity Stewardship Sites.

Future Mineral Development and Biodiversity Offsets

The MEG requested that the proponent for the Project should consider the potential for resource sterilisation should any additional biodiversity offsets be considered, and should consult with the Department and the holders of any exploration authority that may be affected.

Response

MACH concurs with the MEG's recommendation regarding consultation on any additional biodiversity offset creation.

NGO and Public Submissions

Biodiversity

A number of submitters raised concerns regarding potential impacts on biodiversity, including impacts on connectivity or potential cumulative impacts on Endangered Ecological Communities and threatened species, including in the context of climate change.

Response

The BDAR (Attachment G) provides a discussion of the potential cumulative impacts of the Project on biodiversity, including both direct and indirect impacts (Section 4 of the BDAR), inclusive of potential impacts to habitat connectivity and species movement (Sections 4.3.1 to 4.3.3 of the BDAR). The Project Additional Disturbance Areas are not part of a larger linkage of remnant native vegetation that could provide movement areas for fauna as they expand on areas already approved to be cleared for the Mount Pleasant Operation (Figure 1-4 of the EIS).

Biodiversity Offsets

Some submissions raised concerns as to whether existing Mount Pleasant Operation biodiversity areas located west of Merriwa are suitable to offset Project impacts.

Response

The existing biodiversity offset areas for the Mount Pleasant Operation are approved under the EPBC Act and provide similar vegetation and habitat as would be impacted by the Project, including large amounts of *Box-Gum Woodland CEEC*. Species credits have also been calculated in the BDAR for the Striped Legless Lizard, Squirrel Glider and Tiger Orchid. The Project potential impacts on biodiversity would be offset as required by the NSW and Australian Governments (i.e. in accordance with applicable legislation including the EP&A Act, the BC Act and the EPBC Act).

4.3.6 Aboriginal Heritage

Regulatory Submissions

Survey Coverage

Heritage NSW recommended completion of some small areas of further systematic heritage surveys, in particular:

- Small portions of the additional primary impact areas of SSD Zones B3 and B4, including the alternative alignment of the Northern Link Road that may be adopted that were unable to be surveyed due to property access restrictions.
- Potential surface impact areas associated with works subject to future detailed design within SSD Zone C.

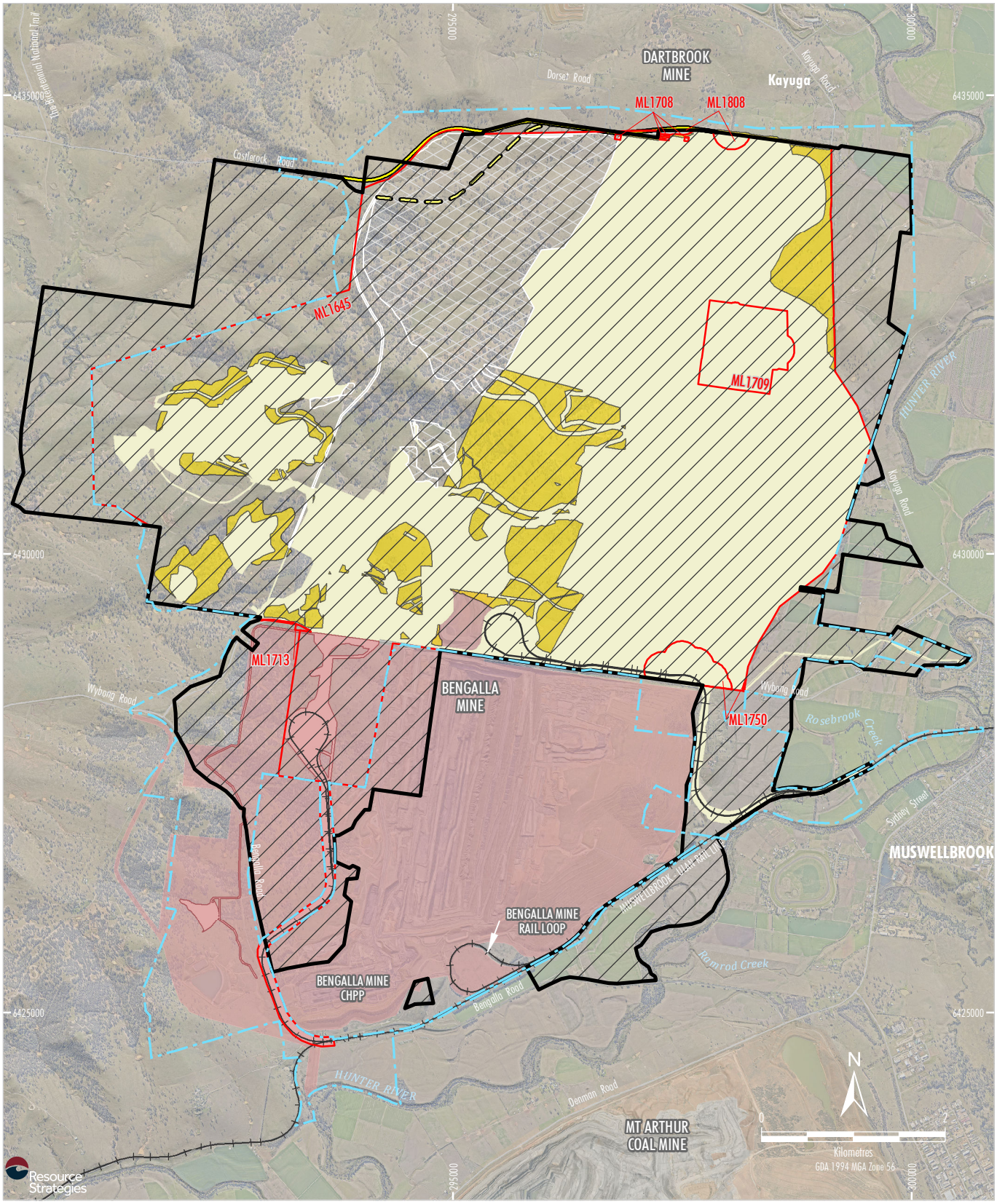
Response

Prior to the completion of the Project ACHA (South East Archaeology, 2020a), the Mount Pleasant Operation had conducted Aboriginal heritage surveys on approximately 5,600 ha of land. This encompassed the vast majority of the MLs and also adjoining lands to the east and west (Figure 6). The conduct of the previous Aboriginal heritage surveys and assessments culminated in the grant of area-based Aboriginal Heritage Impact Permits by the NSW Office of Environment and Heritage (OEH) (now administered by Heritage NSW) across much of the Mount Pleasant Operation site, including the majority of the Project additional disturbance area (Figure 7). Further, Bengalla Mine also conducted a range of assessments and salvage activities to the south of Wybong Road.

Northern Link Road

For context, it should be noted that the development of the Northern Link Road is already approved to be constructed under the existing Mount Pleasant Operation Development Consent DA 92/97 (i.e. is required to be constructed prior to the closure of Castlerock Road), and it is only the western portion of the road alignment that is proposed to be materially altered by the Project.

As part of the conduct of the Project ACHA, South East Archaeology (2020a) conducted survey of Project additional disturbance areas that had not already been subject to previous archaeological survey, including portions of a provisional alignment of the Northern Link Road. However, one private landholder on the Northern Link Road realignment declined to allow South East Archaeology and the Registered Aboriginal Parties (RAPs) access for the purpose of conducting these heritage surveys.



LEGEND

Existing Mine Elements

- Mining Lease Boundary (Mount Pleasant Operation)
- Project Continuation of Existing/Approved Surface Development (DA92/97) [1]
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)
- Existing/Approved Mount Pleasant Operation Infrastructure within Bengalla Mine Approved Disturbance Boundary (SSD-5170) [1]

Additional/Revised Project Elements

- Approved Disturbance Area to be Relinquished [2]
- Approximate Additional Disturbance of Project Extensions [1]
- Northern Link Road Option 1 Centreline [3]
- Northern Link Road Option 2 Centreline
- SSD Development Application Area
- Previous Aboriginal Heritage Survey Coverage

[1] Excludes some incidental Project components such as water management infrastructure, access tracks, topsoil stockpiles, power supply, temporary offices, other ancillary works and construction disturbance.

[2] Subject to detailed design of Northern Link Road alignment.

[3] Preferred alignment subject to landholder access.

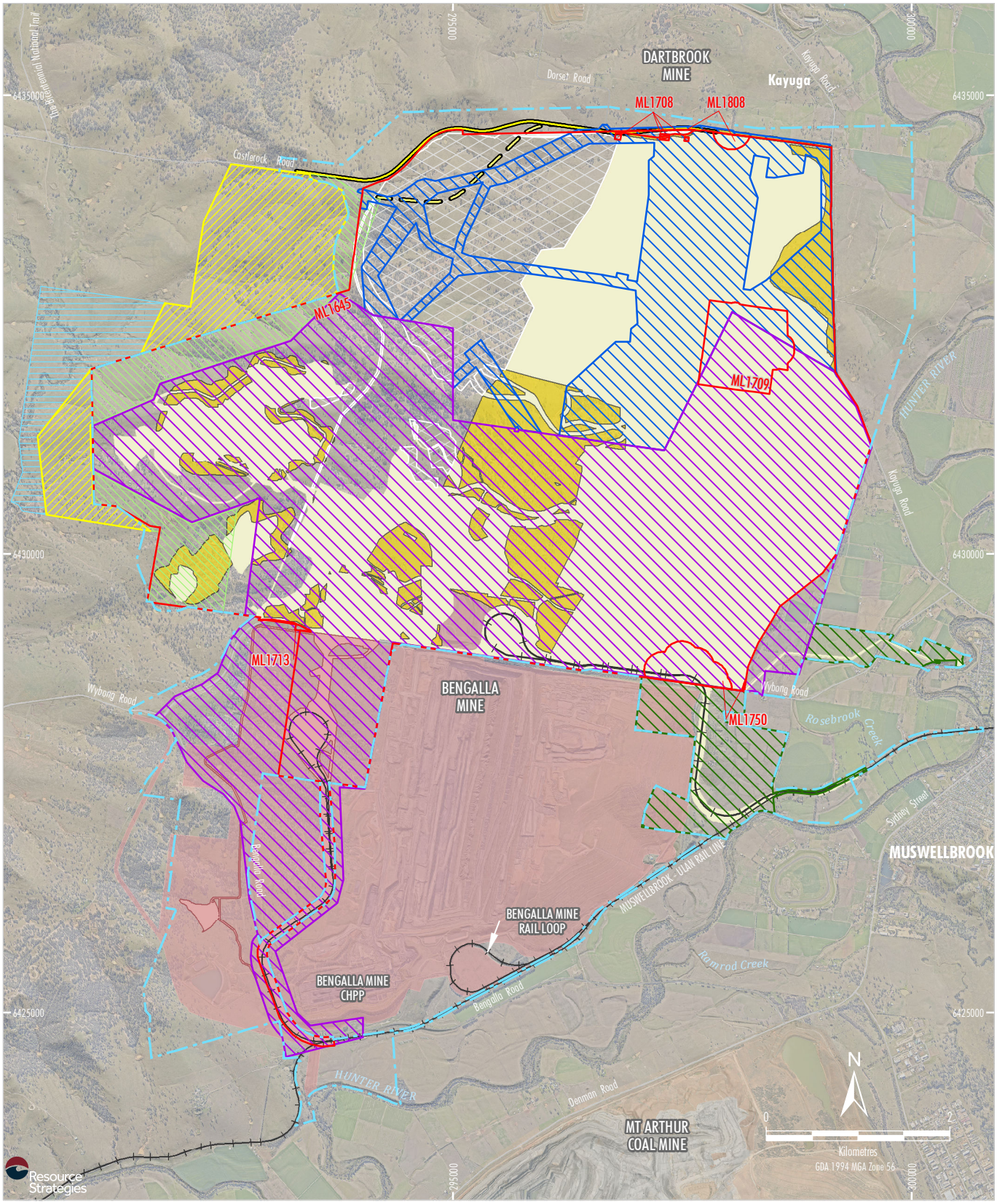
Source: MACH (2020); NSW Spatial Services (2020); Department of Planning and Environment (2016); South East Archaeology (2020)
Orthophoto: MACH (July 2020)

MACHEnergy

MOUNT PLEASANT OPTIMISATION PROJECT

Previous Aboriginal Heritage Survey Coverage Relative to Project Extensions

Figure 6



LEGEND

Existing Mine Elements

- Mining Lease Boundary (Mount Pleasant Operation)
- Project Continuation of Existing/Approved Surface Development (DA92/97) [1]
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)
- Existing/Approved Mount Pleasant Operation Infrastructure within Bengalla Mine Approved Disturbance Boundary (SSD-5170) [1]

Additional/Revised Project Elements

- Approved Disturbance Area to be Relinquished [2]
- Approximate Additional Disturbance of Project Extensions [1]
- Northern Link Road Option 1 Centreline [3]
- Northern Link Road Option 2 Centreline
- SSD Development Application Area

Existing AHIPs

- AHIP #C0002053
- AHIP #C0002092
- AHIP #C0004783

Aboriginal Heritage Conservation Areas

- Area A (Committed)
- Area B (Potential)
- Area C (Potential)

[1] Excludes some incidental Project components such as water management infrastructure, access tracks, topsoil stockpiles, power supply, temporary offices, other ancillary works and construction disturbance.

[2] Subject to detailed design of Northern Link Road alignment.

[3] Preferred alignment subject to landholder access.

Source: MACH (2020); NSW Spatial Services (2020); Department of Planning and Environment (2016); South East Archaeology (2020)
Orthophoto: MACH (July 2020)

MACHEnergy

MOUNT PLEASANT OPTIMISATION PROJECT

Existing Mount Pleasant Operation AHIPs and Provisional Conservation Areas

Figure 7

MACH has continued to negotiate with the relevant private landowner, and may reach an agreement that would permit the construction of MACH's preferred alignment of the Northern Link Road on this land in the future. However, until such agreement has been reached between the relevant parties, MACH is unable to complete further archaeological assessment on this portion of the Project additional disturbance area, as it is privately held land (and access has specifically been declined for this assessment purpose).

Given the extensive survey coverage that has been achieved across the Mount Pleasant and Bengalla Mine development application areas by numerous heritage surveys and heritage salvage operations to date (i.e. providing a very comprehensive sample of the heritage resources present), the restriction on access to a small area of privately-owned land is of no consequence in determining the nature and scale of the potential impacts of the Project on Aboriginal heritage resources.

To provide Heritage NSW with some further context as to the nature of the landscape through which both the currently approved and proposed realigned Northern Link Road would traverse, it is noted that the Department of Regional NSW – Primary Industries (Agriculture) stated the following in its submission on the Project EIS:

> *The majority of the Project area has been cleared and used for agricultural grazing purposes for well over 100 years. The landform in the Project area consists of undulating hills with open paddock grazing land and intermittent creeks and unnamed ephemeral drainage lines*

Plate 7 provides a photograph taken on the Option 1 alignment of the Northern Link Road, and illustrates the nature of the gently undulating topography that does not feature major escarpments that may be conducive to the presence of rock shelters. Consistent with this plate and the statement from Department of Regional NSW – Primary Industries (Agriculture) above, the potential for grinding grooves, rock shelter and bora/ceremonial sites in the Project area was assessed as being typically low to very low, or negligible in the ACHA (Appendix G of the EIS).

Plate 7 – Photograph Taken on Northern Link Road Alignment Option 1

In the event that MACH cannot reach an agreement with the private landholder on the Project's preferred Northern Link Road (Option 1) alignment, the Option 2 alignment described in the EIS would be adopted. Figure 6 shows that Option 2 of the revised Northern Link Road alignment is within the extent of previous Mount Pleasant Operation Aboriginal heritage surveys and is also largely within the surface development area of the approved mine (i.e. is within the extent of the approved North West Out-of-Pit Emplacement).

SSD Zone C

The potential impacts on Aboriginal heritage associated with the Project comprise (South East Archaeology, 2020a):

- *SSD Zone A - Direct surface impacts involving existing Approved Areas where the SSD disturbance would not comprise additional primary disturbance.*
- *SSD Zone B - Direct surface impacts involving areas in which additional SSD primary disturbance is proposed.*
- *SSD Zone C - Remainder of the SSD Area in which potential minor future disturbance may occur subject to detailed infrastructure engineering design. This includes existing Approved Areas (Zones A1R, A2R, A3R and A4R) in which the disturbance areas are to be relinquished under the SSD.*

With respect to the Heritage NSW comments on survey of potential surface impact areas within SSD Zone C, South East Archaeology (2020a) stated the following:

> *Additional field survey of Zone C in relation to the SSD Project was not considered to be warranted at present, as minimal impacts are proposed and these have not yet been subject to detailed design (ie. the precise locations of any potential impact areas are not currently known, for example, for any alternative alignment of the Northern Link Road). Any such potential impact areas are likely to be minor in extent and can be satisfactorily addressed subsequent to SSD approval through the inclusion of appropriate requirements (specifying the need for heritage survey and procedures for managing any identified Aboriginal heritage evidence) in the revised AHMP…*

Given the extensive previous Aboriginal heritage survey coverage, existing granted Aboriginal Heritage Impact Permits for the Mount Pleasant Operation, and the nature of Project development that would occur within the SSD Zone C (e.g. supporting infrastructure such as water management structures, access tracks, and environmental monitoring installations that are somewhat flexible in location), complete survey coverage of the Project Development Application area is not required (nor typically achieved in practice) for major projects such as mines that may extend across thousands of hectares.

Any ancillary disturbance associated with infrastructure detailed design within SSD Zone C could be suitably addressed by an updated Mount Pleasant Operation Aboriginal Cultural Heritage Management Plan (ACHMP), as recommended by South East Archaeology (2020a).

It is noted that this would be consistent with the current approved Mount Pleasant Operation ACHMP, which provides additional survey requirements for areas not previously subject to heritage survey (i.e. MACH will engage a suitably qualified archaeologist and representatives of the RAPs to undertake a heritage survey of such an area in a manner consistent with the BCD *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* [DECCW, 2010] prior to undertaking any ground disturbance works), and in the event that previously unidentified Aboriginal objects are found, a protocol for the management of previously unrecorded Aboriginal heritage evidence would be implemented.

Additional Test Excavations

Heritage NSW recommended that test excavations for the ten sites located in SSD Zone A2R-C are conducted prior to determination.

Response

MACH understands that the purpose of test excavation is described in section 3.1 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010):

> ***Purpose:*** *To collect information about the nature and extent of sub-surface Aboriginal objects, based on a sample derived from sub-surface investigations. Test excavations contribute to the understanding of site characteristics and local and regional prehistory and they can be used to inform conservation goals and harm mitigation measures for the proposed activity.*

It should be noted that a range of archaeological excavations have previously been conducted within the Mount Pleasant Operation MLs and surrounds for previous assessment or salvage operations that have collected a range of information about the nature and extent of sub-surface Aboriginal objects at the site, including:

- Cameron and Deacon (2016) – excavated 11 Potential Archaeological Deposits (PADs) (refer ACHA Figure 32);
- Regal et al. (2017) – excavated four test areas (refer ACHA Figure 36);
- RPS (2018) – excavated seven sites (refer ACHA Figure 39); and
- South East Archaeology (2020b) – excavated seven sites (refer ACHA Figure 40).

Further, a range of test excavations have also been conducted at the Bengalla Mine to the immediate south of Wybong Road, and at the nearby Mt Arthur Coal Mine. Collectively, these previous studies at the Mount Pleasant Operation and surrounds have collected a range of information about the nature and extent of sub-surface Aboriginal objects in the area that can inform potential conservation goals and harm mitigation measures for the Project.

South East Archaeology (2020a) recommended that a number of "uncertain" significance sites are subject to excavation as part of impact management measures, should the site be subject to Project disturbance, as follows:

> *Ten sites are situated in SSD Zone A2R-C which have been assessed as 'uncertain' significance with a recommendation by McCardle (2007) to conduct test excavations. Hence, the appropriate management strategy for these sites is firstly to 'reassess impacts with detailed design', with test excavation if impacts are to occur, then further management as per the SSD AHMP for the site type, level of impacts and significance.*

Review of the location of these ten sites indicates that none of them are located within the approximate extent of the Project open cut and waste rock emplacement landforms (Figures 8 and 9), and all are within the extent of the existing approved Mount Pleasant Operation disturbance area.

One site (MTP-159) is an artefact scatter that is located proximal to the provisional disturbance area of a Project water management dam HWD3 (Figure 9). HWD3 would be constructed later in the Project life and is within the approved disturbance footprint of the existing mine (Figure 9), with the final disturbance area of HWD3 to be determined by detailed engineering design.

Section 3.1 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010) states (emphasis added):

> *The first priority in test excavations, and recording Aboriginal objects during test excavations, must always be to avoid or minimise, as far practicable, the risk of harm to the objects under investigation. This means due care must be taken when excavating and collecting objects,* ***and that unnecessary excavations do not comply with this Code****.*

All ten artefact scatter sites where South East Archaeology recommends excavation (if the site is to be disturbed) are located within the existing approved mine footprint (Figure 9). These artefact scatter sites are outside of the Project open cut and waste rock emplacement disturbance area and would only be disturbed by ancillary infrastructure that would be subject to further detailed engineering design. MACH therefore does not concur that excavation of these sites prior to determination of the Project is required, nor is it consistent with the harm minimisation principles as outlined in the Code. Mention of the potential need for test excavations in the standard SEARs does not dictate that excavations are required for assessment purposes, and in this case a range of such excavations have already been undertaken.

Scarred Tree Reassessment

Heritage NSW recommended reassessment of 'possible scarred trees', specifically Zone A1 and SSD Zone C should be conducted to determine the origins of the scars and assess the significance of these sites prior to determination.

Response

The locations of the "possible scarred trees" that have not been as reassessed in the ACHA are primarily located within the Bengalla Mine approved disturbance boundary (SSD-5170), or outside of the potential Project disturbance area (Figure 10). A number of potential scarred trees are proximal to the approved water pipeline corridor associated with the Mount Pleasant Discharge Dam (DW1) that is to be constructed by Bengalla Mine as compensation for its clean water dam being located within the Mount Pleasant Operation site. This construction is already authorised by the Bengalla Mine approvals and would occur following detailed engineering design, irrespective of the determination status of the Project.

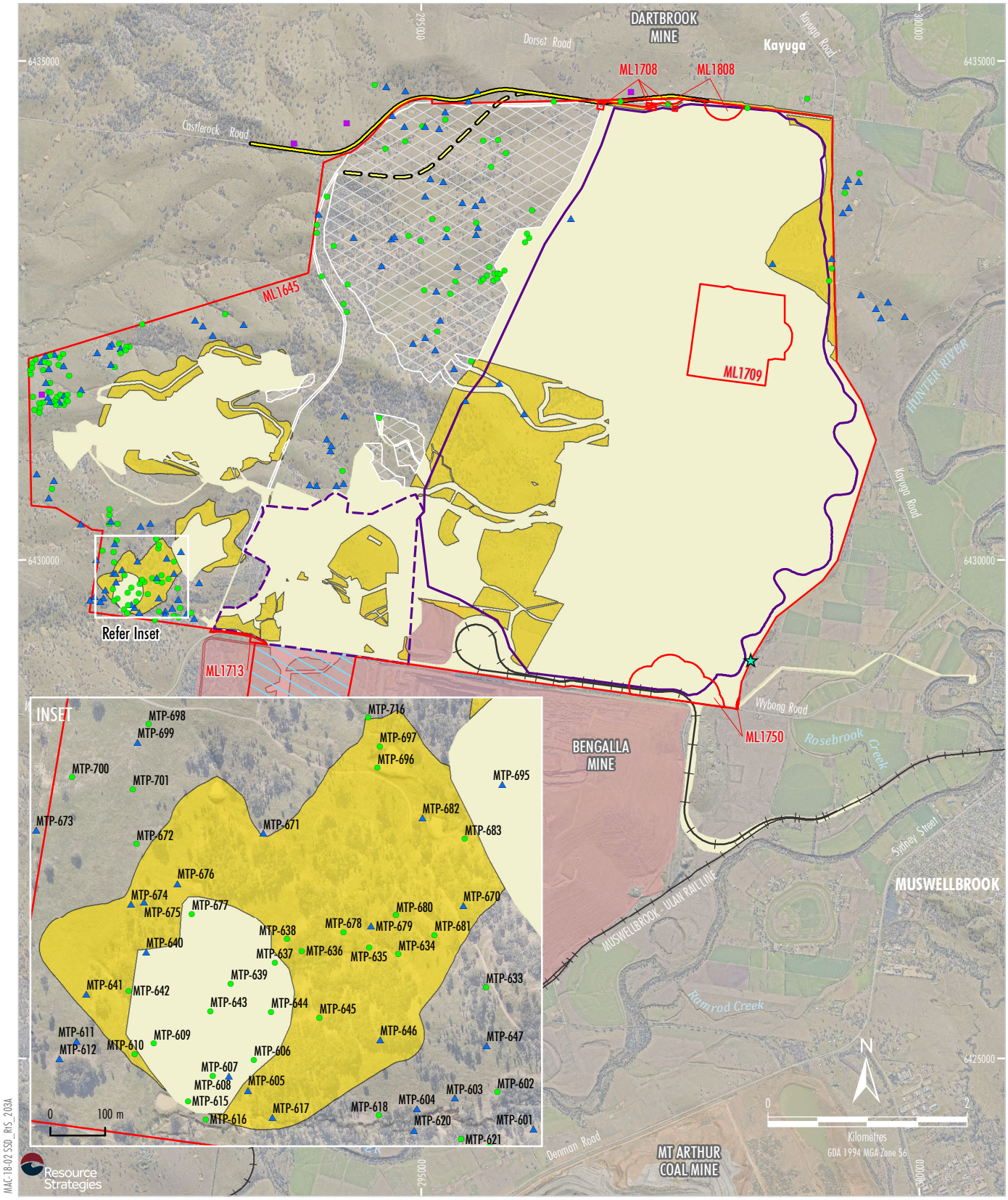
As the locations of these potential scar trees is on Bengalla Mine land and largely within the authorised disturbance area of the Bengalla Mine, MACH does not agree that any further assessment of the origin of the scars is required prior to the determination of the Project. Notwithstanding, should the detailed design of this water management infrastructure indicate that a scarred tree cannot be avoided, then it would be reassessed as necessary and managed in accordance with an approved ACHMP.

Significance Reassessment

Heritage NSW recommended that a significance assessment should be undertaken for all recorded sites that are currently listed as being of "uncertain" significance and which would be impacted by the Project, including sites in SSD Zones B2, B4 and C which remain in-situ and are subject to potential additional impacts, but which have not had their significance assessed. In addition, Heritage NSW recommends that the significance assessment should be undertaken in consultation with RAPs.

Response

MACH understands that South East Archaeology assigned an "uncertain" significance rating to some previously identified sites in the ACHA, on the basis that the previous archaeological study did not assign a scientific significance rating to the relevant site.



LEGEND

Existing Mine Elements

- Mining Lease Boundary (Mount Pleasant Operation)
- Project Continuation of Existing/Approved Surface Development (DA92/97) [1]
- Infrastructure to be removed under the Terms of Condition 37, Schedule 3 (DA92/97)
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)
- Existing/Approved Mount Pleasant Operation Infrastructure within Bengalla Mine Approved Disturbance Boundary (SSD-5170) [1]

Additional/Revised Project Elements

- Approved Disturbance Area to be Relinquished [2]
- Approximate Additional Disturbance of Project Extensions [1]
- Northern Link Road Option 1 Centreline [3]
- Northern Link Road Option 2 Centreline
- Approximate Extent of Project Open Cut and Waste Rock Emplacement Landforms
- Revised Infrastructure Area Envelope

ABORIGINAL CULTURAL HERITAGE SITES

Site Type - "Uncertain" Significance

- Artefact Scatter
- Isolated Artefact
- Open Artefact Site
- Spiritual Place

[1] Excludes some incidental Project components such as water management infrastructure, access tracks, topsoil stockpiles, power supply, temporary offices, other ancillary works and construction disturbance.

[2] Subject to detailed design of Northern Link Road alignment.

[3] Preferred alignment subject to landholder access.

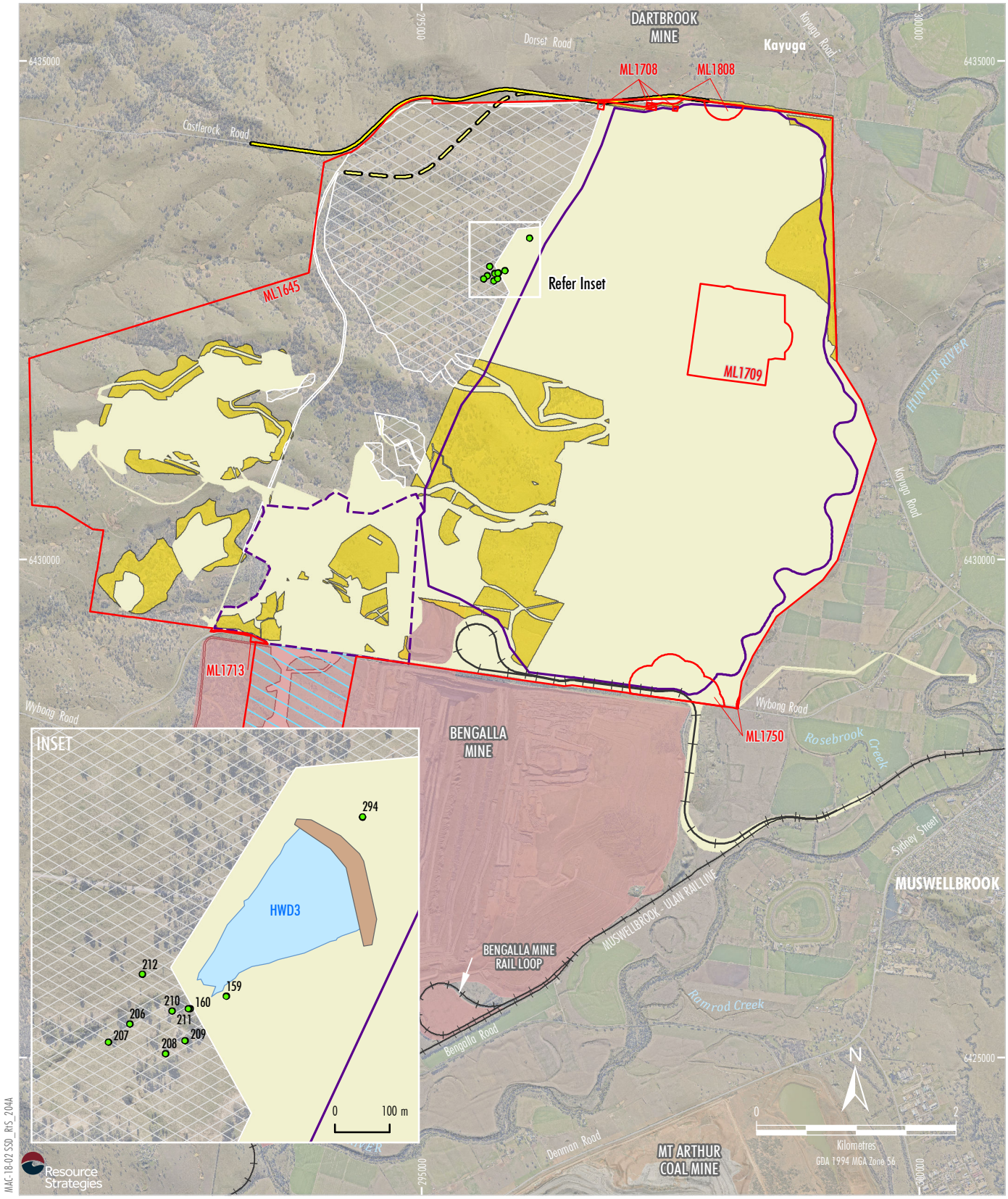
Source: MACH (2020); NSW Spatial Services (2020); Department of Planning and Environment (2016); South East Archaeology (2020) Aboriginal Cultural Heritage Database: RES01078287-003 Orthophoto: MACH (July 2020)

MACHEnergy

MOUNT PLEASANT OPTIMISATION PROJECT

Distribution of "Uncertain" Significance Heritage Sites Relative to Project Extensions

Figure 8



LEGEND

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- Approximate Additional Disturbance of Project Extensions [1]
- Northern Link Road Option 1 Centreline [3]
- Northern Link Road Option 2 Centreline
- Approximate Extent of Project Open Cut and Waste Rock Emplacement Landforms
- Revised Infrastructure Area Envelope

ABORIGINAL CULTURAL HERITAGE SITES

Site Type - "Uncertain" Significance

- Artefact Scatter

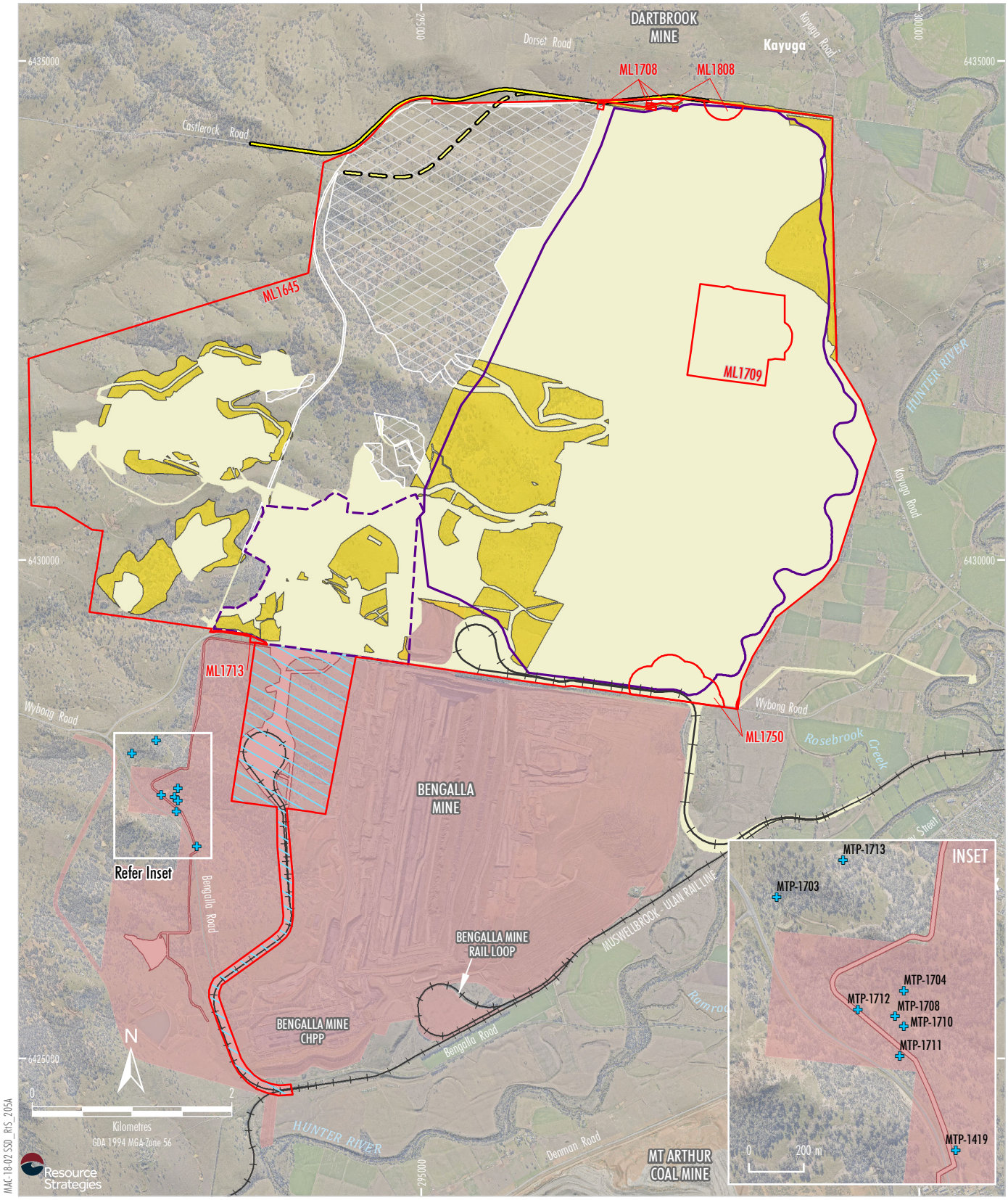
Source: MACH (2020); NSW Spatial Services (2020); Department of Planning and Environment (2016); South East Archaeology (2020)
Aboriginal Cultural Heritage Database: RES01078287-003
Orthophoto: MACH (July 2020)

MACHEnergy

MOUNT PLEASANT OPTIMISATION PROJECT

"Uncertain" Significance Heritage Sites
Subject to Excavation if Disturbed by the Project

Figure 9



LEGEND

Existing Mine Elements

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- Approximate Additional Disturbance of Project Extensions [1]
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- Northern Link Road Option 2 Centreline
- Approximate Extent of Project Open Cut and Waste Rock Emplacement Landforms
- Revised Infrastructure Area Envelope

ABORIGINAL CULTURAL HERITAGE SITES

Scarred Tree/Scarred Tree and Isolated Artefact

- Scarred Tree Identified for Re-Assessment

[1] Excludes some incidental Project components such as water management infrastructure, access tracks, topsoil stockpiles, power supply, temporary offices, other ancillary works and construction disturbance.

[2] Subject to detailed design of Northern Link Road alignment.

[3] Preferred alignment subject to landholder access.

Source: MACH (2020); NSW Spatial Services (2020); Department of Planning and Environment (2016); South East Archaeology (2020) Aboriginal Cultural Heritage Database: RES01078287-003 Orthophoto: MACH (July 2020)

MACHEnergy

MOUNT PLEASANT OPTIMISATION PROJECT

Scarred Trees Identified for Re-Assessment

Figure 10

Analysis of the sites to which the "uncertain" significance rating was assigned included:

- 110 isolated artefacts;
- 135 artefact scatters;
- four open artefact sites; and
- one spiritual place that is within the footprint of the existing open cut mine.

As shown on Figure 8, the vast majority of the "uncertain" significance sites are within the Project relinquishment area (i.e. current approved mine footprint that is no longer required for the Project) or the existing or provisional heritage conservation areas associated with the approved Mount Pleasant Operation (Figure 7), and therefore would not be impacted by the Project.

Some five isolated artefacts of "uncertain" significance are located within the approximate extent of the Project open cut and waste rock emplacement landforms (Figure 8). In addition, some eight isolated artefacts, and 18 artefact scatters of "uncertain" significance are located within the potential construction footprint of MWD3 and HWD3 (Figure 8). These proposed site water management dams would be constructed later in the Project life (i.e. between approximately 2035 and 2040), subject to detailed engineering design. The provisional location of HWD3 is also within the disturbance footprint of the existing approved mine (Figure 9).

The existing Mount Pleasant Operation AHMP outlines management measures that are applied to Aboriginal heritage sites that would be impacted by the mine based on the scientific significance of the site:

> *Where impacts are proposed to an open artefact site/PAD, and avoidance of impacts is not feasible:*
>
> - *Where the site is assessed by a suitably qualified archaeologist as being of low archaeological significance and impacts cannot be avoided, following detailed recording of the heritage evidence, impacts will be permitted to occur without further action.*
> - *Where the site is assessed by a suitably qualified archaeologist as being of moderate archaeological significance, where impacts are substantial, the evidence within the impact area will be subject to surface collection before impacts are permitted to occur.*
> - *Where the site is assessed as by a suitably qualified archaeologist as being of moderate to high, or high archaeological significance, and impacts cannot be avoided, following detailed recording of the evidence, MACH Energy will determine in consultation with a suitably qualified archaeologist the extent of proposed impacts:*
>   - *Where the impacts are considered to be substantial, the evidence within the impact area will be subject to surface collection and any other management and/or mitigation measures, such as hand excavation, as determined in consultation with the attending RAPs before impacts are permitted to occur (and/or as required by the relevant AHIP[s]).*
>   - *Where the impacts are considered to be minimal, impacts will be permitted to occur after the evidence within the impact area has been subject to surface collection (and/or as required by the relevant AHIP[s]).*

South East Archaeology (2020a) recommended that the existing ACHMP be revised to address the Project, including:

> *SSD AHMP:*
>
> *Provisions relating to Aboriginal heritage would need to be included in an SSD AHMP, which subsequent to SSD Approval and approval of the AHMP, would guide all management of Aboriginal heritage within the SSD Area in lieu of the existing AHIPs and NP&W Act requirements.*

> *The existing AHMP (MACH Energy 2017) could form an adequate basis for development of an SSD AHMP, however critical revisions would be needed to reflect the significant change in the heritage management process (from the AHIPs and NP&W Act to the SSD Approval and AHMP). A revised SSD AHMP should be prepared by an appropriately qualified heritage practitioner with significant expertise in Aboriginal heritage…*

Isolated artefacts within the Mount Pleasant Operation MLs have typically been assigned low scientific significance by previous studies. It is unlikely that the scientific significance of any isolated artefacts would be above moderate, should their significance be reassessed.

The majority of artefact scatters at the Mount Pleasant Operation have also previously been determined to be of low or moderate scientific significance. The ACHA (South East Archaeology, 2020a) identified one artefact scatter (site MTP-44 comprising over 2,500 artefacts) of high scientific significance, and moderate-high significance was also assigned to two artefact scatter sites within the extent of previous assessments (MTP-10 and MTP-64). These three artefact scatters are located proximal to the existing Fines Emplacement Area.

There is only very limited occurrence of "uncertain significance" isolated artefact sites within the Project open cut and waste rock emplacement area. In practice it may be difficult to re-identify these isolated artefacts in the field and the management of these sites would typically comprise recording and/or surface collection in accordance with the ACHMP.

For isolated artefacts and artefact scatters that have been assigned an "uncertain" scientific significance rating within the Project ancillary infrastructure disturbance areas, MACH supports the recommendation of South East Archaeology (2020a) to manage these previously identified sites in accordance with the ACHMP, following completion of detailed engineering design.

Contemporary cultural values have been identified by the RAPs during the course of the ACHA and the previous Aboriginal heritage assessments (Appendix G of the EIS). Environmental & Cultural Services (2020) also highlighted key cultural heritage themes associated with the Mount Pleasant Operation and the surrounding landscape, including the important cultural connections held by Aboriginal people today to the ancestral past through archaeological objects, such as open artefact sites.

Environmental & Cultural Services (2020) also identified the following cultural values associated with Wanaruah[7] people today:

- the historic resistance of Wanaruah ancestors to colonisation is valued;
- the past acts are an integral part of contemporary Wanaruah cultural identity and form part of people's attachment to place;
- the customary right to care for and make decisions about one's traditional land is important; and
- the ongoing cultural use of natural resources across the landscape is an important cultural practice.

The mitigation, management and monitoring measures detailed in the Project EIS were developed in consultation with the RAPs, in consideration of the cultural and archaeological significance of the Aboriginal heritage sites predicted to be impacted, and the cultural significance of the area. South East Archaeology (2020a) provided recommended management measures for each known Aboriginal heritage site of relevance to the Project.

[7] It is understood that both "Wonnarua" and "Wanaruah" have been used to describe population groups in different contexts. The spelling variations can be attributed to oral histories and limited written documentation that identifies traditional population groups and sub-communities. The Wanaruah language group was reportedly the largest in the region pre-European settlement.

It should also be noted that the Project is relatively unique for a major open cut mining proposal, in that the approved Mount Pleasant Operation authorises approximately 2,800 ha of surface development, and under the Project proposal this would largely remain unchanged. The Project Relinquishment Area (approximately 497 ha) compensates for the Project additional disturbance area (refer Section 1 of the EIS). In addition, there are more known heritage sites located within the Project Relinquishment Area, than are known within the proposed Project Additional Disturbance Area (Section 7 of the EIS).

Conservation Areas B and C

Heritage NSW noted that MACH may seek an alternative to provisional Aboriginal heritage conservation areas B and C. Heritage NSW recommended that suitable alternative conservation area(s) should be evaluated to ensure any proposed conservation options will appropriately mitigate the impacts of the Project.

Response

The establishment of Aboriginal heritage conservation areas for the Mount Pleasant Operation (Figure 7) is an existing requirement of Development Consent DA 92/97, and therefore will occur irrespective of the Project. In accordance with the existing requirements of the Aboriginal Heritage Management Plan (AHMP), MACH is currently proceeding with a program to resolve suitable alternative conservation areas, or alternative conservation outcomes, in consultation with Heritage NSW. MACH met with Heritage NSW on 17 March 2021 to discuss the existing AHMP requirements for establishment of conservation areas A, B and C, and previous consultation feedback from RAPs, OEH (now administered by Heritage NSW) and other local mining interests on the provisional conservation areas B and C.

Based on the timing requirements of the existing Mount Pleasant Operation AHMP, it is anticipated that alternative conservation areas (or conservation measures) will be resolved in consultation with the RAPs and Heritage NSW, prior to the determination of the Project. The alternative areas or measures would be developed cognisant that the Project proposes some new development within the existing provisional conservation area C. As resolution of the alternative conservation areas will occur under Development Consent DA 92/97 and in consultation with Heritage NSW, irrespective of the determination status of the Project, MACH suggests no further documentation on the potential alternatives is required in the Project ACHA.

Consultation – ACHA Addendum Report

Heritage NSW requested that documentation should be provided to demonstrate that RAPs were consulted with regard to the additional impact assessment presented in the 'Addendum Report to Assess Minor Amendments'.

Response

MACH provided a digital link or digital USB copy of the Project EIS, including the final ACHA (inclusive of the Addendum Report) to the RAPs on 15 February 2021. The accompanying MACH letter advised the RAPs that the Project EIS had been placed on public exhibition and encouraged RAPs to provide comments on the final ACHA (or any other aspect of the EIS) via the EIS submission process.

No RAPs provided any additional formal comments on the ACHA (and associated Addendum Report) via the EIS submissions process, or directly to MACH. Subsequently, in May 2021, MACH held an annual RAPs meeting on-site that further discussed the ACHA, the Addendum Report and potential alternative conservation areas.

Consultation – Further Investigations and Assessments

Heritage NSW recommended that:

- Further Aboriginal community consultation should be undertaken in relation to those parts of the project area where further investigation, significance assessment and impact assessment has been recommended in the ACHA.
- Further Aboriginal community consultation should be undertaken in relation to the identification and assessment of suitable alternative conservation areas.

Response

As described in the responses to Heritage NSW's comments above, MACH does not concur that any further Aboriginal heritage investigation or assessments are required prior to determination of the Project. Rather, suitable mitigation in accordance with an AHMP should be undertaken based on the final Project disturbance areas as determined by detailed engineering design (e.g. of supporting infrastructure such as dams and tracks). In accordance with an approved AHMP, any additional investigations or salvage works undertaken post-determination would involve appropriate consultation with, and involvement, of the RAPs in accordance with an approved AHMP.

In addition, the consultation program with respect to the resolution of Mount Pleasant Operation Aboriginal heritage conservation areas B and C is already underway in accordance with the existing AHMP and will be resolved, irrespective of the Project. This existing consultation program involves Heritage NSW and the RAPs and does not require any further documentation in the Project ACHA (refer to the response above).

Aboriginal Heritage Management Plan

Heritage NSW recommended that:

- Policies and actions required to manage Aboriginal heritage within the Project area should be included in an updated AHMP for the Project. These policies and actions should be developed by an appropriately qualified heritage practitioner with expertise in Aboriginal heritage, in consultation with RAPs, and should take into account the results of the additional assessment and consultation recommended above.
- The AHMP should include procedures for further management and mitigation measures to be implemented prior to any impacts occurring to specific sites, values and areas. This should include management strategies for all identified Aboriginal heritage sites as listed in Appendix 7 of the ACHA.
- Provisions related to the management and curation of all salvaged Aboriginal objects from within the Project area should be developed in consultation with the RAPs and included within the AHMP.
- Appropriate management and mitigation measures, as outlined in the AHMP, should be implemented, as per the recommendations of the ACHA, prior to the commencement of any ground disturbing works within the Project area. All mitigation measures should be undertaken in consultation with RAPs.

Response

MACH concurs with these Heritage NSW recommendations regarding the update of the existing AHMP, should the Project be approved.

NGO and Public Submissions

Some submitters raised concerns regarding the potential cumulative impacts on Aboriginal cultural heritage from mining, and the number of artefacts that have been identified by the surveys conducted across the site, or concerns regarding impacts on connection to land.

Response

Prior to the completion of the Project ACHA (South East Archaeology, 2020a), the Mount Pleasant Operation had conducted Aboriginal heritage surveys on approximately 5,600 ha of land. This encompassed the vast majority of the MLs and also adjoining lands to the east and west (Figure 6). The conduct of the previous Aboriginal heritage surveys and assessments culminated in the grant of area-based Aboriginal Heritage Impact Permits by OEH (now administered by Heritage NSW) across much of the Mount Pleasant site, including the majority of the Project additional disturbance area (Figure 7).

As part of the Project ACHA, South East Archaeology (2020a) conducted survey of some Project additional disturbance areas that had not already been subject to previous archaeological survey. As is common with assessments of this type in the Hunter Valley, the Aboriginal heritage surveys have identified approximately 1,736 tangible Aboriginal heritage sites (including in the extent of the approved Mount Pleasant Operation), of which approximately 810 sites are known to have been managed (i.e. salvaged/impacted) under the currently approved Mount Pleasant Operation (MACH, 2019d). These sites predominantly included open artefact sites[8], with lesser occurrences of scarred trees, artefact scatters with PADs and isolated artefacts with PADs. Many of the identified sites are located within the existing Aboriginal Heritage Impact Permit (AHIP) areas (AHIPs #C0002053, #C0002092 and #C0004783) that already authorise impacts on heritage values associated with the existing approved Mount Pleasant Operation (Figure 7-28 of the EIS).

The Department of Regional NSW – Primary Industries (Agriculture) made a submission on the Project EIS that stated the following:

> *The majority of the Project area has been cleared and used for agricultural grazing purposes for well over 100 years. The landform in the Project area consists of undulating hills with open paddock grazing land and intermittent creeks and unnamed ephemeral drainage lines*

Consistent with the statement from the Department of Regional NSW – Primary Industries (Agriculture) above, the potential for other types of Aboriginal heritage evidence (e.g. grinding grooves, rock shelter and bora/ceremonial sites) was assessed as being typically low to very low, or negligible in the ACHA (Appendix G of the EIS).

The currently approved Mount Pleasant Operation AHMP would be replaced by a new AHMP prepared to include provisions relating to the Project, and to specify the policies and actions required to manage Aboriginal heritage consistent with the conditions of any Project Development Consent. The Project AHMP would be prepared in consultation with RAPs and Heritage NSW. A summary of the management measures implemented over the life of the Project are provided in the Appendix G of the EIS.

[8] The term 'open artefact site' refers to both artefact scatters and isolated finds.

4.3.7 Historic Heritage

Regulatory Submissions

Test Excavation Records

Heritage NSW noted that a series of test excavations were conducted at the Mount Pleasant Operation in 2017 – 2018 in accordance with the Veritas Archaeology and History Service (VAHS) *Mount Pleasant Historic Heritage Study Report* (VAHS Report) (2014) as required in support of ongoing approved operations. These included test excavations for sites MP8 (Bates 2), MP10 (Scriven 1), MP12 (Bollibon – Nowland's) and MP17 (Clayden's). Heritage NSW noted that MACH has previously provided copies of the post excavation reports for sites MP10 (Scriven 1) and MP12 (Bollibon – Nowland's) and requested that copies of the post excavation reports for MP8 (Bates 2) and MP17 (Clayden's) are also provided.

Response

Post excavation reports for sites MP8 (Bates 2) and MP17 (Clayden's) prepared by the University of Queensland Culture and Heritage Unit have been provided to Heritage NSW.

Historical Research

Heritage NSW noted that the Project Historical Heritage Assessment and Statement of Heritage Impact (HHA and SOHI) (Appendix H of the EIS) relied on historical research conducted by the VAHS in 2014, and suggested that further historical research and justification may be required. Heritage NSW also noted that a copy of the VAHS Report (2014) was not supplied for reference.

Response

It should be noted that the Mount Pleasant Operation was approved in 1999, and the Project would effectively comprise continuation of impacts on the same historical heritage sites as previously approved for disturbance in 1999.

The VAHS Report (2014) was prepared in October 2014 and was endorsed by the former NSW Department of Planning and Infrastructure. Since then, the VAHS Report (2014) assessment findings have been reviewed and augmented by additional work as required by ongoing operations at the approved Mount Pleasant Operation.
The VAHS Report (2014) is publicly available on MACH's website:

> https://machenergyaustralia.com.au/wp-content/uploads/CCC.04-0000-HH-REP-00026_0-Mount-Pleasant-Historical-Heritage-Report.pdf.

The Project HHA and SOHI also draw on information from the following documents (Attachment F):

- *Muswellbrook Shire-Wide Heritage Study: Final Report* (EJE Heritage, 1996).
- *Muswellbrook Shire Council Local Environmental* Plan (LEP) (Muswellbrook Shire Council, 2009).
- *Hunter Estates: A Comparative Heritage Study of pre-1850s Homestead Complexes in the Hunter Region* (Clive Lucas, Stapleton and Partners, 2013).
- *Bengalla Mine Historic Heritage Management Plan* (AECOM, 2015).

The HHA and SOHI (Appendix H of the EIS) was also informed by additional fieldwork undertaken by Extent between November 2016 and September 2018.

Further, MACH understands that Extent (2020) applied a cautious approach when providing management recommendations for a small number of sites outside of the Project area where there was some uncertainty in regard to their potential heritage significance (e.g. MP41 Negoa). In these cases, Extent conservatively recommended management measures (that MACH has adopted) as if these sites met the threshold for State significance.

MACH therefore does not concur that further historical research and justification is required for the Project. Further advice from Extent is provided in Attachment F.

Management Recommendations included in the HHA and SOHI

Heritage NSW noted that the HHA and SOHI provides management recommendations for some items that were assessed to not meet the criteria for either State of local heritage significance.

Response

MACH understands that Section 4 'Assessments of heritage significance' of the HHA and SOHI assessed the following sites to not meet the criteria for either State or local heritage significance:

- MP06 Coady's;
- MP13 Humphries;
- MP23 Devine's;
- MP25 Gall's Farm;
- MP26 Page's Farm;
- MP31 Cox's Portion 20;
- MP32 Cox's Orchard;
- MP43 St Andrew's Anglican Church;
- MP44 Scarred Tree;
- MP49(a-c) Weidmann's;
- MP54 Portion 71; and
- MP55 Portion 26.

Section 5 'Assessment of heritage impacts' of the HHA and SOHI concludes that disturbance or demolition of the above listed sites by the Project would not constitute an adverse heritage impact and does not provide further management recommendations for these sites, with the exception of MP23 Devine's. Extent (2020) noted that there are limited, unconfirmed anecdotal data of two child burials on the grounds of MP23 Devine's.

Applying a precautionary approach, Section 6 'Management recommendations' of the HHA and SOHI therefore includes management recommendations for the management of MP23 Devine's, in case such anecdotally reported child burials are present in practice.

MACH is of the view that this precautionary approach is valid and accords with MACH's potential obligations to manage any such burials under applicable NSW legislation.

Historical Archaeology

Heritage NSW requested clarification of the sites that contain wells to clarify the presence of any artefacts, objects or deposits which could be regarded as 'relics' under the *Heritage Act 1977* and confirm the appropriate management of any relics found.

Response

The HHA and SOHI (Appendix H of the EIS) identified wells at MP13 Humphries, MP23 Devine's, MP25 Gall's Farm and MP38 Rosebrook. It is noted that MP38 Rosebrook is located outside of the Project area, and MP13 Humphries, MP23 Devine's and MP25 Gall's Farm have been determined by Extent to not meet the criteria for either State or local heritage significance. Should these wells contain artefacts, MACH understands these may be regarded as 'relics' under the *Heritage Act 1977*.

MACH understands that approvals for disturbing relics under section 139 of the *Heritage Act 1977* would not apply to approved SSD projects, in accordance with section 4.41 of the EP&A Act. MACH therefore does not agree that any further investigation of the relevant wells outlined above is required prior to the determination of the Project. Notwithstanding, should the Project be approved, MACH could potentially record the wells at MP13 Humphries, MP23 Devine's and MP25 Gall's Farm. Should any relics be discovered in the recording process, MACH could undertake archaeological investigation of the wells.

Weidmann's Historical Significance

Heritage NSW requested further clarification regarding the historical research and heritage significance of MP49 Weidmann's, including clarification of the phasing and likely occupation of the site.

Response

MACH understands that the VAHS Report (2014) was prepared based on a combination of historical land tenure records, primary sources (newspaper articles) and anecdotal information, and was endorsed by the former NSW Department of Planning and Infrastructure.

Based on the site inspections undertaken by Extent as part of the preparation of the HHA and SOHI, and the information contained in the VAHS Report (2014), Extent concluded that the physical remains that comprise MP49 (a-c) Weidmann's are consistent with Weidmann's main period of occupation (i.e. late 19th century or early 20th century). Further discussion is provided in Attachment F.

Archaeological Research Design and Excavation Methodology

Heritage NSW suggested the Project would require the preparation of an Archaeological Research Design and Excavation Methodology (ARDEM) to manage disturbance of historical archaeological relics. Heritage NSW advised that the ARDEM should address all sites where archaeological relics are anticipated as per the HHA and SOHI, and that it should include an unexpected finds protocol.

Response

MACH understands that an ARDEM would typically be prepared in support of an excavation permit application under section 139 of the *Heritage Act 1977*. Excavation permits under section 139 of the *Heritage Act 1977* do not apply to an approved SSD project in accordance with section 4.41 of the EP&A Act. MACH therefore understands any such requirements are typically addressed in development consents for SSD projects via a requirement to prepare a HHMP.

Investigation of Potential Child Burials

Heritage NSW requested clarification of the potential presence of child burials at sites MP23 Devine's and MP27 Thorndale, and requested further information regarding the proposed protocol in the event of discovery of human remains.

Response

MACH would comply with the relevant NSW Government legislative requirements in the event that any human remains are discovered during the life of the Project. Further discussion regarding the potential for child burials to occur at sites MP23 Devine's and MP27 Thorndale is provided by Extent in Attachment F.

Reassessment of Heritage Significance of Rosebrook, Negoa, and Overdene (Overton)

Heritage NSW requested for the heritage significance of MP28 Rosebrook, MP41 Negoa and MP52 Overdene (Overton) to be reassessed as they may meet criteria for State significance, even though they are not State Heritage Register listed.

Response

It is noted that MP38 Rosebrook, MP41 Negoa and MP52 Overdene (Overton) are located well outside of the potential Project additional disturbance area (Figure 11). MACH understands that these sites were included in the HHA and SOHI for completeness on the basis that they may form part of a broader 'cultural heritage' landscape. The HHA and SOHI concluded that the three sites would not be directly impacted by the Project.

MACH supports Extent's recommendation to prepare Conservation Management Plans (CMPs) for MP38 Rosebrook and MP41 Negoa, and has already engaged Extent to prepare the CMP for MP41 Negoa.

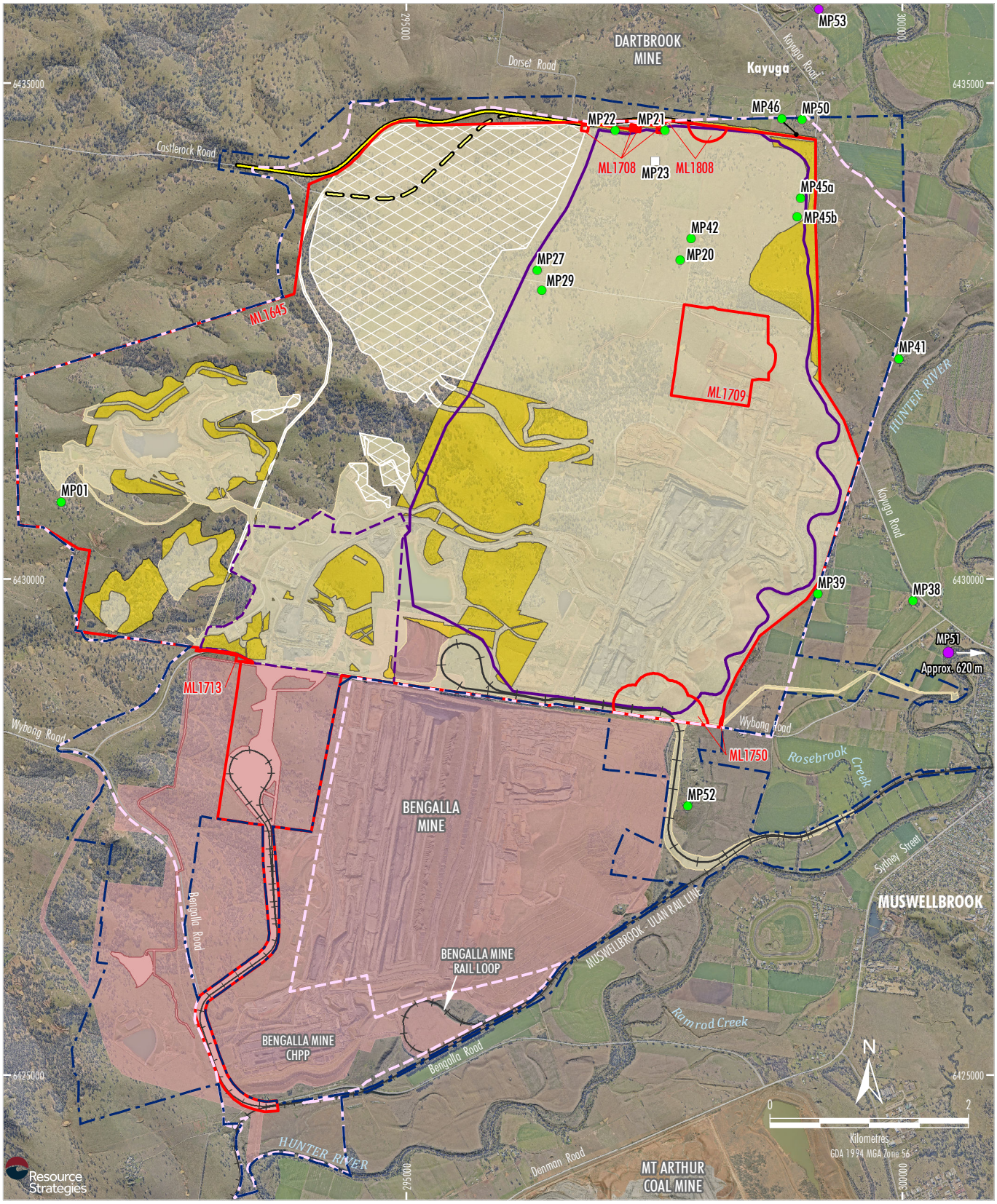
With respect to MP38 Rosebrook, the HHA and SOHI assessed the site as being of local heritage significance, based on the information included in the VAHS Report (2014) and site visits by built heritage specialists. Notwithstanding, Extent has recommended preparation of a CMP for MP38 Rosebrook and MACH has accepted this recommendation.

A CMP for MP52 Overdene (Overton) was previously prepared by the Bengalla Mine in consultation with the Heritage Council of NSW and the Muswellbrook Shire Council (AECOM, 2015).

MACH therefore is of the view that the assessment and proposed management recommendations for MP38 Rosebrook, MP41 Negoa and MP52 Overdene (Overton) that are located outside of the Project additional disturbance area has been approached conservatively, and no further reassessment of these sites is warranted.

Potential Blasting Impacts and Associated Management Measures

Heritage NSW requested clarification of the proposed blast monitoring and contingency measures at historical heritage sites in the event that historical heritage sites, such as MP38 Rosebrook, MP41 Negoa, MP50 Waitomo and MP52 Overdene (Overton), are damaged as a result of blasting activities.



LEGEND

Existing Mine Elements

- Mining Lease Boundary (Mount Pleasant Operation)
- Approximate Extent of Existing/Approved Surface Development (DA92/97) [1]
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)
- Existing/Approved Mount Pleasant Operation Infrastructure within Bengalla Mine Approved Disturbance Boundary (SSD-5170) [1]

Additional/Revised Project Elements

- Approved Disturbance Area to be Relinquished [2]
- Approximate Additional Disturbance of Project Extensions [1]
- Northern Link Road Option 1 Centreline [3]
- Northern Link Road Option 2 Centreline
- Approximate Extent of Project Open Cut and Waste Rock Emplacement Landforms
- Revised Infrastructure Area Envelope
- Development Application Area
- SSD Study Area

Historical Heritage Sites

- Local Significance
- State Significance

Other

- MP23 - Site of Interest

NOTES

1. Excludes some incidental Project components such as water management infrastructure, access tracks, topsoil stockpiles, power supply, temporary offices, other ancillary works and construction disturbance.
2. Subject to detailed design of Northern Link Road alignment.
3. Preferred alignment subject to landholder access.

Source: MACH (2020); NSW Spatial Services (2020); Department of Planning and Environment (2016) Orthophoto: MACH (2020)

MACHEnergy

MOUNT PLEASANT OPTIMISATION PROJECT

Historical Heritage Sites of Local and State Significance

Figure 11

Response

The Project Noise and Blasting Assessment (Wilkinson Murray, 2020) assessed the potential impacts of on-site blasting for the Project at the nearest historic heritage sites that would remain in-situ. The blasting assessment assessed the predicted overpressure and vibration levels resulting from the proposed MIC of 1,600 kilograms (kg) against the conservative building damage vibration criterion of 10 mm/s and airblast overpressure criterion of 130 linear decibel (dBL) (consistent with Development Consent DA 92/97 requirements).

To meet the relevant blasting criteria, the assessment determined that the maximum MIC would need to be reduced only when blasting within 1,010 m of historic heritage sites, and would comply at more distant historic heritage sites. It is noted that MP38 Rosebrook, MP52 Overdene (Overton) and MP41 Negoa are located at setback distances of 1,072 m to 1,888 m from the Project open cut, and mining would advance westwards over time.

MP50 Waitomo is located some 400 m from the Project open cut and was assessed to be of local heritage significance. Consistent with Extent's (2020) recommended management, MACH intends to complete archival recording of MP50 Waitomo in accordance with the relevant guidelines[9], prior to undertaking blasting activities within 1,010 m of the site.

The Project would also continue to comply with applicable human comfort criteria at the nearest residences on privately-owned land:

- maximum overpressure due to blasting should not exceed 115 decibels (dB) for more than 5% of blasts in any year, and should not exceed 120 dB for any blast; and
- maximum peak particle ground velocity should not exceed 5 mm/s for more than 5% of blasts in any year, and should not exceed 10 mm/s for any blast.

Blast management measures for the Mount Pleasant Operation are described in the existing approved Blast Management Plan (BMP) and would continue to be implemented for the Project. The existing BMP requires MACH to undertake blast vibration monitoring either at a nearby historical heritage site or at representative locations when blasting is within 500 m of the site using a portable or permanent monitoring device. The existing BMP also includes a contingency plan in the event that the relevant blast criterion is considered to have been exceeded. The BMP would be reviewed and updated to address the Project, subject to the conditions of any Development Consent for the Project.

Management of Rosebrook

Heritage NSW noted that the CMP for MP38 Rosebrook should be prepared in accordance with the existing Heritage Council of NSW guidelines and previous assessments. Heritage NSW also noted that section 139 of the *Heritage Act 1977* may not apply to approved SSD projects.

Response

It should be noted that MP38 Rosebrook is located outside of the Project area, the approved Mount Pleasant Operation MLs and the Project Development Application Area. The HHA and SOHI (Appendix H of the EIS) indicates that MP38 Rosebrook would not be directly impacted by the Project.

[9] Including guidelines documents entitled *How to Prepare Archival Records of Heritage Items* (NSW Heritage Office and Department of Urban Affairs and Planning, 1998) and *Photographic Recording of Heritage Items Using Film or Digital Capture* (NSW Heritage Office and Department of Planning, 2006).

Notwithstanding, MACH has adopted Extent's management recommendations for MP38 Rosebrook as outlined in Section 6 'Management recommendations' of the HHA and SOHI, which include the preparation of a CMP in line with the relevant Heritage NSW requirements.

Negoa Conservation Management Plan

Heritage NSW requested clarification regarding the proposed preparation of the MP41 Negoa CMP.

Response

As discussed above, MACH has engaged Extent to prepare a CMP for MP41 Negoa. The preparation of the MP41 Negoa CMP has been informed by additional research and a number of site visits to MP41 Negoa by heritage architects and archaeologists. MACH intends to manage Negoa so that its heritage values are maintained.

Management of Overdene (Overton)

Heritage NSW requested clarification regarding the proposed adaptive reuse of MP52 Overdene (Overton).

Response

MP52 Overdene (Overton) is located on the Bengalla Mine's controlled land, outside of the Project additional disturbance area and the approved Mount Pleasant Operation MLs. As noted in the HHA and SOHI, the Project would have no direct impact on MP52 Overdene (Overton).

As noted above, there is an existing CMP for the site, prepared under the Bengalla Mine's consent conditions in consultation with the Heritage Council of NSW and the Muswellbrook Shire Council. The HHA and SOHI notes the site is to be conserved and maintained in accordance with the existing MP52 Overdene (Overton) CMP. MACH understands this is consistent with the requirements of the Bengalla Mine consent.

Cultural Landscapes Assessment

Heritage NSW requested clarification regarding the Project's potential impact on the Muswellbrook-Jerry Plains Landscape Conservation Area.

Response

It should be noted that almost all of the Project is located outside of the Muswellbrook-Jerry Plains Landscape Conservation Area. As noted in the EIS, the Project would comprise extension and continuation of the Mount Pleasant Operation, which was approved in 1999. Some minor elements of the approved Mount Pleasant Operation are located with the Muswellbrook-Jerry Plains Landscape Conservation Area.

The HHA and SOHI concluded that the Project would have a negligible impact on the broader setting of the Muswellbrook-Jerry Plains Landscape Conservation Area (refer Attachment F).

Interpretation

Heritage NSW requested clarification regarding the preparation and potential benefits of preparation of a Heritage Interpretation Plan (HIP) for the Project.

Response

Section 6.31 of the HHA and SOHI (Appendix H of the EIS) recommends the preparation of a HIP within one year of obtaining Development Consent for the Project. Further discussion regarding the potential benefits of a HIP is provided by Extent in Attachment F. If Heritage NSW is of the view that a HIP is not warranted, MACH would be agreeable to preparation of a HHMP instead (Section 3.3).

Demolition of Homesteads

The Muswellbrook Shire Council noted that the Project would remove some homesteads of local heritage significance from the local cultural landscape.

Response

It should be noted that the Mount Pleasant Operation was approved in 1999, and the Project would effectively comprise continuation of impacts on the same historical heritage sites as previously approved for disturbance in 1999.

Extent (2020) has assessed the potential cumulative impacts of the Project on historical heritage, and noted that six homesteads of local heritage significance would be removed over the life of the mine.

The associated potential cumulative impacts would be mitigated through the preparation of the HIP and the recommended photographic archival recording of relevant sites (Extent, 2020).

Further discussion regarding the Project's potential impacts on the Mount Pleasant cultural landscape is provided by Extent in Attachment F.

Kayuga Cemetery

The Muswellbrook Shire Council requested clarification regarding the Project's potential blasting impact on headstones at the MP53 Kayuga Cemetery, which is a State Heritage Register site located north of Kayuga.

Response

It should be noted that MP53 Kayuga Cemetery is located at a minimum setback distance of 1,492 m from the Project open cut, and mining would advance westwards over time. MP53 Kayuga Cemetery is also located within the Dartbrook Mine's tenements.

RWDI undertook an additional assessment of the predicted blasting effects at MP53 Kayuga Cemetery (see Attachment F). RWDI indicated that airblast overpressure and ground vibration levels resulting from the proposed maximum blast MIC of 1,600 kg would comply with the conservative building damage vibration criterion of 10 mm/s and airblast overpressure criterion of 130 dBL (consistent with Development Consent DA 92/97 requirements) at the Kayuga cemetery. Further details regarding the predicted blasting impacts at MP53 Kayuga Cemetery are provided in Attachment F.

Several privately-owned residences are also located closer to the Project open cut than MP53 Kayuga Cemetery, which are subject to more stringent human comfort criteria (vibration criterion of 5 mm/s and airblast overpressure criterion of 115 dBL).

MACH is of the opinion that MP53 Kayuga Cemetery is too far away from the Project to be adversely impacted by Project blasting activities.

NGO and Public Submissions

Cumulative Loss of Heritage

A concern was raised by a number of submitters that the Project would result in cumulative impacts on historical heritage, including loss of homesteads and associated built features.

Response

It should be noted that the Mount Pleasant Operation was approved in 1999, and the Project would effectively comprise continuation of impacts on the same historical heritage sites as previously approved for disturbance in 1999.

Extent (2020) has assessed the potential cumulative impacts of the Project on historical heritage, and noted that six homesteads of local heritage significance would be removed over the life of the mine.

The associated potential cumulative impacts would be mitigated through the preparation of the HIP and the recommended photographic archival recording of relevant sites (Extent, 2020).

Further discussion regarding the Project's potential impacts on the Mount Pleasant cultural landscape is provided by Extent in Attachment F.

Landscape Heritage Values

A concern was raised that the Project would disturb the ridgeline where Castlerock Road is located, which along with the development of the Project integrated waste rock emplacement, would affect the landscape heritage values of the Upper Hunter Valley.

Response

For context it should be noted that development of the North Pit and associated North West Out-of-Pit Emplacement, which both extend approximately to the northern boundary of ML 1645 is already authorised under the existing Mount Pleasant Operation Development Consent DA 92/97 (Figure 1-3 of the EIS). Therefore, the Project would effectively comprise continuation of impacts on the same historical heritage sites as previously approved for disturbance in 1999.

Notwithstanding, consideration of the potential cumulative impacts of the Project in the context of the existing approved Mount Pleasant Operation on both historical heritage and landscape values is provided in Appendices H and M of the EIS.

In the sub-regional context, the expansion in scale and elevation of the integrated waste rock emplacement landform associated with the Project are considered to be consistent with extensive existing mining landscapes within the region (Section 7 of the EIS).

4.3.8 Transport

Regulatory Submissions

Construction Traffic Management

Transport for NSW had no material comments on the Project, other than to suggest that any Development Consent for the Project should include a condition requiring the use of shuttle buses to transport the construction workforce for the Project, consistent with the assumptions in the Road Transport Assessment (Appendix J of the EIS).

Response

MACH would be agreeable to the inclusion of consent condition requiring a Construction Traffic Management Plan for the Project that would include, among other matters, a requirement to use shuttle buses during major construction activities. This would allow for the need for shuttle buses to be evaluated over the course of the Project in line with the construction workforce requirements (e.g. shuttle buses to be used during major construction events [e.g. CHPP module construction], but not during minor construction events such as Emplacement Area embankment lifts over the life of the Project [refer Figure 3-11 of the EIS]).

Western Link Road

The Muswellbrook Shire Council acknowledged that the Mount Pleasant Operation incorporating the Project would not include the closure of Wybong Road, and therefore the approved Western Link Road would not be constructed as part of the Project. Notwithstanding, the Muswellbrook Shire Council suggests a similar road to the approved Western Link Road would improve the road network, and that such a road network upgrade should be funded by the Mount Pleasant Operation and other local mines. The Muswellbrook Shire Council also suggested the conduct of a road safety audit on the length of Castlerock Road, due to a concern that any road upgrades (i.e. the realigned Northern Link Road) may increase through traffic.

Response

MACH consulted with the Muswellbrook Shire Council regarding the approved Western Link Road not being constructed as part of participation with the Council's Mine Affected Roads Strategy. MACH maintains its position that there is no nexus between the Project and the development of a road similar to the approved Western Link Road, as Wybong Road would remain open for the life of the Mount Pleasant Operation. This is supported by the outcomes of the Project Road Transport Assessment (Appendix J of the EIS). As a road similar to the approved Western Link Road would not be constructed, and little Project traffic would use the Project revised Northern Link Road alignment, the Project is not expected to lead to a major increase in through traffic on Castlerock Road. As such, a road safety audit of the length of Castlerock Road is not considered warranted.

NGO and Public Submissions

Project Traffic Generation

Some submitters raised concerns were raised regarding the potential road transport impacts of the Project generally, and in particular the potential for significant additional traffic to use the revised Northern Link Road alignment.

Response

It is noted that the Northern Link Road is already a component of the approved Mount Pleasant Operation (Figure 1-3 of the EIS).

With regard to general road transport implications of the Project, the Project Road Transport Assessment (Appendix J of the EIS) concluded that no specific measures or upgrades are required to mitigate the impacts of the Project on the capacity, safety and efficiency of the road network. In relation to Northern Link Road, the Project Road Transport Assessment (Appendix J of the EIS) also concluded that the revised Northern Link Road alignment would have negligible impact on general traffic conditions, as it would generally provide only local area access.

Implications for the Bicentennial National Trail

Concerns were raised in some submissions regarding the proposed closure of Castlerock Road and potential implications of the road closure for the Bicentennial National Trail.

Response

The approved Mount Pleasant Operation includes the closure of a section of Castlerock Road and the development of the Northern Link Road, which connects Dorset Road and Castlerock Road. As part of the Project, the alignment of the Northern Link Road would be revised to improve the safety of the connection between the Northern Link Road and Castlerock Road. It is anticipated that this change would have negligible impact on the Bicentennial National Trail, which includes a portion of Castlerock Road approximately 2 km to the west of the Mount Pleasant Operation.

Interruption to Public Rail Services

Some public submissions raised concerns regarding the Project's increased coal transport requirements, and the potential for corresponding interruptions to public rail services.

Response

It is noted that public rail services on the Main Northern Railway have priority over coal trains. In addition, the staging of the Project's increases to ROM coal extraction and resulting increases to product coal is anticipated to coincide with reductions in coal transport requirements for other mines in the Upper Hunter Valley. The Project is therefore not anticipated to result in any increase in interruption of public rail services.

4.3.9 Visual and Landscape Character

Regulatory Submissions

Landform Heights and Landform Design Principles

The Muswellbrook Shire Council noted that the Project waste rock emplacement landform would, in places, be up to 40 m higher in elevation than previously approved Mount Pleasant Operation waste rock emplacement landforms.

MACH also notes that Muswellbrook Shire Council supports the continued use of Mount Pleasant Operation landform design principles that result in more natural looking mine landforms. Muswellbrook Shire Council did, however, raise a concern that some slopes would exceed 30% and these slopes may be difficult to traverse or maintain.

Response

The Project integrated waste rock emplacement would be up to 40 m higher in elevation than the maximum elevation of previous waste rock emplacement designs at the Mount Pleasant Operation. These Project features would be associated with constructing landforms of more natural appearance, as the high-points in the proposed Project landform would allow the establishment of macro-relief (i.e. varying the upper form of landforms, to avoid flat-topped structures when viewed on the horizon).

The design of the Project integrated waste rock emplacement also avoids the need for the construction of two major approved out-of-pit emplacements (i.e. South-West and North-West out-of-pit emplacements) that formed part of the originally approved Mount Pleasant Operation. These were generally flat-topped structures with maximum elevations of approximately 320 m AHD and west of the Project open cut extent.

The Project integrated waste rock emplacement has been developed using geomorphic design to provide a range of slopes consistent with natural landscape features in the region. The resulting final landform largely limits slopes to less than 33% (18 degrees [°]).

There are some limited areas where the slopes are up to 33%, but this only represents a small proportion of the total surface area of the final landform and would not form a major limitation for ongoing access or maintenance. Similar slopes are common features in natural landforms, and the final landform design would continue to be tested and iteratively designed as additional data is collected on rehabilitation and landform monitoring over the life of the Project.

The Project would also involve some steeper slopes being retained below the final void waterbody equilibrium level. These steeper areas would be inundated as water levels recover in the void, and this allows gentler slopes to be achieved above the equilibrium level (due to material balance constraints).

Mine Landform Effect on Visibility of Natural Landscape Features

The Muswellbrook Shire Council noted that the increase in the elevation of the integrated waste rock emplacement would result in the mine landform being visible from more locations in the local area, and from some locations this would block views of natural background or horizon landscape features, which may contribute to the community sense of place.

Response

As described above, it is noted that the approved Mount Pleasant Operation incorporated major waste rock emplacement structures, which were largely flat-topped structures up to an elevation of approximately 320 m AHD. Waste rock mined during the development of the Project would continue to be placed within the approved Eastern Out-of-Pit Emplacement and used to backfill the mine void behind the advancing open cut operations. This would result in the topographic alterations of the Project being more concentrated in the eastern portion of the MLs, and reduced alterations to the west.

MACH acknowledges that the development of the single integrated waste rock emplacement landform and associated increase in scale and elevation would introduce some additional viewpoints of the mine landforms within Muswellbrook and surrounds. These changes, while altering the layout and extent of the existing/approved Mount Pleasant Operation, would generally be consistent with the nature and form of approved Mount Pleasant Operation mine landforms.

Many elevated parts of Muswellbrook already have direct views of the most visible components of the approved Mount Pleasant Operation. Areas that would have views to the Project are typically already subject to high visual impacts from the approved Mount Pleasant Operation (Appendix M of the EIS). The visual impacts would remain high in Muswellbrook during construction and operation of the Project, reducing to moderate/low in the long-term (Appendix M of the EIS).

An interactive illustration based on comparison of two photographs taken from Muswellbrook and looking towards the mine in September 2019 and February 2021 is provided on MACH's website at the following link:

https://machenergyaustralia.com.au/rehabilitation-views/

This graphic illustrates that from Muswellbrook, some natural features on the horizon are progressively being obscured with the construction of the existing and approved mine landforms. This would continue to be the case during the remainder of the currently approved life of the Mount Pleasant Operation, and would also occur during the life of the proposed Project.

VPA Visual Planning & Assessment (2020) (Appendix M of the EIS) notes that there would be moderate cumulative impacts due to the extension of duration of the mine operations and some further reduction in views to surrounding hills and mountains on the horizon line from some view locations due to the increase in elevation of the integrated waste rock emplacement landform.

The graphic at the link above also highlights that the progressive development of the geomorphic landform and rapid rehabilitation at the Mount Pleasant Operation has significantly ameliorated initial visual impacts of the development of the existing waste rock emplacement from Muswellbrook, and this methodology would continue to be implemented over the life of the Project.

Potential Visual Amenity Impacts on Aberdeen

The Upper Hunter Shire Council explained that Aberdeen is located on a western-facing slope and the Project extensions would be visible from many properties in Aberdeen. The Upper Hunter Shire Council identified that the existing coal mine located north of the Project (Dartbrook Mine) is an underground mine, and therefore suggested the Project would materially alter the landscape and amenity of Aberdeen.

Response

Some Aberdeen residences located on western-facing slopes may be primarily oriented to rural views to the west, or to the north, to capture winter sun. Residences located on elevated southern facing slopes in Aberdeen are potentially more likely to have houses oriented towards the Mount Pleasant Operation.

The approved Mount Pleasant Operation extends from Wybong Road in the south to Dorset Road in the north. A local road, Castlerock Road, bisects the approved mine in a rough east-west orientation and partly follows a topographic ridge that largely screens views from the north to the current mining operations. The Project would also continue to extend between Dorset Road and Wybong Road, effectively consolidating the Mount Pleasant Operation mining area to the eastern portion of ML 1645 (refer EIS Figures 1-3 and 1-4).

To date, the approved Mount Pleasant Operation has remained south of Castlerock Road. However, previous assessments determined that the approved Mount Pleasant Operation would result in high visual impacts at some locations within Aberdeen, because more elevated locations in Aberdeen that have views to the south will experience visual impacts from the approved open cut and waste rock emplacements, once mining advances north of Castlerock Road. The visual impacts during construction and operation of the Project on viewing locations within Aberdeen would continue to be high/moderate, reducing to low in the long-term (Appendix M of the EIS).

It is noted that Aberdeen is located approximately 5 km to the north of the Project, and therefore is located at a materially greater distance than Muswellbrook.

NGO and Public Submissions

Potential Impacts on General Visual Amenity and Local/Regional Character

A number of submissions raised concerns regarding the general visual amenity impacts of the Project landforms on residences, towns and roads, including the scale of the integrated waste rock emplacement and potential impacts on local/regional character, including reduced views of distant hills and the horizon.

Response

The Mount Pleasant Operation was approved in 1999, with operations commencing in 2017. The Project is therefore not a "greenfields" Project.

The approved Mount Pleasant Operation is predicted to have high visual impacts at nearby viewpoints (including elevated locations within Muswellbrook and Aberdeen).

Many elevated parts of Muswellbrook and other nearby viewpoints (e.g. surrounding roads and properties located on the Hunter River floodplain) already have direct views onto the most visible components of the approved Mount Pleasant Operation. Areas that would have views to the Project are typically already subject to high visual impacts from the approved Mount Pleasant Operation (Appendix M of the EIS).

The integrated waste rock emplacement landform has been designed to incorporate geomorphic drainage design principles for hydrological stability, and varying topographic relief to be more natural in exterior appearance. MACH is also accelerating progressive rehabilitation of the integrated waste rock emplacement landform to:

- reduce the extent of raw emplaced waste rock lifts that have high visual contrast to surrounding unmined land; and
- rapidly improve visual integration of the emplacement landform with the unmined landscape.

MACH would conduct ongoing consultation with local stakeholders over the life of the Project to identify any issues in relation to visual impacts on surrounding sensitive viewing locations. Following further consultation with the stakeholders, additional measures that are reasonable and feasible may be implemented to increase visual mitigation at specific sensitive viewer locations (refer to Section 7.16.4 of the EIS for further detail).

Refer also to the Muswellbrook Shire Council submission response provided above with respect to potential impacts on views of natural features located on the horizon.

Visual Amenity Impacts North of the Project

Some submitters raised concerns that the increased height of the integrated waste rock emplacement (and associated removal of the approved North-west Out-of-Pit Emplacement) would result in increased visibility from Scone, or that mining north of the ridge at Castlerock Road would result in additional visual amenity impacts on Aberdeen and the New England Highway.

Response

The Mount Pleasant Operation (incorporating the Project) would not be highly visible from Scone, given Scone is located approximately 17 km north of the Project.

Aberdeen is located directly to the north of the Dartbrook Mine, some 5 km from the Project. The approved Mount Pleasant Operation was predicted to have high visual impacts at elevated viewpoints in Aberdeen, and high-moderate impacts are expected for the Project (Appendix M of the EIS). These impacts would be mitigated through progressive rehabilitation (as described above).

The approved Mount Pleasant Operation is visible from a number of locations along the New England Highway and was determined to have high visual impacts from the Highway. The visual impacts of the Project on the northern parts of the New England Highway during construction and operation would continue to be high/moderate, and would reduce to very low in the long-term. The visual impacts of the Project on the eastern parts of the New England Highway during construction and operation would continue to be high/moderate and would reduce to moderate/low in the long-term (Appendix M of the EIS).

Visual and Landscape Assessment Viewpoints

A concern was raised that the Project Visual and Landscape Assessment (Appendix M of the EIS) did not assess sufficient viewpoints.

Response

The Mount Pleasant Operation is an existing major operating open cut coal mine, and hence views of the existing operation are currently available at multiple locations, including from the central business district of Muswellbrook (refer response to the Muswellbrook Shire Council submission above). Section 7, Table 7-33 of the EIS provides a summary of the visual impacts of the Project at more than 30 representative locations within the five key sectors analysed by VPA Visual Planning & Assessment (2020) (Appendix M of the EIS).

Further to the detailed assessment at these receptor locations, visual simulations were also prepared at eight locations to illustrate potential views of the Project from key vantage points in the north, south, east and west (refer EIS Figure 7-31). These simulations were particularly focused on locations where higher numbers of potentially impacted receptors were located (i.e. three locations in Muswellbrook and three locations to the north of the Project, including an elevated location in Aberdeen and the New England Highway). The visual simulations prepared for the EIS provide a clear understanding of the nature of the potential visual impacts of the Project.

Indirect and Dynamic Landscape Impacts

Concerns were raised that indirect and dynamic potential visual and landscape impacts associated with dust, blast fume, sound and smells would have unacceptable impacts.

Response

Potential indirect or dynamic visual impacts (collectively referred to as dynamic landscape impacts) have previously been identified as a key issue during the assessment of the mining developments in the vicinity of the Project. Dynamic landscape assessment refers to the collective evaluation of people's perceptions as they move through the landscape. Dynamic landscape assessment focuses on the perceptual and aesthetic characteristics of a landscape, including visual, sound, smell, touch/feel, preferences, associations and memories (Appendix M of the EIS).

Whilst dynamic landscape assessment considers each of these inputs to a receptor's perception of the landscape, it is accepted that sight is the most dominant sensory input (Appendix M of the EIS). Individual perception varies between individuals and can, therefore, be difficult to assess. In the *Social impact assessment guideline for State significant mining, petroleum production and extractive industry development*, the Department of Planning and Environment (DP&E) (now DPIE) (2017) states the following with respect to assessing perceptions of adverse impacts:

> *When considering perceptions of adverse impacts on amenity, an evaluation must be made of the reasonableness of those perceptions. This evaluation involves 'the identification of evidence that can be objectively assessed to ascertain whether it supports a factual finding of an adverse effect on amenity…': Telstra Corporation Ltd v Hornsby Shire Council [2006] NSWLEC 133.*

Accordingly, the assessment of perceptions in the dynamic landscape assessment draws, in part, on the assessment of potential adverse effects on amenity undertaken by other specialists (Appendix M of the EIS).

The impact of the Project on the landscape and the extended duration of those impacts over time in the context of existing land use patterns at the regional, subregional and local scales would create a moderate dynamic landscape impact (Appendix M of the EIS).

It is also noted that the Mount Pleasant Operation operates under an Environmental Management Strategy that provides a framework to facilitate conduct of the operation in an environmentally responsible manner and in accordance with relevant statutory requirements. Further discussion of these plans, strategies and programs and how they would continue to be implemented during the life of the Project is provided in the EIS.

Night Lighting

Concerns were raised regarding potential Project increases in night-lighting, and the appropriateness or adequacy of existing Mount Pleasant Operation light pollution management measures.

Response

There are two types of lighting effects that are observed in the existing environment surrounding the Mount Pleasant Operation and could be generated by the Project: direct light effects and diffuse light effects (Appendix M of the EIS).

Vehicle headlights would be visible along the upper elevations of the Project integrated waste rock emplacement landform when mobile equipment is operating at night. The Project would extend the duration of direct lighting effects until the completion of rehabilitation. However potential impacts associated with direct light effects of the Project would be similar to the approved Mount Pleasant Operation (Appendix M of the EIS).

A number of mining operations, power stations, residences and agricultural activities in the vicinity of the Project already contribute to diffuse light effects (sky glow). The potential diffuse light effects of the Project would extend further north as mining advances, however, the nature of the diffuse light effects would be consistent with the approved effects of the approved Mount Pleasant Operation and the existing effects of other developments in the vicinity of the Project (e.g. Bengalla Mine and Mt Arthur Coal Mine) (Appendix M of the EIS).

It is noted that the design of the Project integrated waste rock emplacement to minimise noise emissions to the east, and MACH's progressive rehabilitation of the lower batters of the eastern face of the emplacement would act to minimise the duration that mobile equipment is required to be operating in exposed locations at night.

MACH manages visual impacts of the approved Mount Pleasant Operation in accordance with a Visual Impact Management Plan (2019e), which describes screen plantings, visual bunds, lighting controls and other visual treatments. The night-lighting required for the Project (i.e. for safety reasons) would be similar to the approved Mount Pleasant Operation. Potential lighting impacts would be minimised through the implementation of mitigation measures in consideration of *AS/NZS 4282:2019 – Control of the Obtrusive Effects of Outdoor Lighting*. Further discussion of these measures is provided in Section 7.16.4 of the EIS.

4.3.10 Social and Community Infrastructure

Regulatory Submissions

Muswellbrook Shire Council Voluntary Planning Agreement

The Muswellbrook Shire Council indicated that a VPA would be required for the Project for community enhancement, road maintenance and to mitigate potential cumulative road maintenance impacts of the Project.

Response

MACH met with the Muswellbrook Shire Council in June 2021 to discuss development of a VPA for the Project, based on the current Mount Pleasant Operation VPA terms. At this meeting it was agreed that MACH would work with a sub-committee of the Muswellbrook Shire Council to negotiate further on MACH's VPA offer.

Housing Demand

The Muswellbrook Shire Council raised a concern regarding regional shortage in affordable housing and the impact of infrastructure and mining construction periods (and to a lesser extent operational mine expansions), on rental housing availability and affordability. The Muswellbrook Shire Council requested MACH employs locally based people or encourages new employees to relocate to the Upper Hunter Region and provides signals to the market of likely changes in housing demand.

Response

It should be noted that annualised construction workforces for the Project would be less than the peak experienced during the initial construction of the Mount Pleasant Operation. The Project operational workforce would increase relatively gradually and growth would extend over approximately two decades.

Just Add Lime (Appendix N of the EIS) indicated that the additional Project workforce may lead to some increases in property values associated with increased demand for housing.

MACH would seek to reduce potential impacts on housing prices by:

- continuing to maximise locally sourced employees, including both MACH employees and contractors; and
- participating in an employment working group (or similar) with the Muswellbrook Shire Council and other industry to keep the council and the private sector informed regarding planned Mount Pleasant Operation employment growth.

Upper Hunter Shire Council VPA

The Upper Hunter Shire Council requested MACH commences negotiations with the council regarding possible terms of a VPA for the Project between the Upper Hunter Shire Council and the Mount Pleasant Operation.

Response

MACH met with the Upper Hunter Shire Council in May 2021 to discuss Council's submission on the Project. At this meeting it was agreed that the Upper Hunter Shire Council would articulate the need for a VPA for the Project and its requested terms. MACH will review and respond to the Upper Hunter Shire Council advice, which was received on 7 June 2021.

NGO and Public Submissions

Housing Prices

A number of submissions raised concerns regarding potential negative impacts on housing prices in Muswellbrook, and surrounding rural properties (i.e. decrease in property values), due to the Project's environmental and visual impacts, and land acquisitions.

Response

Just Add Lime (Appendix N of the EIS) identified that the housing market in the Upper Hunter region is currently on a slow upward turn, following a downturn experienced after the cessation of the previous "coal boom". Just Add Lime (Appendix N of the EIS) also indicated that the additional Project workforce may lead to some increase in property values associated with increased demand for housing.

There would not be any material incompatibility between the Project and existing rural residential land uses, given that the assessment outcomes are similar to the approved Mount Pleasant Operation, and key Project management measures would comply with relevant Government policy (e.g. the VLAMP) (Section 8 of the EIS). Similarly, the Mount Pleasant Operation open cut is currently at its closest proximity to Muswellbrook, with mining activities centred in the south-east of ML 1645 (Figure 1-3 of the EIS). Over the life of the Project, the focus of mining activities would progressively move north and west, increasing separation from Muswellbrook. Coincident with the western progression of mining, the integrated waste rock emplacement would increase in elevation, acting to screen potential views and provide an increasing barrier to potential air quality and noise emissions.

MACH has staged the proposed Project increases in ROM coal production to minimise potential amenity impacts on nearby rural residences and the town of Muswellbrook (Section 8 of the EIS). It is also noted that the Mount Pleasant Operation operates under an Environmental Management Strategy that provides a framework to facilitate conduct of the operation in an environmentally responsible manner and in accordance with relevant statutory requirements. Further discussion of these plans, strategies and programs and how they would continue to be implemented during the life of the Project is provided in the EIS.

With the adoption of the Project management measures, it is not anticipated that the Project would result in additional environmental impacts that would materially alter regional property values in a negative manner. The SIA conducted for the EIS (Just Add Lime, 2020) suggests that there is some likelihood that property values would increase, due to some increase in local housing demand.

Land Acquisition and Depopulation of Local Communities

Concerns were raised in submissions that the Project SIA has documented existing social impacts associated with previous mine land acquisitions, and that additional Project land acquisitions and cumulative effects with other mines in the region would contribute to loss of volunteers in community services (e.g. Rural Fire Service) and additional impacts on mental health and social cohesion.

Response

Just Add Lime (Appendix N of the EIS) noted that social impacts associated with mining company land acquisitions in the region occurred prior to MACH's purchase of the Mount Pleasant Operation, and has also continued to occur since MACH's purchase of the mine.

It should be noted that MACH has been implementing measures to encourage its workforce to volunteer for community services such as the NSW Rural Fire Service. MACH would seek to reduce potential social impacts associated with any further Project land acquisitions by developing a policy to promote and support Mount Pleasant Operation employees to participate in local community groups in the Muswellbrook, Upper Hunter or Singleton LGAs.

Socio-economic Challenges

Some submitters raised a concern that the Project would exacerbate existing socio-economic challenges such as unequal distribution of benefits and impacts between groups in the community, and that the SIA has not sufficiently documented these existing or potential impacts.

Response

The SIA (Appendix N of the EIS) (Just Add Lime, 2020) assessed the socio-economic impacts of the existing approved Mount Pleasant Operation and other mining operations in the region. Just Add Lime (2020) indicated that the socio-economic impacts related to the approved Mount Pleasant Operation and other major projects in the region are experienced differentially, with people within the same geographical area experiencing both positive and negative social impacts.

Just Add Lime (2020) indicated that these impacts would continue should the Project be approved, with negative impacts continuing to be experienced by people in close geographical proximity to the Mount Pleasant Operation and positive social impacts continuing to be experienced generally over the same and wider geographical area. Should the Project not proceed, it is predicted that negative and positive socio-economic impacts would also be experienced differentially (Appendix N of the EIS).

Existing Social Impacts

Concerns were raised in some submissions that the Project would represent a continuation of the existing negative socio-economic impacts in the region related to the Mount Pleasant Operation (e.g. rural character and landscape, property values, social cohesion, anxiety, solastalgia, environment, concerns about health and time spent dealing with mining operations).

Response

As noted above, Just Add Lime (2020) identified differential positive and negative social impacts associated with the approved Mount Pleasant Operation and other mining operations in the region.

Just Add Lime (2020) assessed the potential impacts of the Project as a continuation of the social impacts currently being experienced from the Mount Pleasant Operation. Negative social impacts would continue to be experienced by people in close geographical proximity to the current operation, while positive social impacts would continue to be experienced generally over the same and wider geographical area (Appendix N of the EIS). A number of the potential impacts identified for the Project were also considered to already occur due to the existing nearby mining operations, and cumulative social impacts would continue to occur in combination with the Project (Appendix N of the EIS).

The Project would increase the availability and longevity of direct employment at the Mount Pleasant Operation. The Project would also provide continued indirect employment opportunities through MACH's continued support of local businesses. This increased employment would help maintain a stable economic base in the region (Appendix N of the EIS).

A number of SIA mitigation and management strategies to address the identified impacts of the existing Mount Pleasant Operation and the Project continuation of these impacts have been identified in the EIS, and would be implemented by MACH. Social impact management measures and enhancement measures for positive impacts would be described in a Social Impact Management Plan to be developed for the Project (subject to Development Conditions applied to the Project). MACH has also commenced negotiation with the Muswellbrook Shire Council regarding a revision of the existing Mount Pleasant Operation VPA for the Project (refer response above).

It is also noted that some public or NGO submissions highlighted existing positive social impacts of the Mount Pleasant Operation, including the Independent Chairperson of the Aboriginal Community Development Fund, who stated the following:

> *As part of fulfilling their part of a Native Title Agreement with the local Wonnaruah community, Mach Energy was committed to the improvement of Aboriginal Peoples in the Upper Hunter. An Aboriginal Community Development Fund (ACDF) was established in 2006. This Community Fund is comprised of Aboriginal peoples chaired by an independent chairperson and administered by Mach Energy. Currently approximately $4 million has been invested into supporting Aboriginal projects in the Upper Hunter, projects that would not receive support from any other institution government or non-government.*
> *…*
>
> *The Mount Pleasant Optimisation Project if approved will not only ensure mining continuity and more jobs. But this continuity will also enable Upper Hunter Aboriginal community the opportunity to plan and improve their educational, health, cultural, history and employment outcomes. Without Mach Energy's establishment of the Aboriginal Community Development Fund, one should ask the question. Who would have provided the opportunities for our local Aboriginal communities, "To Close the Gap?"*

Way of Life

Some submissions raised concerns regarding the potential impacts on the lifestyle of local communities and landholders associated with potential environmental and health impacts, including impacts on Mount Pleasant Operation employees and families due to the length of mining shifts.

Response

The Project would extend the life of the Mount Pleasant Operation and, therefore, any associated existing impacts on wellbeing and quality of life that are perceived in the local community (Appendix N of the EIS). Some nearby landholders who participated in engagement activities raised a number of causes of stress and anxiety as a result of the existing Mount Pleasant Operation and the Project. These predominantly related to stress and anxiety caused by permanent changes to the landscape, leading to loss of homeliness, change in connection to land or place, and distress caused by environmental change (i.e. solastalgia) (Appendix N of the EIS). The Project would also continue to support the wellbeing of employees and their families through continued provision of employment, and would also provide continued indirect employment opportunities through MACH's continued support of local businesses (Appendix N of the EIS).

Negative social impacts would continue to be experienced by people in close geographical proximity to the current operation, while positive social impacts would continue to be experienced generally over the same and wider geographical area (Appendix N of the EIS). The Mount Pleasant Operation operates under an Environmental Management Strategy that provides a framework to facilitate conduct of the operation in an environmentally responsible manner and in accordance with relevant statutory requirements. Further discussion of these plans, strategies and programs and how they would continue to be implemented during the life of the Project is provided in the EIS.

Visual Impacts

Concerns were raised in some submissions that the Project landform changes, including the development of the integrated waste rock emplacement would result in the development of solastalgia (i.e. distress caused by environmental change) for local people.

Response

It is acknowledged that open cut mining operations, including the approved Mount Pleasant Operation, do result in landform alterations. MACH is implementing geomorphic landform design and rapid rehabilitation to minimise the impacts associated with landform developments as far as practicable.

Concerns regarding the potential visual impacts of the Project are addressed in Section 4.3.9.

Proportion of Non-local Workforce at the Project

Some submissions raised concerns regarding potential impacts that may arise with any increased non-local workforce associated with the Project, including:

- local community's access to community services and infrastructure;
- social cohesion; and
- lack of economic contribution to the local community.

Response

It is anticipated that annualised construction workforces for the Project would be less than the peak experienced during the initial construction of the Mount Pleasant Operation. The Project operational workforce would increase relatively gradually and this workforce growth would extend over approximately two decades.

As shown in Table 6, the additional Project workforce would be unlikely to result in any significant change to population.

Table 6
Predicted Population Growth Associated with the Project

	LGA	2026	2036	2041
Estimated additional people[1]	Muswellbrook	177	174	104
	Upper Hunter	86	85	51
	Singleton	115	111	66
Estimated population change in the LGA	Muswellbrook	1%	1%	1%
	Upper Hunter	1%	1%	1%
	Singleton	<1%	<1%	<1%

Source: Appendix N of the EIS.

[1] Includes employees and their families.

Just Add Lime (2020) indicated that the additional Project workforce may lead to some increases in property values associated with increased demand for housing.

MACH would seek to reduce potential social impacts associated with non-local employees by:

- continuing to maximise locally sourced employees and encouraging relocation to the local area for non-local employees, including both MACH employees and contractors; and
- reporting the proportion of Mount Pleasant Operation employees residing within 80 km of site in the Annual Review.

Social Impact Assessment

Some submissions raised concerns regarding the SIA process, including documentation of the impacts of the existing Mount Pleasant Operation, representativeness, or sufficiency of assessment of social impacts associated with global warming.

Response

As part of the SIA (Appendix N of the EIS), Just Add Lime (2020) conducted 29 interviews between June and August 2020, which included interviews with the following stakeholders:

- Mount Pleasant Operation statutory groups;
- near neighbours;
- native title holders;
- Aboriginal stakeholders;
- local councils;
- environmental and community groups;
- industry groups;
- local businesses and local suppliers; and
- State government departments and agencies.

A community survey was also undertaken between 19 June 2020 to 31 August 2020, which was designed to enable a broad range of community members to participate in consultation and seek community members' views about potential impacts and opportunities associated with the Mount Pleasant Operation, and the Project proceeding or not proceeding (Appendix N of the EIS). The survey was made available online and was also advertised through various means, including MACH's website, local newspapers, letterbox drop of DL flyers and SMS and emails sent to people and organisations on MACH's consultation database. A link to the survey was also provided to the participants of the SIA consultation program for distribution within their networks (Just Add Lime, 2020).

A workforce survey was also undertaken to obtain information regarding the existing Mount Pleasant Operation workforce and to seek the employees' views regarding the potential impact and opportunities associated with the Project proceeding or not (Just Add Lime, 2020). The survey was made available online, and was distributed to the Mount Pleasant Operation employees via internal communication channels.

The SIA primarily reports on issues raised in the consultation program, and therefore reflects key issues raised by the SIA participants. Refer to the responses above with respect to recognition of the existing social impacts of the Mount Pleasant Operation.

Regional Skills Shortages

A concern was raised that mining employment demand contributes to regional skills shortages.

Response

As noted above, annualised construction workforces for the Project would be less than the peak experienced during the initial construction of the Mount Pleasant Operation. The Project operational workforce would increase relatively gradually and employment growth would extend over approximately two decades.

Just Add Lime (Appendix N of the EIS) identified that differential positive and negative impacts on regional workforce associated with the approved Mount Pleasant Operation and other mining operations in the region may occur. MACH would seek to reduce potential impacts related to regional skills over the life of the Project by:

- continuing to maximise locally sourced employees and encouraging relocation to the local area for non-local employees, including both MACH employees and contractors; and
- developing strategies to employ, train and upskill people from the local area who are unemployed.

It is also noted that some public or NGO supporting submissions highlighted the existing positive impacts of the Mount Pleasant Operation on skills development, or maintaining existing skilled employment, including WesTrac Pty Ltd, which stated the following:

> *MACH Energy are an established WesTrac customer and we have extensive engagements with them at their Mount Pleasant operation. In addition to direct employment opportunities, WesTrac has continued to invest in high end technology to support Mount Pleasant and our other mining customers. In the last 12 months we have spent $15m on capital equipment to expand our technical support capacity to our mining customers. The Mount Pleasant Optimisation Project provides us with the certainty to make these investments and provide ongoing skilled employment opportunities in regional NSW.*

4.3.11 Economics

Regulatory Submissions

MEG undertook a Resource and Economic Assessment of the Project, which included verification of the proposed ROM coal tonnes, product quality, target export market split and yield, and an independent calculation of estimated royalties based on coal prices that MEG considers are conservative.

MEG concluded that, should the Project be approved, the Project represents an efficient and optimised development of coal resources, which will foster significant social and economic benefits to the State of NSW. In addition, MEG considers that the Project is consistent with the objects of the *Mining Act 1992*.

NGO and Public Submissions

Future Thermal Coal Demand

Some submissions questioned the future global market for thermal coal in light of global greenhouse gas reduction efforts, and raised concerns regarding potential implications for Project product coal demand and prices.

Response

As described in the NSW Government's *Strategic Statement on Coal Exploration and Mining in NSW* (NSW Government, 2020), while many countries are transitioning from fossil fuels to low-carbon sources of energy, global seaborne thermal coal demand is not expected to decrease significantly in the next three decades. The NSW Government notes that (NSW Government, 2020):

> *Ending or reducing NSW thermal coal exports while there is still strong long-term global demand would likely have little or no impact on global carbon emissions. Most coal consumers would be likely to source their coal from elsewhere, and much of this coal would be lower quality compared to NSW coal.*

It should also be noted that J.C.D. Australia Pty Ltd is a part owner of the Mount Pleasant Joint Venture, and its parent company, J.C.D., is a consortium owned by all of the major Japanese Power Utilities who consume thermal coal in their own operations, and who have historically taken strategic stakes in specific coal mines that can provide stable quality products to their constituents' power plants now and into the future.

The assumed coal prices for projecting revenue from the Project adopted in the Project Economic Assessment (AnalytEcon, 2021) were developed from price forecasts from Wood Makenzie in 2020. Wood Mackenzie is considered to be a reasonable and independent source for coal prices. In addition, sensitivity analyses for potential changes in coal prices were also conducted, and showed that in all modelled scenarios, the Project would still have a substantial net benefit to NSW.

Furthermore, the MEG completed its own independent assessment of potential economic benefits from the Project, including the adoption of more conservative coal prices than Wood Mackenzie. The MEG concluded that the sale of the Project thermal coal products would be achievable and calculated that royalties generated by the Project with the more conservative coal prices would be $580 million (discounted), which is comparable to the estimate by AnalytEcon (2021) in the EIS ($684 million [discounted]). This demonstrates that the production and coal prices adopted in the Project Economic Assessment (AnalytEcon, 2021) are reasonable, based on NSW Government independent economic assessment.

The NSW Government's (2020) *Strategic Statement on Coal Exploration and Mining in NSW* outlines how the NSW Government will continue to support responsible resource development for the benefit of the State. The statement indicates that the NSW Government will take a balanced approach to the future of coal mining in the State by setting a clear and consistent policy framework that supports investment certainty, so the NSW coal sector can satisfy long-term global demand for coal, while giving NSW coal-reliant communities time to adapt to a low carbon future. The Project would be consistent with the statement. It is also noted that the NSW Government's *Net Zero Plan* reiterates that actions on climate change should not undermine the businesses, jobs and communities supported by mining (DPIE, 2020e).

Consideration of the International Energy Agency's Sustainable Development Scenario

Some submissions raised a concern that the Project Economic Assessment (Appendix O of the EIS) did not evaluate a thermal coal demand scenario that considers the International Energy Agency's (IEA's) Sustainable Development Scenario.

Response

Firstly, it must be recognised that the World Energy Outlook does not forecast what will happen. The IEA does not endorse any particular scenario in the World Energy Outlook 2020 (IEA, 2020a).

The World Energy Outlook 2020 includes a Sustainable Development Scenario that assumes a "surge in clean energy policies and investment" to meet the goal of the Paris Agreement (i.e. to limit global temperature increases to well below 2 degrees Celsius (°C) above pre-industrial levels). It is noted that the Sustainable Development Scenario does not reflect currently announced policy and emission reduction targets made by countries under the Paris Agreement.

The World Energy Outlook 2020 (IEA, 2020a) forecasts a global thermal coal demand of approximately 2,500 million tonnes coal equivalent (Mtce) and 1,350 Mtce in 2030 and 2040 under the Sustainable Development Scenario, respectively. This shows significant demand for thermal coal is expected in the long-term under the Sustainable Development Scenario.

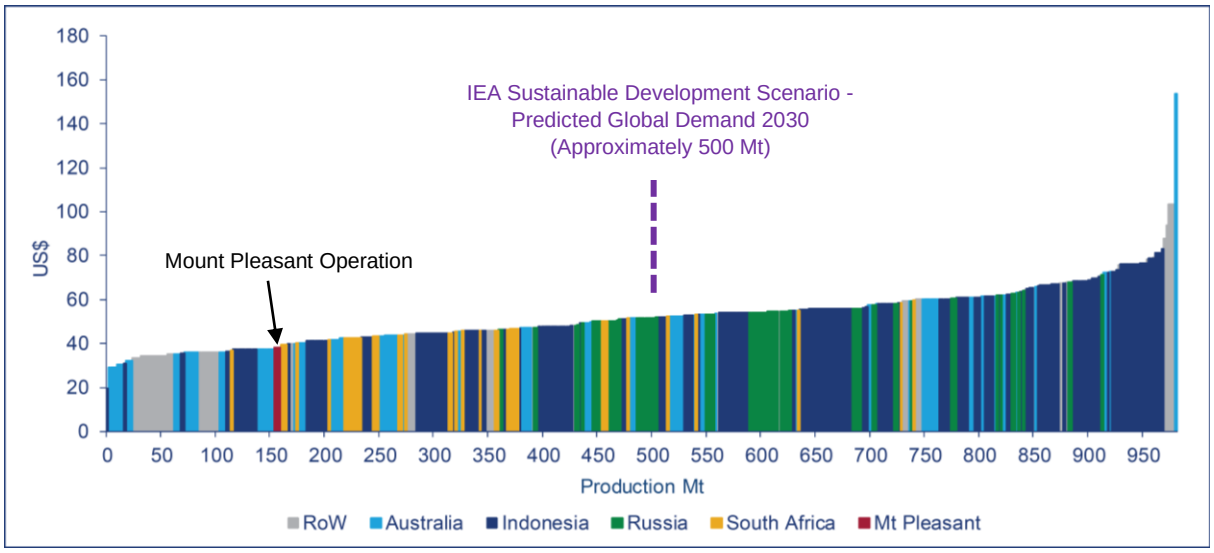
Under the Sustainable Development Scenario, global thermal coal export demand is expected to reduce by 50% in 2030 (IEA, 2020a). Applying this forecast Sustainable Development Scenario reduction to the current global thermal coal market export demand (approximately 1,000 Mt) (IEA, 2020b), the forecast global thermal coal export demand in 2030 would be approximately 500 Mt. The IEA notes that Australia would remain the largest coal exporter in 2030 under the Sustainable Development Scenario, as it serves emerging Asian markets.

As described above, the assumed coal prices for projecting revenue from the Project adopted in the Project Economic Assessment (Appendix O of the EIS) were developed from price forecasts from Wood Makenzie in 2020. Wood Mackenzie is considered to be a reasonable and independent source for coal prices. In addition, sensitivity analyses for potential changes in coal prices were also conducted, and showed that in all modelled scenarios the Project would still have a substantial net benefit to NSW. The *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015) do not require consideration of any particular IEA scenario, such as the Sustainable Development Scenario.

Notwithstanding, if the Sustainable Development Scenario was to occur, MACH anticipates there would be contraction in the number of operating coal mines, as less efficient and higher-cost coal mines begin to close as global demand for coal falls. Long life and low operating-cost projects would, however, continue to supply the reduced global demand under the Sustainable Development Scenario.

The Project would comprise a long life and low-cost mining operation as the geology of the coal deposit allows the recovery of low strip ratio thermal coal that is recognised and accepted internationally. This is reflected in the Mount Pleasant Operation being within the first quartile of the global seaborne thermal coal free onboard cost curve, where the Mount Pleasant Operation sits within the lowest 200 Mt of production cost (Graph 3) (Wood Mackenzie, 2020).

Based on the above, MACH considers the Project would continue to supply the global seaborne thermal coal market under the IEA's (2020b) Sustainable Development Scenario. The Project would therefore align with the NSW Government's (2020) *Strategic Statement on Coal Exploration and Mining in NSW* by providing NSW coal reliant communities time to adapt to a low carbon future.



Graph 3 – Global Seabourne Thermal Coal FOB Supply Curve (2020, US$/t, nominal) Adjusted to 6,322 kcal/kg

After: Wood Mackenzie, 2020; IEA, 2020b.

Furthermore, consistent with the NSW Government's *Strategic Statement on Coal Exploration and Mining in NSW* (NSW Government, 2020), should the Project be rejected, global coal demand under the Sustainable Development Source would be satisfied by alternative sources of coal.

Project Impact on Global Thermal Coal Price

Concerns were raised that extra coal production associated with the Project would drive down thermal coal prices, and therefore increase thermal coal consumption globally.

Response

The IEA estimates the global seaborne thermal coal demand to be in the order of 1,000 Mt of per annum (IEA, 2020b). The proposed peak product coal production rate of the Project of 16.9 Mt represents an 9.1 Mt increase over the Mount Pleasant Operation's current product coal production rate (7.8 Mt). This increase in product coal is approximately 0.9% of the estimated global seaborne thermal coal demand.

In addition, the coal produced by the Project would not necessarily result in, or coincide with, a net increase in coal production globally, or in the Upper Hunter Valley, compared to current levels of production. Graph 4 provides a summary of the approved and proposed coal extraction in the Upper Hunter Valley for the period 2010 to 2050 based on currently approved and proposed projects. Graph 4 illustrates that the Project's coal would be expected to replace some of the production from other coal mines that will cease once their coal reserves have depleted.

Given the above, the Project is not expected to significantly change seaborne thermal coal production or prices, nor have any measurable influence on seaborne thermal coal demand.

This supports the policy position in the NSW Government's *Strategic Statement on Coal Exploration and Mining in NSW* (NSW Government, 2020), that should the Project be rejected, global coal demand would be satisfied by alternative sources of coal.

Competition with other NSW Coal Mines

A number of submissions stated that competition amongst current and new coal projects in NSW would increase, and the demand for coal decrease, over time.

Response

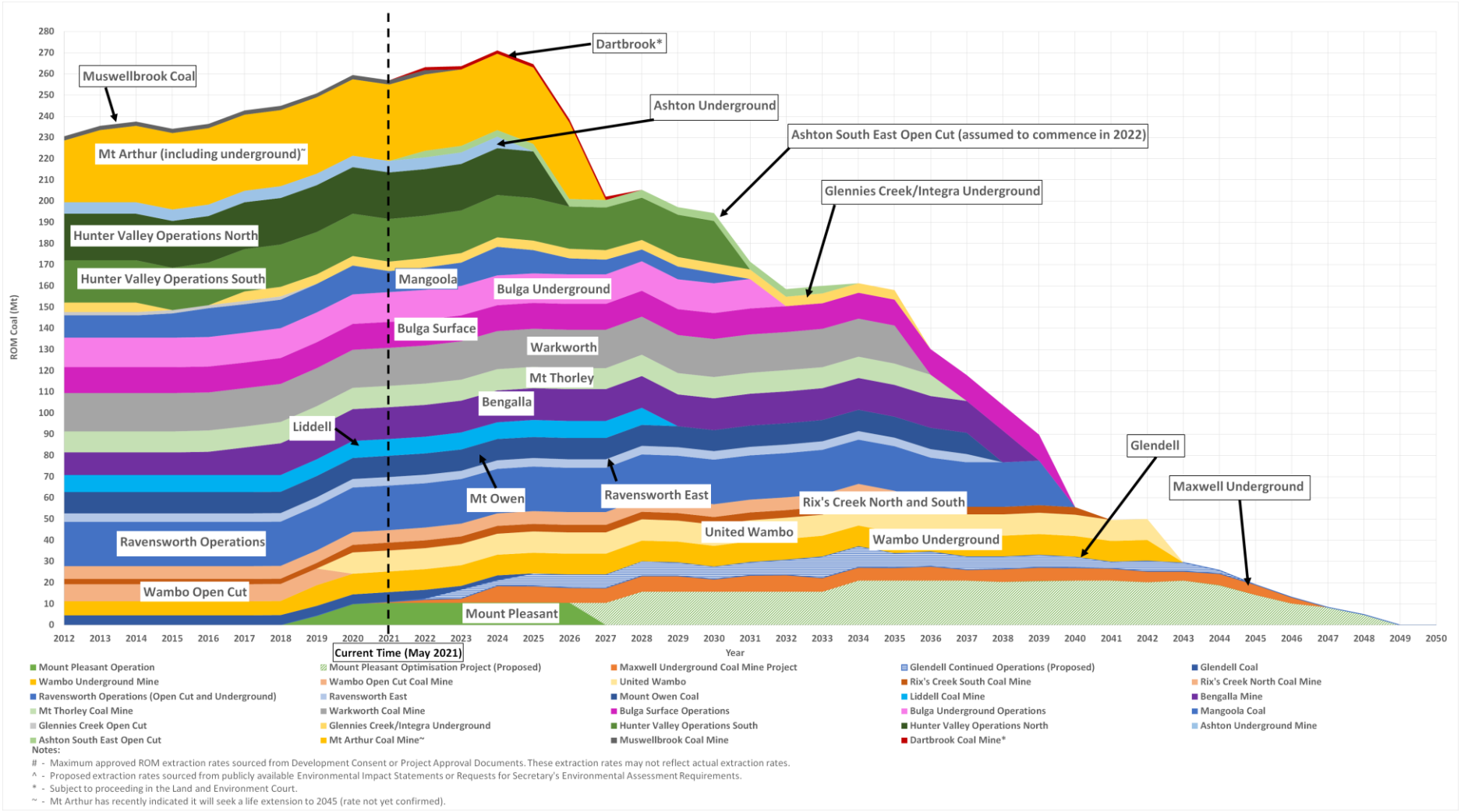
The Project is a "brownfield" project that builds on and optimises the existing Mount Pleasant Operation. In particular, the Project would:

- continue and extend open cut mining wholly within the existing Mount Pleasant Operation MLs;
- provide augmentation of the existing Mount Pleasant Operation facilities including coal handling and processing, water storage, mine infrastructure, and Fines Emplacement Area;
- use the existing approved Mount Pleasant Operation rail infrastructure to its full capacity; and
- provide continuation and augmentation of supply for existing coal customers, including the Japanese electricity generators that are part-owners of the Project (through J.C.D Australia Pty Ltd).

Graph 4 shows the currently approved ROM coal production rates and duration of mine lives and proposed expansions in the Upper Hunter Valley. While it is recognised that some of the mines represented in this graph may currently, or in the future, be seeking to extend their permitted duration of mining, MACH anticipates that the Project is likely to offset some of the coal production declines in the local area and wider Hunter Valley from 2034, rather than significantly expanding total Hunter Valley coal production compared to current approved production rates.

As described above, the Project would comprise a long life and low-cost mining operation as the geology of the coal resources favours the recovery of low strip ratio thermal coal that is recognised and accepted internationally (Graph 3). MACH anticipates that there will be some contraction in the number of operating coal mines in NSW, as less efficient and higher-cost coal mines begin to close. Long life and low operating-cost projects, such as the Project, will therefore be important to maintain the generation of royalties and employment in the NSW mining industry.

As stated by the NSW Government, mining will continue to be an important part of the State economy into the future, and the Project represents a mining proposal that aligns with key local, regional and State strategic policy objectives. Further, the low-cost nature of the Project and production of high-quality recognised thermal coal products leads to a key role in the long-term transition to a low-carbon economy by meeting ongoing demand for high quality thermal coal and facilitating a more gradual decline of coal mining in the region, giving coal-reliant communities time to adapt.



Graph 4 – Approved[#] and Proposed[^] Coal Extraction of the Upper Hunter Valley*

* Based on Major Projects website as at May 2021.

Consideration of the Newcastle Thermal Coal Benchmark Specification

Concerns were raised regarding the assumption that the Project product coal would be saleable when the majority is expected to be of a lower quality than the Newcastle Thermal Coal Benchmark specifications.

Response

ROM coal would be processed at the Mount Pleasant Operation CHPP to produce up to three thermal coal product types (5,000 kilocalories per kilogram [kcal/kg], 5,500 kcal/kg and 6,000 kcal/kg specifications). These products would be transported via rail to the Port of Newcastle for export, or to domestic customers for use in electricity generation. There would be flexibility throughout the life of the Project to adjust the mix of these product types to meet market demand.

The MEG completed a review of the Project's coal quality information and concluded that the sale of these thermal coal products would be achievable.

Furthermore, the assumed coal prices adopted in the Project Economic Assessment (Appendix O of the EIS) were developed from price forecasts from Wood Makenzie and include price adjustments associated with Project's product coal energy content differences from the Newcastle Thermal Coal Benchmark.

Project Operational and Capital Costs

Concerns were raised that the operational and capital costs assumed for the Project appear lower than some other Hunter Valley mines.

Response

The Project is a "brownfield" project that would use existing facilities at the Mount Pleasant Operation.

The Project operational costs are expected to be lower than other Hunter Valley coal mining operations as the geology of the Mount Pleasant Operation coal resources would result in the recovery of low strip ratio thermal coal. The Mount Pleasant Operation is well within the first quartile of global seaborne thermal coal free onboard cost curve (Graph 3) (Wood Mackenzie, 2020).

The Project capital costs are based on engineering and construction planning conducted for the Project Pre-Feasibility Study. The capital cost estimates also take into consideration MACH's recent experience constructing the Mount Pleasant Operation. The capital cost estimates are therefore considered to be robust.

Consideration of Coal Price Change on Net Benefit to NSW

Concerns were raised regarding the lack of assessment of the "cost and revenue changes that would be required for returns to the proponents to reach levels that would see production cut back or halted."

Response

The *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015) require assessment of the net benefit to NSW and require:

> *Where practicable, sensitivity analysis should identify how much output prices would need to fall for a project to have a zero NPV and report on whether such a scenario is either likely or unlikely.*

In accordance with this requirement, the Project Economic Assessment (Appendix O of the EIS) concluded that all coal prices over the life of the Project would need to fall by 48% from 2023 to 2048 relative to Project coal price estimates, to result in a net benefit to NSW of $0. Under the current cost profile (Graph 3), a long-term change of this magnitude is considered unlikely, unless there is an equally significant shift in cost structures in the global seabourne thermal coal market (e.g. through technological advancements).

It is for the Applicant to make its own assessment of the economic viability of a Project and then decide whether it wishes to proceed to seek development consent for a project. MACH has demonstrated its commitment to the Mount Pleasant Operation and the Project through its significant capital investments to date.

Project Producer Surplus

Concerns were raised regarding the accuracy of the predicted Project producer surplus of $1.1 billion, while BHP has recently revised Mt Arthur's book value down to roughly $387 million.

Response

The net producer surplus reported in the Project Economic Assessment (Appendix O of the EIS) (i.e. $1,110 million) has been calculated based on the Project's estimated revenue, capital and operating costs and tax liabilities in accordance with the methodology outlined in the *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015). MACH considers the estimated net producer surplus to be reasonable. It is noted that every mine has varying cost and operating constraints that may influence the 'book value' of individual projects. Each resource company may also apply differing accounting methods to determine the 'book value' of a project.

Consideration of Externalities

Concerns were raised that there may be an overestimation of the effectiveness of the Project mitigation measures, particularly for air quality-related impacts that could increase environmental externality costs.

Response

Refer to responses in Section 4 with respect to the application of air quality management measures at the Mount Pleasant Operation and their effectiveness. It is noted that the Mount Pleasant Operation will continue to be required to comply with NSW Government consent requirements, including air quality compliance limits, should the Project be approved.

The estimated externality costs (including potential air quality impacts) in the Project Economic Assessment (Appendix O of the EIS) were estimated in accordance with *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015) and the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DP&E, 2018).

The estimated externality costs were estimated based on the predicted potential impacts in the relevant specialist assessment that were prepared in accordance with the relevant NSW Government guidance. For example, the estimated externality costs associated with potential air quality impacts were estimated based on the outcomes of the Project Air Quality Assessment (Todoroski Air Sciences, 2020) that was prepared in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2017c).

The estimated externality costs (including potential air quality impacts) in the Economic Assessment (Appendix O of the EIS) are therefore considered to be appropriate.

Potential Greenhouse Gas Costs Outside of NSW

Concerns were raised that greenhouse gas costs are underestimated due to use of a methodology that does not account for damage costs outside of NSW.

Response

The estimated externality costs associated with greenhouse gas emissions in the Project Economic Assessment (Appendix O of the EIS) were calculated in accordance with *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015) and the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DP&E, 2018) and based on the Project's predicted greenhouse gas emissions estimated in accordance with the *National Greenhouse Accounts Factors August 2019* (DISER, 2020) (Todoroski Air Sciences, 2021b).

In relation to the estimation of greenhouse gas emission externality costs, the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DP&E, 2018) state:

> *Accordingly, project proponents should provide an analysis of:*
>
> - *their business-as-usual (BAU) GHG emission output (central estimate) and the expected emissions profile of this central estimate (Scope 1 and 2);*
> - *Estimate the economic impact of GHG emission output to NSW only;*
> - *Undertake a sensitivity analysis on anticipated project GHG emissions output (Scope 1 and 2) at carbon prices below and above the central estimate price.*
>
> *The value of the externality is limited to the impact on NSW, consistent with the Guidelines and how all other costs/benefits are measured within the CBA. As noted in the Guidelines, the focus is on the costs and benefits of the project as they relate to the community of NSW.*

Consistent with the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DP&E, 2018), the externality costs associated with Scope 1 and 2 greenhouse gas emissions from the Project were determined for NSW.

This approach was adopted consistently for all costs and benefits in the cost benefit analysis in the Project Economic Assessment (Appendix O of the EIS).

Rehabilitation Costs and Workforce Transition Measures

Concerns were raised regarding high environmental rehabilitation costs, and potential lack of transition measures for the workforce, should mining close early.

Response

Under the NSW *Mining Act 1992*, environmental protection and rehabilitation are regulated by conditions included in all MLs, including requirements for the submission of a Mining Operations Plan prior to the commencement of operations. All mining operations must be carried out in accordance with the Mining Operations Plan, which has been prepared to the satisfaction of the NSW Resources Regulator. The Mining Operations Plan describes site activities and the progress toward environmental and rehabilitation outcomes required under ML conditions, Development Consent conditions and other approvals.

All titleholders engaged in mining activities are required to lodge a security deposit. The security deposit covers the NSW Government's full estimated costs in undertaking rehabilitation in the event of default by the titleholder. The security deposit is reviewed and progressively increased or decreased, based on the extent of disturbed land and rehabilitation activities described in each new or amended Mining Operations Plan.

A security deposit is currently held by the NSW Government for rehabilitation activities at the approved Mount Pleasant Operation. The existing rehabilitation security deposit is based on a rehabilitation cost estimate for the currently approved Mining Operations Plan period prepared in accordance with the relevant NSW Resources Regulator requirements.

Prior to the commencement of any activities under a Mining Operations Plan for the Project, MACH would lodge a revised security deposit in accordance with the following relevant guidelines (or their contemporary versions):

- *ESG1: Rehabilitation Cost Estimate Guidelines* (NSW Resources Regulator, 2020a); and
- *ESP1: Rehabilitation security deposits* (NSW Resources Regulator, 2020b).

The Project Economic Assessment (Appendix O of the EIS) considered the Project rehabilitation and decommissioning costs in the cost benefit analysis and it concluded that the Project would have a substantial net benefit to NSW.

If the Project does not proceed, the current Mount Pleasant Operation workforce (approximately 440 full-time equivalents) would be discontinued following the completion of the currently approved duration of mining at the Mount Pleasant Operation in 2026. The Project would therefore increase the availability and longevity of direct employment at the Mount Pleasant Operation. The Project would also provide continued indirect employment opportunities through MACH's continued support of local businesses. This increased employment would help maintain a stable economic base in the region (Just Add Lime, 2020).

MACH would continue to engage with stakeholders regarding mine closure planning and how the Project can contribute to the Upper Hunter long-term transition from coal mining and power generation over the life of the Project. Social impact management measures and enhancement measures for positive impacts would be described in a Social Impact Management Plan, which would also address socio-economic issues associated with mine closure.

A Mine Closure Plan would be developed for the Project in consultation with relevant regulatory authorities and community stakeholders. The Mine Closure Plan would be developed over the Project life, and would include consideration of amelioration of potential adverse socio-economic effects due to the reduction in employment at Project closure.

Overstated Flow-on Benefits

Some submissions made general statements that the Project Economic Assessment overstated flow-on benefits due to the use of input-output modelling.

Response

The estimated flow-on benefits of the Project in the Economic Assessment (Appendix O of the EIS) were estimated using input-output modelling. This methodology is consistent with the *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015).

It is also noted that some public or NGO supporting submissions highlighted the potential positive impacts of the Project with respect to economic flow-on effects, including Pirtec Muswellbrook, which stated the following:

…

- *ECONOMIC BENEFITS: The Mount Pleasant Optimisation Project will create more jobs for the region. These jobs and the wages that will flow from them, will deliver a much needed boost to the local economy. Further afield, the project will also generate billions of dollars for the NSW State Government and local Councils. This money can be used to upgrade regional hospitals, schools or infrastructure. Projects like this help ensure our ongoing prosperity and can support the economy for years to come.*
- *LOCAL ECONOMY: The project will boost our local economy and help local business owners such as ourselves. It will support a wide range of local businesses until 2048.*
- *Long term projects, like this one, will mean local businesses can make more investments, grow their operations, hire more people and keep workers – especially young people – in the region.*

These benefits will make a substantial long-term difference to the communities in the Upper Hunter and to NSW.

…

Potential Impacts on Agricultural Enterprises

Some submitters raised concerns regarding cumulative impacts on agriculture and dairy farming enterprises currently being impacted by the approved operations, including post-mining.

Response

The Project would result in no significant increase in total land disturbance compared to the existing approved Mount Pleasant Operation, due to the relinquishment of an approved disturbance area in the north-west. MACH has approached the design of the Project and its relationship with nearby agricultural enterprises with the following aims:

- being open to the feedback of nearby agricultural enterprises on the existing impacts of the Mount Pleasant Operation;
- facilitating ongoing agricultural production on available MACH-owned lands and the productive use of MACH water resources that are not presently required for mining; and
- incorporating staging in the Project design to reduce potential incremental Mount Pleasant Operation impacts on nearby residences, including proximal agricultural enterprises.

MACH would implement a number of mitigation and management strategies during the Project, including the following key strategies (Appendix N of the EIS):

- Continuing to work with the neighbouring landholders and people from surrounding villages and communities to develop engagement methods that suit them and that are reasonable and feasible.
- Continuing to engage with stakeholders who are directly impacted and interested organisations to develop, implement and review environmental management measures that are reasonable and feasible.

The forgone agricultural gross margin due to the Mount Pleasant Operation (incorporating the Project) is approximately $22.8 million in net present value terms. The total incremental forgone gross margin associated with the Project is approximately $5.5 million in NPV terms. The forgone value of agricultural production should any additional Project biodiversity offset areas be required is not expected to be significant (Appendix O of the EIS).

The proposed final land uses for the Mount Pleasant Operation area include agricultural land, including parts that would potentially be conducive to high-intensity agricultural use (e.g. existing mine infrastructure areas). These areas would be rehabilitated to pasture using appropriate grass species. These areas are characterised by:

- Low gradient slopes and flat areas.
- Proximity to existing land used for agricultural purposes.
- Access to Mount Pleasant Operation supporting infrastructure that could potentially remain in place to support intensive agricultural use (e.g. rail loop, water storages, high capacity water pumps and pipelines, electrical infrastructure and other services).

Overstatement of Benefits

General statements were made in some submissions that the Project Economic Assessment overstated benefits (royalties, tax payments and jobs).

Response

The Project Economic Assessment (Appendix O of the EIS)) was undertaken in accordance with *Guidelines for the economic assessment of mining and coal seam gas proposals* (NSW Government, 2015) and the *Technical Notes Supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (DP&E, 2018).

The assumed coal prices for projecting revenue from the Project adopted in the Project Economic Assessment (Appendix O of the EIS)) were developed from price forecasts from Wood Makenzie in 2020. Wood Mackenzie is considered to be a reasonable and independent source for coal prices. In addition, sensitivity analyses for potential changes in coal prices were also conducted, and showed that in all modelling scenarios the Project would still have a substantial net benefit to NSW.

Furthermore, the MEG completed its own independent assessment of potential economic benefits from the Project, including the adoption of more conservative coal prices than those supplied by Wood Mackenzie. The MEG concluded that the sale of the Project thermal coal products would be achievable and calculated that royalties generated by the Project with the more conservative coal prices would be $580 million (discounted), which is comparable to the estimate by AnalytEcon (2021) in the EIS ($684 million [discounted]). This demonstrates that the production and coal prices adopted in the Project Economic Assessment (Appendix O of the EIS)) are reasonable, based on NSW Government independent economic assessment.

In addition, sensitivity analyses for potential changes in company tax payments (including consideration of zero company tax payments) were also conducted, and showed that in all modelled scenarios the Project would still have a substantial net benefit to NSW.

The current operational workforce at the Mount Pleasant Operation is approximately 440 full-time equivalents. The workforce required for the Project would increase to an estimated average of approximately 600 people, with a peak of approximately 830 full-time equivalent operational personnel (including MACH staff and on-site contractor personnel) anticipated. Employment growth for the Project would be spread through the life of the Project and would generally be consistent with the staged increases in coal production.

It is also noted that a high proportion of supporting public or NGO submissions for the Project articulated the importance of existing Mount Pleasant Operation (or the proposed Project) employment benefits and/or flow-on economic effects to them and their families.

4.3.12 Hazards and Risks

Regulatory Submissions

Minimum separation distance to overhead powerlines and underground cables

Ausgrid noted that the applicable minimum separation distances should be maintained between overhead powerlines or underground cables and Project operational or construction/development activities.

Response

As part of the Project, the existing electricity supply and distribution system at the Mount Pleasant Operation would continue to be used, with minor upgrades, and some existing services would be relocated to facilitate mining. Standard electrical safety practices and laws (including considerations of vehicle clearance) would continue to apply.

Bushfire Management Plan

The NSW Rural Fire Service requested that a fire management plan be prepared to cover the existing Mount Pleasant Operation and the Project, and that all habitable buildings should maintain appropriate separation distances from un-managed vegetation hazards.

Response

The Mount Pleasant Operation has an existing Bushfire Management Plan that would be reviewed and updated, as required, should the Project be approved. As described in the Project Preliminary Hazard Analysis (Appendix Q of the EIS), habitable buildings that would be constructed for the Project would be constructed in accordance with the applicable Australian Standards, codes and guidelines, including those related to separation distances from vegetation susceptible to bushfires.

Declared Dams

While Dams Safety NSW did not raise any specific concerns regarding MACH's dams in its submission on the Project, it did note MACH should consult with Dams Safety NSW in regard to any proposed mining within Declared Dam notification areas.

Response

MACH would continue to consult with Dams Safety NSW regarding the management of Declared Dams operated by MACH (including ED3, MWDs and the Fines Emplacement Area) and also meet Dams Safety NSW requirements applicable for any Project works within Bengalla Mine Declared Dam notification areas.

NGO and Public Submissions

Fines Emplacement Area

A concern was raised regarding the potential for failure of the Fines Emplacement Area (e.g. in an earthquake).

Response

The Project Preliminary Hazard Analysis (Appendix Q of the EIS) includes analysis of a range of potential incidents, including Fines Emplacement Area embankment failure. The existing and proposed preventative measures to avoid such an incident include design and construction of the Fines Emplacement Area to relevant standards and legislation (including Dams Safety NSW requirements), blast monitoring and post-blast inspections and regular inspections for structural integrity and effectiveness. It is also noted that the Fines Emplacement Area is being developed using the downstream construction method which provides greater stability than the upstream method (Appendix Q of the EIS).

4.3.13 Human Health

Regulatory Submissions

Implementation of Reasonable and Feasible Mitigation Methods

NSW Health made no specific comments regarding the Project Human Health Assessment (Appendix R of the EIS). NSW Health did, however, note that any exposure to particulate matter may have potential health effects, and monitored air quality levels within population centres in the region often exceed national standards. NSW Health also highlighted the importance of the implementation of reasonable and feasible air quality mitigation measures.

Response

MACH acknowledges the importance of the implementation of reasonable and feasible air quality mitigation and management measures at the Mount Pleasant Operation and for the Project. Discussion of the air quality mitigation and management measures implemented at the existing Mount Pleasant Operation, which would continue to be implemented for the Project, as well as additional mitigation and management measures, can be found in Section 4.3.1.

NGO and Public Submissions

General Potential Health Impacts

Concerns were raised regarding the potential health impacts of the Project generally, with reference to particulate matter levels and existing community health in Muswellbrook. Some submissions stated that the Muswellbrook area has higher incidence of asthma and respiratory/cardiovascular disease-related hospital admissions than other areas, and that this would be exacerbated by additional mining development in the region since 2009.

Response

The Project Human Health Assessment (Appendix R of the EIS) was prepared in accordance with the relevant Federal and NSW Government policies and guidelines by a well-regarded health risk assessment consultancy, Environmental Risk Sciences. The assessment was comprehensive, including quantifying potential health risks at more than 900 receivers across six operational scenarios. The outcomes of the assessment are therefore considered reliable and appropriate for use by the determining authority in assessing the Project.

Trends in hospital admissions within the Muswellbrook LGA and NSW generally are summarised in Figure 12 below, as provided on the NSW Government's HealthStats website (NSW Government, 2021). The data indicate that in the Muswellbrook LGA, hospitalisations due to asthma and circulatory diseases are generally trending downward, while hospitalisations due to respiratory (represented by chronic obstructive pulmonary diseases) have generally trended upward – though they appear to be trending down again since the 2015-2017 period.

Regardless of these observed declining trends in the data, the data do indicate a greater number of hospitalisations due to circulatory and respiratory diseases in the Muswellbrook LGA per unit of population than in NSW generally. However, the data also show a greater number of hospitalisations related to smoking in the Muswellbrook LGA than in NSW per unit of population. This does not necessarily indicate that higher incidences of circulatory and respiratory diseases in Muswellbrook are due to smoking, rather it highlights that a variety of societal factors must be considered when reviewing health-related data such as hospitalisation rates.

Source: NSW Government, 2021

Figure 12 – Trends in Health Statistics – Muswellbrook LGA and NSW

MACH acknowledges the importance of the implementation of reasonable and feasible air quality mitigation and management measures at the Mount Pleasant Operation and for the Project. Discussion of the air quality mitigation and management measures implemented at the existing Mount Pleasant Operation, which would continue to be implemented for the Project, as well as additional mitigation and management measures, can be found in Section 4.3.1 above.

4.3.14 Greenhouse Gas Emissions

Regulatory Submissions

Project Greenhouse Gas Emissions and Climate Change Action

The Upper Hunter Shire Council stated that it has committed to becoming carbon neutral by 2030 in order to do its part in reducing global greenhouse gas emissions, and that the Project's greenhouse gas emissions counteract such local actions, and those actions being taken globally, to address climate change.

Response

The Project is not located in the Upper Hunter LGA and would therefore not contribute to the Upper Hunter LGA's greenhouse gas emissions.

Notwithstanding the above, it is acknowledged that (subject to the efficacy of national and international greenhouse gas abatement measures) all sources of greenhouse gas emissions will contribute in some way towards the potential global, national, state and regional effects of climate change.

The Project's contribution to global climate change effects would be proportional to its contribution to global greenhouse gas emissions. Greenhouse gases directly generated at the Project (i.e. Scope 1 emissions) and indirect emissions associated with the on-site use of fuel and electricity (i.e. Scope 2 emissions) have together been estimated at approximately 0.54 million tonnes of carbon dioxide equivalent per year (Mt CO_2-e per year). This is a relatively small contribution to Australian emissions, representing approximately 0.4% of the estimated total greenhouse gas emissions in NSW from 2017 (131.5 Mt CO_2-e) and approximately 0.1% of Australia's annual greenhouse gas emissions from 2017 (534.7 Mt CO_2-e) (Todoroski Air Sciences, 2021b).

The Project's Scope 1 and 2 emissions would be significantly less than the Scope 3 emissions produced by customers using Project product coal. The estimated Scope 3 emissions would represent approximately 0.065% of the total anthropogenic greenhouse gas emissions globally (excluding land use change) in 2017 (Appendix S of the EIS). It is anticipated that a significant majority of the Scope 3 emissions from the use of Project coal would occur overseas. Expected export markets for Project coal are described in Appendix S of the EIS and all of these export markets are signatories to the *Paris Agreement*.

Under the *Paris Agreement*, each Party is required to prepare, communicate and maintain Nationally Determined Contributions (NDCs) that will contribute to the long-term goals of the *Paris Agreement* (United Nations Framework Convention on Climate Change [UNFCCC], 2020).

It is important to note that, under the *Paris Agreement*, each NDC reflects the country's ambition for reducing emissions, taking into account its domestic circumstances and capabilities (UNFCCC, 2020). Each country will have its own range of opportunities and priorities to trade off various alternative emission reduction (and carbon sink) options, having regard to the economic priorities and physical attributes of the country.

MACH would implement various mitigation measures to minimise the overall generation of greenhouse gas emissions from the Project. MACH would manage its contribution to Australian greenhouse gas emissions inventories through participation in the *National Greenhouse and Energy Reporting Scheme*, as well as other applicable government initiatives and policies implemented to manage emissions at the national level under Australia's progressive NDCs.

Scope 3 emissions from the use of Project coal in overseas customer countries would be managed in accordance with customer countries commitments under the *Paris Agreement* and would not contribute to Australian greenhouse gas emissions or factor into Australian greenhouse gas reduction targets. Any small quantities of Project product coal sold on the domestic market (e.g. to AGL's Bayswater Power Station) would likely be substituting or augmenting supply from existing coal sources. It is therefore anticipated these emissions would not increase Australia's current greenhouse gas emissions.

If the Project does not proceed, global demand for coal could be satisfied by other sources and, therefore, there would not be a corresponding reduction in global greenhouse emissions in the atmosphere. The Project's relatively low greenhouse gas emissions intensity and low cost of production (due to relatively low strip ratios) means that it would remain competitive in the global coal market. If the Project does not proceed, and therefore does not produce high-quality thermal coal, the existing and future demand for coal is likely to be satisfied by lower-quality (and thus more emissions-intensive) coal, which means that more coal would need to be burned to meet the same energy needs, resulting in higher greenhouse gas emissions.

The NSW Government's (2020) *Strategic Statement on Coal Exploration and Mining in NSW* outlines how the NSW Government will continue to support responsible resource development for the benefit of the State. The statement indicates that the NSW Government will take a balanced approach to the future of coal mining in the State by setting a clear and consistent policy framework that supports investment certainty, so the NSW coal sector can satisfy long-term global demand for coal, while giving NSW coal-reliant communities time to adapt to a low carbon future. The Project would be consistent with the statement. It is also noted that the NSW Government's *Net Zero Plan* reiterates that actions on climate change should not undermine the businesses, jobs and communities supported by mining (DPIE, 2020e).

NGO and Public Submissions

Project Greenhouse Gas Emissions and Climate Change Action

Similar to the statement made by the Upper Hunter Shire Council, concerns were raised regarding the Project's increased greenhouse gas emissions (in comparison to the approved Mount Pleasant Operation) in light of State and Federal commitments to reduce greenhouse gas emissions and global climate change targets (e.g. 1.5°C warming), and a perceived lack of carbon offsets or greenhouse gas emission reduction strategies.

Response

Consideration of this issue is provided in the response to the Upper Hunter Shire Council above.

In relation to Australian and NSW laws and policies, it is noted that:

- There is nothing in existing climate change laws and policies which prohibits the approval of new coal mining development (including 'brownfield' expansions, such as the Project).
- None of the mechanisms or measures that Australia has adopted for the purpose of meeting its NDC under the *Paris Agreement* include restrictions on coal mine expansions.
- MACH would continue to comply with its obligations to report greenhouse gas emissions and energy consumption/production under the NGER Act.
- MACH would continue to comply with the Federal Government's Safeguard Mechanism by remaining below its baseline set by the Clean Energy Regulator, offsetting its emissions above its baseline, or otherwise managing compliance.

- The life of the Project would be completed before 2050, which is the target date for NSW achieving net zero emissions.
- It is the NSW Government's policy[10] that coal in NSW continues to be developed in recognition of the significant social and economic benefits to NSW that result from the efficient development of mineral resources.

Estimation of Fugitive Greenhouse Gas Emissions

The use of a site-specific emission factor for estimating potential fugitive emissions was queried, as the factor is lower than the default factor in the National Greenhouse Accounts (NGA) Factors.

Response

The site-specific fugitive emission factor used to estimate greenhouse gas emissions for the Project is based on site-specific sampling consistent with the methodology outlined in the NGA Factors and is also consistent with that used for previous assessments of site greenhouse gas emissions.

Gas content data collected from the site prior to mining has the potential to be more conservative than gas content data collected following the commencement of mining (e.g. as the mine progresses, coal seams are exposed and trapped gas may be released, reducing the gas content in coal seams at the active mine).

Climate Change

Some submitters raised concerns that meeting the NSW Government's target of net zero greenhouse gas emissions by 2050 is not sufficient. Some submissions suggested that no additional coal projects should be approved.

Response

The life of the Project would be completed before 2050, which is the target date for NSW achieving net zero emissions (DPIE, 2020e).

It is also noted that the NSW Government's *Net Zero Plan* reiterates that actions on climate change should not undermine the businesses, jobs and communities supported by mining (DPIE, 2020e).

In relation to greenhouse gas emissions, climate change and the principles of ESD, it is noted that:

- Greenhouse gas emissions estimates for the Project (Scopes 1, 2 and 3) have accounted for uncertainty by adopting conservative assumptions (Todoroski Air Sciences, 2020).
- The assessment of greenhouse gas emissions of the Project allows the effective integration of social, economic and environmental considerations in the decision-making process for the Project.
- MACH would implement a suite of mitigation measures to minimise the Project's Scope 1 and Scope 2 greenhouse gas emissions.
- Valuation of potential impacts of Project Scope 1 and Scope 2 greenhouse gas emissions has been incorporated into the Project Economic Assessment (Appendix O of the EIS) for the Project.

[10] As embodied in the *NSW Mining Act 1992*, the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, Net Zero Plan Stage 1: 2020 – 2030* (DPIE, 2020e) and the *Strategic Statement on Coal Exploration and Mining in NSW* (NSW Government, 2020).

- The Project would benefit current and future generations through:
  - approximately $856 million (net present value) in royalties and NSW's share of company income tax – noting a range of uncertainty analyses (e.g. variations in discount rate, coal price and exchange rate) indicate benefits would still be delivered to NSW under numerous economic scenarios (AnalytEcon, 2021);
  - the continuation and expansion of the Mount Pleasant Operation employment to 2048 (up to approximately 830 full-time equivalent operational personnel); and
  - a range of positive flow-on effects of the Project, including continuation and expansion of local spend by the Project workforce and continuation and expansion of community contributions (i.e. under an updated VPA for the Project) (AnalytEcon, 2021).
- The greenhouse gas emissions associated with the combustion of Project product coal will be primarily addressed and regulated by the Project expected export countries (Appendix S of the EIS), under their NDCs. Those NDCs reflect national priorities, including in respect of sustainable development and considering the potential benefits of providing reliable, affordable and efficient energy and electricity to different populations.

4.3.15 Agriculture and Land Resources

Regulatory Submissions

Area of the Post-Mining Landform Under Agriculture

The Department of Regional NSW – Primary Industries (Agriculture) noted that the majority of the area has been cleared and used for agricultural grazing purposes for well over 100 years, and therefore suggested that the Project should include more land to be restored to agricultural use, and potential obstacles to agricultural use (such as the construction of native animal habitat rockpiles) should be avoided.

The Department of Regional NSW – Primary Industries (Agriculture) also suggested that in agricultural areas, the post-mining rehabilitation should target more of Land and Soil Capability (LSC) Class 3 or Class 4 outcomes.

Response

MACH has undertaken a preliminary assessment of potential post-mining land uses (e.g. nature conservation, agriculture) taking into account relevant strategic land use objectives of the area in the vicinity of the Project and the potential benefits of the post-mining land use to the environment, future landholders and the community. This has included consideration of Muswellbrook Shire Council's preference for the inclusion of some intensive agricultural/industrial post-mining land uses that would provide employment for the local community (Section 3.1.2 of the EIS).

The Project would involve some land targeted to agricultural uses post-mining (Figure 3-18 of the EIS), however, the majority would target native woodland and grassland consistent with the existing commitments of the Mount Pleasant Operation under EPBC Act Approval 2011/5795, and to maximise the post-mining stability of mine landforms.

The Project final landform areas proposed for agriculture are shown on Figure 3-18 of the EIS and would be prepared to accommodate agricultural activities such as sustainable/managed livestock grazing. The objective would be to establish areas to be classified as Land Capability Class 4, Class 5 or Class 6 lands, which are suitable for grazing, but not cropping or other high intensity uses.

It should be noted that these parts of the Project final landform would also potentially be conducive to high-intensity agricultural use, as they are characterised by:

- Low gradient slopes and flat areas.
- Proximity to existing land used for agricultural purposes.
- Access to Mount Pleasant Operation supporting infrastructure that could potentially remain in place to support intensive agricultural use (e.g. rail loop, water storages, high capacity water pumps and pipelines, electrical infrastructure and other services).

MACH suggests that the Project final land use and rehabilitation objectives present a reasonable compromise between future land uses, and would provide for some ongoing agricultural use, while primarily achieving a net gain in native vegetation.

Post-Mining Fate of Mine Infrastructure

The Department of Regional NSW – Primary Industries (Agriculture) requested that when consideration is being made as to the post-mining fate of Project infrastructure, the Department of Regional NSW – Primary Industries (Agriculture) should be consulted along with the Muswellbrook Shire Council and the NSW Resources Regulator, particularly with respect to the potential requirements of agribusiness.

Response

MACH concurs with this recommendation of the Department of Regional NSW – Primary Industries (Agriculture), and would be happy to involve the Department in consultation on the post-mining use of the site and the potential ongoing use of Project infrastructure for community or agribusiness uses.

Animal Welfare

The submission made by the Department of Regional NSW – Primary Industries (Animal Welfare) did not raise any concerns regarding the Project proposal.

NGO and Public Submissions

Compatibility of Mining and Agriculture

A range of submitters expressed an opinion that there was material incompatibility between mining and other land uses, particularly agricultural land uses (or more specifically horse-breeding industries).

Response

Existing and approved land uses in the vicinity of the Project include:

- Dartbrook Mine (currently on care and maintenance) located to the immediate north of the Project, with surface facilities extending to the eastern side of the Hunter River and New England Highway;
- Bengalla Mine (operational to 2039 under current approvals) located to the immediate south of the Project, in the area bounded by Wybong Road to the north and the Muswellbrook–Ulan Rail Line to the south;
- exploration tenements that are located to the east and west of the Mount Pleasant Operation MLs, which are subject to approved mineral exploration activities by a number of parties, including Muswellbrook Coal Mine;

- agricultural land owned by MACH, which is subject to a number of uses including cattle grazing, dairying, turf farming, horse breeding and fodder cropping by local farmers;
- proximal private agricultural land that is largely subject to cattle grazing in the north and west, and a variety of more intensive land uses on the Hunter River floodplain to the east (including dairying and irrigated cropping);
- various rural residential properties on the Hunter River floodplain and located along the major infrastructure corridor of the New England Highway, plus more sparsely located rural properties to the north and west of the Mount Pleasant Operation;
- the Muswellbrook Race Club located to the east of the Hunter River between Bengalla Mine and Denman Road;
- the town of Muswellbrook and associated residential, commercial and industrial areas that are located on the eastern side of the Hunter River, and west of the Muswellbrook Coal Mine; and
- the village of Aberdeen, located in the Upper Hunter LGA to the north.

There are no viticulture enterprises within the immediate vicinity of the Project. With respect to equine industries, the most proximal horse stud is located on MACH-owned land to the east of the Mount Pleasant Operation and produces stock horses. Notwithstanding, a number of equine enterprises and some viticulture enterprises have previously objected to, or commented on, the development of the approved Mount Pleasant Operation. Concerns have included potential visual effects viewed from the public road network, dynamic impacts, indirect impacts, or general concerns about the acceptability of predicted environmental impacts.

Section 8.1 of the EIS explores the compatibility of the Project with equine and viticulture land uses in the region in detail, Table 7 summarises the findings of this analysis.

Table 7
Summary of Key Assessment Outcomes for Regional Equine and Viticulture Enterprises

Potential Impact	Summary of Assessment Outcome
Potential indirect, flow-on or perceptual impacts on equine and viticulture enterprises	
Visual and landscape changes.	In the sub-regional and regional context, the expansion in scale and elevation of the integrated waste rock emplacement landform associated with the Project is considered to be consistent with extensive existing mining landscapes within the region (Section 7.16 and Appendix M of the EIS). The relinquishment of some previously approved disturbance areas would balance the Additional Disturbance Area required for the Project (Section 7.16 and Appendix M of the EIS). There are a number of horse studs (i.e. Abbey Thoroughbreds, Balmoral Park Thoroughbred Studs and Edinglassie Stud) that have high or moderate visual impacts from the approved Mount Pleasant Operation, in the context of these businesses also having views of other mining operations (e.g. Bengalla Mine and Mt Arthur Coal Mine). The visual impacts of the Project on these horse studs would continue to be high to moderate/low and would reduce in the long-term (Section 7.16 and Appendix M of the EIS). There would be no views of the Project from Monarch, Coolmore and Godolphin Woodlands, Kelvinside, Segenhoe and Yarraman Park Studs and therefore there would be no visual impacts at these more remote locations (Section 7.16 and Appendix M of the EIS). It is expected that the potential diffuse light effects of the Project would extend further north in comparison to the existing levels, creating more localised lighting visual impacts. However, the nature of the diffuse light effects would be consistent with the approved effects of the approved Mount Pleasant Operation and the existing effects of other developments in the vicinity of the Project (e.g. Bengalla Mine and Mt Arthur Coal Mine) (Section 7.16 and Appendix M of the EIS).

Table 7 (Continued)
Summary of Key Assessment Outcomes for Regional Equine and Viticulture Enterprises

Potential Impact	Summary of Assessment Outcome
Dynamic impacts, perception of impacts as a result of preferences, associations and memories.	Personal perceptions would be affected by preferences, associations and memories derived from reading, hearing and/or seeing information on previous, existing and proposed activities and stakeholder interactions. Perceptions vary between individuals and can, therefore, be difficult to assess (Appendix M of the EIS). DP&E (2017) relevantly states: *When considering perceptions of adverse impacts on amenity, an evaluation must be made of the reasonableness of those perceptions. This evaluation involves 'the identification of evidence that can be objectively assessed to ascertain whether it supports a factual finding of an adverse effect on amenity…': Telstra Corporation Ltd v Hornsby Shire Council [2006] NSWLEC 133.* The impact of the Project on the landscape and the extended duration of those impacts over time in the context of existing land use patterns at the regional, sub-regional and local scales would create a moderate dynamic landscape impact (Appendix M of the EIS). MACH would continue to engage with agricultural industries to identify and manage any concerns (including concerns regarding customer perceptions) over the life of the Project.

Source: Section 8 of the EIS.

No equine or viticulture enterprises have been identified in the EIS assessments that would experience material adverse direct impacts as a result of the Project, that are not already occurring with the approved Mount Pleasant Operation. The nearest equine enterprise is a horse stud that is located on land that MACH owns, and produces stock horses.

Section 7 of the EIS assesses the predicted incremental (direct and indirect), and potential cumulative environmental impacts of the Project, and discusses the acceptability of these impacts in the context of applicable guidance documents, and regulatory requirements.

The submission made by the Department of Regional NSW – Primary Industries (Agriculture and Animal Welfare) did not raise any concerns regarding potential for impacts to surrounding agricultural land uses or animal welfare.

Duration of Impacts on Adjoining Agricultural Operations

A public submitter was concerned that the Project's impact on equine or viticulture enterprises and other adjoining agricultural users such as dairy farming, would increase relative to the Mount Pleasant Operation's current duration of operations to 2026.

Response

The Project compatibility with adjoining land uses is explored in detail in Section 8.1 of the EIS.

It is acknowledged that the Project proposed continuation of the Mount Pleasant Operation to 2048 would see the continuation of some existing impacts experienced by near neighbours to the operation, including, for instance, hearing mining equipment at night, or visual impacts associated with construction of the Eastern Out-of-Pit Emplacement.

The SIA (Appendix N of the EIS) assessed the potential impacts of the Project as a continuation of the social impacts currently being experienced from the Mount Pleasant Operation. Negative social impacts would continue to be experienced by people in close geographical proximity to the current operation, while positive social impacts would continue to be experienced generally over the same and wider geographical area (Appendix N of the EIS).

A wide range of reasonable and feasible environmental management measures would be implemented to minimise the potential impacts of the Project on near neighbours (Section 7 of the EIS). In addition, MACH would implement a range of reasonable and feasible measures to address social impacts including the following key strategies (Appendix N of the EIS):

- Continue to work with the neighbouring landholders and people from surrounding villages and communities to develop engagement methods that suit them and that are reasonable and feasible.
- Continue to engage with stakeholders who are directly impacted and interested organisations to develop, implement and review environmental management measures that are reasonable and feasible.
- Support for the agricultural industry through, for example, supporting continuation of agriculture on MACH-owned land that is not required for mining operations, or temporary trading of water licences for periods the licences are not required by MACH.

The submission made by the Department of Regional NSW – Primary Industries (Agriculture and Animal Welfare) did not raise any concerns regarding potential for impacts to surrounding agricultural land uses or animal welfare.

Potential impacts on Local Agricultural Uses

Concerns were raised that the EIS assessment limited consideration of potential agricultural impacts on land affected by the ML and to adjoining Critical Industry Clusters (CIC), not other agricultural uses.

Response

A range of agricultural enterprises are located on private land in the vicinity of the Mount Pleasant Operation and the Project.

The Project would result in no significant increase in total disturbance area compared to the existing approved Mount Pleasant Operation, due to the relinquishment of an approved disturbance area in the north-west. Notwithstanding, comprehensive assessment of the Project's potential impacts on neighbouring land uses has been conducted in the EIS. MACH approached the design of the Project and its relationship with nearby agricultural enterprises with the following aims:

- being open to the feedback of nearby agricultural enterprises on the existing impacts of the Mount Pleasant Operation;
- facilitating ongoing agricultural production on available MACH-owned lands and the productive use of MACH water resources that are not presently required for mining; and
- incorporating staging in the Project design to reduce potential incremental Mount Pleasant Operation impacts on nearby residences, including proximal agricultural enterprises (Section 8.2.1 of the EIS).

Table 8 presents a summary of the key assessment outcomes related to adjacent agricultural enterprises.

MACH would continue to facilitate the productive use of MACH-owned agricultural land outside of Project active mining areas through leasing arrangements (e.g. to local farmers) over the life of the Project.

The submission made by the Department of Regional NSW – Primary Industries (Agriculture and Animal Welfare) did not raise any concerns regarding potential for impacts to surrounding agricultural land uses or animal welfare.

Table 8
Summary of Key Assessment Outcomes for Nearby Agricultural Enterprises

Potential Impact	Summary of Assessment Outcome
Potential impacts to infrastructure used by nearby agricultural enterprises	
Increased traffic levels on surrounding road network.	The Project would continue to use the existing site access to the Mount Pleasant Operation. Heavy vehicle deliveries would be required to continue using Bengalla Road and Wybong Road and would be prohibited from use of the Kayuga Bridge over the Hunter River. Any employee travel on Kayuga Road would be primarily limited to employees residing locally (e.g. in Aberdeen and Scone). The Project Road Transport Assessment (Appendix J of the EIS) concludes that the existing road network can satisfactorily accommodate the forecast traffic demands resulting from the Project without any specific additional road upgrade requirements.
Changes in the surrounding road network.	The approved Mount Pleasant Operation is already required to construct the Northern Link Road to compensate for the planned closure of Castlerock Road. MACH would not close Wybong Road or construct the currently approved Western Link Road as a component of the Project. The proposed Project realignment of the Northern Link Road would have no material impact on travel time on the surrounding road network, and has been designed to optimise efficiency.
Access to agricultural support services and infrastructure.	The Project would not have any material incremental impact on agricultural support services or infrastructure, as MACH would continue to make its agricultural properties that are not required for mining available for ongoing productive agricultural use by local farmers. MACH further contributes to local demand for agricultural and rural services through Mount Pleasant Operation on-site weed and pest management activities, on-site and off-site fencing, rehabilitation works, maintenance activities and management of its major biodiversity offset properties in the broader region.
Potential impacts to agricultural resources used by nearby agricultural enterprises	
Availability and/or quality of water available to agricultural enterprises.	The Project would not have any material impacts on water resources used by nearby agricultural enterprises (water extraction would continue from the regulated Hunter River and other sources in accordance with applicable water access licences) (Sections 7.8 and 7.9 and Appendices C and D of the EIS).
Increased biosecurity risks (weeds, plants and animals).	MACH would continue to implement weed and pest animal management programs to reduce biosecurity risks to off-site areas. Where vehicles and mechanical equipment have operated off-road, these would be washed down to minimise seed transport off-site (Section 7.10 of the EIS).
Potential impacts affecting amenity	
Construction noise, operational noise and dust emissions.	Noise and air quality contributions from the Project on adjoining agricultural properties would be broadly consistent with the currently approved Mount Pleasant Operation, with local and temporal changes in emission levels occurring as the open cut activities initially progress north, and then westwards over the life of the Project. Wilkinson Murray and TAS concluded that MACH's proposed staging of the expansion of Project ROM coal production would be effective in minimising potential noise and air quality impacts to the majority of receivers in the vicinity of the Mount Pleasant Operation (Sections 7.3 to 7.7 and Appendices A and B of the EIS).
Blasting and blast vibration.	The Project would comply with applicable overpressure and blast vibration criteria at nearby private residences with the application of blast management measures, including minimising blast MIC (Section 7.6 and Appendix A of the EIS).
Odour.	Any spontaneous combustion that may occur over the life of the Project would be managed in accordance with the Mount Pleasant Operation Spontaneous Combustion Management Plan (Section 7.7 and Appendix B of the EIS).
Visual and landscape changes.	The landforms and activities of the existing approved Mount Pleasant Operation are visible from surrounding agricultural properties, from the public road network and west-facing areas of Muswellbrook (Appendix M of the EIS). The lights of the Mount Pleasant Operation are also visible at night (i.e. a combination of direct and indirect lighting effects). The Project expansion in elevation and scale of the integrated waste rock emplacement landform and associated activities (including lighting) would alter the visual impacts of the approved Mount Pleasant Operation from nearby rural properties. There would be moderate cumulative impacts due to the extension of duration of the mine operations that would be evident in the local and sub-regional area (Section 7.16 and Appendix M of the EIS). These impacts would be mitigated through progressive rehabilitation.

Source: Section 8 of the EIS.

Potential Impacts on the Equine Critical Industry Cluster

Concerns were raised that insufficient assessment was conducted with respect to potential impacts of the Project on the Equine CIC, as mapped by the NSW Government.

Response

The Equine CIC has been mapped as covering 254,900 ha of land within the Upper Hunter. It is comprised of a number of stud and broodmare farms supported by specialised veterinary services, stock agents and farriers located in two broad corridors stretching from Jerrys Plains in the south to the area surrounding Scone in the north and the Bylong Valley in the west. Primarily, the focus of the industry is on thoroughbred horses for the racing industry, although the industry includes horse agistment and horse breeding for other purposes.

The location of Equine CIC land mapped by the NSW Government and nearby equine enterprises is presented in Figure 4 of the Agricultural Impact Statement (Appendix I of the EIS). This Figure illustrates that some land mapped as Equine CIC is not currently used for equine enterprises.

The Project would result in no significant increase in total disturbance area compared to the existing approved Mount Pleasant Operation, due to the relinquishment of an approved disturbance area in the north-west. There is no NSW Government-mapped Equine CIC land within the Project General Extension Areas (Figure 3 of Appendix I of the EIS). Part of the Relinquishment Area intersects a lot classified as Equine CIC. The proposed Northern Link Road Option 1 would traverse this same lot and is not considered to significantly impact the Equine CIC (Appendix I of the EIS).

No equine enterprises have been identified in the EIS assessments that would experience material adverse direct impacts as a result of the Project that are not already occurring with the approved Mount Pleasant Operation.

The Mount Pleasant Operation open cut is also currently at its closest proximity to the Muswellbrook Race Club and equine enterprises adjacent to the Hunter River to the south-east, with mining activities currently centred in the south-east of ML 1645. Over the life of the Project, the focus of Mount Pleasant Operation mining activities would progressively move north and west, away from the Muswellbrook Race Club and these equine enterprises.

Further assessment of the potential impacts on local agricultural uses and the potential indirect impacts on equine enterprises (and the Equine CIC more broadly) is provided in the Agricultural Impact Statement (Appendix I of the EIS).

Potential Impacts on Kelvinside Stud

Godolphin Australia Pty Ltd[11] raised concerns regarding potential Project impacts on its Kelvinside Stud located to the north-east of the Project, including potential impacts associated with:

- blasting impacts;
- dust deposition/odour;
- traffic; and
- lighting associated with night-time operations.

[11] His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the United Arab Emirates and Ruler of Dubai, founded Godolphin as an expression of his lifelong passion for horses and racing (Godolphin, 2021).

Response

The Project would result in no significant increase in total disturbance area compared to the existing approved Mount Pleasant Operation, due to the relinquishment of an approved disturbance area in the north-west. Figure 4 of the Project Agricultural and Land Resources Assessment (Appendix I of the EIS) illustrates the location of the Kelvinside Stud relative to the Mount Pleasant Operation MLs.

This Figure is illustrative of a number of factors that are of some relevance to considering the potential impacts of the Project on this Godolphin Australia Pty Ltd[11] stud, including:

- The closest mining infrastructure to the Kelvinside Stud is the Dartbrook Mine surface infrastructure and associated rail loop adjacent to the New England Highway, which is located approximately halfway between the Mount Pleasant Operation and the stud.
- Aberdeen is located on the western point of a major ridgeline that extends to the south-east and provides a major topographic barrier between the Kelvinside Stud and the Dartbrook Mine.
- The nearest horse stud to the Mount Pleasant Operation (Rosebrook Australian Stock Horses) operates within 1 km from the mine.
- The Kelvinside Stud is located approximately 6 km from the northern boundary of the Mount Pleasant Operation MLs (which form the northern boundary of both the currently approved and proposed Project mining activities).
- The Hunter River is adjacent to and north of the Kelvinside Stud, and flows generally south towards the Project. The section of the Hunter River adjacent to the Kelvinside Stud is approximately 7.5 km upstream of the Project.

In addition, the noise and air quality modelling conducted for the Project has found the Mount Pleasant Operation would comply with all applicable noise, blasting and air quality criteria in the village of Aberdeen (Section 7 of the EIS). Aberdeen is significantly closer to the mine than the Kelvinside Stud and does not benefit from the significant topographic shielding afforded to Kelvinside by the ridgeline.

Further discussion of the key findings of the EIS with respect to potential impacts of the Project on the equine industry is provided in Table 8 above. Further discussion regarding potential visual impacts of the Project and associated mitigation measures is provided in Section 4.3.9 of this Submissions Report and Appendix M of the EIS.

Based on the above, MACH does not concur that the Project would result in material incremental impacts for the Godolphin Australia Pty Ltd[11] Kelvinside Stud that are not already occurring from the approved Mount Pleasant Operation (i.e. personal perceptions regarding the potential for dynamic effects).

The submission made by the Department of Regional NSW – Primary Industries (Agriculture and Animal Welfare) did not raise any concerns regarding potential for impacts to surrounding agricultural land uses or animal welfare.

Productivity of Adjoining Agricultural Land

A local agricultural producer stated that productivity of nearby agricultural enterprises has declined since the Mount Pleasant Operation commenced, and existing impacts on productivity, animal health, reproductive performance, pasture quality and profitability would continue, should the Project proceed.

Response

The Mount Pleasant Operation is required to comply with applicable air quality, noise and blasting criteria set by the NSW Government, which are primarily set for the protection of human health and amenity of the NSW population. The air quality and noise emissions of a compliant mining operation logically would therefore be unlikely to result in any measurable impact on the productivity of nearby agricultural operations. MACH notes that a number of local agricultural businesses (including the author of this particular submission) lease Mount Pleasant Operation buffer land from MACH as part of their productive agricultural operations in the region.

The submission made by the Department of Regional NSW – Primary Industries (Agriculture and Animal Welfare) did not raise any concerns regarding potential for impacts to surrounding agricultural land uses or animal welfare.

Revised Northern Link Road Alignment and ML 1645

A local landholder suggested the Project revised Northern Link Road alignment and the presence of ML1645 would adversely affect the utility and value of adjacent agricultural land.

Response

It is noted that ML1645 is the existing ML under which the Mount Pleasant Operation conducts the majority of its operations (Figure 1-3 of the EIS). This ML has been in place since it was granted to Coal & Allied in 2010.

The approved Mount Pleasant Operation includes the closure of a section of Castlerock Road and development of the Northern Link Road to connect Dorset Road and Castlerock Road, to the west of the Mount Pleasant Operation MLs (Section 2.2.8 and Figure 1-3 of the EIS). The alignment of the Northern Link Road would be revised for the Project to improve the safety of the intersection between the Northern Link Road and Castlerock Road. As shown on Figure 3-1 of the EIS, two options were assessed in the EIS, with Option 1 being preferred by MACH (subject to landholder access).

It is not anticipated that revised alignment of the Northern Link Road would result in any material additional impacts on the utility of adjacent agricultural land relative to the currently approved alignment. Notwithstanding, two options have been assessed as Option 1 is, in part, located on private land. The Option 2 alignment would be constructed if the private landholder does not agree to provide MACH suitable access to establish a public road in the private land of the Option 1 alignment.

4.3.16 Other Environmental Matters

Telecommunications

The Muswellbrook Shire Council (and some other submitters) raised concerns that the increased height of the Mount Pleasant integrated waste rock emplacement could have some detrimental impact on telecommunications from the Rossgole Tower, due to terrain effects.

Response

MACH is not aware of an example where development of a mine waste rock emplacement has resulted in any material alteration of the efficacy of existing public service transmission towers. Notwithstanding, the Project would result in alteration of local terrain within the Mount Pleasant Operation MLs, and the potential for any impact on local communication systems could depend on the transmission technology and location of facilities being employed at the time. Therefore, MACH would not object to a condition requiring make-good provisions (e.g. such as raising an existing tower or construction of an additional transmission station), should such an adverse impact be demonstrated to occur due to the increased elevation of the Mount Pleasant Operation integrated waste rock emplacement.

Seismic Activity

The Muswellbrook Shire Council (and some other submitters) raised concerns regarding a perception that seismic activity in the order of 3-4 in the Richter Scale has been increasing in the Shire, with an event epicentre in the vicinity of the Mt Arthur Coal Mine having occurred in recent years. Council is concerned that seismic activity could increase as a result of the Project, and adaptive management measures may be required.

Response

MACH is not aware of a material correlation between the development of open cut coal mining and the frequency of minor earthquakes in NSW. Review of the Geoscience Australia National Seismic Hazard Assessment 2018 appears to suggest that Muswellbrook has similar seismic hazard risk to much of eastern NSW and Victoria, but less than Canberra (Geoscience Australia, 2018).

Ownership of Local Landholdings

A public submission from a nearby landholder raised a concern that the EIS may have overlooked some of their privately-owned land parcels in the assessment of potential impacts (e.g. air quality, noise and water resources).

Response

In this instance, as the landholder owns a significant number of parcels of land in the vicinity of the Project, MACH provided a briefing document that highlighted relevant land parcels where potential impacts were identified. For brevity, the briefing document did not describe the predicted impacts (e.g. air quality and noise) for properties owned by the landholder where the predicted impacts were below the applicable criteria.

The EIS attributes all of the relevant privately-owned land parcels to the landowner, and the potential impacts of the Project on the land parcels and residences are described in the applicable assessments (e.g. Appendices A and B of the EIS for noise and air quality, respectively).

Consideration of Other Mines in Impact Assessment

Some submitters suggested that the potential cumulative impacts of the Project and other mines have not been sufficiently assessed, particularly with regard to air quality and water resources.

Response

Relevant key assessments for the Project (e.g. air quality, noise, water resources and visual) have considered the potential impacts of the Project in the context of the existing and approved mining operations in in the Project vicinity, including the approved Mount Pleasant Operation.

Further, key assessment modelling for the Project (e.g. conducted for the Project Groundwater Assessment [Appendix C of the EIS]) has assessed the potential impacts of the Project along with surrounding approved mines such as Dartbrook Mine, Bengalla Mine and Mt Arthur Coal Mine. This modelling has also been conducted in accordance with the SEARs, and applicable NSW Government or national assessment guidelines (e.g. the *Australian Groundwater Modelling Guidelines* [Barnett *et al.*, 2012]), and for key studies such cumulative modelling has also been subject to peer review.

For example, the Project Groundwater Assessment was peer reviewed by Brian Barnett, the primary author of the *Australian Groundwater Modelling Guidelines,* and the peer review concluded:

> *I have concluded that the calibration approach and outcomes meet all reasonable expectations (including guiding principles outlined in Australian Groundwater Modelling Guidelines).*
> *Four predictive scenarios have been assessed as follows:*
>
> - *A baseline scenario (null case scenario) that includes no mining in the area.*
> - *A scenario that includes neighbouring mines only and no Mount Pleasant Operation mining.*
> - *A scenario that includes the approved and proposed extension to the Mount Pleasant Operation and mining at neighbouring mines.*
> - *A scenario that includes the approved mining at Mount Pleasant only (i.e., the proposed extension is not included) and mining at neighbouring mines.*
>
> *Comparisons of results from the various scenarios are able to yield the predicted cumulative impacts of all mines in the area including Mount Pleasant Operation and the incremental impacts that can be attributed to the approved and proposed extension to Mount Pleasant Operation mining and of the proposed extension of Mount Pleasant Operation in isolation.*
>
> *…*
>
> *The groundwater assessment and supporting groundwater modelling work described in the Report and Appendix have been carried out in a professional and rigorous manner and meet or exceed current industry standards. I have concluded that the model is fit for the purpose of impact quantification and assessment.*

Environmental Track Record of Proponent

Some submitters raised concerns regarding the environmental track record and international reputation of MACH, or its parent company, including its commitments to follow NSW regulations/laws.

Response

The proponent for the Project is MACH Energy Australia Pty Ltd, on behalf of the unincorporated joint venture (Section 1 of the EIS). MACH Energy is an Australian company that was specifically founded to purchase and operate the Mount Pleasant Operation and is bound by applicable Australian and NSW legislation.

MACH Energy has a strong record in mine safety, environmental management and business operation.

MACH Energy conducts its mining operations in accordance with a range of regulatory consents, leases and licences. MACH Energy has established and is committed to continue open and constructive dialogue with the local community and stakeholders.

Further, MACH Energy has a documented Environmental Policy that applies to the Mount Pleasant Operation, which states:

> *MACH Energy Australia Pty Ltd (MACH Energy) is committed to achieving an excellent standard of environmental performance from all its business activities.*
>
> *MACH Energy commits to:*
>
> - *Promoting a culture in which everyone takes responsibility for protecting the environment;*
> - *Measuring our performance against objectives and targets to drive continual improvement of our environmental performance;*
> - *Maintaining clear and consistent communication and consultation with our stakeholders with the intent of enhancing environmental outcomes;*
> - *Identifying, assessing, communicating and managing our environment risks;*
> - *Complying with all relevant legislative and regulatory requirements;*
> - *Ensure incidents, including near misses, are reported and investigated in a timely manner to prevent a recurrence;*
> - *Being a learning organisation; and*
> - *Providing the systems, resources and training to meet our commitments.*
>
> *Finding ways to continually make advances in environmental sustainability is embedded in the way we conduct our business.*

A description of the existing environmental management system implemented by MACH at the Mount Pleasant Operation is in Section 2.2.12 of the EIS.

Historical Environmental Approvals at the Site

Concerns were raised that some submitters were not aware of previous modifications to the Mount Pleasant Operation, or the level of consultation and cumulative impact assessment conducted for previous Mount Pleasant Operation approvals.

Response

The Mount Pleasant Operation was approved under NSW legislation in 1999 and is a major existing open cut coal mine (Section 2 of the EIS). The original approval under NSW legislation in 1999 and subsequent Modifications have been publicly notified where relevant under applicable NSW legislation. The approval of the Project under the Federal EPBC Act in 2012 also involved a public process.

Since purchasing the Mount Pleasant Operation, MACH has published regular community newsletters that are distributed to local postcodes and include periodic updates on the Mount Pleasant Operation approvals, as well as making a range of information publicly accessible on its website.

Future Modifications Could Occur

A concern was raised that future modifications could occur that would allow disturbance of land within the Project relinquishment area, that would lead to altered potential impacts on nearby residences.

Response

MACH does not intend to develop the land in the Project relinquishment area for mining in the period up until 2048 (i.e. over the life of the Project). Notwithstanding, the Project would not mine all potentially recoverable coal resources in ML 1645. It is therefore acknowledged that future modifications to the approved Mount Pleasant Operation, or a further SSD application could be lodged at some time in the future that involves further open cut or underground mining within the Project MLs.

Should any modification to the Mount Pleasant Operation Development Consent, or another SSD application be proposed by MACH at some stage in the future, such an application would need to assess the potential impacts of the relevant proposal, including potential impacts on near neighbours. Such a proposal would then be evaluated on its merits by the NSW (and Federal) Government at that time, in accordance with applicable assessment requirements.

4.4 EVALUATION OF THE PROJECT

Regulatory Submissions

Extension of the Mount Pleasant Operation

The Upper Hunter Shire Council raised a concern that the Project extension and intensification of the Mount Pleasant Operation would extend the exposure of local communities to the impacts of noise, dust and visual impacts, with mining occurring for an additional 22 years.

Response

Responses to air quality, noise and visual impact related submissions on the Project are provided in Sections 4.3.1, 4.3.2 and 4.3.9, respectively. The Project would extend the life of the Mount Pleasant Operation from 2026 to 2048, which would extend the duration of mining related impacts. Just Add Lime (Appendix N of the EIS) indicated that existing social impacts would continue should the Project be approved, with negative impacts continuing to be experienced by people in close geographical proximity to the Mount Pleasant Operation and positive social impacts continuing to be experienced generally over the same and wider geographical area.

The optimisation of the Mount Pleasant Operation would also provide for the continuation of employment of the existing workforce, with an average of approximately 600 full-time-equivalent direct operational jobs. The Project would invest approximately $950 million in capital expenditure. As at mid-2020 the Mount Pleasant Operation employed 440 full-time equivalent people and operated at a ROM coal production rate of up to 10.5 Mtpa, at the mine's closest proximity to Muswellbrook. The proposed Project staging of the ROM coal production rate up to a maximum of 21 Mtpa would increase financial returns to MACH, employment, and the generation of royalties to the State of NSW, while maintaining key emissions at levels that are generally consistent with the existing Mount Pleasant Operation Development Consent DA 92/97.

NGO and Public Submissions

Cumulative Impacts of Mining

A broad range of submitters suggested that the Project would continue cumulative impacts currently experienced from the approved/existing mining operations in the Upper Hunter (e.g. air quality, noise and visual amenity), and asserted that any Project intensification is not acceptable as existing cumulative impacts of mining in the Hunter Valley are beyond sustainable thresholds, and hence no additional projects should be considered.

Response

As discussed in the responses above, the EIS assesses the potential cumulative impacts of the Project in accordance with relevant assessment guidelines and NSW Government assessment requirements as set out in the SEARs. The EIS provides an evaluation consistent with the requirement of the SEARs, which describes the strategic justification of the Project, including consideration of (Section 8 of the EIS):

- the suitability of the site;
- Project design decisions, including feasible alternatives;
- relevant planning considerations and policy objectives, including the principles of ESD;
- key potential biophysical, economic and social impacts and benefits; and
- the consequences of not carrying out the Project.

This assessment concluded that the Project would comply with applicable statutory requirements and relevant strategic planning policy objectives and is, on balance, considered to be in the public interest of the State of NSW (Section 8 of the EIS).

Greenfield Proposal

A number of submitters suggested the Project represents a greenfield proposal similar to the Dartbrook Mine or West Muswellbrook Project, and/or asserted that no more greenfield coal projects should proceed.

Response

The Mount Pleasant Operation was approved under NSW legislation in 1999 and is a major existing open cut coal mine (Section 2 of the EIS).

As described in the EIS, the Project is therefore a 'brownfield' project that builds on and optimises the existing Mount Pleasant Operation. In particular, the Project would:

- continue and extend open cut mining wholly within the existing Mount Pleasant Operation MLs;
- provide augmentation of the existing Mount Pleasant Operation facilities including coal handling and processing, water storage, mine infrastructure, and Fines Emplacement Area;
- use the existing approved Mount Pleasant Operation rail infrastructure to its full capacity;
- continue to use the existing Mount Pleasant Operation Mine Access Road as the primary site access point; and
- provide continuation and augmentation of supply for existing coal customers, including the Japanese electricity generators that are part-owners of the Project (through J.C.D. Australia Pty Ltd).

As at mid-2020 the Mount Pleasant Operation employed 440 full-time equivalent people and operated at a ROM coal production rate of up to 10.5 Mtpa, at the mine's closest proximity to Muswellbrook.

The proposed Project staging of the ROM coal production rate up to a maximum of 21 Mtpa would increase financial returns to MACH, employment, and the generation of royalties to the State of NSW, while maintaining key emissions at levels that are generally consistent with the existing Development Consent DA 92/97.

The NSW Government's 2020 *Strategic Statement on Coal Exploration and Mining in NSW* indicates that the NSW Government will take a balanced approach to the future of coal mining in the State, so the NSW coal sector can satisfy long-term global demand for coal, while giving NSW coal-reliant communities time to adapt to a low carbon future. Long life and low operating-cost mines such as the Project that align with NSW's strategic objectives will be important to maintain the generation of royalties and employment in the NSW mining industry, facilitating a more gradual decline of coal mining in the region.

Consideration of the Objects of the EP&A Act

Some submitters suggested there had been insufficient consideration of the Project against the objects of the EP&A Act (including, but not limited to, consideration of the principle of inter-generational equity and ESD principles).

Response

The EIS provides an evaluation of the Project in Section 8, inclusive of consideration of the objects of the EP&A Act (Section 8.3.1 of the EIS), the objects of the EPBC Act (Section 8.3.2 of the EIS) and the principles of ESD (Section 8.3.5). This assessment concluded that the Project would comply with applicable statutory requirements and relevant strategic planning policy objectives and is, on balance, considered to be in the public interest of the State of NSW (Section 8 of the EIS).

The design, planning and assessment of the Project has been carried out applying the principles of ESD, through:

- incorporation of risk assessment and analysis at various stages in the Project design, environmental assessment and decision-making;
- adoption of high standards for environmental and occupational health and safety performance;
- consultation with regulatory and community stakeholders;
- optimisation of the economic benefits to the community arising from the development of the Project; and
- taking into account biophysical considerations in the Project design.

Assessment of potential medium and long-term impacts of the Project was carried out during the preparation of this EIS on aspects of surface water and groundwater, visual character, agriculture, transport movements, air quality emissions, greenhouse gas emissions, noise emissions, aquatic and terrestrial ecology, heritage and socio-economics.

In addition, it can be demonstrated that the Project can be operated in accordance with ESD principles through the application of management measures, compensatory measures and offset measures that have been developed based on conservative impact assumptions for the Project.

The Project would benefit current and future generations through the continuation of existing, and creation of significant additional, employment opportunities that would continue to 2048. It would also provide significant stimulus to local and regional economies and provide continued NSW export earnings and royalties, thus contributing to current and future generations through social welfare, amenity and infrastructure.

The Project incorporates a range of mitigation measures to minimise potential impacts on the environment. The costs of these measures would be met by MACH and these costs have been included in the Economic Assessment (Appendix O of the EIS). The potential benefits to current and future generations have therefore been calculated in the context of the mitigated Project.

Ecologically Sustainable Development

Concerns were raised in some submissions that the environmental, social and economic impacts outweigh economic benefits of the Project, or that the Project represents short term gains relative to potential long-term impacts, and the consent authority has a responsibility to future generations.

Response

The EIS provides an evaluation of the Project in Section 8, inclusive of consideration of the objects of the EP&A Act (Section 8.3.1 of the EIS), the objects of the EPBC Act (Section 8.3.2 of the EIS) and the principles of ESD (Section 8.3.5). This assessment concluded that the Project would comply with applicable statutory requirements and relevant strategic planning policy objectives and is, on balance, considered to be in the public interest of the State of NSW (Section 8 of the EIS).

Strategic Planning

Some submitters raised concerns regarding the Project's consistency with strategic planning for the Upper Hunter and/or asserted that such planning should focus on tourism and agriculture, or raised concerns regarding regional economic and investment diversification being limited by the Project.

Response

The Project area is identified in the *Hunter Regional Plan 2036* (NSW Government, 2016) as a coal production title, and in the *Upper Hunter Strategic Regional Land Use Plan* (NSW Government, 2012b) as existing mining title, which is defined as "a mineable coal resource has been proven and Government mining approval granted".

This is further supported by the *Draft Muswellbrook Local Strategic Planning Statement 2020-2040* (Muswellbrook Shire Council, 2020) that identifies planning principles and actions to assist in implementing the Regional Plan and meet the objectives of the Community Strategic Plan. The Mount Pleasant Operation is included in the Statement as part of the 'Coal Mines and Agribusiness' mapped zone for the 2020-2040 period addressed by the statement.

The NSW Government's 2020 *Strategic Statement on Coal Exploration and Mining in NSW* outlines how the NSW Government will continue to support responsible resource development for the benefit of the State (NSW Government, 2020). The statement indicates that the NSW Government will take a balanced approach to the future of coal mining in the State by setting a clear and consistent policy framework that supports investment certainty, so the NSW coal sector can satisfy long-term global demand for coal, while giving NSW coal-reliant communities time to adapt to a low carbon future.

The Project would be consistent with the statement (Section 4 of the EIS). It is also noted that the NSW Government's *Net Zero Plan* reiterates that actions on climate change should not undermine the businesses, jobs and communities supported by mining (DPIE, 2020e) (Section 4.3.1 of the EIS).

In summary, the Project is a continuation of the existing approved Mount Pleasant Operation that would comply with applicable statutory requirements and relevant strategic planning policy objectives (Sections 4 and 5, and Attachments 6 and 7 of the EIS). Therefore, the proposed continuation of the Mount Pleasant Operation under the Project proposal is unlikely to adversely affect regional economic and investment diversification.

The Project Would Preclude Other Land Uses

A number of submitters were concerned that the Project would involve disturbance of land that could otherwise be used for agriculture, viticulture, bushland, renewable energy projects or tourism.

Response

The Project would involve the extension to the duration of mining and the recovery of additional coal reserves within ML 1645, but would not significantly increase the approved land disturbance of the approved Mount Pleasant Operation (Section 1 of the EIS).

The Project would involve the relinquishment of a significant portion of the approved disturbance area of the Mount Pleasant Operation, to compensate for the proposed Additional Disturbance Area. The proposed Project Relinquishment Area includes part of North Pit and some major approved infrastructure of the Mount Pleasant Operation that MACH does not intend to develop, including:

- the Western Link Road – a public road running north-south through ML 1645 (approved but not yet constructed);
- the South West Out-of-Pit Emplacement – approved to be constructed up to approximately 320 m AHD in the early part of the mine life; and
- the North West Out-of-Pit Emplacement –approved to be constructed up to approximately 320 m AHD in the latter part of the mine life.

MACH has previously relinquished the majority of the South West Out-of-Pit Emplacement area to compensate for minor additional land disturbance areas associated with Mod 3 and Mod 4.

The Project presents an opportunity to recover an additional 247 Mt of ROM coal within the existing Mount Pleasant Operation MLs, without materially altering the land available for other land uses.

Regional Reputation

Concerns were raised that the Project would adversely impact the reputation of the region and surrounding businesses, including agriculture, the equine industry and tourism.

Response

There would not be any material incompatibility between the Project and existing rural residential land uses, and the Mount Pleasant Operation open cut is currently at its closest proximity to Muswellbrook, with mining activities centred in the south-east of ML 1645 (Figure 1-3 of the EIS). Over the life of the Project, the focus of mining activities would progressively move north and west, increasing separation from Muswellbrook and from the nearby section of the New England Highway. Coincident with the western progression of mining, the integrated waste rock emplacement would increase in elevation, acting to screen potential views and provide an increasing barrier to potential air quality and noise emissions. MACH has staged the proposed Project increases in ROM coal production to minimise potential amenity impacts on nearby rural residences and the town of Muswellbrook (Section 8 of the EIS).

The integrated waste rock emplacement landform has been designed to incorporate geomorphic drainage design principles for hydrological stability, and varying topographic relief to be more natural in exterior appearance. MACH is also accelerating progressive rehabilitation of the integrated waste rock emplacement landform to:

- reduce the extent of raw emplaced waste rock lifts that have high visual contrast to surrounding unmined land; and
- rapidly improve visual integration of the emplacement landform with the unmined landscape.

Further discussion of the landform and rehabilitation works being undertaken at the Mount Pleasant Operation is provided in Section 4.1.1.

The Mount Pleasant Operation is located within a recognised mining precinct that incorporates a wide range of existing and approved underground and open cut mining operations (Figure 1-2 of the EIS). With the adoption of the Project management measures, it is not anticipated that the Project would result in additional environmental impacts that would adversely affect the regional reputation. It is also noted that the Mount Pleasant Operation operates under an Environmental Management Strategy that provides a framework to facilitate conduct of the operation in an environmentally responsible manner and in accordance with relevant statutory requirements. Further discussion of these plans, strategies and programs and how they would continue to be implemented during the life of the Project is provided in the EIS.

4.5 OTHER ISSUES

Regulatory Submissions

Cumulative Assessment Methodology in NSW

The Muswellbrook Shire Council made some comments directed towards the DPIE and the determining authority (i.e. the NSW IPC) that explored the conventional approach to cumulative assessment of mining projects, suggested potential alternative approaches, and also advocated for an update to the *Upper Hunter Cumulative Impact Study and Action Strategy* (Department of Urban Affairs and Planning, 1997).

Response

MACH understands that the Muswellbrook Shire Council may have some suggestions for how cumulative assessment methodology for mining projects in NSW could be improved. However, MACH is required to assess the Project in accordance with applicable NSW Government guidelines and assessment requirements that currently apply (as set out in the SEARs), which has been undertaken in the EIS.

Concern that the Applicable Air Quality Assessment Criteria, Particularly for $PM_{2.5}$, are not Sufficient to Protect Human Health

The Muswellbrook Shire Council raised a concern that the air quality criteria set by the State and Federal governments are not sufficient to protect human health.

Response

The NSW EPA impact assessment criteria and the NEPM Air Quality Environmental Protection goals are set to ensure the protection of human health and wellbeing. These criteria are periodically reviewed by the relevant NSW and Federal Government authorities in the context of available health and air quality data.

Cumulative Impacts on Future Water Availability

The Muswellbrook Shire Council made some comments directed towards the DPIE and the determining authority (i.e. the NSW IPC) that suggested irrespective of licensing, mining projects result in the permanent loss of water, which may place limitations on the ability of the NSW Government to change the water-sharing regime in future.

Response

MACH understands that the Muswellbrook Shire Council may have some suggestions for how the regulation of water sharing may change in the future. However, MACH is required to assess the Project in accordance with applicable NSW Government guidelines and assessment requirements that currently apply, including licensing of water use from the regulated Hunter River under the *Water Management Act 2000*. The volume of water in the Hunter Regulated water source extracted by mining relative to licensed extraction for other purposes is explored in Section 4.3.4.

Planning for a Coal Industry Transition

The Muswellbrook Shire Council made some comments directed towards the DPIE and the determining authority (i.e. the NSW IPC) that suggested the NSW State Government needs to take a lead in planning for a socio-economic transition associated with future coal industry contraction.

Response

The NSW Government's 2020 *Strategic Statement on Coal Exploration and Mining in NSW* indicates that the NSW Government will take a balanced approach to the future of coal mining in the State, so the NSW coal sector can satisfy long-term global demand for coal, while giving NSW coal-reliant communities time to adapt to a low carbon future. The EIS describes how long life and low operating-cost mines such as the Project that align with NSW's strategic objectives will be important to maintain the generation of royalties and employment in the NSW mining industry, facilitating a more gradual decline of coal mining in the region.

Lack of Shorter-term Particulate Matter Concentration Criteria

The Muswellbrook Shire Council commented on the absence of particulate matter criteria for averaging periods of less than 24-hours, suggesting this could mask elevated particulate levels during certain periods (e.g. night-time). 12-hour average particulate matter concentration criteria are suggested. Muswellbrook Shire Council linked these comments/suggestions to higher cardiovascular and respiratory hospitalisations, and asthma hospitalisations, in the Muswellbrook and Upper Hunter LGAs than in the rest of NSW (based on the 2010 NSW Health report [NSW Health, 2010]).

Response

The dispersion modelling conducted for the Project was assessed against all applicable particulate matter concentration criteria, which include annual and 24-hour average impacts. The Project Air Quality Assessment (Appendix B of the EIS) also included review of the diurnal PM_{10} and $PM_{2.5}$ levels at the Muswellbrook monitor, in response to a similar comment from the Muswellbrook Shire Council in its input to the SEARs. The analysis showed only a slight trend of higher PM_{10} levels in the early morning and evening compared to the middle of the day. A more noticeable trend was visible for $PM_{2.5}$, however, which was shown to be most apparent in winter. While mining-related dust would have some contribution to these levels, it is likely the most significant contribution to the elevated $PM_{2.5}$ levels in Muswellbrook are due to the known effects of domestic wood heaters.

While it is acknowledged that the 2010 NSW Health report indicates higher rates of cardiovascular, respiratory and asthma hospitalisations in the Muswellbrook and Upper Hunter LGAs in comparison to the rest of NSW, such statistics cannot be readily linked to any individual factor. For example, smoking-related hospitalisations are also materially higher in the Muswellbrook LGA than the rest of NSW (NSW Government, 2021).

Further investigation of potential health effects of elevated dust levels during the night-time

To investigate the potential health effects of elevated dust levels at night in the Upper Hunter, the Muswellbrook Shire Council requested the State Government update the 2010 NSW Health report, commissions a study into the health effects of exposure to elevated dust levels at night, and provides funds for the EPA to install a ceilometer in Muswellbrook.

Response

MACH is supportive of the Muswellbrook Shire Council investigating the effects of elevated dust levels in the Upper Hunter on the regional population. Notwithstanding, the Muswellbrook Shire Council's proposed investigation is not directly linked to the Mount Pleasant Operation, nor the Project. It is expected that such an investigation would likely link elevated $PM_{2.5}$ levels in cooler months to the known effects of domestic wood heaters.

NGO and Public Submissions

Environmental Regulation of Mining

A concern was expressed that there is not enough government regulation and/or monitoring in place in NSW to control the environmental performance of mining operations over long durations, including regulation of cumulative impacts, particularly for dust emissions.

Response

Applicable assessment methods and standards for industry are set by NSW and Federal regulatory agencies, and application of these assessment criteria to the Project is set out in the SEARs.

For example, the assessment standards for air quality emissions are contained with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2017c). Consideration is also given to the *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) (NSW Government, 2018). The standards within these guidance documents also inform the criteria that an approved operation must comply with.

In addition to assessment and compliance criteria, NSW and Federal regulatory agencies may operate targeted programs to control the environmental performance of mining operations. For example, the EPA implements Pollution Reduction Programs, which result in improved environmental performance over time.

MACH has assessed the Project against applicable criteria set out by the NSW Government, and would comply with applicable performance criteria defined in the Development Consent, should the Project be approved.

Cessation of All Operating Mines

Concerns were raised in some submissions that no additional coal projects should be approved (in light of ESD principles) and that all operating mines should be immediately closed.

Response

Some community members may hold philosophical views that mining activities do not accord with ESD principles. However, MACH has evaluated the Project in accordance with the SEARs and concluded that the Project would comply with applicable statutory requirements and relevant strategic planning policy objectives and is, on balance, considered to be in the public interest of the State of NSW (Section 8 of the EIS).

The NSW Government's 2020 *Strategic Statement of Coal Exploration and Mining in NSW* outlines how the NSW Government will continue to support the responsible resource development for the benefit of the State (NSW Government, 2020). The statement indicates that the NSW Government will take a balanced approach to the future of coal mining in the State by setting a clear and consistent policy framework that supports investment certainty, so the NSW coal sector can satisfy long-term global demand for coal, while giving NSW coal-reliant communities time to adapt to a low carbon future.

The Project would be consistent with the statement (Section 4 of the EIS). It is also noted that the NSW Government's *Net Zero Plan* reiterates that actions on climate change should not undermine the businesses, jobs and communities supported by mining (DPIE,2020e) (Section 4.3.1 of the EIS).

5 PROJECT EVALUATION

Submissions on the Project were received from government agencies, local councils, organisations and members of the public during the exhibition period for the EIS. A large proportion of the public objections received on the Project were from the Upper Hunter LGA, or elsewhere in NSW, whereas a large proportion of the public supporting submissions were from the Muswellbrook and Singleton LGAs (Section 2.1).

This Submissions Report provides responses to issues raised by submissions from government agencies, local councils, organisations and members of the public during the exhibition period for the EIS and has been prepared in consideration of the draft *Preparing a Submissions Report - State Significant Development Guide* (DPIE, 2020a).

The EIS provides an evaluation of the Project in Section 8, inclusive of consideration of the objects of the EP&A Act, the objects of the EPBC Act and the principles of ESD. This evaluation concluded that the Project would comply with applicable statutory requirements and relevant strategic planning policy objectives and was, on balance, considered to be in the public interest of the State of NSW.

Since lodgement of the Project EIS, MACH has reviewed the submissions on the Project and has continued to consult with members of the community, local councils and government agencies, and has also sought some additional advice from its independent experts. Based on this further consideration and analysis MACH has concluded that the key potential impacts of the Project, the key potential benefits of the Project, the strategic context and consequences of not carrying out the Project remain consistent with the conclusions presented in Section 8 of the EIS.

In weighing up the main environmental impacts (costs and benefits) associated with the proposal as assessed and described in the EIS and this Submissions Report, the Project therefore remains, on balance, in the public interest of the State of NSW.

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MACHEnergy

Mount Pleasant Operation

A JOINT VENTURE WITH JCDA Japan Coal Development Australia

Attachment A

Submissions Register

Table A1-1
Register of Submissions

Group	Reference Number	Name	Where Comments are Addressed (Section)
Agencies	784846	Subsidence Advisory NSW	-
	784881	Crown Lands	-
	785181	Department of Transport	4.3.8
	785186	Regional NSW – Mining, Exploration & Geoscience	4.3.5, 4.3.11
	785191	NSW Resources Regulator	4.1.1, 4.1.2
	785486	Department of Planning, Industry and Environment – Water and NSW Natural Resources Access Regulator	4.3.4
	785491	Heritage NSW – as delegate to the Heritage Council of NSW	4.3.7
	785496	Heritage NSW – Aboriginal Cultural Heritage Regulation	4.3.6
	785506	Dams Safety NSW	4.3.12
	785516	Ausgrid	4.3.12
	785521	NSW Rural Fire Service	4.3.12
	785836	Australian Rail Track Corporation	-
	786016	Environment Protection Authority	4.3.1, 4.3.2, 4.3.4
	786151	Biodiversity and Conservation Division	4.3.4, 4.3.5
	786161	NSW Health	4.3.13
	785526	Department of Regional NSW – Primary Industries	4.3.15
Councils	786136	Muswellbrook Shire Council	4.1.3, 4.3.2, 4.3.3, 4.3.7, 4.3.8, 4.3.9, 4.3.10, 4.3.16, 4.5
	785761	Upper Hunter Shire Council	4.3.1, 4.3.9, 4.3.10, 4.3.14, 4.4
Organisations	785401	Ryde Gladesville Climate Change Action Group	4.3.1, 4.3.11, 4.4
	785551	Hunter Environment Lobby Inc	4.1.3, 4.3.1, 4.3.11, 4.3.13, 4.3.14, 4.3.4, 4.3.5, 4.3.9, 4.4
	785646	Denman Aberdeen Muswellbrook Scone Healthy Environment Group	4.1.3, 4.2, 4.3.1, 4.3.10, 4.3.13, 4.3.14, 4.3.4, 4.3.5, 4.3.6, 4.3.9, 4.4
	785676	Hunter Communities Network	4.3.1, 4.3.10, 4.3.11, 4.3.13, 4.3.15, 4.3.16, 4.3.4, 4.4
	785771	Lock the Gate Alliance	4.1.1, 4.3.1, 4.3.10, 4.3.11, 4.3.11, 4.3.12, 4.3.13, 4.3.14, 4.3.15, 4.3.16, 4.3.4, 4.3.9, 4.4
	785791	Institute for Energy Economics and Financial Analysis	4.3.11

Group	Reference Number	Name	Where Comments are Addressed (Section)
	785801	Scone Equine Hospital	4.1.3, 4.2, 4.3.1, 4.3.11, 4.3.12, 4.3.13, 4.3.15, 4.3.16, 4.3.4, 4.3.9, 4.4
	785806	Yarraman Park Stud	4.1.1, 4.1.3, 4.3.1, 4.3.10, 4.3.13, 4.3.16, 4.3.4, 4.3.9, 4.4
	785856	Cowtime Investments Pty Limited	4.3.1, 4.3.10, 4.3.13, 4.3.15, 4.3.16, 4.3.2, 4.3.9
	785861	Newgate Operations Pty Ltd	4.1.1, 4.1.3, 4.3.1, 4.3.2, 4.3.4
	785866	Australian Parents for Climate Action	4.3.1, 4.3.11, 4.3.11, 4.3.13, 4.3.14, 4.3.14, 4.5, 4.3.4, 4.4
	785871	Hunter Thoroughbred Breeders Association	4.1.1, 4.1.2, 4.1.3, 4.3.1, 4.3.10, 4.3.11, 4.3.14, 4.3.16, 4.3.2, 4.3.4, 4.3.9, 4.4
	785911	Friends of the Upper Hunter Inc	4.1.3, 4.3.1, 4.3.10, 4.3.11, 4.3.11, 4.3.13, 4.3.14, 4.3.16, 4.3.2, 4.3.5, 4.3.6, 4.3.7, 4.3.9, 4.4
	785946	Godolphin Australia Pty Ltd	4.2, 4.3.1, 4.3.11, 4.3.13, 4.3.15, 4.3.16, 4.3.4, 4.3.9, 4.4
	785966	People For Heritage, Upper Hunter Inc	4.3.5, 4.3.6, 4.3.7
	786031	The Australia Institute	4.3.1, 4.3.11, 4.3.11, 4.3.11, 4.3.11, 4.3.11, 4.3.11, 4.3.11, 4.3.14
Public	784696	Luke Ward Thomas	4.3.15, 4.4
	784851	Anonymous	4.3.1, 4.3.2, 4.3.3, 4.3.8, 4.3.9
	784866	Sue Abbott	4.3.14, 4.3.14, 4.5, 4.4
	784886	Anonymous	4.1.3, 4.3.1, 4.3.10, 4.3.11, 4.3.13, 4.3.14, 4.3.15, 4.3.4, 4.3.6, 4.3.7, 4.4
	784891	Anonymous	4.1.3, 4.3.10, 4.3.4, 4.3.6, 4.3.7, 4.3.9, 4.4
	784921	Anonymous	4.3.1, 4.3.2, 4.3.9, 4.4
	784961	Anonymous	4.1.1, 4.1.3, 4.3.1, 4.3.10, 4.3.11, 4.3.12, 4.3.14, 4.3.14, 4.5, 4.3.16, 4.3.2, 4.3.4, 4.3.9, 4.4
	785011	Anonymous	4.3.1, 4.3.10, 4.3.13, 4.3.9
	785016	Anonymous	4.3.1, 4.3.10, 4.3.11, 4.3.14, 4.3.9
	785021	Peter Tebbutt	4.3.11
	785026	Bruce Derkenne	4.3.1, 4.4
	785031	Christine Aus	4.3.1, 4.3.10, 4.3.13, 4.3.14, 4.3.5
	785036	Daniel Katz	4.3.14, 4.4

Group	Reference Number	Name	Where Comments are Addressed (Section)
	785041	Mary Lois Katz	4.3.1, 4.3.13, 4.4, 4.5
	785046	Moira Bishop	4.3.10, 4.3.14, 4.5, 4.4
	785051	Greg Chidgey	4.3.1, 4.3.10, 4.3.11, 4.3.14, 4.3.9, 4.4
	785056	Eric van Beurden	4.3.14, 4.4
	785061	Jens Svensson	4.3.14, 4.5
	785066	Edward Newling	4.3.14, 4.4
	785076	Anonymous	4.3.1, 4.3.10, 4.3.11, 4.3.14, 4.5, 4.3.9, 4.4
	785081	Dennis Hatzidimitriou	4.3.1, 4.3.13
	785086	Margaret Skeel	4.3.1, 4.3.4, 4.4
	785091	Andreas Dalman	4.3.1, 4.3.11, 4.3.13, 4.3.14, 4.3.4, 4.3.5, 4.4
	785096	Dale Curtis	4.3.1, 4.3.10, 4.3.13, 4.3.14, 4.5, 4.3.9, 4.4
	785101	Fiona Sim	4.3.1, 4.3.10, 4.3.13, 4.3.14, 4.3.9
	785106	Anonymous	4.3.13, 4.3.14, 4.4
	785111	Anonymous	4.2, 4.3.1, 4.3.10, 4.3.16
	785116	Anonymous	4.3.10, 4.3.13, 4.3.15
	785121	Chris Clarke	4.3.1, 4.3.11, 4.3.13, 4.4
	785126	Anonymous	4.1.3, 4.3.1, 4.3.10, 4.3.13, 4.3.15, 4.4
	785131	Anonymous	4.2
	785151	Richard Stanford	4.3.14
	785156	Anonymous	4.3.13, 4.4
	785161	Anonymous	4.3.1, 4.3.13, 4.3.14, 4.3.9, 4.4
	785171	Dorte Planert	4.3.1, 4.3.10, 4.3.13, 4.3.14, 4.3.14, 4.5, 4.3.15, 4.3.16, 4.3.4, 4.3.9, 4.4
	785176	David Hauser	4.3.1, 4.3.11
	785196	Susie Russell	4.3.1, 4.4
	785211	Anonymous	4.2, 4.3.1, 4.3.15, 4.3.4, 4.4
	785231	John Russell	-
	785241	George Mercier	4.3.1, 4.3.13, 4.4
	785251	Michael Bull	4.3.11, 4.4
	785256	Graeme Batterbury	4.3.1, 4.3.10, 4.3.14, 4.3.9
	785261	Mike Vanderzwart	4.3.11, 4.3.13

Group	Reference Number	Name	Where Comments are Addressed (Section)
	785266	Derek Finter	4.3.1, 4.3.14
	785271	Irene Wheatley	4.1.1, 4.3.11, 4.4
	785281	Anonymous	4.3.1, 4.3.10, 4.3.13, 4.3.9, 4.4
	785286	Carey Guihot	4.3.1, 4.3.10, 4.3.11, 4.3.13, 4.3.15, 4.3.16, 4.3.4, 4.3.9, 4.4
	785301	Adele Walsh	4.3.1
	785306	Anonymous	4.3.1, 4.3.10, 4.3.13, 4.3.2, 4.3.9, 4.4
	785316	Narelle Jarvis	4.3.1, 4.3.9, 4.4
	785321	Larry Hamson	4.3.1, 4.3.10, 4.3.13, 4.3.4, 4.4
	785326	Averil Drummond	4.1.1, 4.3.11, 4.3.14
	785336	Anonymous	4.3.5, 4.4
	785341	Jackson Beirs	4.1.1, 4.1.3, 4.2, 4.3.1, 4.3.10, 4.3.11, 4.3.13, 4.3.15, 4.3.16, 4.3.2, 4.3.4, 4.3.9, 4.4, 4.5
	785346	Jonathan Moore	4.3.4
	785351	Diana Fraser	4.4
	785356	Anonymous	4.3.13, 4.3.15, 4.3.5
	785361	Tarlach Mac Giolla Cheara	4.3.15
	785366	Anonymous	4.3.16, 4.4
	785376	Tayah Clout	4.3.1, 4.3.10, 4.3.14, 4.3.4, 4.3.5, 4.3.6
	785381	Anonymous	4.1.3, 4.4
	785391	Michael White	4.1.2, 4.1.3, 4.3.1, 4.3.13, 4.3.14, 4.5, 4.3.15, 4.3.2, 4.3.4, 4.3.9
	785396	Pamela Reeves	4.3.1, 4.3.11, 4.3.13, 4.3.9, 4.4
	785406	Anonymous	4.3.1, 4.3.10, 4.3.2, 4.3.9, 4.4
	785421	Anonymous	4.1.1, 4.1.3, 4.3.1, 4.3.11, 4.3.11, 4.3.13, 4.3.14, 4.3.15, 4.3.4, 4.3.9, 4.4
	785426	Zoe Lonergan	4.3.1, 4.3.13, 4.3.5, 4.4
	785451	Richard Gray	4.1.1, 4.2, 4.3.1, 4.3.11, 4.3.11, 4.3.12, 4.3.13, 4.3.14, 4.3.16, 4.3.2, 4.3.3, 4.3.4, 4.3.9, 4.4
	785456	Sally Shields	4.1.1, 4.1.3, 4.3.1, 4.3.13, 4.4
	785466	Jim Lonergan	4.1.1, 4.2, 4.3.1, 4.3.10, 4.3.13, 4.3.15, 4.3.16, 4.3.2, 4.3.3, 4.3.4, 4.3.8, 4.3.9, 4.4

Group	Reference Number	Name	Where Comments are Addressed (Section)
	785476	Sharyn Munro	4.3.1, 4.3.13, 4.3.14, 4.3.4, 4.3.5, 4.3.9, 4.4
	785531	Anonymous	4.3.1, 4.3.10, 4.3.14, 4.3.14, 4.5, 4.3.2, 4.3.4, 4.3.9, 4.4
	785536	Kiran Kashyap	4.4
	785541	Tasman Miller	4.4
	785546	D Williamson	4.1.3, 4.3.1, 4.3.13, 4.3.14, 4.3.4, 4.3.5, 4.3.6
	785556	Anonymous	4.3.10, 4.3.13, 4.3.4, 4.3.5, 4.3.9, 4.4
	785561	Anonymous	4.3.1, 4.3.10, 4.3.13, 4.3.9, 4.5
	785571	Anonymous	4.3.13, 4.3.14, 4.3.4, 4.4, 4.5
	785586	Paul Adams	4.3.14, 4.4
	785601	Kylie Jones	4.3.1, 4.3.15, 4.4
	785616	Anonymous	4.3.1, 4.3.16, 4.3.2, 4.3.4, 4.3.9, 4.4
	785626	Margot White	4.1.3, 4.3.1, 4.3.10, 4.3.14, 4.3.16, 4.3.4, 4.4
	785651	Alan Stafford	4.3.1, 4.3.14, 4.3.16, 4.3.9, 4.4
	785661	Diana Revington	4.3.1, 4.3.10, 4.3.13, 4.3.14, 4.3.4, 4.3.5, 4.3.9, 4.4
	785666	Anonymous	4.3.1
	785681	John Taylor	4.1.1, 4.1.3, 4.3.1, 4.3.11, 4.3.11, 4.3.13, 4.4
	785686	Nicola Robertson	4.3.1, 4.3.10, 4.3.13, 4.3.14, 4.3.15, 4.3.2, 4.3.4, 4.4
	785691	Denis Rothwell	4.3.1, 4.3.10, 4.3.11, 4.3.12, 4.3.13, 4.3.14, 4.3.2, 4.3.4, 4.3.9, 4.4
	785706	Douglas Robertson	4.3.1, 4.3.10, 4.3.12, 4.3.13, 4.3.14, 4.3.15, 4.3.16, 4.3.4, 4.4
	785711	Anonymous	4.3.1, 4.3.13, 4.3.15, 4.3.4, 4.3.9, 4.4
	785716	Heather Mclean	4.1.3, 4.3.1, 4.3.13, 4.3.14, 4.3.4, 4.4
	785726	John Bancroft	4.3.13, 4.3.4, 4.5
	785731	Anonymous	4.4
	785736	Anonymous	4.3.11, 4.3.14, 4.3.15
	785741	Anonymous	4.3.1, 4.3.10, 4.3.15, 4.3.4, 4.4
	785746	Anonymous	-
	785751	Lily Collins	4.3.12, 4.3.13, 4.3.14, 4.5, 4.4

Group	Reference Number	Name	Where Comments are Addressed (Section)
	785756	Jayne Webster	4.1.1, 4.3.1, 4.3.13, 4.3.15, 4.3.5, 4.3.6
	785786	Anonymous	4.4
	785796	Anonymous	4.3.1, 4.3.13, 4.4
	785811	Anthony Lonergan	4.1.1, 4.1.3, 4.3.1, 4.3.11, 4.3.12, 4.3.13, 4.3.14, 4.3.16, 4.3.4, 4.3.5, 4.4
	785816	Carolyn Diamond	4.1.1, 4.3.1, 4.3.13, 4.3.14, 4.3.5, 4.3.9, 4.4
	785821	Anonymous	4.3.1, 4.3.2, 4.3.4, 4.3.9, 4.4
	785826	Anonymous	4.1.3, 4.3.1, 4.3.4
	785831	Warren Moore	4.1.3, 4.3.1, 4.3.11, 4.3.15, 4.3.4, 4.4
	785846	Virginia Thomas	4.1.3, 4.3.1, 4.3.13, 4.3.4, 4.3.5, 4.3.9, 4.4
	785851	Alison Hodges	4.1.3, 4.3.10, 4.3.13, 4.3.14, 4.5, 4.4
	785876	Kirsty OConnell	4.3.1, 4.3.11, 4.3.13, 4.3.16, 4.3.2, 4.3.4, 4.4
	785881	Adeline OConnell	4.3.1, 4.3.13, 4.3.14, 4.3.15, 4.3.4, 4.3.9, 4.4
	785886	Anonymous	4.3.1, 4.3.11, 4.3.14, 4.4
	785896	Cheryl Hamson	4.3.1, 4.3.13, 4.3.14, 4.3.4, 4.4
	785901	Anonymous	4.3.1, 4.3.10, 4.3.16, 4.3.2, 4.4
	785906	Malcolm Turnbull	4.1.1, 4.1.3, 4.2, 4.3.1, 4.3.11, 4.3.13, 4.3.14, 4.3.16, 4.3.4, 4.4
	785916	Tricia Thomas	4.1.3, 4.3.1, 4.3.15, 4.3.2, 4.3.4
	785921	Anonymous	4.3.1, 4.3.13, 4.3.15, 4.3.2, 4.4
	785926	Janet Murray	4.3.1, 4.3.10, 4.3.11, 4.3.14, 4.3.15, 4.3.16, 4.3.2, 4.4
	785936	Anonymous	4.4
	785941	Des Hernon	4.3.15, 4.3.9, 4.4
	785951	Matthew OConnell	4.3.1, 4.3.15, 4.4
	785956	Gloria Muir	4.1.1, 4.3.14, 4.5, 4.3.4
	785961	Dean Morris	4.3.1, 4.3.3, 4.3.8, 4.4
	785971	Anonymous	4.3.1, 4.3.13, 4.3.14, 4.5
	785986	Joanne van Hees	4.1.3, 4.3.1, 4.3.12, 4.3.13, 4.3.14, 4.5, 4.3.15, 4.3.4, 4.3.9, 4.4
	785991	Fiona Leedham	4.3.1, 4.3.10, 4.3.13, 4.3.3, 4.4
	785996	Bruce Bates	4.1.2, 4.3.11, 4.3.16, 4.3.4

Group	Reference Number	Name	Where Comments are Addressed (Section)
	786001	John Lonergan	4.3.1, 4.3.13, 4.3.2, 4.3.9, 4.4
	786006	Anonymous	4.3.1, 4.3.2, 4.3.4
	786011	Beverley Atkinson	4.1.1, 4.1.3, 4.2, 4.3.1, 4.3.10, 4.3.13, 4.3.14, 4.3.15, 4.3.4, 4.3.6, 4.3.7, 4.3.9, 4.4
	786071	Nic Clyde	4.3.14

Note: Only objecting or commenting organisation and public submissions are presented.

[1] Referred to as Water Group on the Major Projects website.

[2] Referred to as Hunter New England Local Health District on the Major Projects website.

[3] Includes Agriculture and Animal Welfare Unit.

MACHEnergy

Mount Pleasant Operation

A JOINT VENTURE WITH JCDA Japan Coal Development Australia

Attachment B

Supplementary Advice – Air Quality

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1 July 2021

Chris Lauritzen
General Manager – Resource Development
MACH Energy Australia Pty Ltd
Suite 1, Level 3, 426 King Street
Newcastle West
NSW 2302

RE: Request for Clarification - Mount Pleasant Optimisation Project Air Quality Impact Assessment

Dear Chris,
The following provides additional information and clarification to address the requests from the New South Wales (NSW) Environment Protection Authority (EPA), the Muswellbrook Shire Council, the NSW Health, the Upper Hunter Shire Council and others relating to the *Mount Pleasant Optimisation Project Air Quality Impact Assessment* (the AQIA) (**Todoroski Air Sciences, 2020**).

Each of the key requests/ comments/ recommendations we have received relating to air quality is shown in grey italics and is followed by our response immediately below.

NSW EPA

Attachment A

Review of Air Quality Impact Assessment

Modelled mitigation measures not described
The assessment of particulate impacts using the dust mitigation measures in table 6-6 of the AQIA indicate that several receptors surrounding the site would have numerous (up to 14 days) additional exceedances of both PM2.5 and PM10 for the multiple scenarios modelled. The AQIA then considers the predictive/reactive measures used for the project to reduce particulate impacts. The AQIA states that these measures can include temporarily ceasing on-site activities or ceasing those activities that are likely to have significant off-site impacts due to adverse weather conditions. EPL 20850 includes specific conditions under which operations must cease. However, the specific actions and how those actions were applied in the modelling of impacts is not clear in the AQIA.

The AQIA includes table 7-9 that indicates the reactive measures reduce the impacts such that only receptors immediately east of the site (112, 118, 120, 120c and 121 already subject to acquisition rights) are predicted to have one additional exceedance. It appears that the modelling of reactive measures has included additional actions or assumptions other than those included as licence conditions, which are likely only to influence impacts

to the east of the site. Further, cumulative results with and without these reactive measures are presented only for receptor 147 (north west boundary of site). This receptor is not downwind of the mine in the direction stipulated in licence condition O3.5(b) and the background data used is from Aberdeen and not Muswellbrook NW as the station which PM10 concentrations relate to licence condition O3.5(c).

As the reduction of particulate impacts to below the criteria relies on reactive measures, the AQIA has not provided any information regarding the ability of the modelled measures to be successfully implemented in practise. With the proposal seeking to significantly increase the extraction rate, there is uncertainty as to whether the reactive measures are capable of ensuring no additional exceedances in Muswellbrook and at other receptors.

The EPA recommends the AQIA includes details of how the reactive measures were modelled, including, but not limited to:

a) What specific activities were and were not included in the model,
b) What meteorological conditions were used and what number of hours/days this was applied to,
c) What monitoring data was used and what number of hours/days this was applied to,
d) Adequate justification of which receptors would be reasonably affected by the reactive measures undertaken,
e) What meteorological and PM10 conditions in addition to the current licence conditions are required to mitigate the additional exceedances (for all receptors that have additional exceedances),
f) Details and evidence of the historic use of the proactive and reactive measures in mitigating dust impacts

Activities included in the modelling

The AQIA included modelling of all significant dust generating activities occurring at the Mount Pleasant Optimisation Project (the Project). A summary of the activities and estimated Total Suspended Particle (TSP) emissions are presented in Table 6-3 of the AQIA.

To demonstrate the effectiveness of the implementation of predictive/ reactive measures at the Project, the modelled 24-hour average PM_{10} and $PM_{2.5}$ concentrations at some receivers included temporarily pausing activities that can be readily controlled in the pit and overburden areas on some days. Dust from wind erosion of the exposed pit and overburden emplacement area and from the Coal Handling and Preparation Plant (CHPP) activities were assumed to continue to emit dust during these times.

Application of predictive/ reactive measures – meteorological conditions and monitoring data

The key weather condition leading to dust being transported from the Project to a receiver in the surrounding environment would be wind direction.

The *Mount Pleasant Operation Air Quality and Greenhouse Gas Management Plan* (**MACH Energy, 2019**) includes specific wind angles, relative to the mining operations, for each of the air quality monitors operated by the mine. If winds are from the relevant directions, and monitored particulate matter levels are elevated, additional management actions are triggered.

These wind angles will need to be progressively adjusted as the mining operations move further west in the future. To make the adjustments in a timely efficient manner, the revision of the predictive/ reactive dust mitigation triggers will be part of the ongoing routine reviews of the *Mount Pleasant Operation Air Quality and Greenhouse Gas Management Plan* (**MACH Energy, 2019**) throughout the life

of the mine (as is currently required under Condition 4 in Schedule 5 of Development Consent DA 92/97). Developing specific predictive/ reactive dust mitigation triggers for proposed operations many years into the future (i.e. as part of the AQIA) is not appropriate, given the proposed location and intensity of the actual activities and other contributors to cumulative dust levels are subject to change over the life of the mine.

However, to demonstrate how the predictive/ reactive triggers would continue to mitigate potential impacts over the life of the Project, the existing Mount Pleasant Operations' existing dust management triggers have been directly incorporated into the modelling results at the locations in **Figure 1** to review their effectiveness. Some of these receptors are representative of a receptor cluster, and avoiding additional cumulative 24-hour average exceedances at these representative receptors would indicate the same for the cluster.

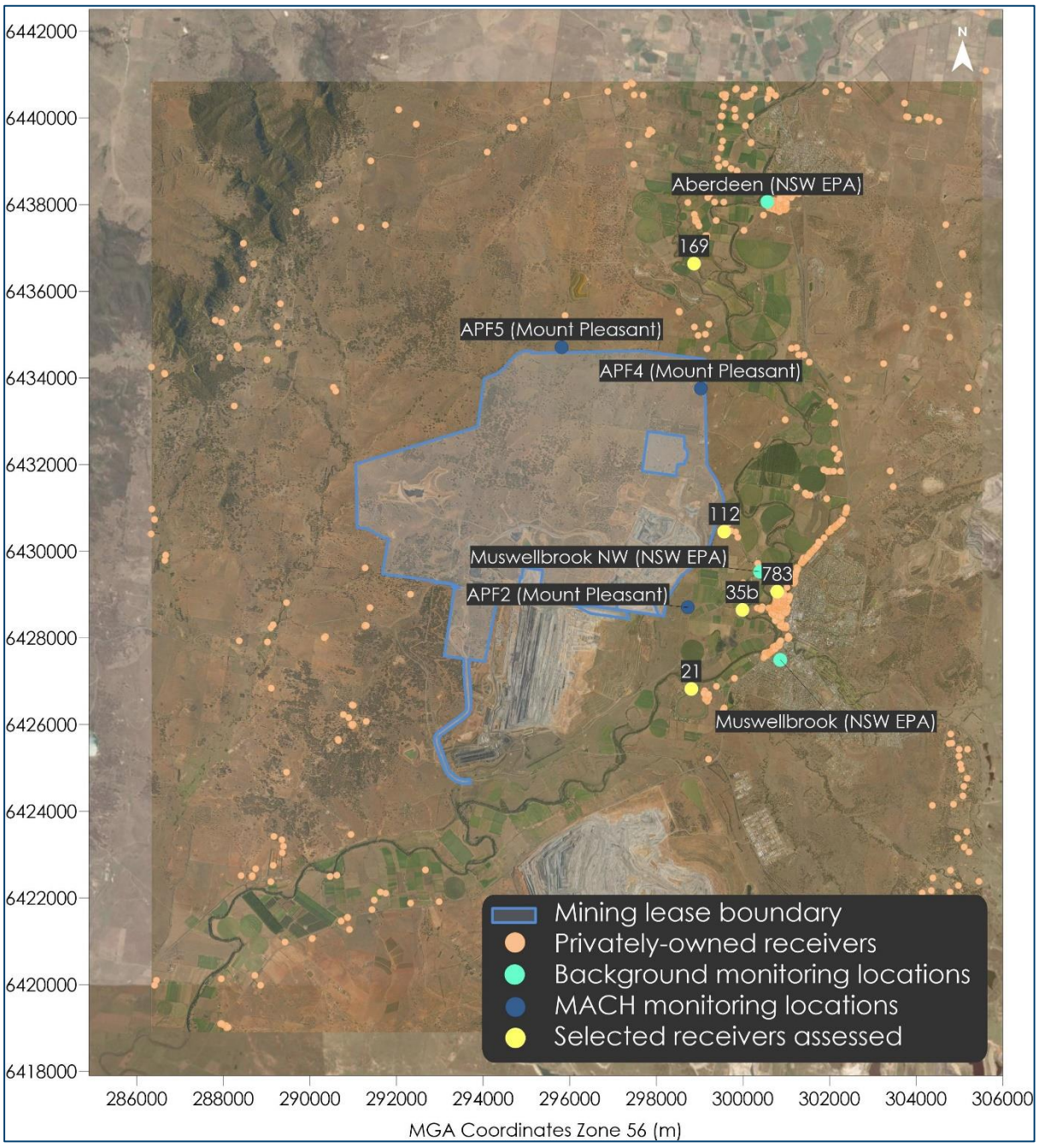


Figure 1: Locations for assessment

Activities that can be readily controlled in the pit and overburden areas were temporarily "paused" in the model outputs under the specific adverse conditions, as per Conditions O3.4 to O3.9 of Environmental Protection Licence (EPL) 20850 at Muswellbrook NW; and as per the real-time response trigger levels outlined in the *Mount Pleasant Operation Air Quality and Greenhouse Gas Management Plan* (**MACH Energy, 2019**) (the AQMP) at the other monitors (APF2, APF4 and APF5).

As requested by EPA, this was done on an hourly basis with direct modelling and using a reasonable 1-hour reaction delay. That is, adverse conditions were identified in the modelling when the rolling 1-hour average wind directions were within the range of wind angles specified for each monitor at the same time that the rolling 24-hour average cumulative dust levels (i.e. incremental contribution from the Project at the monitor location + background level) were above the applicable trigger level.

An allowance of a 1-hour period (before reaction by the mine) was incorporated into the modelling predictions to account for a potential logistical delay in the cessation of activity occurring in the pit and overburden areas, with activity remaining temporarily paused until conditions improve for a 1-hour period before restarting i.e. this 1-hour delay applies to the cessation and resumption of activities. (It is noted that predictive systems are used so that excessive dust impacts are avoided in the first place e.g. by applying more water, however such systems also anticipate potential issues and thus also minimise the response time).

We note that there are limitations to the modelling of these reactive measures as it assumes all the mining equipment and activity are fixed in locations across the site for the one year modelling period, and the modelling does not account for the implementation of any predictive or other reactive measures by the mine (e.g. visual dust plume monitoring).

After consideration of the days where the background level already exceeds the criterion and other days significantly affected by regional events such as bushfires, the analysis of the modelling results indicates that the implementation of the current measures would be effective in reducing dust levels to below the 24-hour average PM_{10} criterion. The only exception to this arises later in the life of the mine, in Scenario 5 (approximately Year 19), where (as might be expected) use of the current dust management triggers would not avoid all predicted additional exceedance days at receptors to the north (representative receptor 169) that far into the future. However, this would not occur in practice as the triggers in the AQMP would be revised progressively. E.g. the existing APF4 monitor could be relocated to the north of the then mining area prior to Year 19 (or another monitor added), and in that case the analysis suggests the use of the existing trigger level of 50µg/m^3 would avoid the predicted additional exceedance days. It is thus concluded that the application of the AQMP (as would be updated regularly) would achieve the outcomes in the AQIA contained in the EIS.

An example is presented in **Figure 2** to illustrate the analysis conducted. The figure presents a timeseries demonstrating the application of the reactive measures to the model results to achieve compliance with the PM_{10} criterion at Receptor 112 (a receiver located to the east of the mine) for Scenario 5. The timeseries plots in **Figure 2** present the predicted dust levels from 30 June to 3 July, with the orange line showing the rolling 24-hour average level without the reactive measures and the green line showing the rolling 24-hour average level with the implementation of the reactive measures. The pink spots indicate the hours in which the adverse condition triggers activate at the 50 µg/m^3 level (noting that the controllable mine activities are paused or re-started one hour after these triggers).

The orange line illustrates that without applying any reactive/ predictive/ visual measures, dust levels could be above the 24-hour average criterion at midnight on 2 July. The adverse conditions are predicted to occur on 1 July when the background level reaches 44µg/m^3 and the wind direction is within the specific wind angle range of the adverse condition trigger in the AQMP. An hour after this trigger, dust generating activities within the pit and overburden areas are temporarily paused and dust levels begin to drop as shown by the green line. The adverse conditions remain in place for a several hours at a time during the day and the potential exceedance of the 24-hour average PM_{10} criterion is averted. In the modelling, the mine resumes operation an hour after there is no trigger.

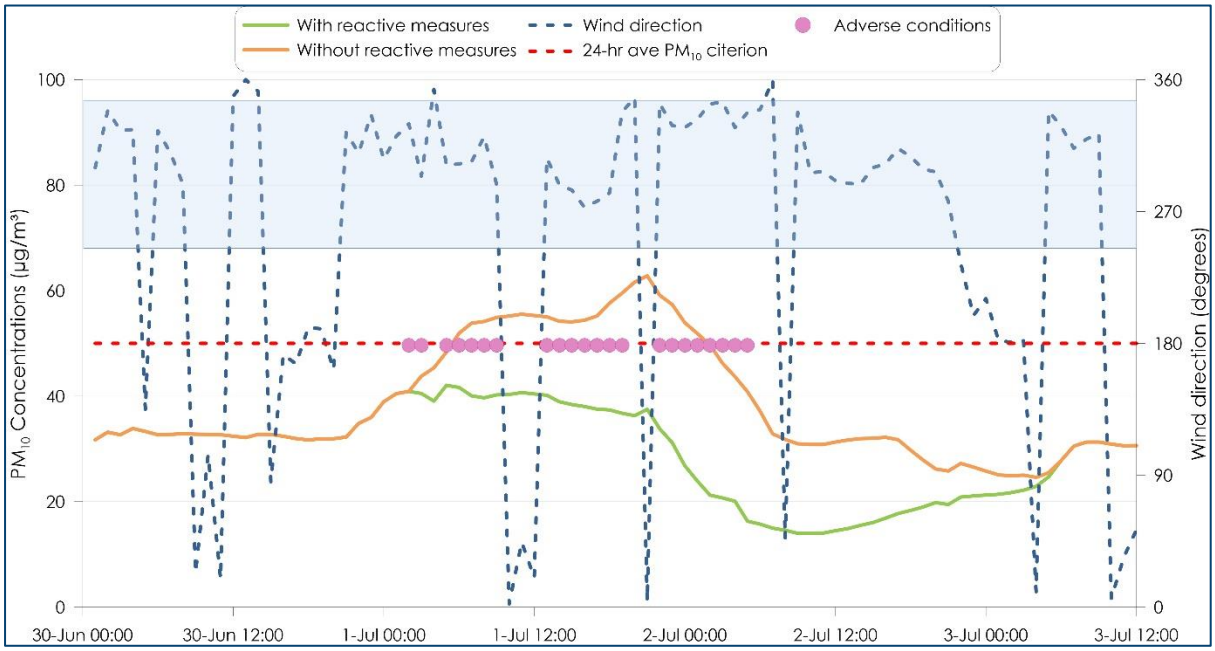


Figure 2: Timeseries graph showing effect of implementation of reactive measures

Monitoring data for $PM_{2.5}$

The only background $PM_{2.5}$ data available for a contemporaneous cumulative 24-hour analysis in the 2015 modelling year is from within Muswellbrook, which is known to be heavily affected by domestic wood heaters during the cooler months. Therefore, the data is not representative of the receptors outside of Muswellbrook, and simply using the measured $PM_{2.5}$ levels in Muswellbrook would not be appropriate. The Mount Pleasant Operation monitors $PM_{2.5}$, but does not have such data for 2015.

To consider the effect of the wood heaters in the available data, the average difference in the measured hourly $PM_{2.5}$ levels between the APF2 monitor and the Muswellbrook UHAQMN monitor during July 2019 to June 2021 was reviewed during the cooler months when wood heaters are typically in use. We note that mining activity at Mount Pleasant would have made some contribution during this period, and the difference is thus likely to be conservative. This difference was considered to account for the effect of the wood heaters that bias the data in Muswellbrook, relative to locations outside of Muswellbrook. This adjustment was made for $PM_{2.5}$ when and conducting the same analysis as completed for PM_{10} (i.e. temporarily pausing activity under the same adverse conditions), the additional analysis indicates that 24-hour $PM_{2.5}$ results presented in the EIS would also be achievable with the current triggers in the EPL and *Mount Pleasant Operation Air Quality and Greenhouse Gas Management Plan* (**MACH Energy, 2019**).

Thus, the analysis shows that with the continued implementation of the existing dust management triggers, no additional days above the relevant 24-hour average criteria is expected to occur and that the 24-hour $PM_{2.5}$ results presented in the EIS would be achieved.

Receptors reasonably affected by reactive measures undertaken

The assessment of 24-hour average PM_{10} and $PM_{2.5}$ concentrations in Section 7.2 of the AQIA identifies the closest and most likely impacted privately-owned receiver locations surrounding the Project for the assessment of how the predictive/ reactive measures would be applied to minimise potential dust impacts at these locations. The predicted dust levels at the receivers located further afield from these would experience less emissions from the Project, however, would still benefit from the application of the predictive/ reactive measures.

Notably, receptor 783, at the edge of Muswellbrook, does not experience impacts even without application of reactive measures, see **Table 3**.

Details and evidence of the historic use of the proactive and reactive measures in mitigating dust impacts

Further detail regarding the predictive/ reactive operational dust mitigation strategies and management measures and the predictive system are outlined in the *Mount Pleasant Operation Air Quality and Greenhouse Gas Management Plan* (MACH Energy, 2019). The current EPL 20850 conditions requiring all dust generating activities to be ceased when specific adverse conditions are identified at the Muswellbrook NW monitor (i.e. Conditions O3.4 to O3.9) have been in place since the commencement of the operations. As described in the most recent *Annual Review and Annual Rehabilitation Report for the Mount Pleasant Operation* (MACH Energy, 2021), MACH implements equipment shutdowns under adverse conditions outside of those required by the EPL conditions in response to visible dust. During 2020, operations were ceased for a total of 617 hours across the mining fleet due to the generation of visible dust and for 86 hours where all items of major mobile equipment were shut down in accordance with the EPL conditions.

Table 1 summarises the number of elevated days (i.e. >50µg/m^3) at UHAQMN monitors near the Project. MACH commenced substantial works in November 2016 with coal first mined in July 2018. A review of the number of elevated days recorded at the Muswellbrook NW monitor indicates no noticeable increase since the operation of the mine or change relative to the other nearby monitors in the UHAQMN, which suggests that MACH's dust mitigation strategy is effective. It is worth noting the number of elevated days increasing during 2018, 2019 and 2020 which is attributable to the drought and bushfire events during this period.

Table 1: Number of elevated days (>50µg/m^3) at UHAQMN monitors near the Project

Year	Muswellbrook	Muswellbrook NW	Wybong	Aberdeen
2012	1	1	1	0
2013	3	1	2	0
2014	1	1	3	2
2015	2	2	1	1
2016	0	0	1	0
2017	2	1	3	2
2018	13	10	9	7
2019	58	57	47	51
2020	13	12	13	8

Controls required

As outlined above, the existing triggers and predictive/ reactive measures in the *Mount Pleasant Operation Air Quality and Greenhouse Gas Management Plan* are effective in mitigating elevated dust at nearby receptors. The additional analysis conducted has demonstrated that these measures, or similar, would be equally effective for the Project.

To allow for ongoing adaptive management and to deal with the dynamic nature of the Project and surrounding mining operations, ongoing review and revision of the *Mount Pleasant Operation Air Quality and Greenhouse Gas Management Plan* would be the most appropriate mechanism to develop and document triggers and predictive/ reactive measures.

The AQIA presents a 24-hour cumulative assessment as predicted exceedances for only a select number of private receptors (Appendices F and G), the majority of which already have acquisition rights. These private receptors were selected for their proximity to the site, however they are unlikely to represent the complete extent of impacts to private receptors as a result of the proposal and do not adequately represent those receptors that will not be subject to acquisition rights.

Appendix D lists the maximum predicted 24-hour PM2.5 and PM10 incremental impacts for all receptors for each modelled scenario. There are numerous private receptors that have predicted incremental impacts that are a significant proportion of the impact assessment criteria. This includes 32 private receptors that have incremental impacts that are 50% or greater than the relevant impact assessment criteria for PM2.5 or PM10, that are not subject to acquisition rights and that have not been considered for further detailed assessment (cumulative impacts and contemporaneous assessment).

The EPA advises that the level of information provided does not allow for adequate determination of the potential short-term impacts at private receptors that are not subject to acquisition or mitigation rights.

The EPA recommends the proponent present a more detailed assessment of 24-hour cumulative impacts for the privately owned receptors, inclusive of receptors in Muswellbrook and isolated rural receptors, that are not subject to acquisition rights.

The AQIA assessed for potential air quality impacts at 499 privately-owned receivers surrounding the Project. The assessment of 24-hour average $PM_{2.5}$ and PM_{10} concentrations applied in the AQIA is an intensive analysis and cannot be reasonably done at all of these locations. The assessment focused on those locations which represent the closest and the most likely impacted. Privately-owned receivers located further afield would experience less impact than those assessed.

Table 2 outlines the receivers subject to acquisition upon request on the basis of noise or air impacts as per Development Consent DA 92/97. These receivers are identified in Appendix A of the AQIA. Currently four receivers have acquisition rights due to air, with no receivers afforded mitigation rights due to air.

Table 2: Land subject to acquisition upon request

Basis	Receiver
Noise	23, 45, 47, 67, 96, 102, 108, 112, 118, 120, 120c, 121, 136, 143a, 143b, 143c, 143d, 143e, 147, 153a, 153b, 156a, 157a, 158, 159, 447, 448, 449
Noise & Air	43, 43b
Air	20, 21

The receivers assessed in the cumulative 24-hour average assessment (Section 7.2 of the AQIA) represent the closest privately-owned receiver locations most likely to be influenced by air impacts surrounding the Project. For receivers located further afield, the predicted impacts from the Project would be less and with the application of predictive/ reactive measures, this would reduce the predicted impacts even further at these locations.

The analysis for cumulative 24-hour average impacts was expanded for the receivers close to those that remained over, to confirm which receivers would have cumulative exceedances. The additional receivers selected for the assessment are shown in **Figure 3**. These receivers represent various locations surrounding the Project and are predicted to experience 50% or greater impact than the relevant impact assessment criteria for 24-hour average $PM_{2.5}$ and PM_{10}. Receptor 86b and Receptor 783 have been included in the analysis to assist with demonstrating cumulative impacts at locations further afield. The same approach used in the AQIA is applied to assess the cumulative 24-hour average impacts for these representative additional locations, with the nearest monitor to each receiver used in the assessment.

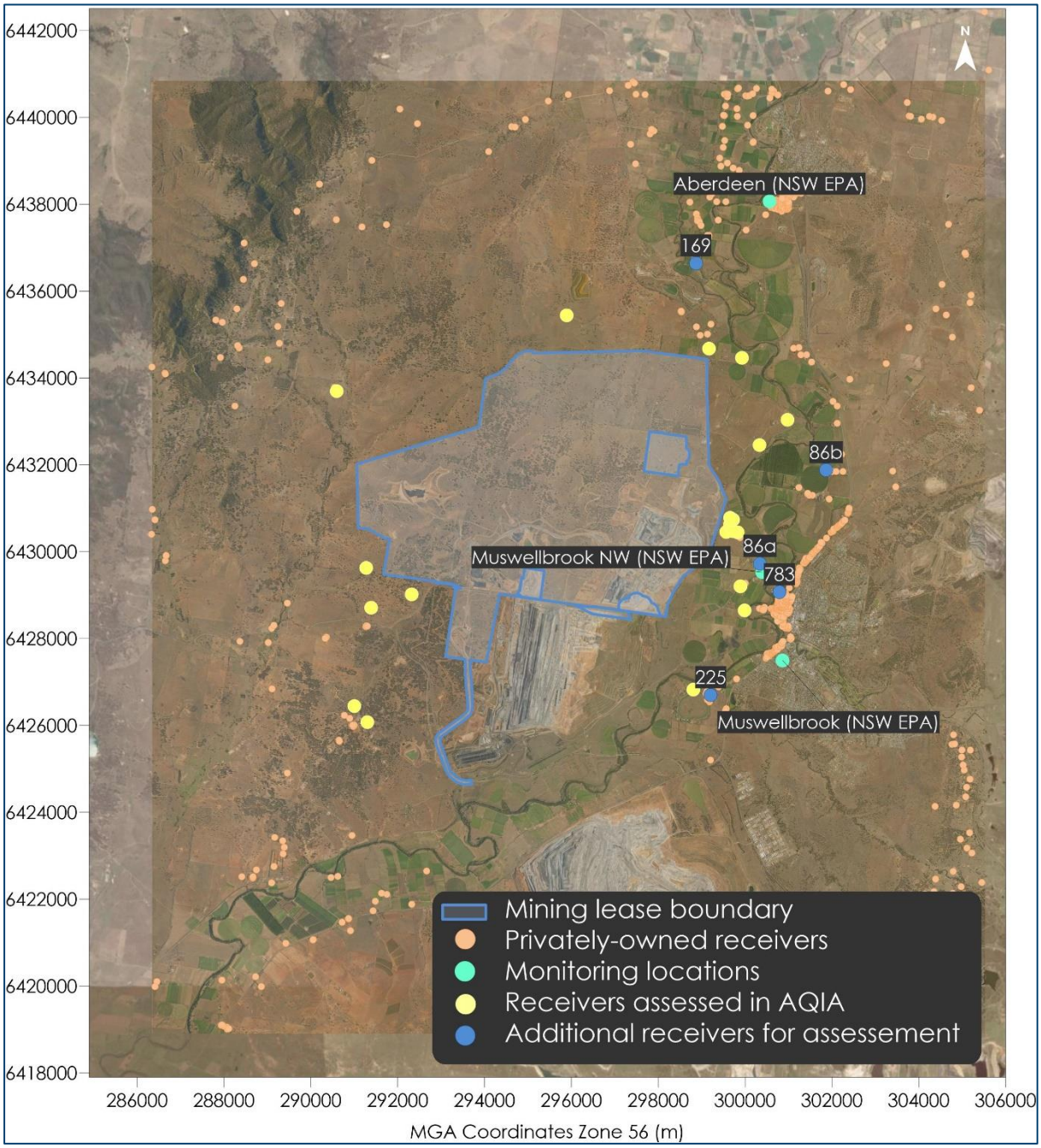


Figure 3: Additional receiver locations for cumulative 24-hour average assessment

Table 3 provides a summary of the contemporaneous assessment at each assessed receiver location without the application of predictive/ reactive measures. The assessment indicates that Receiver 86a may experience 1 additional day in Scenario 4 and Scenario 5 and Receiver 169 may experience 1 additional day in Scenario 2, 3 and 6, 3 additional days in Scenario 4 and 4 additional days in Scenario 5 above applicable PM_{10} criteria and up to 7 days for $PM_{2.5}$ under some scenarios.

The results in **Table 3** show that the predictive cumulative impacts are lower, as expected, compared to those assessed in the AQIA. Detailed tables of the full assessment results are provided in **Appendix A**.

Table 3: NSW EPA contemporaneous assessment for $PM_{2.5}$ and PM_{10} - maximum number of additional days in a year above 24-hour average criterion depending on background level at monitoring sites

Receiver ID	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
	$PM_{2.5}$ analysis					
86a	1	2	1	4	4	4
86b	0	1	1	1	1	1
169	1	2	2	4	5	2
225	2	2	2	5	7	3
783	1	1	1	1	2	2
	PM_{10} analysis					
86a	0	0	0	1	1	0
86b	0	0	0	0	0	0
169	0	1	1	3	4	1
225	0	0	0	0	0	0
783	0	0	0	0	0	0

Table 4 presents the maximum number of additional days in a year predicted to exceed the 24-hour criterion with the implementation of predictive/ reactive measures at the Project. The results indicate that the predictive/ reactive measures would be effective at reducing the incremental contribution of the Project to zero additional days above the relevant criterion. For more detail on how this would be achieved in practice, please refer to the response above.

Table 4: NSW EPA contemporaneous assessment for $PM_{2.5}$ and PM_{10} - maximum number of additional days in a year above 24-hour average criterion depending on background level at monitoring sites with the implementation of reactive measures

Receiver ID	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
	$PM_{2.5}$ analysis					
86a	0	0	0	0	0	0
86b	0	0	0	0	0	0
169	0	0	0	0	0	0
225	0	0	0	0	0	0
783	0	0	0	0	0	0
	PM_{10} analysis					
86a	0	0	0	0	0	0
86b	0	0	0	0	0	0
169	0	0	0	0	0	0
225	0	0	0	0	0	0
783	0	0	0	0	0	0

Inadequate discussion of background air quality data used

Annual

The AQIA describes an approach to determine the contribution from annual non-modelled dust sources. The background air quality of non-modelled dust sources was estimated by modelling past mining activities for 2012-2015 and comparing model predictions with actual measured data. The average difference for PM10 and TSP between the modelled and measured concentrations was then considered the contribution from non-modelled sources and then added to future predicted values to account for background.

The EPA has not provided a discussion regarding the methodology used to model all the mine emissions and impacts, whether the past mining activities modelled considered maximum activity based on consent

or actual operations and the monitor stations and their concentrations used to compare the against the modelled data.

The EPA recommends the proponent:

- ***Clarifies the methodology used to model the past mining activities, and that the methodology (emission estimation and model setup) is the same as that used to model the impacts from the proposal. Where there are differences in the methodology, the AQIA must robustly justify those differences and account for any implications on the final assessment results and conclusions,***
- ***Clarifies and justifies the activity rate used to model past mining activities and discussion that the non-modelled background is representative,***
- ***Provides the details of all monitoring stations and particulate concentration data used to compare the modelled concentrations against.***

24-hour

For 24-hour background PM10 data, the AQIA states that there are 3 suitable monitoring stations and the closest monitor is used in the cumulative assessment, with the exception for receptors west of the site in which Aberdeen station has been used. With the exception of the contemporaneous assessment presented for receptor 147, it has not been identified which monitor was used for background air quality, particularly for the receptors east of the site.

Further, receptors that are closer to mining operations than the monitor used for their background 24-hour concentrations are likely to experience greater particulate concentrations than the monitoring station.

The EPA recommends the proponent clarifies which monitor was used to assess 24-hour cumulative impacts for each receptor and that all receptors have representative background concentrations.

The methodology used to model the past mining activities is similar to that used to predict dust levels associated with the Project and is the same approach applied in the *Mount Pleasant Operation Mine Optimisation Modification Air Quality and Greenhouse Gas Assessment* (**Todoroski Air Sciences, 2017**).

Dust emission estimates for the Bengalla Mine, Mt Arthur Coal Mine, Mangoola Coal, Muswellbrook Coal Mine and the former Drayton Mine (now Maxwell Infrastructure) during 2012-2015 were calculated based on the information presented in the Annual Reviews for the respective operations. This represents the actual operations for each of these operations during the periods analysed (i.e. 2012-2015), rather than solely relying on the approved extraction rates. The Mount Pleasant coal mine was not operating during the 2012-2015 period and was not specifically included in the modelling to determine the contribution from non-modelled sources. Thus, the operating mines and the measured levels are representative of the actual conditions at the time (i.e. 2012-2015) and the calculated non-modelled background would also be representative.

The average difference between the measured and predicted PM_{10}, TSP and deposited dust levels from each of the monitoring points was considered to be the contribution from other non-modelled dust sources. **Table 5** presents a summary of the modelling predictions and the measured levels at each monitoring location and the calculated difference. The average difference between the measured and the predicted dust metric from each of the monitoring points is considered to be the contribution from other non-modelled sources of

particulate matter (the Residual dust level). The Residual dust level is added to the predicted levels for each scenario to account for the background dust levels, i.e. Predicted incremental contribution from all modelled mining operations + Residual dust level = Cumulative impact. Cumulative impact at receivers located closer to the mining operations would not be underpredicted as the mining operations are included in the model with a Residual dust level included in the prediction.

Figure 4 presents the location of the receivers assessed in the cumulative 24-hour average PM_{10} assessment in the AQIA and the corresponding air quality monitors applied. The assessment of cumulative impacts uses the monitoring data from the closest monitor where sufficient data is available. As noted in the AQIA, for the privately-owned receivers located to the west of the Project it has been assumed the measured levels at Aberdeen best represent the background levels experienced at these locations and only the Muswellbrook $PM_{2.5}$ monitoring station has $PM_{2.5}$ data available for use in this assessment.

The approach to the cumulative 24-hour average assessment for this Project applies background dust levels when the Project was not operating (i.e. 2015). The incremental contribution due to the Project is added to the measured background concentrations at the assigned monitor to assess cumulative impacts. The predicted contribution due to the mining operations is accounted for in the incremental contribution and the distance of the mining operations to the monitor does not influence the background level.

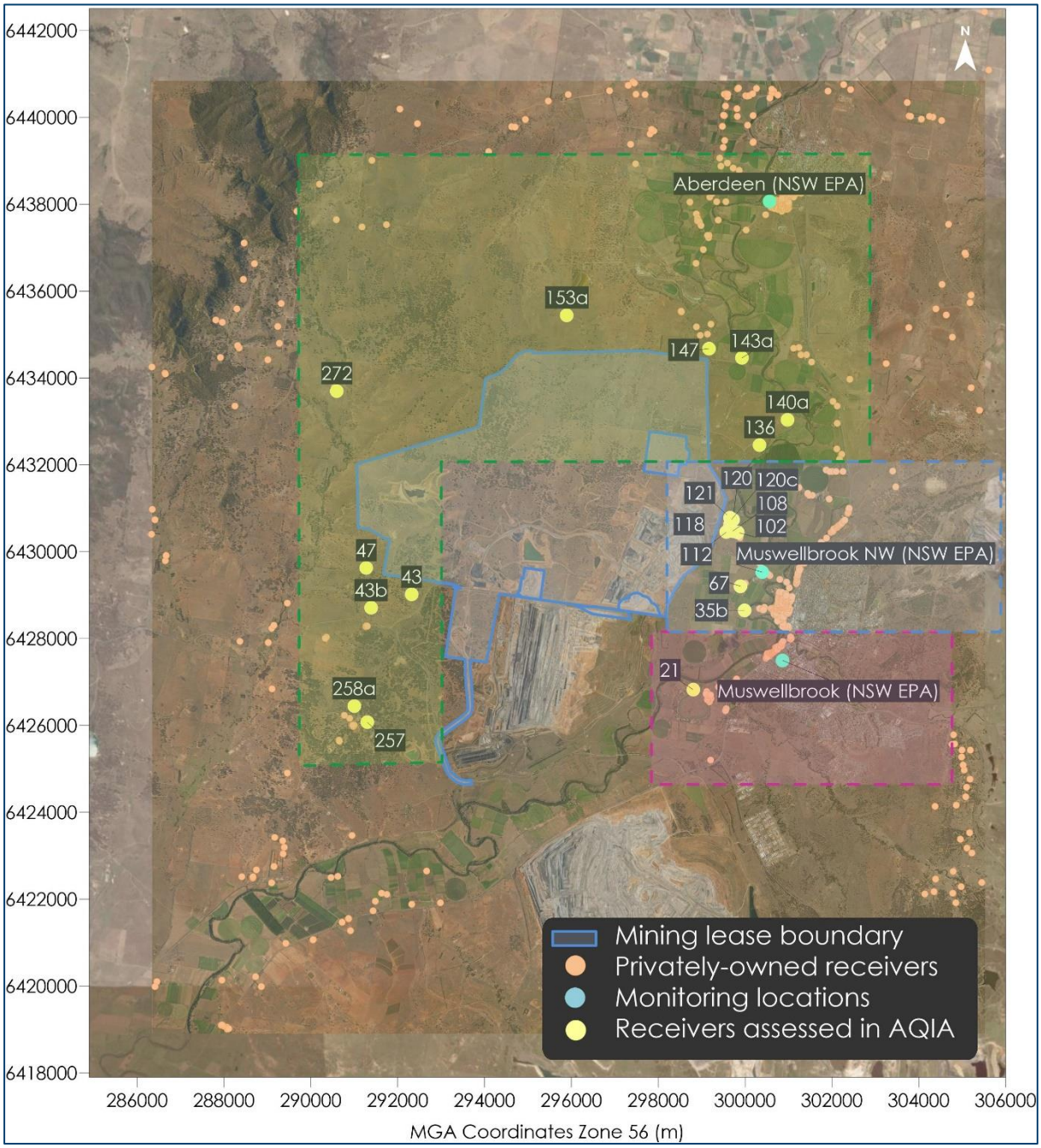


Figure 4: Locations for cumulative 24-hour average PM_{10} assessment and monitoring locations

Table 5: Summary of background dust levels estimation (2012-2015)

Dust metric	Monitor ID	Type	Measured level				Model prediction				Difference (Residual dust level)				Unit
			2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	
PM_{10}	Muswellbrook	TEOM	21.8	22.6	21.4	19.1	6.9	7.0	7.1	6.7	14.9	15.6	14.3	12.4	µg/m³
	Muswellbrook NW	TEOM	19.1	18.9	19.2	16.7	5.0	4.8	5.0	4.7	14.1	14.1	14.2	12.0	µg/m³
	Aberdeen	TEOM	17.0	17.3	17.9	15.2	1.2	1.4	1.6	1.6	15.8	15.9	16.3	13.6	µg/m³
	Wybong	TEOM	15.4	15.5	17.0	14.8	1.6	1.7	1.9	1.7	13.8	13.8	15.1	13.1	µg/m³
	DC02 (Mt Arthur)	TEOM	16.7	22.4	21.3	18.5	14.6	15.9	16.0	15.5	2.1	6.5	5.3	3.0	µg/m³
	DC03 (Mt Arthur)	TEOM	18.9	-	-	-	17.6	-	-	-	1.3	-	-	-	µg/m³
	DC04 (Mt Arthur)	TEOM	18.3	20.8	20.4	18.4	8.5	9.0	9.1	8.7	9.8	11.8	11.3	9.7	µg/m³
	DC05 (Mt Arthur)	TEOM	10.8	16.1	16.3	14.1	9.1	9.2	9.3	8.7	1.8	6.9	7.0	5.4	µg/m³
	DC04 (Mangoola)	TEOM	11.1	12.2	12.2	9.9	2.7	2.8	2.9	2.7	8.4	9.4	9.3	7.2	µg/m³
	DC03 (Mangoola)	TEOM	13.6	14.9	15.4	12.3	9.5	9.4	9.8	10.4	4.1	5.5	5.6	1.9	µg/m³
	DC02 (Mangoola)	TEOM	13.3	14.5	14.4	11.4	6.8	6.2	6.9	6.2	6.5	8.3	7.5	5.2	µg/m³
	PM10-2 (Bengalla)	TEOM	25.0	22.5	23.6	18.9	9.8	10.2	10.3	9.7	15.2	12.3	13.3	9.2	µg/m³
	PM10-3 (Bengalla)	TEOM	16.2	17.7	23.7	18.9	10.4	10.7	10.8	9.9	5.8	7.0	12.9	9.0	µg/m³
	Site 1 (MCC)	TEOM	-	16.6	17.2	14.9	-	5.4	5.9	6.1	-	11.2	11.3	8.8	µg/m³
	Site 2 (MCC)	TEOM	-	17.3	17.6	14.9	-	2.7	3.0	3.0	-	14.6	14.6	11.9	µg/m³
	Site 3 (MCC)	TEOM	-	18.6	15.3	13.7	-	4.2	5.2	5.6	-	14.4	10.1	8.1	µg/m³
TSP	D02-TSP (Mangoola)	HVAS	41.4	42.9	47	37.3	8.5	8.0	8.7	8.0	32.9	34.9	38.3	29.3	µg/m³
	D03-TSP (Mangoola)	HVAS	37.7	43.5	50	38	14.0	13.7	14.3	15.4	23.7	29.8	35.7	22.6	µg/m³
	D04-TSP (Mangoola)	HVAS	28.7	36.7	38.6	39.5	3.2	3.4	3.6	3.2	25.5	33.3	35.0	36.3	µg/m³
	HV1 (Bengalla)	HVAS	50.1	45.5	60.3	45.8	11.5	11.5	11.9	10.9	38.6	34.0	48.4	34.9	µg/m³
	HV2 (Bengalla)	HVAS	60.9	61.3	67.3	54.1	19.7	21.2	21.1	20.8	41.2	40.1	46.2	33.3	µg/m³
	HV3 (Bengalla)	HVAS	43.5	42.6	49.3	39.1	8.6	8.6	8.6	8.2	34.9	34.0	40.7	30.9	µg/m³
	HV4 (Bengalla)	HVAS	55	51.6	60.9	44.5	12.7	13.2	13.3	12.7	42.3	38.4	47.6	31.8	µg/m³
	HV6 (Bengalla)	HVAS	64.6	66.1	80.1	73.1	26.9	30.0	33.9	32.1	37.7	36.1	46.2	41.0	µg/m³
	Site 1 (MCC)	HVAS	-	33	39.5	29.8	-	7.6	8.3	8.8	-	25.4	31.2	21.0	µg/m³
	Site 2 (MCC)	HVAS	-	37.5	39.4	29.7	-	3.4	3.9	4.1	-	34.1	35.5	25.6	µg/m³
	Site 3 (MCC)	HVAS	-	38.2	51.4	32.9	-	6.8	8.9	9.9	-	31.4	42.5	23.0	µg/m³
Dust deposition	DG02 (Mangoola)	DD	3.4	3.0	2.3	1.3	0.01	0.02	0.02	0.02	3.39	2.98	2.28	1.28	g/m²/month
	DG03 (Mangoola)	DD	-	1.2	1.2	0.8	-	0.03	0.03	0.02	-	1.17	1.17	0.78	g/m²/month
	DG04 (Mangoola)	DD	2.5	2.3	1.9	1.7	0.20	0.22	0.19	0.20	2.30	2.08	1.71	1.50	g/m²/month
	DG06 (Mangoola)	DD	1.4	2.4	1.7	1.2	0.52	0.52	0.55	0.59	0.88	1.88	1.15	0.61	g/m²/month

Dust metric	Monitor ID	Type	Measured level				Model prediction				Difference (Residual dust level)				Unit
			2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	
	DG07 (Mangoola)	DD	2.3	2.0	1.8	1.4	0.58	0.56	0.60	0.63	1.72	1.44	1.20	0.77	g/m²/month
	DG09 (Mangoola)	DD	2.5	2.4	1.9	1.6	0.10	0.10	0.11	0.09	2.40	2.30	1.79	1.51	g/m²/month
	DG10 (Mangoola)	DD	2.1	1.9	1.6	1.4	0.19	0.17	0.18	0.17	1.91	1.73	1.42	1.23	g/m²/month
	DG18 (Mangoola)	DD	2.0	1.4	1.9	1.4	0.05	0.05	0.05	0.04	1.95	1.35	1.85	1.36	g/m²/month
	DG19 (Mangoola)	DD	2.1	1.6	1.5	1.1	0.28	0.30	0.35	0.36	1.82	1.30	1.15	0.74	g/m²/month
	DG20 (Mangoola)	DD	2.9	2.2	1.1	1.2	0.05	0.05	0.05	0.04	2.85	2.15	1.05	1.16	g/m²/month
	D05 (Bengalla)	DD	2.0	1.7	1.3	1.2	0.08	0.08	0.08	0.07	1.92	1.62	1.20	1.14	g/m²/month
	D10 (Bengalla)	DD	2.0	2.0	2.7	1.9	0.43	0.47	0.47	0.47	1.57	1.53	2.23	1.44	g/m²/month
	D07A (Bengalla)	DD	1.7	1.6	1.8	1.7	0.28	0.29	0.28	0.28	1.42	1.31	1.51	1.41	g/m²/month
	D21 (Bengalla)	DD	4.6	5.2	5.6	4.9	0.54	0.66	0.78	0.71	4.06	4.54	4.86	4.23	g/m²/month
	D01 (Bengalla)	DD	1.1	1.1	1.3	0.8	0.08	0.09	0.09	0.09	1.02	1.01	1.16	0.71	g/m²/month
	D02 (Bengalla)	DD	1.9	2.3	1.9	1.2	0.15	0.14	0.14	0.14	1.75	2.16	1.72	1.11	g/m²/month
	D04A (Bengalla)	DD	2.6	2.3	2.4	2.1	0.36	0.38	0.42	0.38	2.24	1.92	1.93	1.72	g/m²/month
	D06 (Bengalla)	DD	2.5	2.2	3.1	2.1	0.16	0.16	0.16	0.15	2.34	2.04	2.96	1.99	g/m²/month
	D08 (Bengalla)	DD	1.8	1.7	1.6	1.5	0.36	0.39	0.41	0.40	1.44	1.31	1.20	1.10	g/m²/month
	D17 (Bengalla)	DD	3.0	2.9	3.8	3.8	0.30	0.31	0.30	0.30	2.70	2.59	3.50	3.54	g/m²/month
	D20 (Bengalla)	DD	2.9	2.6	3.9	3.3	0.33	0.35	0.36	0.33	2.57	2.25	3.58	2.98	g/m²/month
	D23A (Bengalla)	DD	2.1	3.3	2.0	1.7	0.22	0.22	0.21	0.20	1.88	3.08	1.76	1.46	g/m²/month
	D25 (Bengalla)	DD	1.9	3.2	3.5	3.1	0.41	0.45	0.53	0.45	1.49	2.75	2.97	2.62	g/m²/month
	D26 (Bengalla)	DD	2.3	2.9	3.5	1.7	0.45	0.51	0.66	0.54	1.85	2.39	2.84	1.13	g/m²/month
	DA (Bengalla)	DD	2.7	2.4	3.4	3.4	0.42	0.46	0.54	0.47	2.28	1.94	2.88	2.91	g/m²/month
	DB (Bengalla)	DD	3.7	3.9	3.1	3.4	0.56	0.63	0.76	0.64	3.14	3.27	2.29	2.78	g/m²/month
	DM19 (MCC)	DD	-	2.1	1.9	1.5	-	0.02	0.02	0.02	-	2.12	1.85	1.46	g/m²/month
	DM18 (MCC)	DD	-	1.5	1.6	1.6	-	0.13	0.18	0.18	-	1.37	1.40	1.46	g/m²/month
	DM17 (MCC)	DD	-	2.5	2.9	2.5	-	0.17	0.25	0.26	-	2.35	2.67	2.23	g/m²/month
	DM14 (MCC)	DD	-	1.4	1.7	-	-	0.06	0.07	-	-	1.34	1.63	-	g/m²/month
	DM26 (MCC)	DD	-	1.6	-	1.7	-	0.09	-	0.12	-	1.54	-	1.60	g/m²/month
	DM29 (MCC)	DD	-	2.1	1.5	1.4	-	0.11	0.11	0.11	-	1.96	1.42	1.28	g/m²/month
	DM22 (MCC)	DD	-	1.8	2.7	2.3	-	0.09	0.09	0.10	-	1.75	2.62	2.18	g/m²/month
	DM16 (MCC)	DD	-	1.5	1.2	1.4	-	0.06	0.07	0.08	-	1.45	1.10	1.36	g/m²/month
	DM23 (MCC)	DD	-	1.2	1.5	1.6	-	0.09	0.09	0.10	-	1.14	1.38	1.50	g/m²/month
	DM28 (MCC)	DD	-	-	1.9	-	-	-	0.05	-	-	-	1.87	-	g/m²/month

Dust metric	Monitor ID	Type	Measured level				Model prediction				Difference (Residual dust level)				Unit
			2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	
	DM2 (MCC)	DD	-	2.3	1.8	1.8	-	0.08	0.09	0.11	-	2.25	1.71	1.70	g/m²/month
	DM7 (MCC)	DD	-	1.1	1.3	1.2	-	0.08	0.08	0.08	-	0.98	1.26	1.14	g/m²/month
	DM30 (MCC)	DD	-	1.3	1.3	1.2	-	0.04	0.05	0.05	-	1.22	1.24	1.16	g/m²/month
	DM24 (MCC)	DD	-	2.2	3.0	2.0	-	0.15	0.19	0.22	-	2.05	2.80	1.82	g/m²/month
	MTP D1	DD	1.4	1.2	1.3	1.0	0.06	0.06	0.07	0.06	1.29	1.14	1.23	0.94	g/m²/month
	MTP D3	DD	2.2	1.8	1.8	1.5	0.22	0.21	0.21	0.20	1.99	1.59	1.57	1.32	g/m²/month
	MTP D4	DD	1.6	1.3	1.6	2.4	0.04	0.04	0.04	0.05	1.60	1.26	1.57	2.38	g/m²/month
	MTP D6	DD	2.2	3.3	3.7	2.5	0.06	0.05	0.06	0.06	2.17	3.25	3.63	2.40	g/m²/month
	MTP D8	DD	3.4	4.4	3.7	3.0	0.49	0.59	0.71	0.64	2.88	3.81	3.02	2.38	g/m²/month
	MTP D9	DD	1.3	1.4	1.5	1.3	0.20	0.25	0.28	0.25	1.06	1.15	1.24	1.07	g/m²/month
	MTP D10	DD	2.0	-	1.0	0.8	0.05	-	0.05	0.05	1.97	-	0.95	0.74	g/m²/month
	MTP D11	DD	2.0	1.3	1.6	1.4	0.09	0.12	0.12	0.11	1.95	1.18	1.48	1.27	g/m²/month
	MTP D12	DD	1.1	0.7	1.0	0.8	0.09	0.13	0.13	0.11	1.01	0.57	0.85	0.66	g/m²/month
	MTP D13	DD	2.2	3.2	3.2	2.1	0.05	0.06	0.07	0.06	2.16	3.14	3.16	2.07	g/m²/month
	MTP D14	DD	2.4	3.0	3.4	2.2	0.55	0.69	0.83	0.76	1.85	2.31	2.53	1.41	g/m²/month

Receptors subject to acquisition rights – PM10 incremental exceedances

The AQIA predicts that for project only (incremental) 24-hour PM10 impacts there will be exceedance of the impact assessment criteria (IAC) of 50 µg/m3 for eight private receptors for the scenarios modelled (Tables 7-2, 7-3, 7-4, 7-5 and Appendix D). As many as 19 days of additional exceedances are predicted from incremental PM10 impacts with concentrations up to 104 µg/m3. The receptors that currently have acquisition rights are 143b, 147, 153a, 154, 154b, 156a, 157a and 159. The AQIA states that these receptors already have acquisition rights under the development consent due to noise impacts.

The EPA identifies that there are inconsistencies within the AQIA (Section 7.1.2 and Appendix A) regarding which receptors have acquisition rights.

The EPA recommends that the AQIA clearly identify all the receptors that already have or as a result of this project will have acquisition rights.

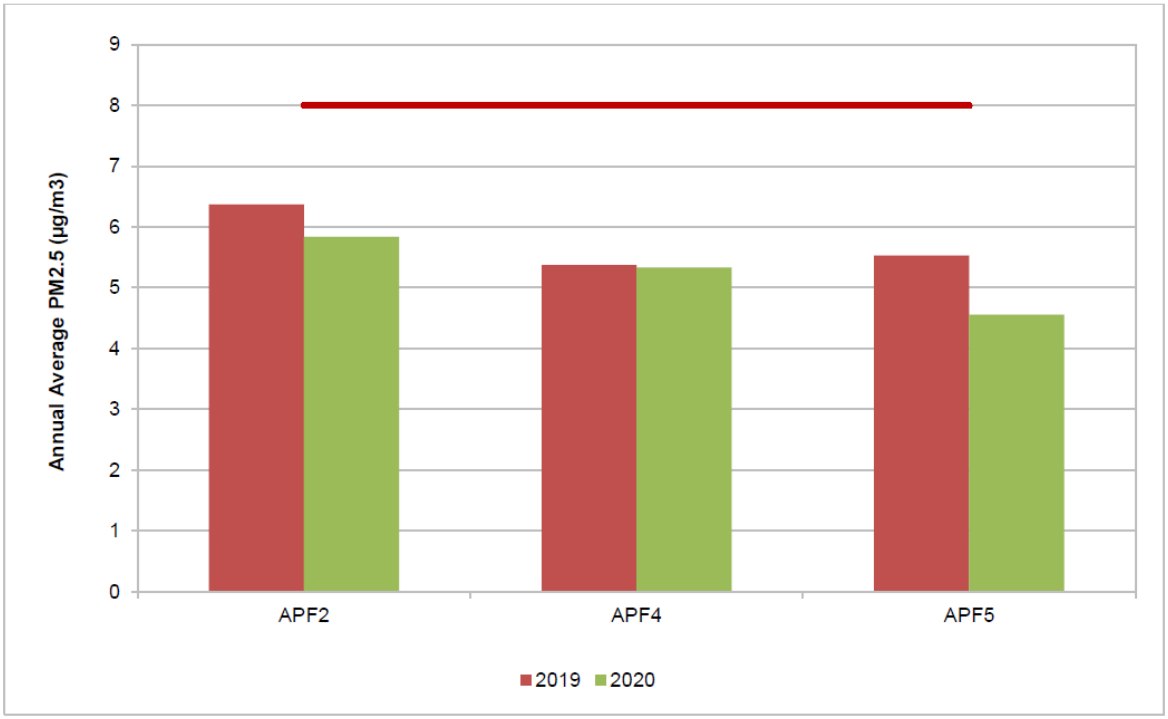
Table 2 outlines the receivers that already have acquisition rights for the approved operations.

Section 7.1.2 of the Air Quality Assessment notes that Receivers 154 and 154b are not currently subject to acquisition upon request under Development Consent DA 92/97, however, Receiver 154 is subject to mitigation upon request rights for approved noise impacts. The other six receivers with predicted Project-only 24-hr average PM_{10} exceedances are noted as being subject to acquisition upon request for approved noise impacts. This is consistent with the presentation of receivers in Appendix A of the Air Quality Assessment.

Muswellbrook Shire Council
AIR QUALITY

45.0 Mount Pleasant mine is in close proximity to the Muswellbrook township and has been the subject of numerous air quality complaints as the eastern emplacement has been constructed. While the EIS suggests that the worst affected properties can be acquired and the dust levels affecting the main township will be within acceptable health limits, the health limits permitted by the State and Federal governments may actually be exposing residents to unacceptable levels of PM 2.5 sized particles.

The NSW EPA impact assessment criteria and the NEPM Air Quality Environmental Protection goals set the standard for adequate protection of human health and well-being. The AQIA demonstrates that the Project can comply with the applicable NSW EPA and NEPM Air Quality goals for $PM_{2.5}$. Recent annual average $PM_{2.5}$ levels recorded at Mount Pleasant monitors indicate levels are below the applicable criterion (see **Figure 5**).



Source: MACH Energy (2021)

Figure 5: Annual average $PM_{2.5}$ levels at Mount Pleasant monitors (excluding 'extraordinary events')

46.0 The 2010 NSW Health report shows that Muswellbrook residents reported higher levels of cardio-vascular and respiratory diseases, emergencies and deaths than the State average.

Noted. The health statistics described do not indicate a clear association with the air quality levels in Muswellbrook as many factors, including sociological factors such as the incidence of cigarette smoking, influence health statistics.

47.0 The 24-hour averaging period for air pollution monitoring may be obscuring issues of elevated dust levels at night, particularly when a surface temperature inversion is present.

An analysis of the diurnal profile of dust levels at the Muswellbrook monitor is presented in Figure 5-7 of the AQIA. The figure indicates the PM_{10} levels show only a slight trend with higher levels occurring in the early morning and evening periods compared to the middle of the day, with $PM_{2.5}$ levels showing a more noticeable trend with the higher levels occurring in the night-time periods, especially during winter when temperature inversions are more prevalent. This can be attributed to domestic wood heater emissions from within the town as opposed to dust emissions from mining operations.

48.0 Council requests that the Proponent contribute funding toward:

...

• The installation of an EPA monitored ceilometer in Muswellbrook.

A ceilometer is an instrument that is typically used to determine the height of cloud. While it is acknowledged that this instrument can also be used to measure aerosol concentration in the atmosphere, it is not designed to monitor ground level concentrations or other key indicators of air quality.

49.0 Council also requests that use of high dump sites be limited after sunset to reduce the potential impacts of dust, noise and light pollution over the Muswellbrook township.

The Project proposes to implement a range mitigation measures to minimise dust impacts, which include avoiding or postponing material handling activities if excessive dust lit-off occurs. It is understood that use of the high dump sites during certain times can increase the risk of a dust impact occurring and activity in these areas would be avoided where practical under adverse meteorological conditions to minimise this risk.

NSW Health

The summary of modelling results, Section 7.1, Appendix B - Air Quality Impact Assessment (AQIA) shows that some privately-owned receptors near the proposed project are predicted to experience exceedances of particulate matter (PM) air quality criteria. This is a region where air quality often exceeds national standards. The following table, adapted from Tables 5-2 and 5-5 in the AQIA demonstrate the extent to which PM10 and PM2.5 levels at Muswellbrook do not meet current Ambient Air Quality National Environment Protection Measures (NEPM) standards

Summary of ambient PM10 and PM2.5 levels from the Upper Hunter Air Quality Monitoring Network at Muswellbrook 2012 to 2019.

Dust metric	*NEPM standard (µg/m³)*	*NEPM 2025 Goal (µg/m³)*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*
PM10 Annual Average	*25*		*21.8*	*22.6*	*21.4*	*19.1*	*19.2*	*21.7*	***27.2***	***34.4***
PM10 Maximum 24 hour average	*50*		***51.0***	***55.6***	***53.0***	***72.6***	*43.9*	***56.5***	***185.9***	***231.3***
PM2.5 Annual Average	*8*	*7*	***10.1***	***9.4***	***9.7***	***8.7***	***8.4***	***9.4***	***9.4***	***12.2***
PM2.5 Maximum 24 hour average	*25*	*20*	***26.4***	***36.6***	***27.4***	***31.2***	***29.4***	***31.1***	***26.5***	***77.4***
Bold indicates exceedance of NEPM standards										

Modelling within the AQIA predicts annual average PM2.5 at selected Muswellbrook receivers to be below the criterion (NEPM standard) when emissions from the project are added to the contribution from other mines and background (AQIA, Table 7-7, page 53). However, the project-only contribution to the annual average PM2.5 (0.5 to 1.4µg/m³) represent 9 to 23% increase in annual average PM2.5 as reported in the AQIA. Population health studies have found that concentrations below the annual NEPM standard impact health and therefore efforts should be made to reduce the contribution that the project makes to the annual average PM2.5 of Muswellbrook receivers. The EIS's Human Health Risk Assessment (Appendix R, page 30), reports that 'In some areas surrounding and close to the Project, there are a number of individual receptors where incremental risks associated with dust (PM2.5) impacts are elevated and considered potentially unacceptable in the absence of proactive/reactive dust mitigation measures'.

The elevated PM_{10} levels in 2018 and 2019 are associated with drought conditions and a severe bushfire season. Table 5-2 of the AQIA indicates that the monitors at Aberdeen and Wybong also recorded annual average PM_{10} levels above the NEPM standard, indicating the wider region was influenced.

$PM_{2.5}$ levels at Muswellbrook have been consistently above the annual average $PM_{2.5}$ levels due to woodsmoke from domestic wood-heaters. This has recently been highlighted by the EPA in its presentation to the Mangoola Continuation Project Independent Planning Commission. The predicted incremental Project-only annual average $PM_{2.5}$ levels at the Muswellbrook monitor ranges from 0.50µg/m³ to 0.67µg/m³, which is 6.2% to 8.4% of the annual average criteria, respectively.

The average change in contribution due to the Project, additional to the already approved contribution from the existing operation, is approximately 0.14µg/m³ at the Muswellbrook monitor, which is 1.75% of the criterion. The 9% to 23% increase reported by NSW Health is for the Mount Pleasant Operation incorporating the Project contribution above the modelled other mines plus background contribution. The average change due to the Project is closer to 2%. It is also noted that the estimated change in contribution due to the Project excludes the benefits associated with the continued implementation of proactive/reactive mitigation measures.

As air quality and resulting health impacts are a justified concern, the Project has been designed to limit increases in all air quality emissions, particularly $PM_{2.5}$, even though there is a doubling in the mining rate. This has been achieved by staging the production increase, as the operations move away from the town.

Private submission

For example, on 1 March 2021, air quality with no drought, recent rain and no bushfires in north west Muswellbrook close to Mount Pleasant, had a PM10 of 113, more than double the NEPM standard of 50 and WHO standard of 20. On Monday March 8, the PM10 figure at the Muswellbrook North West Monitor (closest to Mount Pleasant's existing operations) reached a staggering 224.6. We believe the further expansion of Mount Pleasant would pose a serious risk to public health – particularly for more than 10,000 residents of the Muswellbrook community.

The PM_{10} values identified of 113[µg/m³] on the 1st March 2021 and 224.6[µg/m³] on the 8th March 2021 from the Muswellbrook NW monitor are 1-hour average values. These are not comparable to the NEPM Standard of 50µg/m³, which refers to a 24-hour average mean, or the WHO Standard of 20µg/m³, which refers to an annual mean. We note that the calculated rolling 24-hour average PM_{10} levels were 34.7µg/m³ and 35.4µg/m³, respectively, on these dates.

The Mount Pleasant Operation has conditions in its EPL which require monitoring of dust levels at Muswellbrook NW to ensure dust levels do not exceed the applicable 24-hour average criteria. The Mount Pleasant Operation will continue to apply these measures to ensure the applicable dust criteria are met.

Northstar Air Quality on Behalf of Cowtime Investments Pty Ltd

The use of an unjustifiably low silt content for unpaved haulage routes…

The haul road silt content of 2% used in the AQIA is based on measurements commissioned at an adjacent mine prior to the commencement of mining operations at Mount Pleasant. This haul road silt content was used in the assessments for the Mount Pleasant Operation Modification 3 and 4 assessments, which have been approved.

Four Pollution Reduction Programs for Hunter Valley coal mines, including Bengalla Mine, Muswellbrook Coal Mine, Mount Thorley Warkworth and Hunter Valley Operations were reviewed and the measured silt levels at these locations were analysed. The average measured silt level for a controlled haul road at these coal mining operations is 1.7%, which is below the value of 2% used in the AQIA.

The Mount Pleasant Operation ensures all haul roads are constructed and maintained to a high standard to ensure silt content is maintained at a low level and the resulting dust generation from vehicles traveling on these roads is minimised.

The use of unjustified control factor on unpaved haulage routes of between 80% and 90%.

The two different control factors for the haul roads are applied to two different types of haul roads at the Project. The 80% control factor is applied to haul roads within the overburden dumps which are temporary and subject to change as the mine progresses. The 90% control factor is applied to the main haul road linking the extraction area to the CHPP. This is a permanent road and a higher level of dust control can be achieved through construction and regular maintenance.

Assessment of 24-hr impacts is reliant on annual emissions inventories.

Unlike a small quarry or batching operation, the Project is not significantly influenced by daily production maximums as it is not subject to the same daily market demands.

Application of the NSW Voluntary Land Acquisition and Mitigation Policy (VLAMP).

The VLAMP was derived and applies in the context of the EPA Approved Methods and NEPM, which in the past permitted 5 days above criteria per annum (but now permits unlimited extraordinary events). The Approved Methods criteria apply in any one year, as does the modelling. The modelling is based on the same representative year of meteorology, which is modelled for all key stages of the life of the development.

The assessment thus focuses on key stages of the full life of the mine and focuses on scenarios likely to have the greatest impact regarding air quality. The VLAMP criteria is applied correctly on that basis over the life of the mine, and it can be reasonably inferred that there would not be any greater impacts than have been presented over the life of the development.

We would be pleased to meet and discuss and clarify any residual concerns that the NSW EPA, Muswellbrook Shire Council or NSW Health may have.

Please feel free to contact us if you would like to clarify any aspect of this report.

Yours faithfully,
Todoroski Air Sciences

Philip Henschke

Aleks Todoroski

References

MACH Energy (2019)

"Mount Pleasant Operation Air Quality and Greenhouse Gas Management Plan", prepared by MACH Energy, May 2019.

MACH Energy (2021)

"Mount Pleasant Operation 2020 Annual Review & Annual Rehabilitation Report", prepared by MACH Energy, March 2021.

Todoroski Air Sciences (2017)

"Mount Pleasant Operation Mine Optimisation Modification Air Quality and Greenhouse Gas Assessment", prepared for MACH Energy Australia Pty Ltd by Todoroski Air Sciences, May 2017.

Todoroski Air Sciences (2020)

"Mount Pleasant Optimisation Project Air Quality Impact Assessment", prepared for MACH Energy Australia Pty Ltd by Todoroski Air Sciences, December 2020.

APPENDIX A

Table A-1: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 1 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.7	**31.9**				
21/07/2015	**27.3**	0.9	**28.2**				
22/07/2015	**26.7**	1.1	**27.8**				
30/06/2015	24.5	1.2	**25.7**	1/07/2015	16.4	3.9	20.3
28/06/2015	23.6	0.8	24.4	14/01/2015	4.7	3.6	8.3
6/06/2015	23.2	1.3	24.5	24/04/2015	4.1	3.1	7.2
9/08/2015	22.9	0.4	23.3	16/04/2015	8.3	2.9	11.2
22/06/2015	22	1.0	23.0	6/04/2015	3.5	2.9	6.4
10/03/2015	21.6	0.1	21.7	19/06/2015	13.1	2.9	16.0
29/07/2015	21.5	0.8	22.3	27/03/2015	2.3	2.9	5.2
23/07/2015	21.3	2.4	23.7	4/10/2015	6.8	2.8	9.6
8/07/2015	21.2	1.0	22.2	25/08/2015	3.6	2.7	6.3
8/08/2015	21.2	1.0	22.2	11/12/2015	8	2.7	10.7

Table A-2: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 1 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.1	**31.3**				
21/07/2015	**27.3**	0.2	**27.5**				
22/07/2015	**26.7**	0.5	**27.2**				
30/06/2015	24.5	0.4	24.9	1/07/2015	16.4	1.6	18.0
28/06/2015	23.6	0.1	23.7	19/06/2015	13.1	1.4	14.5
6/06/2015	23.2	0.7	23.9	9/06/2015	11	1.4	12.4
9/08/2015	22.9	0.1	23.0	4/10/2015	6.8	1.4	8.2
22/06/2015	22	0.2	22.2	1/06/2015	12.8	1.3	14.1
10/03/2015	21.6	0.1	21.7	31/01/2015	6.8	1.2	8.0
29/07/2015	21.5	0.1	21.6	18/08/2015	11.3	1.2	12.5
23/07/2015	21.3	0.6	21.9	5/04/2015	3.2	1.2	4.4
8/07/2015	21.2	0.5	21.7	4/08/2015	6.4	1.2	7.6
8/08/2015	21.2	0.1	21.3	25/01/2015	4.1	1.1	5.2

Table A-3: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 1 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.3	**32.5**				
21/07/2015	**27.3**	1.1	**28.4**				
22/07/2015	**26.7**	1.0	**27.7**				
30/06/2015	24.5	1.9	**26.4**	30/03/2015	9.7	2.4	12.1
28/06/2015	23.6	1.4	25.0	20/04/2015	2.1	2.3	4.4
6/06/2015	23.2	0.5	23.7	31/10/2015	7.3	2.3	9.6
9/08/2015	22.9	0.6	23.5	16/06/2015	14.9	2.2	17.1
22/06/2015	22	1.1	23.1	19/09/2015	5.6	2.2	7.8
10/03/2015	21.6	0.8	22.4	3/07/2015	20.2	2.0	22.2
29/07/2015	21.5	0.3	21.8	20/07/2015	15.3	2.0	17.3
23/07/2015	21.3	0.0	21.3	30/06/2015	24.5	1.9	**26.4**
8/07/2015	21.2	1.4	22.6	18/09/2015	6.3	1.9	8.2
8/08/2015	21.2	0.1	21.3	3/06/2015	16.7	1.9	18.6

Table A-4: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 1 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.3	**32.5**				
21/07/2015	**27.3**	1.8	**29.1**				
22/07/2015	**26.7**	1.6	**28.3**				
30/06/2015	24.5	2.1	**26.6**	24/04/2015	4.1	4.4	8.5
28/06/2015	23.6	2.1	**25.7**	30/05/2015	7	4.3	11.3
6/06/2015	23.2	1.3	24.5	4/06/2015	20.2	4.0	24.2
9/08/2015	22.9	1.0	23.9	18/06/2015	8	4.0	12.0
22/06/2015	22	2.1	24.1	28/05/2015	ND	3.8	3.8
10/03/2015	21.6	0.0	21.6	5/06/2015	20.2	3.8	24.0
29/07/2015	21.5	1.7	23.2	27/06/2015	14.3	3.7	18.0
23/07/2015	21.3	3.2	24.5	20/05/2015	4.2	3.7	7.9
8/07/2015	21.2	1.0	22.2	28/07/2015	10.9	3.6	14.5
8/08/2015	21.2	1.4	22.6	29/05/2015	9.1	3.5	12.6

Table A-5: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 1 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.5	**31.7**				
21/07/2015	**27.3**	0.7	**28.0**				
22/07/2015	**26.7**	0.8	**27.5**				
30/06/2015	24.5	0.9	**25.4**	1/07/2015	16.4	3.0	19.4
28/06/2015	23.6	0.7	24.3	27/03/2015	2.3	2.5	4.8
6/06/2015	23.2	0.9	24.1	24/04/2015	4.1	2.4	6.5
9/08/2015	22.9	0.3	23.2	14/01/2015	4.7	2.2	6.9
22/06/2015	22	0.6	22.6	6/04/2015	3.5	2.2	5.7
10/03/2015	21.6	0.1	21.7	25/08/2015	3.6	2.1	5.7
29/07/2015	21.5	0.6	22.1	19/06/2015	13.1	2.1	15.2
23/07/2015	21.3	1.7	23.0	3/08/2015	7	2.0	9.0
8/07/2015	21.2	0.8	22.0	4/10/2015	6.8	2.0	8.8
8/08/2015	21.2	0.7	21.9	16/04/2015	8.3	1.9	10.2

Table A-6: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 2 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.0	**32.2**				
21/07/2015	**27.3**	1.2	**28.5**				
22/07/2015	**26.7**	1.5	**28.2**				
30/06/2015	24.5	1.8	**26.3**	1/07/2015	16.4	4.1	20.5
28/06/2015	23.6	1.4	**25.0**	19/06/2015	13.1	3.6	16.7
6/06/2015	23.2	1.6	24.8	14/01/2015	4.7	3.5	8.2
9/08/2015	22.9	0.9	23.8	28/05/2015	ND	3.3	3.3
22/06/2015	22	1.5	23.5	27/05/2015	ND	3.2	3.2
10/03/2015	21.6	0.1	21.7	5/06/2015	20.2	3.2	23.4
29/07/2015	21.5	1.2	22.7	24/04/2015	4.1	3.1	7.2
23/07/2015	21.3	3.0	24.3	16/04/2015	8.3	3.1	11.4
8/07/2015	21.2	1.2	22.4	31/05/2015	5.8	3.1	8.9
8/08/2015	21.2	1.3	22.5	23/07/2015	21.3	3.0	24.3

Table A-7: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 2 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.2	**31.4**				
21/07/2015	**27.3**	0.2	**27.5**				
22/07/2015	**26.7**	0.7	**27.4**				
30/06/2015	24.5	0.5	**25.0**	1/07/2015	16.4	2.2	18.6
28/06/2015	23.6	0.3	23.9	19/06/2015	13.1	2.0	15.1
6/06/2015	23.2	1.0	24.2	9/06/2015	11	1.6	12.6
9/08/2015	22.9	0.1	23.0	23/04/2015	4.5	1.6	6.1
22/06/2015	22	0.4	22.4	4/10/2015	6.8	1.6	8.4
10/03/2015	21.6	0.1	21.7	4/08/2015	6.4	1.5	7.9
29/07/2015	21.5	0.2	21.7	18/08/2015	11.3	1.5	12.8
23/07/2015	21.3	1.0	22.3	25/01/2015	4.1	1.5	5.6
8/07/2015	21.2	0.5	21.7	5/04/2015	3.2	1.4	4.6
8/08/2015	21.2	0.5	21.7	31/01/2015	6.8	1.4	8.2

Table A-8: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 2 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.8	**33.0**				
21/07/2015	**27.3**	1.7	**29.0**				
22/07/2015	**26.7**	1.8	**28.5**				
30/06/2015	24.5	2.7	**27.2**	30/03/2015	9.7	3.6	13.3
28/06/2015	23.6	1.8	**25.4**	16/06/2015	14.9	3.2	18.1
6/06/2015	23.2	0.8	24.0	19/09/2015	5.6	3.2	8.8
9/08/2015	22.9	0.9	23.8	20/04/2015	2.1	3.1	5.2
22/06/2015	22	1.5	23.5	31/10/2015	7.3	3.1	10.4
10/03/2015	21.6	1.6	23.2	27/02/2015	8	2.9	10.9
29/07/2015	21.5	0.5	22.0	3/07/2015	20.2	2.9	23.1
23/07/2015	21.3	0.0	21.3	20/07/2015	15.3	2.9	18.2
8/07/2015	21.2	2.0	23.2	30/10/2015	8.3	2.7	11.0
8/08/2015	21.2	0.1	21.3	4/05/2015	6.1	2.7	8.8

Table A-9: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 2 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.5	**32.7**				
21/07/2015	**27.3**	1.8	**29.1**				
22/07/2015	**26.7**	1.6	**28.3**				
30/06/2015	24.5	2.2	**26.7**	30/05/2015	7	4.7	11.7
28/06/2015	23.6	2.5	**26.1**	4/06/2015	20.2	4.3	24.5
6/06/2015	23.2	1.4	24.6	24/04/2015	4.1	4.3	8.4
9/08/2015	22.9	1.3	24.2	27/06/2015	14.3	4.3	18.6
22/06/2015	22	2.3	24.3	28/05/2015	ND	4.0	4.0
10/03/2015	21.6	0.1	21.7	28/07/2015	10.9	3.9	14.8
29/07/2015	21.5	2.1	23.6	18/06/2015	8	3.7	11.7
23/07/2015	21.3	3.3	24.6	5/06/2015	20.2	3.7	23.9
8/07/2015	21.2	0.9	22.1	20/05/2015	4.2	3.6	7.8
8/08/2015	21.2	1.6	22.8	29/05/2015	9.1	3.6	12.7

Table A-10: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 2 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.7	**31.9**				
21/07/2015	**27.3**	1.0	**28.3**				
22/07/2015	**26.7**	1.0	**27.7**				
30/06/2015	24.5	1.3	**25.8**	1/07/2015	16.4	3.2	19.6
28/06/2015	23.6	1.2	24.8	24/04/2015	4.1	2.7	6.8
6/06/2015	23.2	1.1	24.3	19/06/2015	13.1	2.5	15.6
9/08/2015	22.9	0.6	23.5	31/05/2015	5.8	2.5	8.3
22/06/2015	22	1.0	23.0	27/03/2015	2.3	2.5	4.8
10/03/2015	21.6	0.1	21.7	14/01/2015	4.7	2.4	7.1
29/07/2015	21.5	0.9	22.4	25/08/2015	3.6	2.4	6.0
23/07/2015	21.3	2.1	23.4	6/04/2015	3.5	2.4	5.9
8/07/2015	21.2	0.8	22.0	3/08/2015	7	2.3	9.3
8/08/2015	21.2	0.9	22.1	28/05/2015	ND	2.3	2.3

Table A-11: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 3 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.0	**32.2**				
21/07/2015	**27.3**	1.0	**28.3**				
22/07/2015	**26.7**	1.5	**28.2**				
30/06/2015	24.5	1.9	**26.4**	1/07/2015	16.4	4.2	20.6
28/06/2015	23.6	1.3	24.9	14/01/2015	4.7	3.6	8.3
6/06/2015	23.2	1.6	24.8	19/06/2015	13.1	3.5	16.6
9/08/2015	22.9	0.9	23.8	27/05/2015	ND	3.2	3.2
22/06/2015	22	1.5	23.5	23/07/2015	21.3	3.1	24.4
10/03/2015	21.6	0.1	21.7	20/06/2015	14.4	3.0	17.4
29/07/2015	21.5	1.3	22.8	23/04/2015	4.5	3.0	7.5
23/07/2015	21.3	3.1	24.4	5/06/2015	20.2	3.0	23.2
8/07/2015	21.2	1.2	22.4	28/05/2015	ND	3.0	3.0
8/08/2015	21.2	1.1	22.3	31/05/2015	5.8	2.9	8.7

Table A-12: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 3 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.2	**31.4**				
21/07/2015	**27.3**	0.2	**27.5**				
22/07/2015	**26.7**	0.7	**27.4**				
30/06/2015	24.5	0.5	**25.0**	1/07/2015	16.4	2.3	18.7
28/06/2015	23.6	0.3	23.9	19/06/2015	13.1	2.0	15.1
6/06/2015	23.2	1.0	24.2	23/04/2015	4.5	1.6	6.1
9/08/2015	22.9	0.1	23.0	16/07/2015	6.2	1.6	7.8
22/06/2015	22	0.4	22.4	20/06/2015	14.4	1.6	16.0
10/03/2015	21.6	0.1	21.7	9/06/2015	11	1.5	12.5
29/07/2015	21.5	0.2	21.7	4/10/2015	6.8	1.5	8.3
23/07/2015	21.3	1.2	22.5	5/04/2015	3.2	1.4	4.6
8/07/2015	21.2	0.6	21.8	27/05/2015	ND	1.4	1.4
8/08/2015	21.2	0.6	21.8	22/04/2015	9.3	1.3	10.6

Table A-13: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 3 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.8	**33.0**				
21/07/2015	**27.3**	2.0	**29.3**				
22/07/2015	**26.7**	2.5	**29.2**				
30/06/2015	24.5	3.2	**27.7**	16/06/2015	14.9	3.9	18.8
28/06/2015	23.6	1.8	**25.4**	30/03/2015	9.7	3.7	13.4
6/06/2015	23.2	0.8	24.0	19/09/2015	5.6	3.7	9.3
9/08/2015	22.9	1.0	23.9	3/07/2015	20.2	3.3	23.5
22/06/2015	22	1.6	23.6	23/05/2015	9.1	3.3	12.4
10/03/2015	21.6	1.7	23.3	31/10/2015	7.3	3.2	10.5
29/07/2015	21.5	0.5	22.0	20/04/2015	2.1	3.2	5.3
23/07/2015	21.3	0.0	21.3	30/06/2015	24.5	3.2	**27.7**
8/07/2015	21.2	2.5	23.7	27/02/2015	8	3.1	11.1
8/08/2015	21.2	0.1	21.3	20/07/2015	15.3	3.1	18.4

Table A-14: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 3 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.6	**32.8**				
21/07/2015	**27.3**	2.1	**29.4**				
22/07/2015	**26.7**	1.6	**28.3**				
30/06/2015	24.5	2.2	**26.7**	24/04/2015	4.1	4.6	8.7
28/06/2015	23.6	2.4	**26.0**	30/05/2015	7	4.4	11.4
6/06/2015	23.2	1.4	24.6	4/06/2015	20.2	4.0	24.2
9/08/2015	22.9	1.2	24.1	27/06/2015	14.3	3.9	18.2
22/06/2015	22	2.2	24.2	28/05/2015	ND	3.8	3.8
10/03/2015	21.6	0.1	21.7	18/06/2015	8	3.8	11.8
29/07/2015	21.5	1.9	23.4	5/06/2015	20.2	3.6	23.8
23/07/2015	21.3	3.5	24.8	28/07/2015	10.9	3.6	14.5
8/07/2015	21.2	1.0	22.2	7/06/2015	14.7	3.6	18.3
8/08/2015	21.2	1.5	22.7	23/07/2015	21.3	3.5	24.8

Table A-15: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 3 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.7	**31.9**				
21/07/2015	**27.3**	0.9	**28.2**				
22/07/2015	**26.7**	1.0	**27.7**				
30/06/2015	24.5	1.3	**25.8**	1/07/2015	16.4	3.2	19.6
28/06/2015	23.6	1.0	24.6	19/06/2015	13.1	2.5	15.6
6/06/2015	23.2	1.1	24.3	27/03/2015	2.3	2.5	4.8
9/08/2015	22.9	0.6	23.5	14/01/2015	4.7	2.4	7.1
22/06/2015	22	1.0	23.0	24/04/2015	4.1	2.3	6.4
10/03/2015	21.6	0.1	21.7	25/08/2015	3.6	2.3	5.9
29/07/2015	21.5	1.0	22.5	31/05/2015	5.8	2.3	8.1
23/07/2015	21.3	2.2	23.5	30/05/2015	7	2.3	9.3
8/07/2015	21.2	0.9	22.1	27/05/2015	ND	2.2	2.2
8/08/2015	21.2	0.8	22.0	23/07/2015	21.3	2.2	23.5

Table A-16: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 4 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.4	**32.6**				
21/07/2015	**27.3**	1.5	**28.8**				
22/07/2015	**26.7**	2.0	**28.7**				
30/06/2015	24.5	2.5	**27.0**	1/07/2015	16.4	5.4	21.8
28/06/2015	23.6	1.7	**25.3**	23/07/2015	21.3	4.4	**25.7**
6/06/2015	23.2	2.0	**25.2**	19/06/2015	13.1	4.4	17.5
9/08/2015	22.9	1.3	24.2	27/05/2015	ND	4.3	4.3
22/06/2015	22	2.2	24.2	28/05/2015	ND	4.0	4.0
10/03/2015	21.6	0.2	21.8	20/06/2015	14.4	4.0	18.4
29/07/2015	21.5	1.8	23.3	27/03/2015	2.3	4.0	6.3
23/07/2015	21.3	4.4	**25.7**	5/06/2015	20.2	3.9	24.1
8/07/2015	21.2	1.3	22.5	14/01/2015	4.7	3.9	8.6
8/08/2015	21.2	1.4	22.6	23/04/2015	4.5	3.9	8.4
19/07/2015	21.1	1.0	22.1	30/05/2015	7	3.9	10.9
5/07/2015	20.9	3.5	24.4	31/05/2015	5.8	3.7	9.5

Table A-17: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 4 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.3	**31.5**				
21/07/2015	**27.3**	0.3	**27.6**				
22/07/2015	**26.7**	0.9	**27.6**				
30/06/2015	24.5	0.8	**25.3**	1/07/2015	16.4	3.3	19.7
28/06/2015	23.6	0.5	24.1	19/06/2015	13.1	2.7	15.8
6/06/2015	23.2	1.4	24.6	20/06/2015	14.4	2.5	16.9
9/08/2015	22.9	0.2	23.1	23/04/2015	4.5	2.3	6.8
22/06/2015	22	0.7	22.7	16/07/2015	6.2	2.3	8.5
10/03/2015	21.6	0.1	21.7	2/06/2015	19.6	2.1	21.7
29/07/2015	21.5	0.5	22.0	4/10/2015	6.8	2.0	8.8
23/07/2015	21.3	1.8	23.1	5/06/2015	20.2	2.0	22.2
8/07/2015	21.2	0.7	21.9	27/05/2015	ND	2.0	2.0
8/08/2015	21.2	1.0	22.2	4/08/2015	6.4	1.9	8.3

Table A-18: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 4 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	2.7	**33.9**				
21/07/2015	**27.3**	3.1	**30.4**				
22/07/2015	**26.7**	5.1	**31.8**				
30/06/2015	24.5	5.0	**29.5**	16/06/2015	14.9	7.2	22.1
28/06/2015	23.6	2.4	**26.0**	19/09/2015	5.6	6.3	11.9
6/06/2015	23.2	1.0	24.2	23/05/2015	9.1	5.8	14.9
9/08/2015	22.9	1.2	24.1	30/03/2015	9.7	5.8	15.5
22/06/2015	22	2.2	24.2	31/10/2015	7.3	5.8	13.1
10/03/2015	21.6	2.5	24.1	3/07/2015	20.2	5.5	**25.7**
29/07/2015	21.5	0.8	22.3	27/02/2015	8	5.4	13.4
23/07/2015	21.3	0.1	21.4	22/07/2015	**26.7**	5.1	**31.8**
8/07/2015	21.2	4.9	**26.1**	30/06/2015	24.5	5.0	**29.5**
8/08/2015	21.2	0.1	21.3	20/04/2015	2.1	5.0	7.1
19/07/2015	21.1	3.6	24.7	8/07/2015	21.2	4.9	**26.1**
5/07/2015	20.9	0.1	21.0	20/07/2015	15.3	4.9	20.2
24/06/2015	20.7	3.5	24.2	4/05/2015	6.1	4.9	11.0
19/08/2015	20.5	1.3	21.8	26/05/2015	18.5	4.8	23.3
21/08/2015	20.5	0.0	20.5	30/10/2015	8.3	4.7	13.0
4/06/2015	20.2	0.0	20.2	18/09/2015	6.3	4.6	10.9

Table A-19: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 4 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.9	**33.1**				
21/07/2015	**27.3**	2.0	**29.3**				
22/07/2015	**26.7**	2.0	**28.7**				
30/06/2015	24.5	2.6	**27.1**	30/05/2015	7	5.4	12.4
28/06/2015	23.6	2.9	**26.5**	27/06/2015	14.3	5.0	19.3
6/06/2015	23.2	1.7	24.9	4/06/2015	20.2	4.9	**25.1**
9/08/2015	22.9	1.6	24.5	24/04/2015	4.1	4.8	8.9
22/06/2015	22	2.8	24.8	28/05/2015	ND	4.8	4.8
10/03/2015	21.6	0.1	21.7	28/07/2015	10.9	4.4	15.3
29/07/2015	21.5	2.4	23.9	23/07/2015	21.3	4.3	**25.6**
23/07/2015	21.3	4.3	**25.6**	25/05/2015	19.6	4.2	23.8
8/07/2015	21.2	1.0	22.2	5/07/2015	20.9	4.2	**25.1**
8/08/2015	21.2	1.9	23.1	7/06/2015	14.7	4.1	18.8
19/07/2015	21.1	0.4	21.5	3/06/2015	16.7	4.0	20.7
5/07/2015	20.9	4.2	**25.1**	29/05/2015	9.1	4.0	13.1

Table A-20: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 4 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.9	**32.1**				
21/07/2015	**27.3**	1.2	**28.5**				
22/07/2015	**26.7**	1.4	**28.1**				
30/06/2015	24.5	1.8	**26.3**	1/07/2015	16.4	3.9	20.3
28/06/2015	23.6	1.4	25.0	30/05/2015	7	3.2	10.2
6/06/2015	23.2	1.4	24.6	27/03/2015	2.3	3.1	5.4
9/08/2015	22.9	0.9	23.8	23/07/2015	21.3	3.1	24.4
22/06/2015	22	1.5	23.5	31/05/2015	5.8	3.0	8.8
10/03/2015	21.6	0.1	21.7	19/06/2015	13.1	3.0	16.1
29/07/2015	21.5	1.3	22.8	27/05/2015	ND	3.0	3.0
23/07/2015	21.3	3.1	24.4	24/04/2015	4.1	2.9	7.0
8/07/2015	21.2	1.0	22.2	28/05/2015	ND	2.9	2.9
8/08/2015	21.2	1.1	22.3	16/07/2015	6.2	2.8	9.0

Table A-21: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 5 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.6	**32.8**				
21/07/2015	**27.3**	1.6	**28.9**				
22/07/2015	**26.7**	2.1	**28.8**				
30/06/2015	24.5	2.8	**27.3**	1/07/2015	16.4	6.5	22.9
28/06/2015	23.6	2.3	**25.9**	20/06/2015	14.4	5.2	19.6
6/06/2015	23.2	2.3	**25.5**	19/06/2015	13.1	5.1	18.2
9/08/2015	22.9	1.5	24.4	27/05/2015	ND	5.1	5.1
22/06/2015	22	2.7	24.7	23/07/2015	21.3	4.8	**26.1**
10/03/2015	21.6	0.2	21.8	28/05/2015	ND	4.8	4.8
29/07/2015	21.5	2.3	23.8	14/05/2015	16	4.6	20.6
23/07/2015	21.3	4.8	**26.1**	30/05/2015	7	4.4	11.4
8/07/2015	21.2	1.0	22.2	23/04/2015	4.5	4.4	8.9
8/08/2015	21.2	1.9	23.1	24/04/2015	4.1	4.4	8.5
19/07/2015	21.1	0.6	21.7	27/03/2015	2.3	4.3	6.6
5/07/2015	20.9	3.9	24.8	27/06/2015	14.3	4.3	18.6
24/06/2015	20.7	3.5	24.2	2/06/2015	19.6	4.3	23.9

Table A-22: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 5 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.4	**31.6**				
21/07/2015	**27.3**	0.3	**27.6**				
22/07/2015	**26.7**	0.8	**27.5**				
30/06/2015	24.5	0.8	**25.3**	1/07/2015	16.4	4.0	20.4
28/06/2015	23.6	0.6	24.2	19/06/2015	13.1	3.3	16.4
6/06/2015	23.2	1.6	24.8	20/06/2015	14.4	3.1	17.5
9/08/2015	22.9	0.2	23.1	23/04/2015	4.5	2.7	7.2
22/06/2015	22	0.8	22.8	16/07/2015	6.2	2.6	8.8
10/03/2015	21.6	0.1	21.7	2/06/2015	19.6	2.5	22.1
29/07/2015	21.5	0.4	21.9	5/06/2015	20.2	2.3	22.5
23/07/2015	21.3	2.1	23.4	27/05/2015	ND	2.2	2.2
8/07/2015	21.2	0.5	21.7	4/10/2015	6.8	2.2	9.0
8/08/2015	21.2	1.3	22.5	30/08/2015	11.6	2.1	13.7

Table A-23: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 5 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.8	**33.0**				
21/07/2015	**27.3**	2.3	**29.6**				
22/07/2015	**26.7**	5.7	**32.4**				
30/06/2015	24.5	5.2	**29.7**	23/05/2015	9.1	9.3	18.4
28/06/2015	23.6	1.8	**25.4**	16/06/2015	14.9	8.2	23.1
6/06/2015	23.2	1.1	24.3	19/09/2015	5.6	7.5	13.1
9/08/2015	22.9	1.1	24.0	27/02/2015	8	6.5	14.5
22/06/2015	22	2.0	24.0	26/05/2015	18.5	6.0	24.5
10/03/2015	21.6	1.6	23.2	8/07/2015	21.2	5.8	**27.0**
29/07/2015	21.5	0.6	22.1	18/09/2015	6.3	5.7	12.0
23/07/2015	21.3	0.1	21.4	22/07/2015	**26.7**	5.7	**32.4**
8/07/2015	21.2	5.8	**27.0**	31/10/2015	7.3	5.6	12.9
8/08/2015	21.2	0.1	21.3	3/07/2015	20.2	5.6	**25.8**
19/07/2015	21.1	4.1	**25.2**	16/09/2015	7.1	5.6	12.7
5/07/2015	20.9	0.1	21.0	23/11/2015	5.7	5.5	11.2
24/06/2015	20.7	3.2	23.9	30/03/2015	9.7	5.4	15.1
19/08/2015	20.5	1.4	21.9	4/05/2015	6.1	5.2	11.3
21/08/2015	20.5	0.0	20.5	30/06/2015	24.5	5.2	**29.7**
4/06/2015	20.2	0.0	20.2	10/01/2015	7	4.8	11.8
5/06/2015	20.2	0.7	20.9	29/01/2015	4.2	4.4	8.6

Table A-24: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 5 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	2.3	**33.5**				
21/07/2015	**27.3**	2.2	**29.5**				
22/07/2015	**26.7**	2.2	**28.9**				
30/06/2015	24.5	2.9	**27.4**	30/05/2015	7	5.7	12.7
28/06/2015	23.6	3.3	**26.9**	24/04/2015	4.1	5.6	9.7
6/06/2015	23.2	1.9	**25.1**	4/06/2015	20.2	5.5	**25.7**
9/08/2015	22.9	2.0	24.9	27/06/2015	14.3	5.5	19.8
22/06/2015	22	3.3	**25.3**	28/05/2015	ND	5.5	5.5
10/03/2015	21.6	0.1	21.7	25/05/2015	19.6	4.8	24.4
29/07/2015	21.5	2.8	24.3	28/07/2015	10.9	4.7	15.6
23/07/2015	21.3	4.7	**26.0**	23/07/2015	21.3	4.7	**26.0**
8/07/2015	21.2	0.7	21.9	5/07/2015	20.9	4.6	**25.5**
8/08/2015	21.2	2.3	23.5	7/06/2015	14.7	4.6	19.3
19/07/2015	21.1	0.2	21.3	27/05/2015	ND	4.6	4.6
5/07/2015	20.9	4.6	**25.5**	3/06/2015	16.7	4.6	21.3
24/06/2015	20.7	3.2	23.9	23/06/2015	18.4	4.6	23.0
19/08/2015	20.5	1.6	22.1	18/06/2015	8	4.5	12.5

Table A-25: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 5 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.1	**32.3**				
21/07/2015	**27.3**	1.3	**28.6**				
22/07/2015	**26.7**	1.5	**28.2**				
30/06/2015	24.5	2.0	**26.5**	1/07/2015	16.4	4.4	20.8
28/06/2015	23.6	1.8	**25.4**	30/05/2015	7	3.9	10.9
6/06/2015	23.2	1.7	24.9	24/04/2015	4.1	3.7	7.8
9/08/2015	22.9	1.1	24.0	20/06/2015	14.4	3.7	18.1
22/06/2015	22	1.9	23.9	27/05/2015	ND	3.6	3.6
10/03/2015	21.6	0.1	21.7	23/07/2015	21.3	3.6	24.9
29/07/2015	21.5	1.8	23.3	27/03/2015	2.3	3.6	5.9
23/07/2015	21.3	3.6	24.9	27/06/2015	14.3	3.5	17.8
8/07/2015	21.2	0.8	22.0	19/06/2015	13.1	3.5	16.6
8/08/2015	21.2	1.4	22.6	28/05/2015	ND	3.5	3.5

Table A-26: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 6 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.3	**32.5**				
21/07/2015	**27.3**	1.2	**28.5**				
22/07/2015	**26.7**	1.6	**28.3**				
30/06/2015	24.5	2.0	**26.5**	1/07/2015	16.4	4.6	21.0
28/06/2015	23.6	1.9	**25.5**	27/05/2015	ND	4.2	4.2
6/06/2015	23.2	1.8	**25.0**	6/04/2015	3.5	4.1	7.6
9/08/2015	22.9	1.0	23.9	31/05/2015	5.8	4.0	9.8
22/06/2015	22	2.0	24.0	16/07/2015	6.2	4.0	10.2
10/03/2015	21.6	0.1	21.7	30/05/2015	7	4.0	11.0
29/07/2015	21.5	1.7	23.2	27/07/2015	12.7	3.9	16.6
23/07/2015	21.3	3.9	**25.2**	23/07/2015	21.3	3.9	**25.2**
8/07/2015	21.2	0.7	21.9	28/05/2015	ND	3.9	3.9
8/08/2015	21.2	1.9	23.1	24/04/2015	4.1	3.8	7.9
19/07/2015	21.1	0.4	21.5	2/06/2015	19.6	3.8	23.4

Table A-27: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 6 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.3	**31.5**				
21/07/2015	**27.3**	0.2	**27.5**				
22/07/2015	**26.7**	0.7	**27.4**				
30/06/2015	24.5	0.6	**25.1**	1/07/2015	16.4	3.6	20.0
28/06/2015	23.6	0.5	24.1	19/06/2015	13.1	2.6	15.7
6/06/2015	23.2	1.4	24.6	20/06/2015	14.4	2.4	16.8
9/08/2015	22.9	0.2	23.1	31/01/2015	6.8	2.2	9.0
22/06/2015	22	0.7	22.7	23/04/2015	4.5	2.2	6.7
10/03/2015	21.6	0.1	21.7	16/07/2015	6.2	2.0	8.2
29/07/2015	21.5	0.3	21.8	4/10/2015	6.8	2.0	8.8
23/07/2015	21.3	1.6	22.9	2/06/2015	19.6	1.9	21.5
8/07/2015	21.2	0.3	21.5	27/05/2015	ND	1.8	1.8
8/08/2015	21.2	1.0	22.2	4/08/2015	6.4	1.7	8.1

Table A-28: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 6 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	0.7	**31.9**				
21/07/2015	**27.3**	1.4	**28.7**				
22/07/2015	**26.7**	3.7	**30.4**				
30/06/2015	24.5	3.5	**28.0**	23/05/2015	9.1	7.6	16.7
28/06/2015	23.6	0.9	24.5	16/06/2015	14.9	4.9	19.8
6/06/2015	23.2	1.0	24.2	27/02/2015	8	4.8	12.8
9/08/2015	22.9	0.8	23.7	19/09/2015	5.6	4.8	10.4
22/06/2015	22	1.3	23.3	26/05/2015	18.5	4.4	22.9
10/03/2015	21.6	0.9	22.5	16/09/2015	7.1	4.1	11.2
29/07/2015	21.5	0.3	21.8	8/07/2015	21.2	4.0	**25.2**
23/07/2015	21.3	0.1	21.4	23/11/2015	5.7	4.0	9.7
8/07/2015	21.2	4.0	**25.2**	3/07/2015	20.2	3.9	24.1
8/08/2015	21.2	0.1	21.3	22/07/2015	**26.7**	3.7	**30.4**

Table A-29: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 6 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.8	**33.0**				
21/07/2015	**27.3**	1.0	**28.3**				
22/07/2015	**26.7**	1.7	**28.4**				
30/06/2015	24.5	2.3	**26.8**	28/05/2015	ND	4.9	4.9
28/06/2015	23.6	2.9	**26.5**	27/06/2015	14.3	4.9	19.2
6/06/2015	23.2	1.5	24.7	30/05/2015	7	4.8	11.8
9/08/2015	22.9	1.6	24.5	4/06/2015	20.2	4.7	24.9
22/06/2015	22	2.8	24.8	31/07/2015	17.6	4.6	22.2
10/03/2015	21.6	0.1	21.7	12/05/2015	ND	4.5	4.5
29/07/2015	21.5	2.5	24.0	30/07/2015	14.3	4.2	18.5
23/07/2015	21.3	3.5	24.8	28/07/2015	10.9	4.1	15.0
8/07/2015	21.2	0.5	21.7	5/07/2015	20.9	4.1	**25.0**
8/08/2015	21.2	2.1	23.3	3/06/2015	16.7	4.1	20.8
19/07/2015	21.1	0.1	21.2	23/06/2015	18.4	4.0	22.4
5/07/2015	20.9	4.1	**25.0**	2/07/2015	12.4	3.9	16.3

Table A-30: Cumulative 24-hour average $PM_{2.5}$ concentrations (µg/m³) for Scenario 6 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
14/06/2015	**31.2**	1.0	**32.2**				
21/07/2015	**27.3**	1.2	**28.5**				
22/07/2015	**26.7**	1.2	**27.9**				
30/06/2015	24.5	1.5	**26.0**	24/04/2015	4.1	3.6	7.7
28/06/2015	23.6	1.6	**25.2**	14/08/2015	13.2	3.4	16.6
6/06/2015	23.2	1.4	24.6	27/07/2015	12.7	3.3	16.0
9/08/2015	22.9	0.8	23.7	6/04/2015	3.5	3.3	6.8
22/06/2015	22	1.5	23.5	30/05/2015	7	3.2	10.2
10/03/2015	21.6	0.1	21.7	31/05/2015	5.8	3.2	9.0
29/07/2015	21.5	1.4	22.9	1/07/2015	16.4	3.1	19.5
23/07/2015	21.3	3.0	24.3	27/05/2015	ND	3.1	3.1
8/07/2015	21.2	0.5	21.7	16/07/2015	6.2	3.1	9.3
8/08/2015	21.2	1.5	22.7	23/07/2015	21.3	3.0	24.3

Table A-31: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 1 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	7.8	80.7				
26/11/2015	50.9	7.8	58.7				
10/03/2015	49.1	0.5	49.6	1/07/2015	11.1	18.4	29.5
15/12/2015	42.3	0.5	42.8	14/01/2015	8.2	17.3	25.5
12/12/2015	41.5	1.7	43.2	27/03/2015	22.6	14.8	37.4
7/10/2015	38.3	1.8	40.1	24/04/2015	8.8	14.4	23.2
9/03/2015	37.4	1.4	38.8	16/04/2015	18.4	13.8	32.2
11/12/2015	36.3	11.8	48.1	4/10/2015	20.9	13.8	34.7
4/03/2015	35.6	0.4	36.0	6/04/2015	7.7	13.7	21.4
9/02/2015	35.1	0.6	35.7	18/08/2015	12.5	13.3	25.8
17/10/2015	35	0.7	35.7	25/01/2015	12.2	13.1	25.3
7/03/2015	34.2	4.7	38.9	4/08/2015	7.9	13.0	20.9

Table A-32: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 1 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	1.2	74.1				
26/11/2015	50.9	3.0	53.9				
10/03/2015	49.1	0.4	49.5	1/07/2015	11.1	7.3	18.4
15/12/2015	42.3	0.1	42.4	9/06/2015	11.4	7.0	18.4
12/12/2015	41.5	1.6	43.1	4/10/2015	20.9	6.9	27.8
7/10/2015	38.3	0.0	38.3	1/06/2015	11.2	6.8	18.0
9/03/2015	37.4	0.4	37.8	4/08/2015	7.9	6.0	13.9
11/12/2015	36.3	3.1	39.4	19/06/2015	9.1	6.0	15.1
4/03/2015	35.6	0.5	36.1	18/08/2015	12.5	5.8	18.3
9/02/2015	35.1	0.2	35.3	22/04/2015	4.6	5.6	10.2
17/10/2015	35	0.3	35.3	25/01/2015	12.2	5.5	17.7
7/03/2015	34.2	0.9	35.1	30/01/2015	15.7	5.4	21.1

Table A-33: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 1 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**64.8**	0.0	**64.8**				
10/03/2015	46.5	3.5	50.0	30/03/2015	22.9	10.7	33.6
26/11/2015	45.1	0.2	45.3	31/10/2015	19.7	10.3	30.0
7/10/2015	41.5	0.1	41.6	20/04/2015	4.9	10.3	15.2
15/12/2015	41.3	0.3	41.6	16/06/2015	12.9	9.6	22.5
12/12/2015	39.7	1.0	40.7	3/06/2015	12.4	9.4	21.8
9/02/2015	33.2	2.6	35.8	19/09/2015	13.5	9.0	22.5
11/03/2015	32.6	4.3	36.9	3/07/2015	17.2	9.0	26.2
9/03/2015	32.3	2.1	34.4	30/12/2015	13.7	8.9	22.6
21/11/2015	31.8	0.0	31.8	30/06/2015	15.5	8.6	24.1
4/03/2015	31	1.7	32.7	27/02/2015	19.8	8.2	28.0

Table A-34: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 1 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.6**	16.6	**89.2**				
26/11/2015	**56.3**	7.7	**64.0**				
10/03/2015	46.8	0.2	47.0	24/04/2015	11	22.0	33.0
12/12/2015	46.2	0.1	46.3	18/06/2015	9	20.5	29.5
7/10/2015	40.7	4.1	44.8	30/05/2015	10.7	20.3	31.0
15/12/2015	39.9	1.4	41.3	4/06/2015	16.6	19.8	36.4
11/03/2015	37.8	0.5	38.3	20/05/2015	9.6	18.4	28.0
22/07/2015	37.5	6.4	43.9	28/07/2015	16.4	18.0	34.4
17/10/2015	37.4	1.6	39.0	2/07/2015	12.7	17.7	30.4
9/03/2015	37.2	3.5	40.7	28/05/2015	ND	17.7	17.7
9/02/2015	37.1	0.9	38.0	5/06/2015	17.3	17.7	35.0
11/12/2015	36.2	9.4	45.6	31/07/2015	21.2	17.3	38.5
17/03/2015	35.7	0.6	36.3	27/06/2015	19.6	17.3	36.9
4/03/2015	35.6	0.3	35.9	29/05/2015	11.5	17.1	28.6
19/03/2015	34.5	5.7	40.2	30/07/2015	15.4	17.0	32.4
21/11/2015	34.5	1.1	35.6	27/04/2015	12.6	16.9	29.5
20/03/2015	33.7	8.0	41.7	6/05/2015	**72.6**	16.6	**89.2**
7/03/2015	33.6	4.6	38.2	7/06/2015	14.6	16.0	30.6

Table A-35: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 1 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	8.0	80.9				
26/11/2015	50.9	3.7	54.6				
10/03/2015	49.1	0.3	49.4	1/07/2015	11.1	14.5	25.6
15/12/2015	42.3	0.4	42.7	27/03/2015	22.6	13.6	36.2
12/12/2015	41.5	1.0	42.5	24/04/2015	8.8	11.6	20.4
7/10/2015	38.3	1.1	39.4	3/08/2015	9	11.1	20.1
9/03/2015	37.4	1.3	38.7	14/01/2015	8.2	10.5	18.7
11/12/2015	36.3	8.6	44.9	25/08/2015	4.6	10.5	15.1
4/03/2015	35.6	0.4	36.0	6/04/2015	7.7	10.2	17.9
9/02/2015	35.1	0.4	35.5	4/10/2015	20.9	9.8	30.7
17/10/2015	35	0.6	35.6	18/06/2015	5	9.6	14.6
7/03/2015	34.2	3.4	37.6	3/09/2015	6.5	9.4	15.9

Table A-36: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 2 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	9.8	82.7				
26/11/2015	50.9	10.8	61.7				
10/03/2015	49.1	0.6	49.7	1/07/2015	11.1	18.9	30.0
15/12/2015	42.3	0.8	43.1	14/01/2015	8.2	16.1	24.3
12/12/2015	41.5	1.5	43.0	19/06/2015	9.1	15.6	24.7
7/10/2015	38.3	2.4	40.7	28/05/2015	12.2	15.4	27.6
9/03/2015	37.4	2.2	39.6	31/05/2015	5.1	14.8	19.9
11/12/2015	36.3	13.0	49.3	24/04/2015	8.8	14.6	23.4
4/03/2015	35.6	0.5	36.1	4/08/2015	7.9	14.6	22.5
9/02/2015	35.1	0.9	36.0	27/03/2015	22.6	14.3	36.9
17/10/2015	35	0.9	35.9	25/08/2015	4.6	14.3	18.9
7/03/2015	34.2	6.2	40.4	27/05/2015	13.7	14.3	28.0

Table A-37: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 2 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	2.2	75.1				
26/11/2015	50.9	3.6	54.5				
10/03/2015	49.1	0.5	49.6	1/07/2015	11.1	10.6	21.7
15/12/2015	42.3	0.2	42.5	19/06/2015	9.1	8.4	17.5
12/12/2015	41.5	1.7	43.2	9/06/2015	11.4	7.9	19.3
7/10/2015	38.3	0.2	38.5	4/10/2015	20.9	7.7	28.6
9/03/2015	37.4	0.6	38.0	4/08/2015	7.9	7.4	15.3
11/12/2015	36.3	4.4	40.7	18/08/2015	12.5	7.2	19.7
4/03/2015	35.6	0.5	36.1	25/01/2015	12.2	7.0	19.2
9/02/2015	35.1	0.3	35.4	23/04/2015	7.5	6.8	14.3
17/10/2015	35	0.5	35.5	22/04/2015	4.6	6.8	11.4
7/03/2015	34.2	1.9	36.1	6/11/2015	17.4	6.4	23.8

Table A-38: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 2 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	64.8	0.0	64.8				
10/03/2015	46.5	7.7	54.2	30/03/2015	22.9	16.8	39.7
26/11/2015	45.1	0.4	45.5	16/06/2015	12.9	14.9	27.8
7/10/2015	41.5	0.2	41.7	20/04/2015	4.9	14.8	19.7
15/12/2015	41.3	0.5	41.8	19/09/2015	13.5	14.5	28.0
12/12/2015	39.7	1.5	41.2	31/10/2015	19.7	14.4	34.1
9/02/2015	33.2	4.3	37.5	27/02/2015	19.8	13.6	33.4
11/03/2015	32.6	7.5	40.1	3/07/2015	17.2	13.2	30.4
9/03/2015	32.3	4.0	36.3	20/07/2015	14.5	13.2	27.7
21/11/2015	31.8	0.0	31.8	30/10/2015	19.2	12.9	32.1
4/03/2015	31	2.7	33.7	26/09/2015	11.7	12.5	24.2

Table A-39: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 2 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.6**	14.9	**87.5**				
26/11/2015	**56.3**	8.0	**64.3**				
10/03/2015	46.8	0.3	47.1	30/05/2015	10.7	21.8	32.5
12/12/2015	46.2	0.1	46.3	24/04/2015	11	21.2	32.2
7/10/2015	40.7	5.0	45.7	4/06/2015	16.6	20.3	36.9
15/12/2015	39.9	1.7	41.6	27/06/2015	19.6	19.2	38.8
11/03/2015	37.8	0.6	38.4	18/06/2015	9	18.8	27.8
22/07/2015	37.5	6.5	44.0	28/07/2015	16.4	18.3	34.7
17/10/2015	37.4	1.8	39.2	28/05/2015	ND	18.0	18.0
9/03/2015	37.2	3.6	40.8	20/05/2015	9.6	17.4	27.0
9/02/2015	37.1	0.8	37.9	31/07/2015	21.2	17.0	38.2
11/12/2015	36.2	9.3	45.5	12/05/2015	11.3	16.7	28.0
17/03/2015	35.7	0.8	36.5	29/05/2015	11.5	16.7	28.2
4/03/2015	35.6	0.3	35.9	7/06/2015	14.6	16.6	31.2
19/03/2015	34.5	6.1	40.6	5/06/2015	17.3	16.6	33.9
21/11/2015	34.5	1.4	35.9	5/07/2015	18.5	16.6	35.1
20/03/2015	33.7	8.5	42.2	2/07/2015	12.7	16.4	29.1
7/03/2015	33.6	5.1	38.7	30/07/2015	15.4	16.3	31.7

Table A-40: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 2 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.9**	8.8	**81.7**				
26/11/2015	**50.9**	5.2	**56.1**				
10/03/2015	49.1	0.4	49.5	1/07/2015	11.1	15.3	26.4
15/12/2015	42.3	0.5	42.8	24/04/2015	8.8	13.0	21.8
12/12/2015	41.5	0.8	42.3	27/03/2015	22.6	12.6	35.2
7/10/2015	38.3	1.5	39.8	31/05/2015	5.1	12.2	17.3
9/03/2015	37.4	1.9	39.3	25/08/2015	4.6	11.7	16.3
11/12/2015	36.3	8.9	45.2	3/08/2015	9	11.6	20.6
4/03/2015	35.6	0.4	36.0	14/01/2015	8.2	11.4	19.6
9/02/2015	35.1	0.5	35.6	30/05/2015	9.8	11.0	20.8
17/10/2015	35	0.8	35.8	27/07/2015	8.6	10.9	19.5
7/03/2015	34.2	4.4	38.6	19/06/2015	9.1	10.8	19.9

Table A-41: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 3 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	8.4	81.3				
26/11/2015	50.9	10.2	61.1				
10/03/2015	49.1	0.7	49.8	1/07/2015	11.1	21.3	32.4
15/12/2015	42.3	0.8	43.1	14/01/2015	8.2	18.1	26.3
12/12/2015	41.5	1.7	43.2	19/06/2015	9.1	16.8	25.9
7/10/2015	38.3	2.7	41.0	27/05/2015	13.7	15.5	29.2
9/03/2015	37.4	2.1	39.5	27/03/2015	22.6	15.5	38.1
11/12/2015	36.3	13.2	49.5	31/05/2015	5.1	15.2	20.3
4/03/2015	35.6	0.5	36.1	28/05/2015	12.2	15.2	27.4
9/02/2015	35.1	1.1	36.2	18/08/2015	12.5	14.9	27.4
17/10/2015	35	0.9	35.9	25/08/2015	4.6	14.8	19.4
7/03/2015	34.2	6.7	40.9	30/05/2015	9.8	14.7	24.5

Table A-42: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 3 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	2.6	75.5				
26/11/2015	50.9	3.3	54.2				
10/03/2015	49.1	0.6	49.7	1/07/2015	11.1	11.7	22.8
15/12/2015	42.3	0.2	42.5	19/06/2015	9.1	9.5	18.6
12/12/2015	41.5	1.7	43.2	4/10/2015	20.9	8.2	29.1
7/10/2015	38.3	0.3	38.6	9/06/2015	11.4	8.2	19.6
9/03/2015	37.4	0.6	38.0	16/07/2015	6	7.8	13.8
11/12/2015	36.3	4.7	41.0	23/04/2015	7.5	7.8	15.3
4/03/2015	35.6	0.6	36.2	20/06/2015	9.6	7.5	17.1
9/02/2015	35.1	0.3	35.4	22/04/2015	4.6	7.2	11.8
17/10/2015	35	0.4	35.4	4/08/2015	7.9	7.1	15.0
7/03/2015	34.2	2.4	36.6	18/08/2015	12.5	7.0	19.5

Table A-43: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 3 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**64.8**	0.0	**64.8**				
10/03/2015	46.5	9.2	**55.7**	16/06/2015	12.9	20.1	33.0
26/11/2015	45.1	0.4	45.5	30/03/2015	22.9	19.6	42.5
7/10/2015	41.5	0.2	41.7	19/09/2015	13.5	18.8	32.3
15/12/2015	41.3	0.5	41.8	31/10/2015	19.7	16.9	36.6
12/12/2015	39.7	1.7	41.4	20/04/2015	4.9	16.8	21.7
9/02/2015	33.2	5.5	38.7	3/07/2015	17.2	16.7	33.9
11/03/2015	32.6	9.7	42.3	23/05/2015	12.6	16.5	29.1
9/03/2015	32.3	4.7	37.0	27/02/2015	19.8	16.4	36.2
21/11/2015	31.8	0.0	31.8	30/06/2015	15.5	15.9	31.4
4/03/2015	31	2.7	33.7	4/05/2015	12.1	15.8	27.9

Table A-44: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 3 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.6**	16.7	**89.3**				
26/11/2015	**56.3**	7.5	**63.8**				
10/03/2015	46.8	0.4	47.2	24/04/2015	11	24.4	35.4
12/12/2015	46.2	0.1	46.3	30/05/2015	10.7	22.7	33.4
7/10/2015	40.7	5.0	45.7	4/06/2015	16.6	20.9	37.5
15/12/2015	39.9	1.7	41.6	18/06/2015	9	20.3	29.3
11/03/2015	37.8	0.6	38.4	27/06/2015	19.6	19.4	39.0
22/07/2015	37.5	7.2	44.7	28/05/2015	ND	18.8	18.8
17/10/2015	37.4	1.7	39.1	28/07/2015	16.4	18.7	35.1
9/03/2015	37.2	4.1	41.3	7/06/2015	14.6	18.5	33.1
9/02/2015	37.1	0.9	38.0	20/05/2015	9.6	18.1	27.7
11/12/2015	36.2	9.6	45.8	5/06/2015	17.3	17.8	35.1
17/03/2015	35.7	0.8	36.5	14/08/2015	14.6	17.7	32.3
4/03/2015	35.6	0.3	35.9	5/07/2015	18.5	17.7	36.2
19/03/2015	34.5	6.2	40.7	29/05/2015	11.5	17.2	28.7
21/11/2015	34.5	1.1	35.6	8/09/2015	11.6	17.1	28.7
20/03/2015	33.7	9.3	43.0	31/07/2015	21.2	16.9	38.1
7/03/2015	33.6	5.5	39.1	6/05/2015	**72.6**	16.7	**89.3**
10/10/2015	33.1	4.7	37.8	3/06/2015	19.4	16.6	36.0

Table A-45: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 3 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	8.0	80.9				
26/11/2015	50.9	4.7	55.6				
10/03/2015	49.1	0.5	49.6	1/07/2015	11.1	16.8	27.9
15/12/2015	42.3	0.5	42.8	27/03/2015	22.6	13.5	36.1
12/12/2015	41.5	1.0	42.5	24/04/2015	8.8	12.4	21.2
7/10/2015	38.3	1.7	40.0	30/05/2015	9.8	12.1	21.9
9/03/2015	37.4	1.9	39.3	14/01/2015	8.2	12.1	20.3
11/12/2015	36.3	9.3	45.6	25/08/2015	4.6	12.0	16.6
4/03/2015	35.6	0.4	36.0	31/05/2015	5.1	12.0	17.1
9/02/2015	35.1	0.6	35.7	19/06/2015	9.1	11.7	20.8
17/10/2015	35	0.8	35.8	3/08/2015	9	10.7	19.7
7/03/2015	34.2	4.8	39.0	27/05/2015	13.7	10.6	24.3

Table A-46: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 4 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	10.9	83.8				
26/11/2015	50.9	9.4	60.3				
10/03/2015	49.1	0.7	49.8	1/07/2015	11.1	26.3	37.4
15/12/2015	42.3	1.0	43.3	27/03/2015	22.6	20.8	43.4
12/12/2015	41.5	1.7	43.2	19/06/2015	9.1	20.0	29.1
7/10/2015	38.3	3.5	41.8	14/01/2015	8.2	19.2	27.4
9/03/2015	37.4	2.6	40.0	27/05/2015	13.7	19.1	32.8
11/12/2015	36.3	15.2	51.5	30/05/2015	9.8	19.0	28.8
4/03/2015	35.6	0.6	36.2	28/05/2015	12.2	18.7	30.9
9/02/2015	35.1	1.3	36.4	23/07/2015	13.5	18.7	32.2
17/10/2015	35	1.0	36.0	31/05/2015	5.1	17.9	23.0
7/03/2015	34.2	7.7	41.9	5/06/2015	10	17.7	27.7
19/03/2015	34.2	8.6	42.8	23/04/2015	7.5	17.6	25.1
11/03/2015	34	0.8	34.8	16/04/2015	18.4	17.5	35.9
17/04/2015	33.4	1.9	35.3	25/08/2015	4.6	17.3	21.9
8/03/2015	33.3	3.3	36.6	20/06/2015	9.6	17.3	26.9
17/03/2015	33.2	0.8	34.0	30/08/2015	10.3	16.8	27.1

Table A-47: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 4 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.9**	3.6	**76.5**				
26/11/2015	**50.9**	4.0	**54.9**				
10/03/2015	49.1	0.6	49.7	1/07/2015	11.1	15.6	26.7
15/12/2015	42.3	0.3	42.6	19/06/2015	9.1	12.3	21.4
12/12/2015	41.5	1.8	43.3	20/06/2015	9.6	10.6	20.2
7/10/2015	38.3	0.7	39.0	4/10/2015	20.9	10.2	31.1
9/03/2015	37.4	0.7	38.1	2/06/2015	11	10.1	21.1
11/12/2015	36.3	5.8	42.1	23/04/2015	7.5	10.0	17.5
4/03/2015	35.6	0.7	36.3	16/07/2015	6	10.0	16.0
9/02/2015	35.1	0.4	35.5	4/08/2015	7.9	9.5	17.4
17/10/2015	35	0.6	35.6	9/06/2015	11.4	9.4	20.8
7/03/2015	34.2	3.7	37.9	5/06/2015	10	9.0	19.0

Table A-48: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 4 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**64.8**	0.0	**64.8**				
10/03/2015	46.5	12.3	**58.8**	16/06/2015	12.9	34.8	47.7
26/11/2015	45.1	0.6	45.7	19/09/2015	13.5	29.6	43.1
7/10/2015	41.5	0.3	41.8	30/03/2015	22.9	28.4	**51.3**
15/12/2015	41.3	0.6	41.9	31/10/2015	19.7	28.3	48.0
12/12/2015	39.7	2.1	41.8	23/05/2015	12.6	27.7	40.3
9/02/2015	33.2	9.1	42.3	27/02/2015	19.8	26.1	45.9
11/03/2015	32.6	15.9	48.5	22/07/2015	29.2	25.9	**55.1**
9/03/2015	32.3	6.9	39.2	3/07/2015	17.2	25.8	43.0
21/11/2015	31.8	0.0	31.8	20/04/2015	4.9	23.9	28.8
4/03/2015	31	2.9	33.9	30/06/2015	15.5	23.3	38.8
12/03/2015	29.9	1.2	31.1	4/05/2015	12.1	23.0	35.1
17/03/2015	29.8	9.0	38.8	20/07/2015	14.5	22.9	37.4
24/11/2015	29.6	4.0	33.6	30/10/2015	19.2	22.8	42.0
22/07/2015	29.2	25.9	**55.1**	8/07/2015	13.3	22.7	36.0
14/12/2015	29.1	9.8	38.9	26/05/2015	11.1	22.2	33.3
7/03/2015	28.9	3.5	32.4	16/02/2015	20.7	21.8	42.5
8/12/2015	28.9	6.9	35.8	8/03/2015	26.6	21.5	48.1
17/04/2015	28.4	3.0	31.4	18/09/2015	15	21.5	36.5

Table A-49: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 4 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.6**	17.5	**90.1**				
26/11/2015	**56.3**	8.7	**65.0**				
10/03/2015	46.8	0.4	47.2	24/04/2015	11	26.3	37.3
12/12/2015	46.2	0.1	46.3	30/05/2015	10.7	26.0	36.7
7/10/2015	40.7	6.3	47.0	4/06/2015	16.6	24.0	40.6
15/12/2015	39.9	1.9	41.8	27/06/2015	19.6	23.2	42.8
11/03/2015	37.8	0.8	38.6	28/05/2015	ND	22.7	22.7
22/07/2015	37.5	8.4	45.9	18/06/2015	9	22.5	31.5
17/10/2015	37.4	1.7	39.1	28/07/2015	16.4	22.2	38.6
9/03/2015	37.2	4.2	41.4	7/06/2015	14.6	20.6	35.2
9/02/2015	37.1	0.9	38.0	5/07/2015	18.5	20.5	39.0
11/12/2015	36.2	10.7	46.9	20/05/2015	9.6	20.3	29.9
17/03/2015	35.7	1.0	36.7	31/07/2015	21.2	20.1	41.3
4/03/2015	35.6	0.4	36.0	29/05/2015	11.5	19.9	31.4
19/03/2015	34.5	7.2	41.7	30/07/2015	15.4	19.8	35.2
21/11/2015	34.5	1.4	35.9	25/05/2015	19.4	19.8	39.2
20/03/2015	33.7	11.1	44.8	3/06/2015	19.4	19.5	38.9
7/03/2015	33.6	6.5	40.1	5/06/2015	17.3	19.4	36.7
10/10/2015	33.1	5.3	38.4	14/08/2015	14.6	19.4	34.0
5/03/2015	33	7.1	40.1	23/07/2015	18.4	18.7	37.1
24/11/2015	33	0.0	33.0	23/06/2015	18.5	18.5	37.0
17/04/2015	32.8	1.0	33.8	12/05/2015	11.3	18.5	29.8
15/04/2015	32.5	4.3	36.8	5/05/2015	10.7	18.1	28.8

Table A-50: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 4 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.9**	10.1	**83.0**				
26/11/2015	**50.9**	4.9	**55.8**				
10/03/2015	49.1	0.5	49.6	1/07/2015	11.1	19.6	30.7
15/12/2015	42.3	0.7	43.0	27/03/2015	22.6	16.8	39.4
12/12/2015	41.5	0.9	42.4	30/05/2015	9.8	16.0	25.8
7/10/2015	38.3	2.3	40.6	31/05/2015	5.1	14.8	19.9
9/03/2015	37.4	2.5	39.9	24/04/2015	8.8	14.6	23.4
11/12/2015	36.3	10.6	46.9	19/06/2015	9.1	13.8	22.9
4/03/2015	35.6	0.5	36.1	25/08/2015	4.6	13.5	18.1
9/02/2015	35.1	0.7	35.8	3/08/2015	9	13.3	22.3
17/10/2015	35	0.9	35.9	27/05/2015	13.7	13.2	26.9
7/03/2015	34.2	5.7	39.9	28/05/2015	12.2	13.1	25.3

Table A-51: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 5 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	12.6	85.5				
26/11/2015	50.9	6.4	57.3				
10/03/2015	49.1	0.7	49.8	1/07/2015	11.1	29.7	40.8
15/12/2015	42.3	0.9	43.2	19/06/2015	9.1	22.2	31.3
12/12/2015	41.5	1.4	42.9	14/05/2015	15.7	21.8	37.5
7/10/2015	38.3	4.7	43.0	20/06/2015	9.6	21.3	30.9
9/03/2015	37.4	3.1	40.5	27/05/2015	13.7	21.1	34.8
11/12/2015	36.3	14.1	50.4	27/03/2015	22.6	21.1	43.7
4/03/2015	35.6	0.6	36.2	28/05/2015	12.2	21.0	33.2
9/02/2015	35.1	1.2	36.3	30/05/2015	9.8	20.8	30.6
17/10/2015	35	1.0	36.0	24/04/2015	8.8	20.7	29.5
7/03/2015	34.2	9.5	43.7	23/07/2015	13.5	19.2	32.7
19/03/2015	34.2	8.3	42.5	2/06/2015	11	19.2	30.2
11/03/2015	34	0.9	34.9	23/04/2015	7.5	19.1	26.6
17/04/2015	33.4	1.9	35.3	27/06/2015	12.6	19.0	31.6
8/03/2015	33.3	3.0	36.3	14/01/2015	8.2	18.7	26.9
17/03/2015	33.2	0.7	33.9	6/04/2015	7.7	18.6	26.3
30/11/2015	32.5	6.8	39.3	31/05/2015	5.1	18.4	23.5
14/12/2015	32.1	4.4	36.5	5/06/2015	10	18.0	28.0
12/03/2015	31.8	7.4	39.2	25/08/2015	4.6	17.9	22.5

Table A-52: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 5 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	4.1	77.0				
26/11/2015	50.9	4.6	55.5				
10/03/2015	49.1	0.5	49.6	1/07/2015	11.1	18.0	29.1
15/12/2015	42.3	0.3	42.6	19/06/2015	9.1	14.1	23.2
12/12/2015	41.5	1.8	43.3	20/06/2015	9.6	12.6	22.2
7/10/2015	38.3	0.6	38.9	23/04/2015	7.5	11.3	18.8
9/03/2015	37.4	0.6	38.0	2/06/2015	11	11.2	22.2
11/12/2015	36.3	6.2	42.5	16/07/2015	6	11.0	17.0
4/03/2015	35.6	0.7	36.3	4/08/2015	7.9	10.1	18.0
9/02/2015	35.1	0.4	35.5	4/10/2015	20.9	10.0	30.9
17/10/2015	35	0.6	35.6	22/04/2015	4.6	9.6	14.2
7/03/2015	34.2	3.4	37.6	5/06/2015	10	9.6	19.6

Table A-53: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 5 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**64.8**	0.0	**64.8**				
10/03/2015	46.5	7.8	**54.3**	23/05/2015	12.6	42.5	**55.1**
26/11/2015	45.1	0.5	45.6	16/06/2015	12.9	36.1	49.0
7/10/2015	41.5	0.4	41.9	19/09/2015	13.5	33.8	47.3
15/12/2015	41.3	0.7	42.0	27/02/2015	19.8	30.3	**50.1**
12/12/2015	39.7	1.9	41.6	22/07/2015	29.2	26.2	**55.4**
9/02/2015	33.2	6.0	39.2	31/10/2015	19.7	26.0	45.7
11/03/2015	32.6	14.3	46.9	16/09/2015	17.3	25.8	43.1
9/03/2015	32.3	6.0	38.3	8/07/2015	13.3	25.8	39.1
21/11/2015	31.8	0.0	31.8	26/05/2015	11.1	25.8	36.9
4/03/2015	31	2.1	33.1	23/11/2015	22.4	25.7	48.1
12/03/2015	29.9	1.6	31.5	18/09/2015	15	25.5	40.5
17/03/2015	29.8	4.3	34.1	30/03/2015	22.9	25.5	48.4
24/11/2015	29.6	0.8	30.4	3/07/2015	17.2	24.8	42.0
22/07/2015	29.2	26.2	**55.4**	4/05/2015	12.1	23.0	35.1
14/12/2015	29.1	6.1	35.2	10/01/2015	19.2	22.8	42.0
7/03/2015	28.9	2.2	31.1	30/06/2015	15.5	22.7	38.2

Table A-54: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 5 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.6**	17.5	**90.1**				
26/11/2015	**56.3**	9.1	**65.4**				
10/03/2015	46.8	0.5	47.3	24/04/2015	11	26.8	37.8
12/12/2015	46.2	0.1	46.3	30/05/2015	10.7	25.9	36.6
7/10/2015	40.7	7.4	48.1	4/06/2015	16.6	25.7	42.3
15/12/2015	39.9	1.8	41.7	27/06/2015	19.6	24.8	44.4
11/03/2015	37.8	0.9	38.7	28/05/2015	ND	24.1	24.1
22/07/2015	37.5	8.4	45.9	28/07/2015	16.4	22.0	38.4
17/10/2015	37.4	1.5	38.9	18/06/2015	9	21.8	30.8
9/03/2015	37.2	4.1	41.3	5/07/2015	18.5	21.5	40.0
9/02/2015	37.1	0.7	37.8	7/06/2015	14.6	21.4	36.0
11/12/2015	36.2	10.6	46.8	3/06/2015	19.4	21.1	40.5
17/03/2015	35.7	0.9	36.6	31/07/2015	21.2	20.9	42.1
4/03/2015	35.6	0.4	36.0	23/06/2015	18.5	20.9	39.4
19/03/2015	34.5	7.1	41.6	25/05/2015	19.4	20.9	40.3
21/11/2015	34.5	1.6	36.1	30/07/2015	15.4	20.4	35.8
20/03/2015	33.7	13.5	47.2	14/08/2015	14.6	19.6	34.2
7/03/2015	33.6	6.7	40.3	12/05/2015	11.3	19.6	30.9
10/10/2015	33.1	5.4	38.5	27/05/2015	ND	19.1	19.1
5/03/2015	33	6.9	39.9	20/05/2015	9.6	18.9	28.5

24/11/2015	33	0.0	33.0	11/07/2015	10.7	18.8	29.5
17/04/2015	32.8	1.1	33.9	29/05/2015	11.5	18.7	30.2
15/04/2015	32.5	4.5	37.0	5/05/2015	10.7	18.7	29.4
14/12/2015	31.7	2.2	33.9	2/07/2015	12.7	18.7	31.4
29/03/2015	31.2	1.0	32.2	4/07/2015	21.8	18.5	40.3

Table A-55: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 5 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.9**	11.6	**84.5**				
26/11/2015	**50.9**	3.5	**54.4**				
10/03/2015	49.1	0.5	49.6	1/07/2015	11.1	20.0	31.1
15/12/2015	42.3	0.7	43.0	30/05/2015	9.8	18.3	28.1
12/12/2015	41.5	0.8	42.3	27/03/2015	22.6	17.8	40.4
7/10/2015	38.3	3.2	41.5	24/04/2015	8.8	17.5	26.3
9/03/2015	37.4	2.9	40.3	6/04/2015	7.7	15.6	23.3
11/12/2015	36.3	11.0	47.3	27/06/2015	12.6	15.4	28.0
4/03/2015	35.6	0.5	36.1	14/05/2015	15.7	15.3	31.0
9/02/2015	35.1	0.7	35.8	14/08/2015	10.2	15.2	25.4
17/10/2015	35	0.9	35.9	27/05/2015	13.7	15.1	28.8
7/03/2015	34.2	6.9	41.1	31/05/2015	5.1	15.1	20.2

Table A-56: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 6 – Receiver location 86a

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	**72.9**	12.6	**85.5**				
26/11/2015	**50.9**	4.1	**55.0**				
10/03/2015	49.1	0.5	49.6	1/07/2015	11.1	21.0	32.1
15/12/2015	42.3	0.7	43.0	27/07/2015	8.6	20.1	28.7
12/12/2015	41.5	0.9	42.4	31/05/2015	5.1	20.0	25.1
7/10/2015	38.3	3.6	41.9	30/05/2015	9.8	19.8	29.6
9/03/2015	37.4	3.0	40.4	6/04/2015	7.7	19.8	27.5
11/12/2015	36.3	12.9	49.2	24/04/2015	8.8	19.3	28.1
4/03/2015	35.6	0.6	36.2	16/07/2015	6	19.1	25.1
9/02/2015	35.1	0.6	35.7	14/05/2015	15.7	18.9	34.6
17/10/2015	35	1.0	36.0	3/08/2015	9	18.9	27.9
7/03/2015	34.2	7.7	41.9	2/06/2015	11	18.4	29.4
19/03/2015	34.2	6.7	40.9	27/05/2015	13.7	18.2	31.9
11/03/2015	34	0.8	34.8	28/05/2015	12.2	17.9	30.1
17/04/2015	33.4	1.9	35.3	14/08/2015	10.2	17.9	28.1
8/03/2015	33.3	2.0	35.3	9/09/2015	7.9	17.6	25.5
17/03/2015	33.2	0.4	33.6	27/03/2015	22.6	16.6	39.2

Table A-57: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 6 – Receiver location 86b

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	3.7	76.6				
26/11/2015	50.9	5.0	55.9				
10/03/2015	49.1	0.3	49.4	1/07/2015	11.1	17.3	28.4
15/12/2015	42.3	0.3	42.6	19/06/2015	9.1	11.6	20.7
12/12/2015	41.5	1.3	42.8	31/01/2015	21	10.2	31.2
7/10/2015	38.3	0.4	38.7	20/06/2015	9.6	10.0	19.6
9/03/2015	37.4	0.5	37.9	23/04/2015	7.5	9.6	17.1
11/12/2015	36.3	5.6	41.9	4/10/2015	20.9	9.5	30.4
4/03/2015	35.6	0.7	36.3	2/06/2015	11	9.0	20.0
9/02/2015	35.1	0.2	35.3	16/07/2015	6	8.9	14.9
17/10/2015	35	0.6	35.6	27/03/2015	22.6	8.7	31.3
7/03/2015	34.2	2.5	36.7	4/08/2015	7.9	8.7	16.6

Table A-58: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 6 – Receiver location 169

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	64.8	0.0	64.8				
10/03/2015	46.5	4.3	50.8	23/05/2015	12.6	36.1	48.7
26/11/2015	45.1	0.5	45.6	27/02/2015	19.8	22.7	42.5
7/10/2015	41.5	0.3	41.8	16/06/2015	12.9	22.2	35.1
15/12/2015	41.3	0.6	41.9	19/09/2015	13.5	22.1	35.6
12/12/2015	39.7	2.8	42.5	16/09/2015	17.3	19.6	36.9
9/02/2015	33.2	3.2	36.4	26/05/2015	11.1	19.6	30.7
11/03/2015	32.6	8.0	40.6	23/11/2015	22.4	19.2	41.6
9/03/2015	32.3	3.9	36.2	8/07/2015	13.3	18.5	31.8
21/11/2015	31.8	0.0	31.8	3/07/2015	17.2	18.1	35.3
4/03/2015	31	1.8	32.8	22/07/2015	29.2	17.2	46.4

Table A-59: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 6 – Receiver location 225

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.6	11.3	83.9				
26/11/2015	56.3	9.6	65.9				
10/03/2015	46.8	0.4	47.2	31/07/2015	21.2	23.5	44.7
12/12/2015	46.2	0.0	46.2	12/05/2015	11.3	22.7	34.0
7/10/2015	40.7	7.6	48.3	28/05/2015	ND	22.6	22.6
15/12/2015	39.9	1.5	41.4	27/06/2015	19.6	22.6	42.2
11/03/2015	37.8	0.9	38.7	30/05/2015	10.7	22.5	33.2
22/07/2015	37.5	6.7	44.2	4/06/2015	16.6	22.4	39.0
17/10/2015	37.4	1.1	38.5	30/07/2015	15.4	20.6	36.0
9/03/2015	37.2	2.4	39.6	28/07/2015	16.4	20.1	36.5
9/02/2015	37.1	0.4	37.5	5/07/2015	18.5	20.1	38.6
11/12/2015	36.2	10.6	46.8	2/07/2015	12.7	20.0	32.7
17/03/2015	35.7	0.6	36.3	8/06/2015	9.2	19.8	29.0
4/03/2015	35.6	0.3	35.9	3/06/2015	19.4	19.4	38.8
19/03/2015	34.5	5.4	39.9	23/06/2015	18.5	19.2	37.7
21/11/2015	34.5	1.6	36.1	9/05/2015	13.9	18.5	32.4
20/03/2015	33.7	12.2	45.9	24/04/2015	11	18.1	29.1
7/03/2015	33.6	6.0	39.6	27/08/2015	7.1	18.0	25.1
10/10/2015	33.1	4.5	37.6	15/09/2015	20.4	17.9	38.3
5/03/2015	33	5.8	38.8	26/08/2015	4.3	17.5	21.8
24/11/2015	33	0.0	33.0	20/11/2015	26.2	17.5	43.7
17/04/2015	32.8	0.9	33.7	6/10/2015	28	17.4	45.4
15/04/2015	32.5	3.7	36.2	29/05/2015	11.5	17.3	28.8

Table A-60: Cumulative 24-hour average PM_{10} concentrations (µg/m³) for Scenario 6 – Receiver location 783

Ranked by Highest to Lowest Background Concentrations				Ranked by Highest to Lowest Predicted Incremental Concentration			
Date	Measured background level	Predicted increment	Total cumulative 24-hr average level	Date	Measured background level	Predicted increment	Total cumulative 24-hr average level
6/05/2015	72.9	10.7	83.6				
26/11/2015	50.9	2.5	53.4				
10/03/2015	49.1	0.4	49.5	24/04/2015	8.8	17.9	26.7
15/12/2015	42.3	0.6	42.9	14/08/2015	10.2	17.5	27.7
12/12/2015	41.5	0.5	42.0	27/07/2015	8.6	17.1	25.7
7/10/2015	38.3	2.5	40.8	31/05/2015	5.1	16.2	21.3
9/03/2015	37.4	3.3	40.7	6/04/2015	7.7	15.7	23.4
11/12/2015	36.3	9.7	46.0	30/05/2015	9.8	15.7	25.5
4/03/2015	35.6	0.5	36.1	16/07/2015	6	15.0	21.0
9/02/2015	35.1	0.4	35.5	3/08/2015	9	14.9	23.9
17/10/2015	35	0.8	35.8	1/07/2015	11.1	14.4	25.5
7/03/2015	34.2	5.7	39.9	14/05/2015	15.7	13.5	29.2

MACHEnergy

Mount Pleasant Operation

A JOINT VENTURE WITH JCDA Japan Coal Development Australia

Attachment C

Supplementary Advice – Noise and Vibration

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WILKINSON MURRAY

May 11, 2021

Chris Lauritzen
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Suite 1, Level 3, 426 King Street
Newcastle West NSW 2302

Dear Chris

Re: Mount Pleasant Optimisation Project - Response to NSW EPA Submissions

Introduction

MACH Energy Australia Pty Ltd (MACH Energy) are preparing responses to government agency submissions on the proposed Mount Pleasant Optimisation Project (Application State Significant Development [SSD] 10418). The NSW Environment Protection Authority (EPA) has undertaken a review of the noise and blasting assessment prepared for the Mount Pleasant Optimisation Project (the Noise and Blasting Assessment) and made comments or requested clarification regarding:

- the meteorological conditions modelled;
- the consideration of annoying noise characteristics;
- residual impacts under the *Voluntary Land Acquisition and Mitigation Policy (VLAMP)*; and
- the network rail noise assessment.

RWDI Australia (RWDI) has been commissioned to assist with the preparation of responses to the EPA's comments and requests for clarification. This letter report provides additional information relating to the consideration of annoying noise characteristics and the network rail noise assessment.

Annoying Noise Characteristics

The NIA has only considered low frequency noise (LFN). While tonality and intermittency are unlikely to be relevant for a large scale mine, they should be considered in the NIA. In terms of low frequency noise, while the assessment methodology is considered acceptable, the following points require clarification:

- *The results are atypical for a large-scale mining operation. The low frequency noise assessment should be confirmed with specific attention as to why low frequency content appears to be significantly lower than comparable mining operations with receivers at similar offset distances; and,*

- *The LFN assessment has relied upon measurement data acquired in the village of Bulga, which is an acceptable approach for a greenfield site. However, Mt Pleasant is a brownfield site. An explanation is required as to why data from Mt Pleasant has not been used to assist in the low frequency analysis. The applicability of the "LF tail" used in the assessment should be validated against measurements from existing Mt Pleasant operations. For example Wilkinson Murray undertook measurements in April 2020 to assist in model validation. These measurements could also be used to assist in low frequency noise validation.*

Tonal Noise

While not explicitly stated in the report, the potential for the Mount Pleasant Optimisation Project to generate tonal noise was considered. However, since large-scale mining projects are not expected to generate tonal noise due to the large number of noise sources and the general atonal nature of noise sources at coal mines, and compliance noise measurements conducted for the Mount Pleasant operations have not indicated any tonality issues, RWDI does not consider tonal noise to be relevant to the Mount Pleasant Optimisation Project and no measurements addressing tonal noise have been conducted as part of the Noise and Blasting Assessment.

Further, the Environmental Noise Model (ENM) can only provide noise predictions on a limited number of frequency bands and, for this reason, noise levels for mining projects are predicted in octave bands as opposed to one-third octave bands. In consideration of this, the level of tonal noise, which is based on an analysis of the resultant one-third octave band spectrum at the residential receiver location, cannot be predicted.

Intermittent Noise

While not explicitly stated in the report, the potential for the Mount Pleasant Optimisation Project to generate intermittent noise was considered. However, due to the large number of noise sources in large-scale open cut mining projects, and the considerable distances separating noise sources and residential receivers, RWDI does not consider intermittent noise to be relevant to the Mount Pleasant Optimisation Project. This is consistent with measurement results from the attended noise monitoring conducted in April 2020 as part of the predictive model validation study for the Noise and Blasting Assessment.

Low-Frequency Noise

Past and recent attended compliance noise monitoring conducted for the Mount Pleasant operations generally indicate no low-frequency noise issues. As such, it was not deemed necessary to include low-frequency noise measurements as part of the model validation noise survey, noting monitoring for the model validation study only included frequencies ranging from 31.5 Hertz (Hz) to 16 kilohertz (kHz).

The methodology described as best practice in Gordon Downey's article *An example approach to consider low frequency noise in the context of the NSW Noise Policy for Industry* (Acoustics Australia (2020), Volume 48: 149-180, August 2020) describes how, under suitable circumstances, low-frequency noise measurements undertaken at extractive industry premises other than the proposed project may be used in low-frequency noise assessments. As such, the Bulga Village Noise Audit measurements, which are considered suitable in accordance with the methodology, were used as the basis for the low-frequency noise assessment.

During the site visit carried out by Wilkinson Murray on March 10, 2020, to conduct sound power level (SWL) measurements of the Mount Pleasant Coal Handling and Preparation Plant (CHPP), measurements were also conducted on a number of mobile fleet items to establish site-specific source noise spectrum shapes, which were used in the modelling for the Noise and Blasting Assessment.

The site-specific spectrum shapes are noted to contain acoustic energy in the 31.5 Hz octave band, which is generally not the case with the more generic spectra used in noise assessments for other open cut mining projects. However, it was found that the more generic spectra used for other projects contain more acoustic energy in the 63 Hz octave band (i.e. higher by up to two decibels [dB]), which is used as the basis for the normalisation of the typical low-frequency spectrum shape and prediction of low-frequency noise. Therefore, the low-frequency noise predictions normalised from the site-specific 63 Hz octave band levels are lower than for comparable mining operations with receivers at similar offset distances.

It is considered that the third octave low-frequency noise predictions presented in the Noise and Blasting Assessment, although lower than the low-frequency noise spectra predicted for comparable mining operations and similar distances, are more accurate as they are based on site-specific source noise spectrum shapes.

Rail Noise Assessment

The following points require clarification by the proponent:

- *Were noise-sensitive receivers identified within the offset distances outlined in the NIA (Table 8-3) for the section of network line between Muswellbrook Junction to Antiene Rail Spur?*

- *The NIA (Table 8-3) identifies required RING compliance offset distances to sensitive receivers from the section of network line between Mt Pleasant Operations Rail Spur to Muswellbrook Junction. Table 8-4 presents predicted noise levels for four (4) receivers identified as being within the compliance night-time offset distance of 83m. The predicted noise levels in Table 8-4 are between 4-8dB above the night-time criteria of LAeq,9hrs 60dB. However the offset distances nominated for these receivers in some cases closely approaches this minimum distance of 83m e.g. receiver 631 @ 74m. Based on acoustic attenuation from a quasi-line source one would expect the exceedance at receiver 631 to be within 1dB of the criteria and not 4dB above it. These anomalies need to be fully explained.*

Receivers within Offset Distances – Muswellbrook Junction to Antiene Rail Spur

Approximately 30 noise-sensitive receivers have been identified within the offset distances outlined in the Noise and Blasting Assessment for the section of network line between Muswellbrook Junction to Antiene Rail Spur. Those comprise approximately 20 receivers within Muswellbrook (i.e. along Market and Victoria Street) and ten rural properties east and south-east of Muswellbrook.

The above receivers were not discussed in the Noise and Blasting Assessment as cumulative rail noise exposures and offset distances necessary to comply with the rail noise criteria are anticipated to decrease as a result of a gradual reduction in overall approved coal production in the Hunter Valley (i.e. based on current NSW Government approvals for coal mining projects).

To provide some context, the currently approved and proposed average rail movements on the Main Northern Railway as assessed in the recent rail noise assessment for the Maxwell Project (Wilkinson Murray, 2019) described a total of approximately 140 approved and proposed rail movements on the section between the Muswellbrook junction and the Antiene Rail Spur junction (including rail movements of the approved Mount Pleasant Operation). In accordance with the Noise and Blasting Assessment (Table 8-2), this is expected to reduce to 96 approved and proposed rail movements by 2034 (including the proposed increase in train movements associated with the Mount Pleasant Optimisation Project). It should be noted that there is still some uncertainty associated with coal mining projects in the Hunter Valley that are currently scheduled to cease prior to 2034, as some may seek approval for extensions to their currently approved duration.

Cumulative Rail Noise Levels at Proximal Receivers – Mount Pleasant Operation Rail Spur to Muswellbrook Junction

Review of noise predictions has indicated transcription errors relating to the predicted $L_{Aeq,Period}$ noise levels at the four identified receivers within 83 m from the Muswellbrook-Ulan Rail Line where exceedances may occur. The corrected (lower) noise predictions superseding the noise predictions summarised in Table 8-4 of the Noise and Blasting Assessment are presented in **Table 1**.

Table 1: Cumulative Rail Noise Level Predictions at Proximal Receivers (Mount Pleasant Operation Rail Spur to Muswellbrook Junction)

Receiver ID	Approx. Distance to Railway Line (m)	Day $L_{Aeq,15hr}$ Noise Level (dBA)[1]	Night $L_{Aeq,9hr}$ Noise Level (dBA)[1]	Maximum Pass-by L_{Amax} Noise (5% exceedance) (dBA)[1]
Privately-owned Dwellings				
Rec 631	74	62	61	85
Rec 632	50	65	65	87
Mine-owned Dwellings				
Rec 2aj	70	62	61	86
Rec 2d	73	62	61	85

Note:

1. Predictions at façade.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully

Roman Haverkamp
Senior Engineer
RWDI

MACHEnergy

Mount Pleasant Operation

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Attachment D

Supplementary Advice – Groundwater

Australasian Groundwater
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25 June 2021

MACH Energy – Mount Pleasant Operations
PO Box 351
Muswellbrook NSW 2333

Attention: Chris Lauritzen
via email: Chris.Lauritzen@machenergy.com.au

Dear Chris,

RE: Mount Pleasant Optimisation Project – addressing the DPIE - Water and NRAR comments

1 Background

The Environmental Impact Statement (EIS) prepared for the Mount Pleasant Optimisation Project (MPO or the Project) was placed on public exhibition across February to March 2021 (SSD-10418)[1]. The groundwater assessment component of the EIS received comments from the NSW Department of Planning, Industry and Environment (DPIE) – Water and the NSW Natural Resources Access Regulator (NRAR)[2]. MACH Energy Australia Pty Ltd (MACH) has requested that Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) assist in addressing the DPIE – Water and NRAR commentary on the groundwater assessment in the EIS.

DPIE – Water and NRAR provided two sections of 'pre-approval' recommendations. The points where MACH requires AGE input include:

- No.2 Pre-approval Recommendation (Groundwater Model): "*The proponent should provide supplementary discussion on the groundwater model sensitivity to hydraulic conductivities.*

  This would include a model scenario with conceptualisation of increased hydraulic conductivity to be applied to the porous rock aquifer around the limits of the open cut-mining. Furthermore, the bounds of difference in the potential drawdown and take of water from the alluvial aquifers should be presented for a simulation with the zone of increased hydraulic conductivity in the porous rock aquifer."

[1] MACH Energy. (2021). Mount Pleasant Optimisation Project Environmental Impact Statement. Prepared by Resource Strategies on behalf of MACH Energy February 2021.

[2] DPIE – Water. (2021). Advice to DPIE Planning & Assessment regarding the EIS for the Mount Pleasant Optimisation Project (SSD-10418) – EIS. Dated 12 March 2021.

- No.3 Pre-approval recommendations (Further Technical Information and Assessment): "*The proponent should:*
  - *a. Provide shallow groundwater map(s) overlaid with GDEs which include maximum cumulative predicted drawdown active mining and post-mining stages.*
    - *a) As drawdown is predicted to continue expanding during the post-mining phase, the proponent should confirm timing for figures depicting maximum drawdown in the alluvium and Edderton seam (Layer 18) i.e. during active mining or post-mining.*
  - *b. Confirm the distance(s) of the proposed mining activity from the three-dimensional extent of the alluvial water source buffer distances defined in the AIP.*
  - c. *Confirm whether the drawdown values presented for neighbouring bores represent maximum drawdown active mining or post-mining phase*."

To address the comments provided by DPIE – Water and NRAR, AGE used the numerical groundwater model developed for the Project[3] along with other available resources surrounding the Project.

2 No.2 Pre-approval recommendation – Groundwater model

DPIE – Water and NRAR have suggested that an additional modelling scenario be evaluated where enhanced hydraulic conductivity is assumed around the limits of the open cut. Heightened conductivity at the pit edge is considered to potentially arise due to highwall stress and rock blasting at the Project.

A literature review was conducted to inform a potential fracturing distance that could be applied as an enhanced conductivity zone. Studies in the public domain indicated that 20 to 30 metres (m) is a likely maximum distance of fracturing imposed in geological settings similar to and including the Hunter Valley region (Brent & Smith 1996; McKenzie 1999; Glencore 2019)[4,5,6]. This range served as the basis for the modelling scenario.

The enhanced conductivity zone was introduced into the model by extending the area of mined out cells by an additional cell in a radial pattern. Rather than just increase the hydraulic conductivity at these locations by a nominal ratio, this approach also simulates full dewatering of the strata and therefore much greater impact than would be found in reality if some heightened conductivity was to occur. Th approach is considered conservative in that the full dewatering of additional cells invokes greater flow toward the mine. Moreover, cells in the model grid at the Project have minimum dimensions around 75 m x 75 m and therefore the enhanced conductivity distance applied is more than twice the derived literature range.

[3] AGE. (2020). *Mount Pleasant Optimisation Project – Groundwater Assessment.* Prepared for Resource Strategies on behalf of MACH Energy December 2020.

[4] Brent, G.F., and Smith, G.E. (1996). "Borehole pressure measurements behind blast limits as an aid to determining the extent of rock damage" Fragblast 5 – Conf. of the Int. Soc. Of Rock Mechanics Commission on Rock Fragmentation by Blasting, Mohanty (Ed), Montreal, Canada.

[5] McKenzie, C.K. (1999). "A review of the influence of gas pressure on block stability during rock blasting". EXPLO 99 – A conference on rock breaking, AusIMM, 7-11 November, Kalgoorlie WA, Australia.

[6] Glencore. (2019). Glendell Continued Operations Project Environmental Impact Statement. Prepared by Umwelt Environmental and Social Consultants on behalf of Glencore November 2019.

Predicted incremental drawdown due to the additional drains is shown for the alluvium/regolith (Layer 2) and the Edderton seam (Layer 18) in Figure 2.1. The results presented reflect end of mining (end 2048) drawdown solely due to the Project. Impacts to the alluvium/regolith are in the order of <0.5 m with incremental drawdown ≥0.05 m only appearing to the north of the Project with no significant change to the Hunter Alluvium water levels directly east of the mine. Examining deeper layers identifies that predicted additional drawdown in the Edderton seam is most apparent immediately adjacent the pit to the west. More incremental drawdown in the deeper model layers is to be expected relative to the shallow model layers which are more likely to be desaturated because of the cone of depression emanating from the lower model layers.

Additional indirect water take from the alluvial aquifers was also deduced for the enhanced conductivity scenario. The quantities are minor with the Hunter River alluvium experiencing an additional 1.2 megalitres per year (ML/yr) indirect take. Both the Sandy Creek and Dart Brook alluvium systems see increase of <0.5 ML/yr.

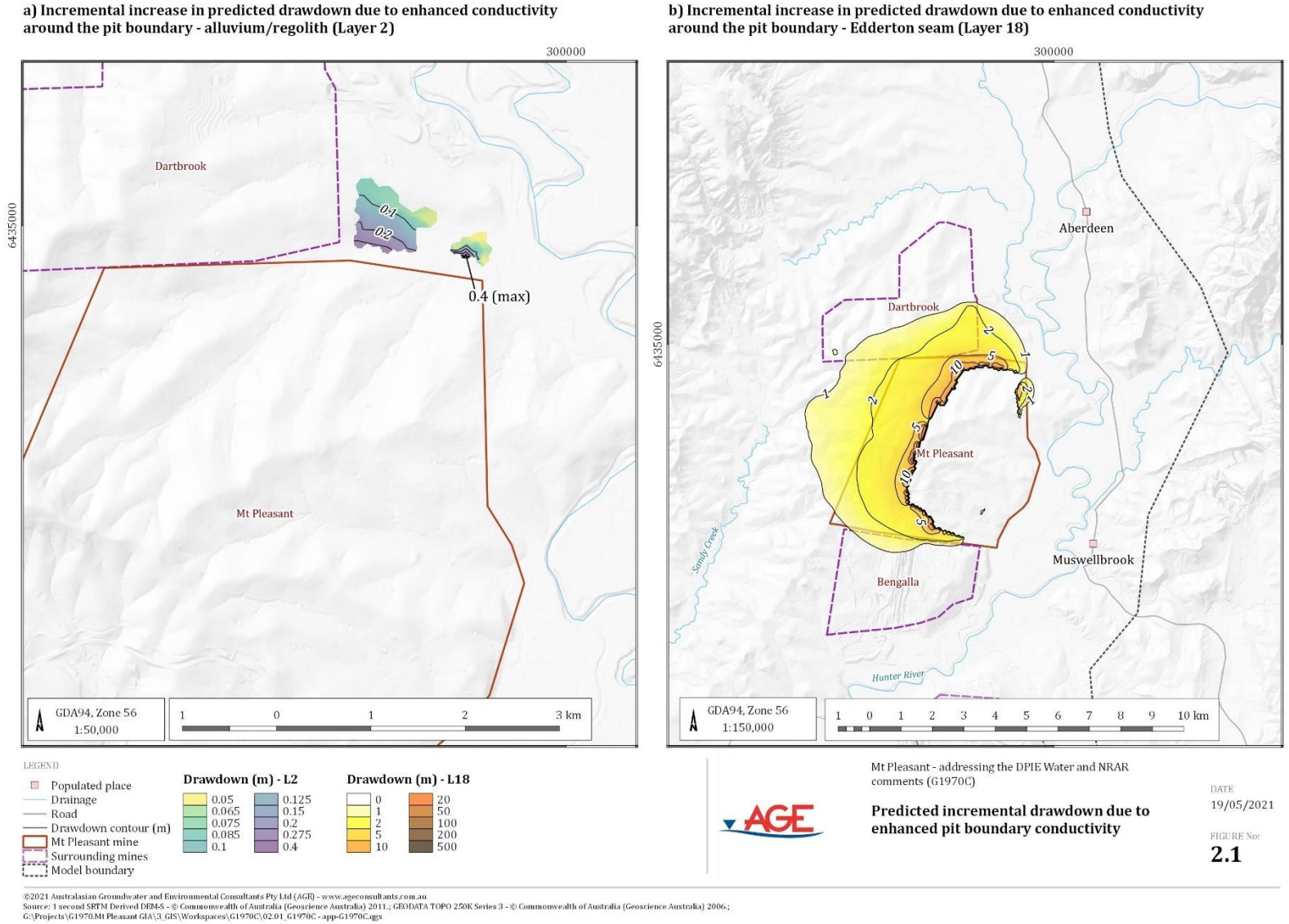

Figure 2.1 Predicted incremental drawdown due to enhanced pit boundary conductivity

3 No.3 Pre-approval recommendations – Further Technical Information and Assessment

3.1 Groundwater maps overlaid with GDEs

The EIS groundwater assessment contains detail on the potential impacts to GDEs in the vicinity of the Project (refer Appendix C: Section 8.4 of the EIS). The scenario discussed in the EIS concerned the drawdown extent predicted to occur in the alluvium/regolith at the end of mining solely due to the Project. DPIE – Water and NRAR have requested mapping to be undertaken to depict the predicted impacts of cumulative regional mining to the same GDEs assessed in the EIS.

Cumulative mining drawdown maps were produced for end of mining and post-recovery scenarios to show predicted impacts to the alluvium/regolith as displayed in Figure 3.2. These predictions show shallow drawdown intersecting reaches of the high potential terrestrial GDE buffer zone along the Hunter River between Bengalla Mine and Mt Arthur Coal Mine in the south and to the north of Mt Pleasant. A comparison of the impacts solely due to the Project is presented in Figure 3.3, where reduced effects are evident both at the end of mining and post-recovery.

No significant drawdown in the alluvium/regolith is apparent in the vicinity of the Forest Red Gum cluster. A shallow observation point labelled G1970C was included in the model to capture drawdown over time nearby the Forest Red Gums (shown in Figure 3.2 and Figure 3.3). The drawdown curve for G1970C during cumulative mining is illustrated in Figure 3.1, showing minimal change in the shallow groundwater alluvium/regolith.

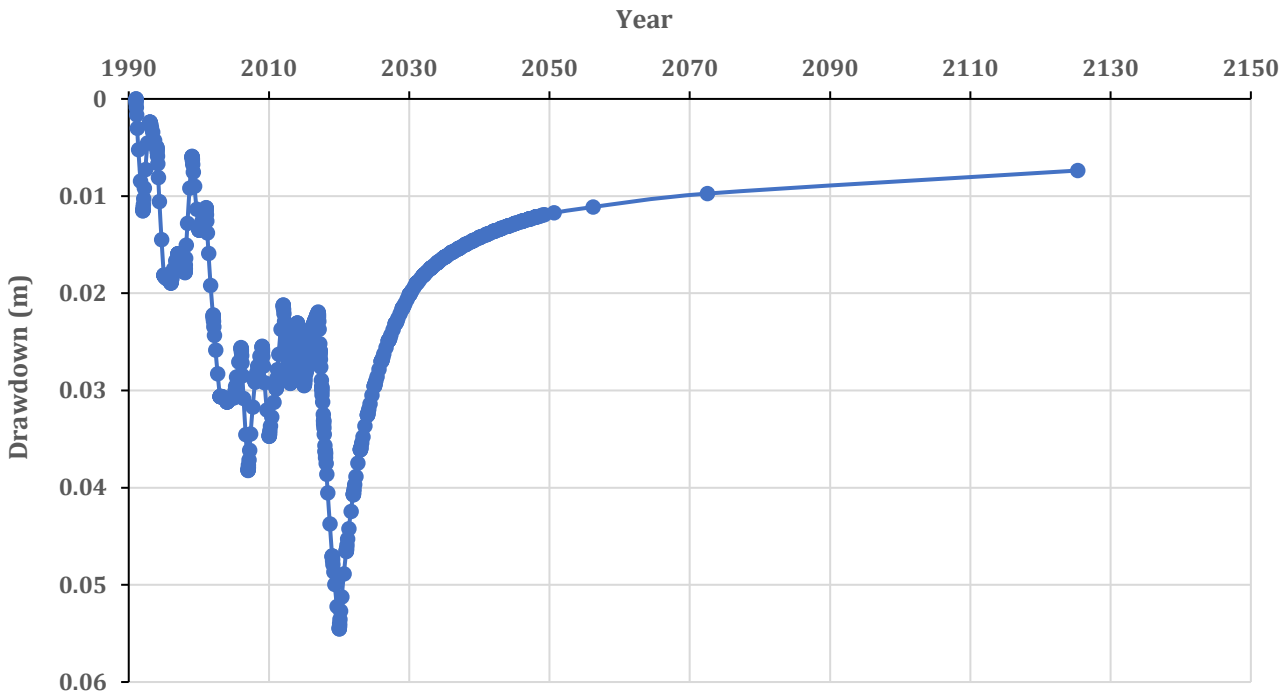

Figure 3.1 G1970C observation point drawdown during cumulative mining

3.2 AIP setback distances

DPIE – Water and NRAR have requested that setback distances from the mine to recognised alluvial water sharing plan (WSP) boundaries be confirmed. Measurements to the relevant boundaries were made in Geographic Information System (GIS) software QGIS as pictured in Figure 3.4.

Minimum distances to the Hunter River Regulated Alluvial Water Source, Dart Brook Water Source and Muswellbrook Water Source are noted as 220 m, 1170 m and 1700 m, respectively. These distances all exceed the buffer distance of 100 m specified in the Level 1 Minimal Impact Considerations under the NSW Aquifer Interference Policy[7].

[7] New South Wales Office of Water, 2012. *"Aquifer Interference Policy",* NSW Government policy for the licensing and assessment of aquifer interference activities. Department of Primary Industries.

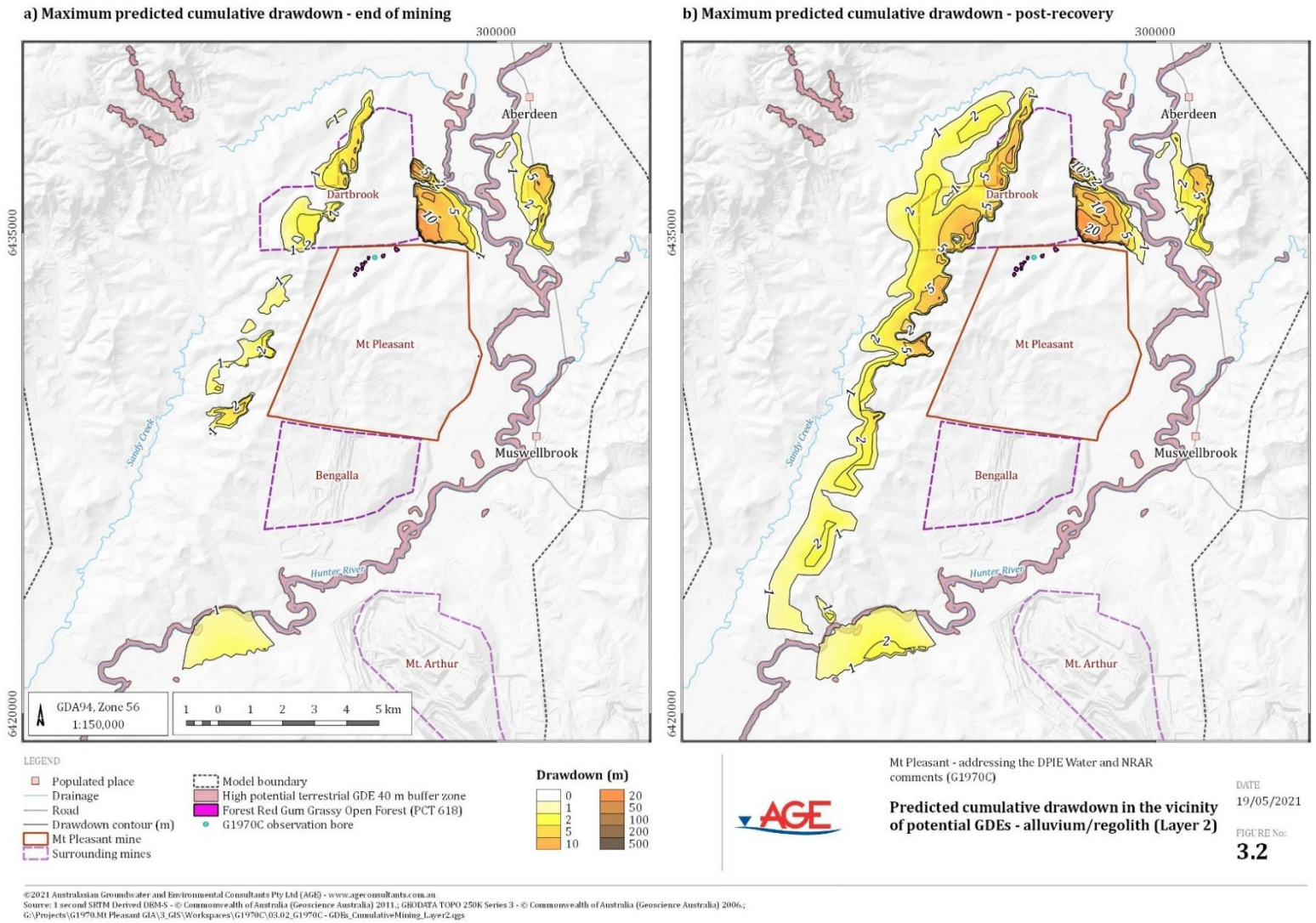

Figure 3.2 Predicted cumulative drawdown in the vicinity of potential GDEs – alluvium/regolith (Layer 2)

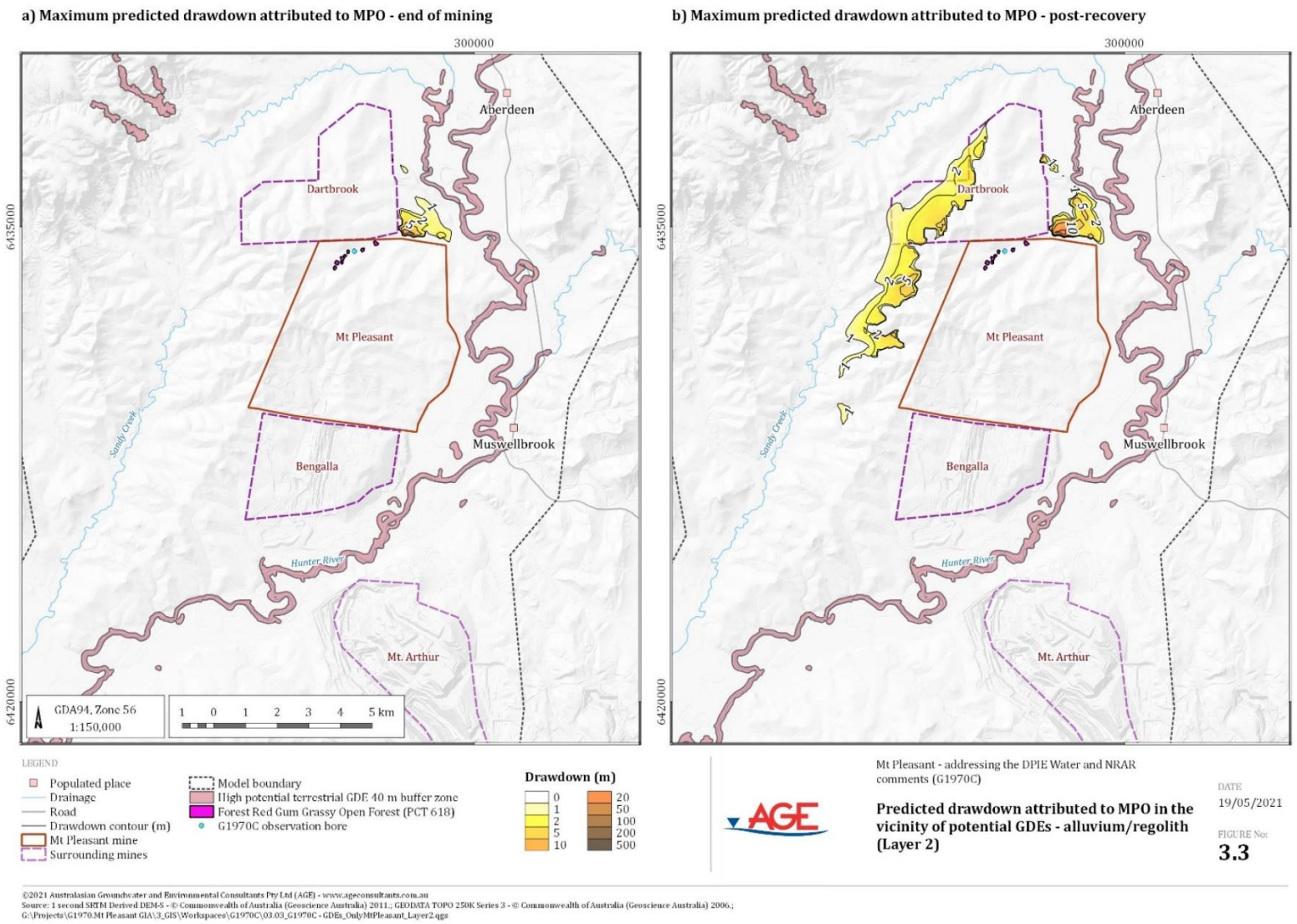

Figure 3.3 Predicted drawdown attributed to MPO in the vicinity of potential GDEs – alluvium/regolith (Layer 2)

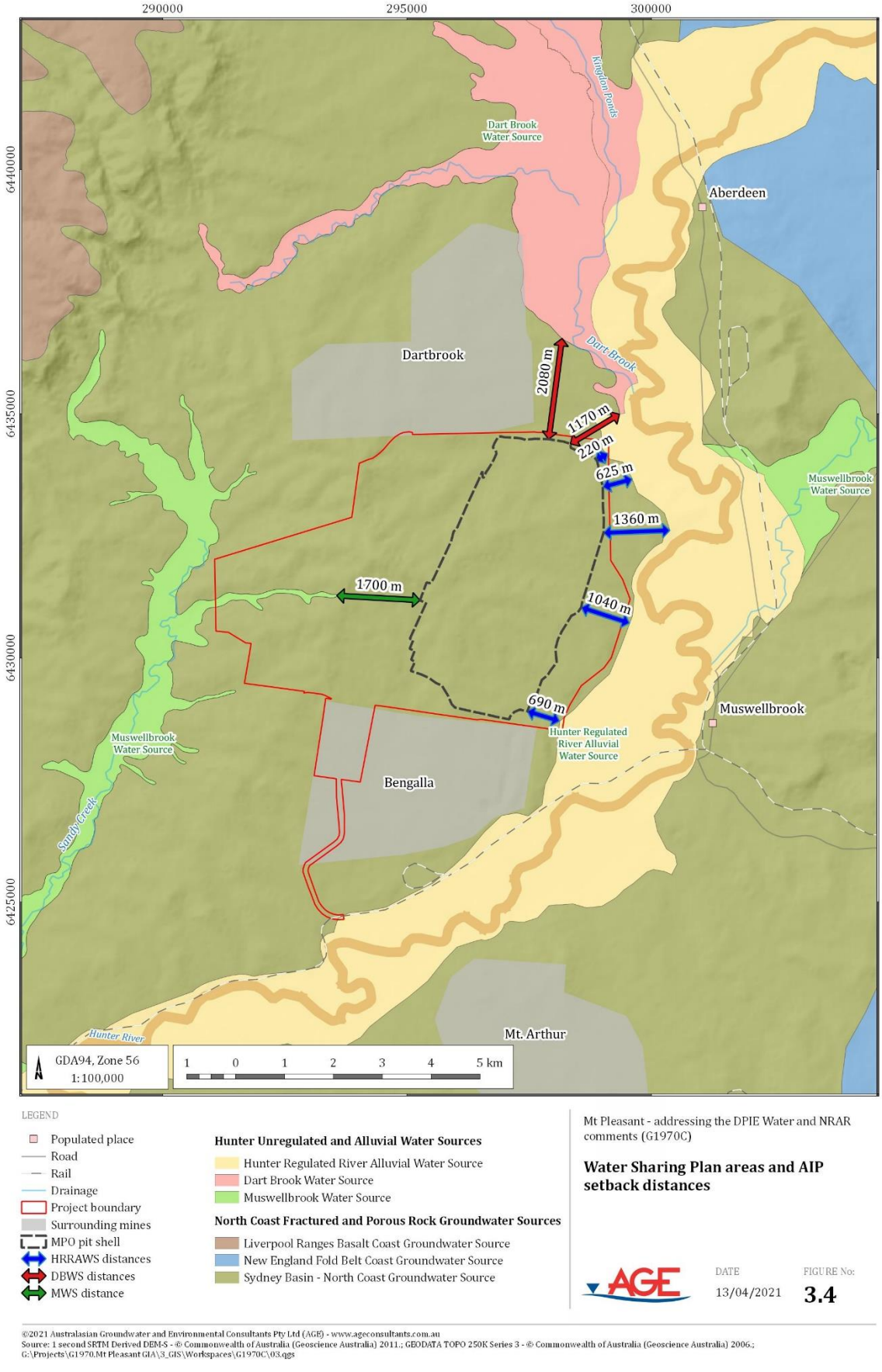

Figure 3.4 Water Sharing Plan areas and AIP setback distances

3.3 Neighbouring bore drawdown values

DPIE – Water and NRAR have requested that the timing of drawdown values presented for private bores in the EIS be confirmed (refer Appendix C: Section 8.3 of the EIS).

The values presented in the EIS represent end of mining drawdown values (end 2048).

In case required, the post-mining drawdown values for private bores exceeding 2 m have been tabulated in Table 3.1. This table comprises the same sites identified in the EIS.

Table 3.1 Drawdown in private bores post-mining

Bore ID	Depth (mTOC)	GWL (mBGL)	Electrical Conductivity (µS/cm)	Post-mining		Type
				Long-term drawdown: All mining (m)	Long-term drawdown: MPO (m)	
BELGRAVE	23.85	7.16	6,280	20.81	16.59	Well - Stock & Monitoring
CAS1_G	28.23	11.73	8,040	36.63	32.50	Bore - Not in Use
CAS2_G	65	39.71	13,045	27.00	16.41	Bore - Monitoring (Not in Use)
CAS3_G	76.7	Dry	Dry	28.00	16.37	Bore - Not in Use*
CAS4_G	34.8	27.89	10,585	21.36	12.77	Bore - Monitoring (Not in Use)
JLON1	52	Dry	Dry	20.84	18.82	Well & Bore - Monitoring*

Notes: *Groundwater level & EC data for all bores is sourced from regional monitoring/Mt Pleasant census data from 2016-2020.*

'-' Denotes that data is not available.

** Bore observed to be dry.*

mTOC = metres below top of casing.

mBGL = metres below ground level.

µS/cm = micro Siemens per centimetre.

4 Summary

The calibrated numerical groundwater model for the Mount Pleasant Optimisation Project and associated resources were used to address the DPIE – Water and NRAR comments.

DPIE – Water and NRAR have suggested that enhanced hydraulic conductivity could occur around the limits of the open cut due to highwall stress and rock blasting at the Project. This was tested in the groundwater model by applying a conservative approach that assumes full dewatering of additional cells around the edge of the open cut pit. Applying this conservative approach showed limited impact to the alluvium/regolith adding <0.5 m in drawdown at any location. Indirect alluvial take increases are marginal with 1.2 ML/yr increase in the Hunter River alluvium and <0.5 ML/yr increase in the Sandy Creek and Dart Brook alluvial systems.

Further drawdown mapping was undertaken to assess the potential impacts of cumulative mining on known and potential GDEs in the vicinity of the Project. Drawdown in the alluvium/regolith is predicted along reaches of the GDE buffer zone mapped along the Hunter River between Bengalla Mine and Mt Arthur Coal Mine and to the north of Mt Pleasant. No significant drawdown is predicted in the alluvium/regolith nearby the identified Forest Red Gum cluster.

Setback distances were measured between the Project pit shell and established alluvial WSP boundaries. Minimum distances from the pit to the Hunter River Regulated Alluvial Water Source, Dart Brook Water Source and Muswellbrook Water Source exceed the buffer distance of 100 m specified in the Level 1 Minimal Impact Considerations under the NSW Aquifer Interference Policy (NOW, 2012).

Predicted drawdown for neighbouring bores stated in the EIS submission represent end of mining predictions (end 2048). For completeness, the post-recovery predicted drawdown values were tabulated for sites expected to experience beyond 2 m of drawdown. Predictions apply to all the same bores outlined in the EIS.

If you have any queries, please do not hesitate to call.

Yours faithfully,

Andrew Durick
Director and Principal Groundwater Modeller
Australasian Groundwater and Environmental Consultants Pty Ltd

MACHEnergy

Mount Pleasant Operation

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Attachment E

Supplementary Advice – Site Water Balance

HYDRO ENGINEERING
& CONSULTING PTY LTD

22 June 2021

General Manager – Resource Development
MACH Energy Australia Pty Ltd
PO Box 2115
Dangar NSW 2309
Via email
Attention: Chris Lauritzen

Chris,

Re: Mount Pleasant Optimisation Project – Assistance with Responses to EPA and Landholder Comments on Surface Water Assessment

Further to recent correspondence, we have undertaken additional works necessary to inform responses to the NSW Environment Protection Authority (EPA) and landholder submissions in relation to the Surface Water Assessment (HEC, 2020)[1] for the Mount Pleasant Optimisation Project (the Project) Environmental Impact Statement (EIS). The following summarises the outcomes of these works.

Operational Water Balance Model Revision

Comment

"Modelling of overflows from storage ED3 shows that it does not achieve the 1% Annual Exceedance Probability (AEP) spill risk design criterion. The proponent should revise the storage capacity of ED3 and demonstrate achievement of the 1% AEP spill risk design criterion" (EPA, 2021)[2].

Response

ED3 was previously simulated with a pump lower bound (dead storage) level of RL 194.1 metres (m), equating to a dead storage volume of 102 megalitres (ML) and an overflow level of RL 198.8 m, equating to a storage capacity of approximately 332 ML (HEC, 2020). The pump lower bound level was limited by the pump and suction lift implemented in ED3 based on the original site water management system design. MACH Energy Australia Pty Ltd (MACH Energy)[3] has subsequently advised that, as a component of recent works within ED3, the land-based pump has been replaced with an amphibious pump which was installed at a significantly lower level. As such, the lower bound level of ED3 has decreased to 192.6 m, equating to a dead storage volume of approximately 29 ML. In addition, as a result of ED3 upgrade works, the dam's storage characteristics have also changed with the overflow level of RL 198.8 m now equating to a maximum storage capacity of approximately 302 ML.

[1] HEC (2020). "Mount Pleasant Optimisation Project Surface Water Assessment". Prepared for MACH Energy Australia Pty Ltd, December.

[2] EPA (2021). "EPA Advice on Environmental Impact Statement". Prepared for the NSW Department of Planning, Industry and Environment, March.

[3] MACH Mount Pleasant Operations Pty Ltd manages the MPO as agent for and on behalf of the unincorporated Mount Pleasant Joint Venture between MACH Energy (95% owner) and JCD Australia Pty Ltd (5% owner).

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The Project operational water balance model, detailed in HEC (2020), has been revised to reflect the changes to the ED3 storage characteristics and reduced dead storage volume. For the EIS simulation (HEC, 2020), the percentage of annual overflow days from ED3 to Dry Creek was estimated at 1.6% based on all model realizations, which was slightly higher than the 1% AEP spill risk design criterion. With the updated ED3 storage characteristics and reduced dead storage volume, the revised simulation predicts the percentage of annual overflow days from ED3 to Dry Creek at 0.84% based on all model realizations. As such, the 1% AEP spill risk design criterion has been achieved through changes to the ED3 storage characteristics and dead storage volume with the installation of a new pump set.

Assessment of Catchment Loss to Landholder Dams

Comment

"The main reason for objecting to the SSD application is the construction of 'additional mine water storages' in the South Western Catchment. The large water dams will significantly reduce surface water flow from this southern catchment into our property Gilgai" (Landholder letter provided to the NSW Department of Planning, Industry and Environment).

Response

The landholder property in question is located to the south of the Mount Pleasant Operation within the catchment area of Sandy Creek. A series of dams, within the property boundary, are located along a third order[4] tributary of Sandy Creek, as shown in Figure 1.

The proposed mine infrastructure area will extend into the eastern limit of the current landholder dam catchment which would result in a slight change to the catchment of these dams and the Coal Handling and Preparation Plant (CHPP) dam catchment (refer Figure 2 and Figure 3). Additionally, two mine water dams (MWD2 and MWD3) are proposed to be progressively constructed in the catchment area of the landholder dams. MWD2 is proposed to be operational from 2026 (Figure 2) and MWD3 from 2041 (Figure 3). The proposed changes would result in some reduction in catchment area to the landholder dams during the life of the Project, as shown in Table 1. It is noted that the catchment area reduction would be kept to a minimum practical amount with the implementation of upslope diversions on these dams.

Table 1 Estimated Catchment Area of Landholder Dams

Year	Existing Catchment Area of Landholder Dams (ha*)	Excised Catchment Area Due to Project (ha)	Percentage Reduction in Landholder Dams' Catchment Area
2020	409.6	0.0	0%
2026	409.6	28.6	7%
2028	409.6	28.6	7%
2031	409.6	28.6	7%
2041	409.6	62.0	15%
2047	409.6	62.0	15%
Final Landform	409.6	0.0	0%

* ha = hectares

[4] Strahler stream order classification scheme – Strahler (1952). "Dynamic basis of geomorphology", *Bulletin of the Geological Society of America*, no. 63, pp. 923–938.

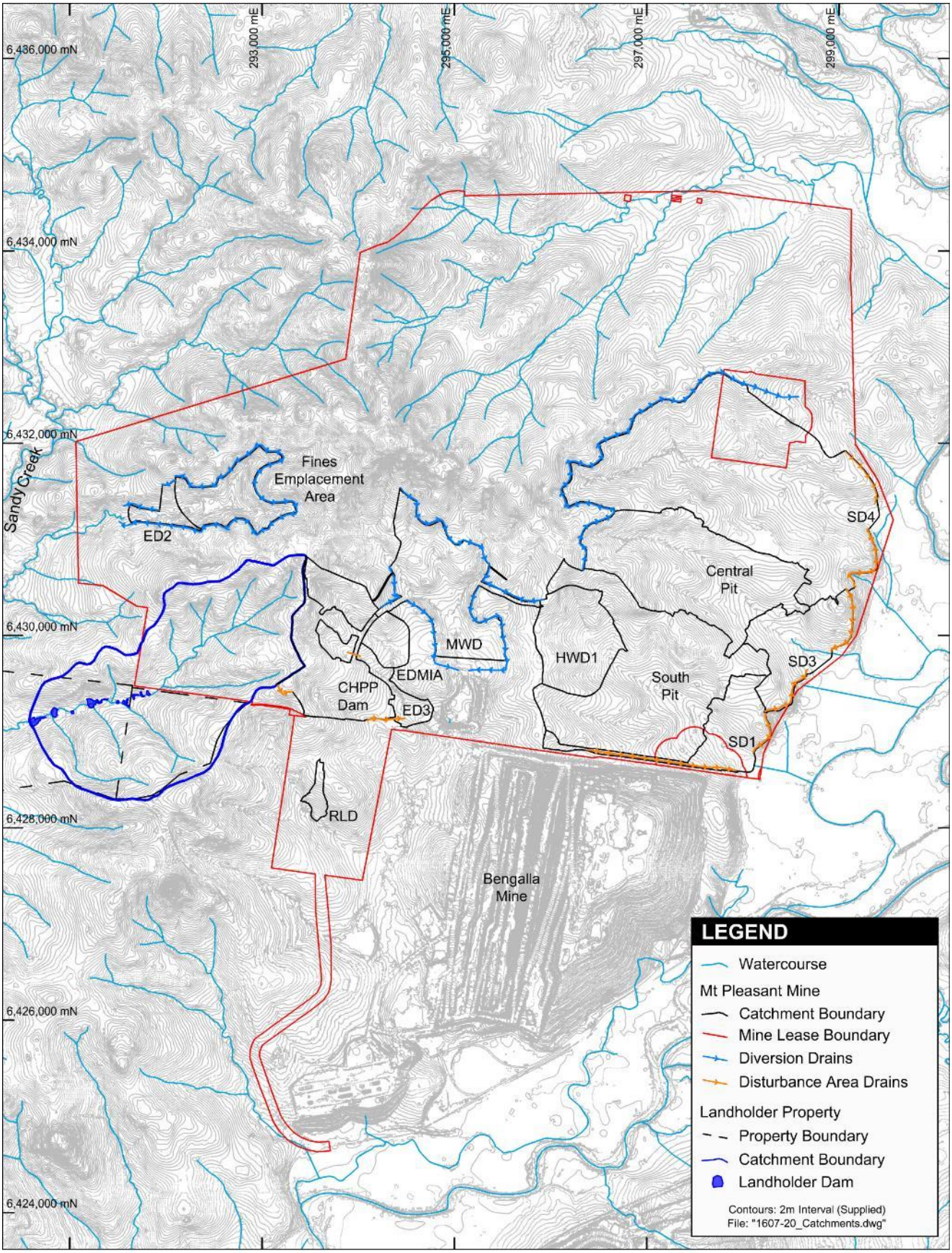

Figure 1 Current Catchment Area of Landholder Dams

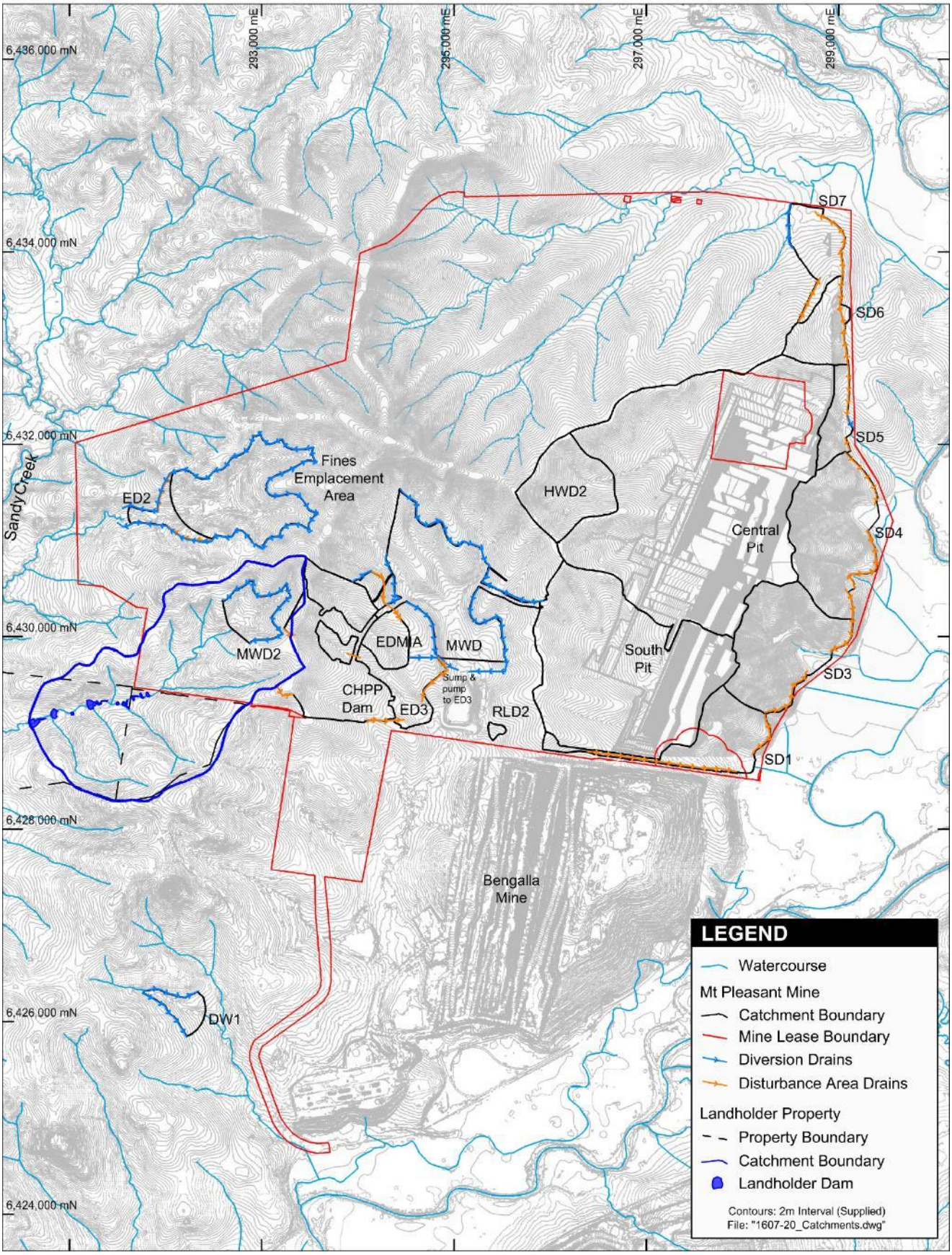

Figure 2 Year 2026 Proposed Water Management Layout and Catchment Area of Landholder Dams

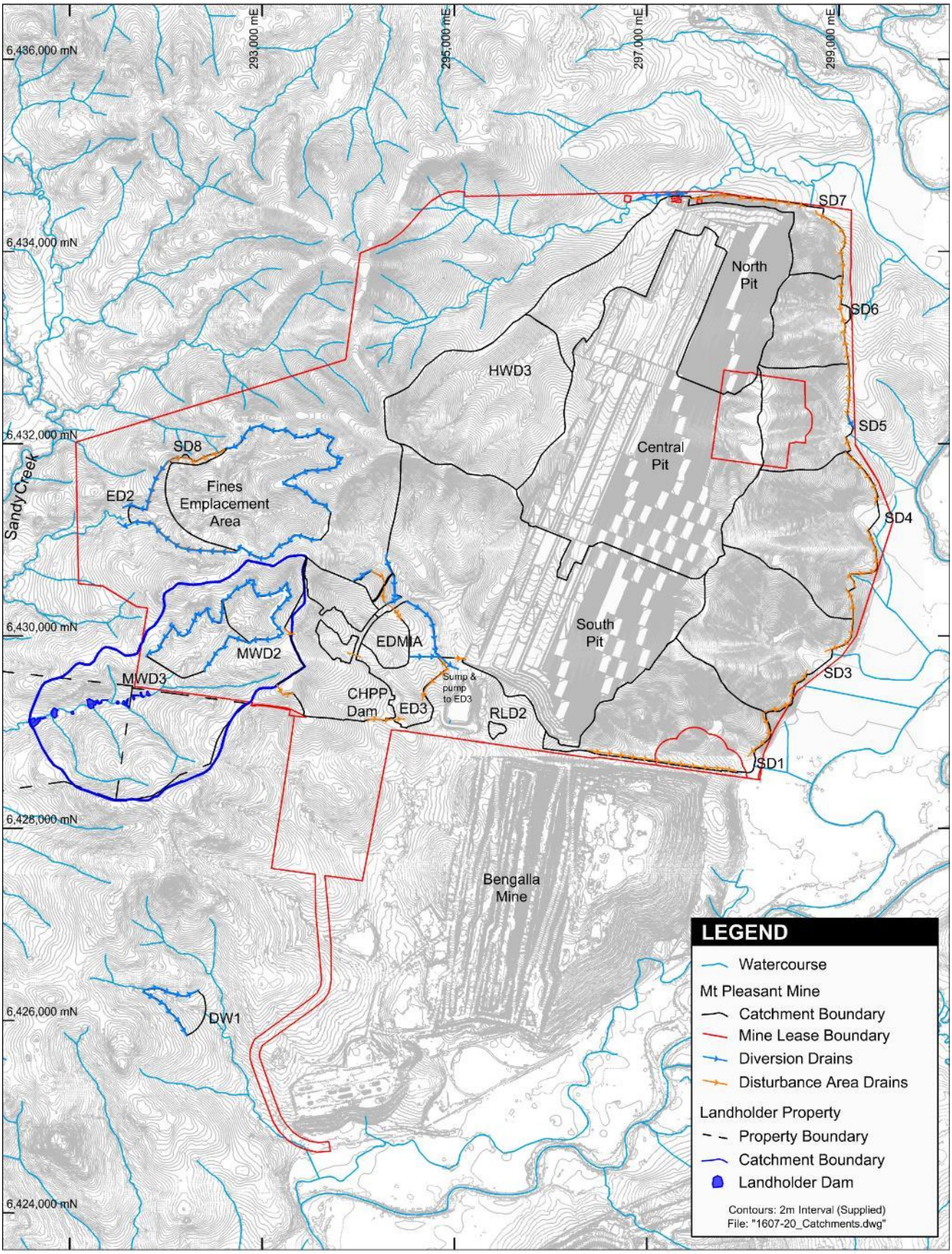

Figure 3 Year 2041 Proposed Water Management Layout and Catchment Area of Landholder Dams

The area excised by the Project from the landholder dams' catchment is estimated at 28.6 ha from 2026 to 2040, equating to 7% of the total catchment area of the landholder dams and at 62 ha from 2041 to 2047, equating to 15% of the total catchment area of the landholder dams. The final landform of the Project would be rehabilitated such that the catchment area of Sandy Creek is fully reinstated (refer HEC [2020] for further details). As such, the existing catchment area of the landholder dams is proposed to be reinstated to existing conditions post-completion of the Project.

The Australian Water Balance Model (AWBM) (Boughton, 2004)[5] was used to estimate the existing annual volume of rainfall runoff to the landholder dams and the annual volume of rainfall runoff to the dams during the Project. The AWBM is a nationally-recognised catchment-scale water balance model that estimates catchment yield (flow) from rainfall and evaporation.

The AWBM was simulated with rainfall and evaporation data obtained from SILO Point Data[6] for a point within the landholder dam catchment. Model parameters for 'natural' (undisturbed) areas were adopted in the AWBM, as detailed in HEC (2020).

The AWBM was run using the full period of available historical daily climatic data from 1889 to 2020 to obtain a series of annual total inflows to the landholder dams. The total annual runoff for each of the 132 complete years of data was ranked and assigned annual exceedance probability values. The same model was then run with the landholder dams' catchment area reduced by the Project in 2026 (by 28.6 ha) and in 2041 (by 62 ha), with the same probability results generated. A comparison of the modelled "existing" and "with Project" total annual runoff volumes to the landholder dams are summarised in Table 2.

Table 2 Modelled Runoff to Landholder Dams

Percentage of Years Runoff Volume is Exceeded	Existing	With Project - Year 2026		With Project - Year 2041	
	Modelled Runoff (ML/year)	Modelled Runoff (ML/year)	Modelled Reduction in Runoff (ML/year)	Modelled Runoff (ML/year)	Modelled Reduction in Runoff (ML/year)
10%	558.6	519.6	39.0	474.0	84.5
20%	354.9	330.1	24.8	301.2	53.7
30%	291.1	270.8	20.3	247.1	44.1
40%	243.5	226.5	17.0	206.6	36.9
50%	192.9	179.4	13.5	163.7	29.2
60%	169.2	157.4	11.8	143.6	25.6
70%	127.2	118.3	8.9	107.9	19.3
80%	99.7	92.8	7.0	84.6	15.1
90%	70.0	65.1	4.9	59.4	10.6

[5] Boughton, W.C. (2004). "The Australian Water Balance Model", Environmental Modelling and Software, vol.19, pp. 943-956.

[6] The SILO Point Data is a system which provides synthetic daily climate data sets for a specified point by interpolation between surrounding point records held by BoM – Queensland Department of Environment and Science (2020).

The results in Table 2 indicate that a runoff volume of 192.9 ML per year to the landholder dams is predicted to be equalled or exceeded in 50% of years. With the excision of the catchment area captured by the Project from 2026 to 2040, the annual runoff volume to the landholder dams that is equalled or exceeded in 50% of years is predicted to reduce by 13.5 ML to 179.4 ML per year (a 7% reduction in total annual runoff). With the excision of the catchment area captured by the Project from 2041, the annual runoff volume to the landholder dams that is equalled or exceeded in 50% of years is predicted to reduce by 29.2 ML to 163.7 ML (a 15% reduction in total annual runoff). Note that these predicted percentage reductions are in line with estimated catchment area reductions (refer Table 1).

It is noted that the capacity of the farm dams is unlikely to retain all of the flows in the third order tributary downstream of the Project infrastructure (i.e. a proportion of stream flows are anticipated to overflow the installed landholder dam structures depending on the evaporation, seepage and extraction from these dams). Therefore, the maximum modelled reduction in runoff in Table 2 would not be expected to represent the potential volume of reduced extraction experienced by the landholder from the farm dams due to the Project.

Notwithstanding, the predicted reduction in runoff reporting to the landholder dams would likely be perceptible in comparison with natural variability in catchment conditions. Make good provisions to compensate for the reduction in the quantity of runoff to the landholder dams should be negotiated with the landholder prior to works occurring in the catchment. It is noted that compensatory measures are likely to be of more value to the landholder's water supply requirements under low rainfall conditions than under high rainfall conditions (i.e. in high rainfall conditions a greater proportion of catchment runoff would be expected to overflow the farm dam structures and hence the Project reduction in upstream catchment area would have lesser effect). The proposed reinstatement of the landholder catchment to existing conditions following completion of operations would remove any surface water flow-related impacts at the landholder's dams.

Please contact the undersigned if you have any queries.

Yours faithfully,

Tony Marszalek
Director

Camilla West
Senior Water Resources Scientist

MACHEnergy

Mount Pleasant Operation

A JOINT VENTURE WITH JCDA Japan Coal Development Australia

Attachment F

Supplementary Advice – Historical Heritage

EXTENT
HERITAGE ADVISORS
TO AUSTRALIA AND
THE ASIA PACIFIC

25 May 2021

Attention: Chris Lauritzen, General Manager – Resource Development
MACH Energy Australia Pty Ltd
PO Box 2115
Dangar NSW 2309

Dear Chris,

RE: Heritage NSW and Muswellbrook Shire Council Comments - Notice of Exhibition of application for Mount Pleasant Optimisation Project (SSD - 10418)

Please find our itemised written response to the Heritage Council of NSW and Muswellbrook Shire Council comments below. The corresponding Heritage NSW and Muswellbrook Shire Council feedback has been reproduced and itemised, and is appended to this letter.

If you have any queries regarding our response, please do not hesitate to contact me directly on 0419 106 606 or asneddon@extent.com.au, so that we may discuss it further.

Yours sincerely,

Dr Andrew Sneddon
Director | Extent Heritage

Heritage NSW

Item 1

Extent Heritage has sourced copies of the previous reports pertaining to MP8, MP10, and MP17 and provided these to MACH for dissemination. These are reports prepared by the UQ Culture & Heritage Unit (UQCHU).

Item 2

It should be noted that the Mount Pleasant Operation was approved in 1999 and the Project would comprise continuation of impacts on the same historical heritage sites as previously approved for disturbance in 1999.

The HHA focuses on 29 of the original 55 sites previously assessed by the VAHS (2014) report, endorsed by the former NSW Department of Planning and Infrastructure. The VAHS report provides detailed historical information for each of those sites within the Mount Pleasant locality, which formed the basis of the historical information presented in the HHA.

The VAHS (2014) report is publicly available on MACH Energy's website:

https://machenergyaustralia.com.au/wp-content/uploads/CCC.04-0000-HH-REP-00026_0-Mount-Pleasant-Historical-Heritage-Report.pdf.

As noted in Part 1.4 of the HHA, the VAHS report has been the subject of occasional revision and augmentation in light of changing circumstances at the Mount Pleasant Operation, principally by UQCHU and Extent Heritage. As a result, the HHA makes regular reference to the VAHS report, providing summaries of the individual site histories (with cross-references to the full VAHS site histories), as well as reviewing the VAHS report's individual site significance assessments and management recommendations, and modifying or refining them where it could be demonstrated to be warranted.

As noted in Part 1.4, the HHA also draws on information from the following documents, which contain detailed histories of heritage places within or directly adjacent to the Project:

- *Muswellbrook Shire-Wide Heritage Study: Final Report* (EJE Heritage 1996).
- *Muswellbrook Shire Council LEP.*
- *Hunter Estates: A Comparative Heritage Study of pre-1850s Homestead Complexes in the Hunter Region* (Clive Lucas, Stapleton and Partners 2013).
- *Bengalla Mine Historic Heritage Management Plan* (AECOM 2015).

Extent Heritage has reviewed the VAHS report and concludes that the level of historical research presented in the HHA (as set out by the VAHS report, and as supplemented by the aforementioned additional resources) is adequate for the purposes of a Historical Heritage

Assessment. Further, that report was endorsed by the former NSW Department of Planning and Infrastructure. In those few locations where it might be argued that there was uncertainty (e.g. on the level of significance of Negoa), Extent Heritage adopted a cautious approach; that is, it assessed potential impacts *as if* the site is state significant and recommended preparation of a CMP.

Item 3

Part 4 of the HHA assesses MP06, MP13, MP23, MP25, MP26, MP31, MP32, MP36, MP43, MP44, MP49(a-c), MP54 and MP55 as failing to meet the threshold for heritage significance.

Part 5 of the HHA does not provide further recommendations in relation to MP06, MP13, MP25, MP26, MP31, MP32, MP36, MP43, MP44, MP49(a-c), MP54, and MP55. It concludes that if these items were disturbed or destroyed by the Project, this would not constitute an adverse heritage impact.

Part 5.7 of the HHA does present recommendations for MP23, which was concluded to not retain heritage significance in the HHA, and adopts a precautionary approach given that there are limited, unconfirmed anecdotal data for two child burials in the grounds of the house (VAHS 2014:75). It is therefore appropriate, applying the precautionary principle, for the HHA to contain a recommendation for the management of the potential archaeological resource at that one location (see Part 6.7 of the HHA). There are no identified impacts on MP23, subject to implementation of the management recommendation provided in Part 5.7 and 6.7 of the HHA.

Item 4

The HHA identifies wells present at MP13, MP23, MP25 and MP38. HNSW's commentary on 'works' and 'relics' is correct and not inconsistent with the conclusions of the HHA.

In relation to MP13, MP23, MP25, and MP38, the wells are regarded as 'works' under the Act. If these wells contained artefacts, they may be 'relics' under the Act.

However, it is understood that Heritage Act approvals for disturbing relics under section 139 would not apply to approved SSD projects. Therefore, the appropriate management strategy for the Project, should it achieve SSD approval, would be to record the wells as part of the proposed mine works and if relics are discovered (as assessed by a qualified archaeologist), they should be archaeologically investigated prior to their damage or destruction. The results of those excavations should be presented in a publicly accessible report within 12 months of completion of the excavation.

Item 5

Extent Heritage has reviewed the historical overview of MP49(a-c) presented in Part 4.23.1 of the HHA and provides the following further rationale, supplementing that already presented in Part 4.23.3 of the HHA).

The historical information presented in Part 4.23.1 of the HHA is a summary of that presented in full in the VAHS report (2014, 627-638). The latter is based on a combination of historical land tenure records, primary sources (newspaper articles), and anecdotal information.

The HHA agreed with the VAHS report and concluded that it is not clear what precise historical period the remains associated with the Weidmann family belong to. However, on the basis of the above historical information and the site inspection(s), the HHA concluded that the bricks, fragments of concrete, and other artefacts that comprise MP49(a-c) are *consistent* with Weidmann's main period of occupation i.e. the late nineteenth century or early twentieth century, as opposed to an earlier time period.

The assessment of MP49(a-c) is based on detailed historical analysis and surface survey. Additional research is unlikely to yield data that would change the conclusion and recommendations in the HHA.

Item 6

An ARDEM would typically be prepared in support of an application for an excavation permit under section 139 of the Heritage Act. Being SSD, it is understood that such excavation permits would not be required for this Project if the latter is approved, in accordance with section 4.41 of the NSW *Environmental Planning and Assessment Act, 1979*.

Nevertheless, the HHA applies a methodology consistent with an ARDEM including reliance on detailed historical investigations that did capture the entire landscape and which identified those specific locations where there was substantial settlement activity (e.g. VAHS).

Having started from that position and having identified those important places, the HHA assessed the individual sites for archaeological potential relying on detailed histories and site visits, addressing the research potential of the potential archaeological resource, and applying the NSW historic themes and the Bickford and Sullivan research questions. As all of these locations were rural residential in character, the research areas that the HHA considered tended to be similar for those locations; however, the assessments of archaeological potential and significance in the HHA were also tailored to reflect the specific development history of the respective sites.

The HHA adopted a targeted, site-by-site approach to the mitigation of potential impacts on the historical archaeological resource. The HHA contains recommendations for further archaeological management on a site-by-site basis as part of the recommendation mitigation of potential heritage impacts presented in Part 6.

We note the suggestion that an ARDEM should be prepared that contains an unexpected finds protocol. It is understood that MACH Energy would accept a consent condition requiring preparation of a Historic Heritage Management Plan prepared in consultation with Heritage NSW that includes consideration and management of unexpected finds.

Item 7

The HHA adopts a precautionary approach to MP23 (Devine's) and MP27 (Thorndale) given that there are unconfirmed anecdotal data for child burials at both sites. The validity of the anecdotal data could not be confirmed through desktop research. Applying the precautionary principle, the HHA therefore presented recommendations for the management of the potential archaeological resource at both locations (see Part 6.7 and 6.10 of the HHA). The feedback provided by HSNW is consistent with this approach and it is agreed that if child burials are identified at MP23 and MP27, these remains have the potential to be considered 'relics' under the Heritage Act.

The summary of the legislative requirements pertaining to the management of human remains provided by HNSW is correct. It is acknowledged that the legislative requirements within the *Public Health Act* and *Public Health Regulation* have been updated since the 1998 NSW government guideline publication entitled, *Skeletal Remains: Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office 1998).

If the Project achieves approval, it might be conditioned to reflect the following:

> If archaeological investigations do indicate the possible location of a grave or graves, excavation should cease immediately. They should proceed again only after observing the legislative requirements of the NSW Department of Health in relation to exhumation under the *Public Health Act 2010* and *Public Health Regulation 2012*, as well as the *Coroners Act 2009* (NSW) and the *Heritage Act 1977* (NSW).

The attending archaeologist should still observe the principles and processes expressed in the NSW government guideline document entitled *Skeletal Remains: Guidelines for the Management of Human Skeletal Remains* (NSW Heritage Office 1998), but in context with the current statutory definition of a 'relic' under the *Heritage Act 1977* and the current guidelines for *Assessing Significance of Historical Archaeological Sites and `Relics'* (NSW Heritage Office 2009).

Item 8

MP38, MP41, and MP52 are all located outside of the Project Study Area and are all located outside of the Mount Pleasant Operation Mining Lease. These places would not be directly impacted by the Project, and have been included in the HHA on the basis that they may form part of a broader 'cultural landscape'.

The HHA includes a recommendation for the preparation of a CMP for MP38 and MP41, and a CMP already exists for MP52 (AECOM 2015).

Since the completion of the HHA, Extent Heritage has been engaged by MACH Energy to prepare a CMP for MP41 (Negoa), and it is in the process of being finalised. The CMP draws on additional research and a number of site visits to MP41 by heritage architects and archaeologists. The CMP assessed Negoa as being of high local significance, narrowly failing

to make threshold for State significance. However, the HHA adopted a cautious approach and has assessed the potential impacts on it, as if it were a place of State significance.

In relation to MP38 (Rosebrook), the HHA considered the significance assessment provided by VAHS (2014), augmented with site visits by built heritage specialists, and assessed MP38 as being of local heritage significance. However, the HHA adopted a cautious approach and has assessed the potential impacts on it, as if it were a place of State significance.

In relation to Overdene (MP52), the HHA adopted the assessment of the AECOM 2015 CMP.

It is therefore concluded that a more detailed analysis of these sites would not need to be undertaken as part of the Project's RTS phase.

Item 9

The Project Noise and Blasting Assessment (Wilkinson Murray, 2020) assessed the potential impacts of on-site blasting for the Project at the nearest historic heritage sites that would remain in situ. The blasting assessment assessed the predicted overpressure and vibration levels resulting from the proposed Maximum Instantaneous Charge (MIC) of 1,600 kilograms (kg) against the conservative building damage vibration criterion of 10 millimetres per second (mm/s) and airblast overpressure criterion of 130 linear decibel (dBL) (consistent with Development Consent DA 92/97 requirements).

To meet the relevant blasting criteria, the assessment determined that the maximum MIC would need to be reduced only when blasting within 1,010 metres (m) of historic heritage sites, and would comply at more distant historic heritage sites. It is noted that MP38 Rosebrook, MP52 Overdene/Overton and MP41 Negoa are located at setback distances of 1,072 m to 1,888 m from the Project open cut, and mining would advance westwards over time. MP50 Waitomo is located some 400 m from the Project open cut, and therefore MIC would need to be managed should MACH decide to comply with the vibration criterion of 10 mm/s at this local significance site.

The Project would also continue to comply with applicable human comfort criteria at the nearest residences on privately-owned land:

- maximum overpressure due to blasting should not exceed 115 decibel (dB) for more than 5 per cent (%) of blasts in any year, and should not exceed 120 dB for any blast; and
- maximum peak particle ground velocity should not exceed 5 mm/s for more than 5% of blasts in any year, and should not exceed 10 mm/s for any blast.

Given the human comfort criteria are more stringent than the criteria applied to historical heritage sites, it is very unlikely any structural damage would occur at the more distant historical heritage sites due to the Project.

Blast management measures for the Mount Pleasant Operation are described in the existing approved Blast Management Plan (BMP) and would continue to be implemented for the Project.

The existing BMP requires MACH to undertake blast vibration monitoring either at a nearby historical heritage site or at representative locations when blasting is within 500 m of the site using portable or permanent monitoring device. The existing BMP also includes a contingency plan in the event that the relevant blast criterion is considered to have been exceeded. The BMP would be reviewed and updated to address the Project, subject to the conditions of any Development Consent for the Project.

Item 10

Extent Heritage has already been engaged by MACH Energy to prepare a CMP for MP41 Negoa, and it is in the process of being finalised. The CMP draws on additional research and a number of site visits to MP41 by heritage architects and archaeologists. It satisfies HNSW's requirements for a CMP.

Item 11

MP38 is located outside of the Project Study Area and outside of the Mount Pleasant Operation Mining Lease. It would not be directly impacted by the Project, and has been included in the HHA on the basis that it may form part of a broader 'cultural landscape'.

Part 6.15 of the HHA recommends that the ongoing conservation of the homestead and the landscaped gardens at MP38 Rosebrook (including any maintenance works) is to be guided by the preparation of a CMP for the site, consistent with HNSW's requirements for a CMP and the principles in the following NSW guideline documents:

- *Conservation Management Plan Assessment Checklist* (NSW Heritage Council 2003).
- *Guidelines on Conservation Management Plans and Other Management Documents* (NSW Heritage Branch, undated).
- *The Conservation Plan* (Kerr 2000).

With regards to the reference to the Heritage Act in Part 6.15 of the HHA, if the Project achieves approval, and if archaeological investigation is required to be undertaken prior to ground disturbance works at MP38, it is understood that Heritage Act approvals for disturbing relics under section 139 would not apply to approved SSD projects.

However, being outside the Project Study Area, no ground disturbance is proposed at MP38, and none is anticipated.

Item 12

MP52 is located outside of the Project Study Area and outside of the Mount Pleasant Operation Mining Lease, on land controlled by Bengalla Mine. It would not be directly impacted by the Project, and has been included in the HHA on the basis that it may form part of a broader 'cultural landscape'.

There is an existing CMP for the place (AECOM 2015). Part 6.26 of the HHA concludes that MP52 is to be maintained and conserved in situ consistent with the recommendations contained in this existing CMP.

The HHA makes no specific reference to the adaptive reuse of MP52. In terms of potential indirect impacts, there would be no change in relation to the use of the structure; it is currently unoccupied and fenced off for safety reasons (see Part 5.26 of the HHA).

Item 13

The MJPLCA abuts the south-eastern extent of the Mount Pleasant Operation Mining Lease (see Fig. 128 in Part 4.30 of the HHA). Almost all of the Project footprint is located wholly outside of the MJP LCA. However, it does overlap to a small degree in two limited and discrete locations:

> A narrow area south of Wybong Road that runs south adjacent to the eastern boundary of the Bengalla Mine and then bends around to the east to follow the alignment of the Muswellbrook-Ulan Rail Line. This area comprises the product coal transport and water supply infrastructure previously approved for the Project as part of MOD4 (i.e. rail load-out facility, rail loop, rail spur, water supply pump station and associated infrastructure).
>
> A scour protection south-west of Bengalla Road located within the extent of the Bengalla Mine. The remainder of this scour protection runs north from this location within the extent of the Bengalla Mine and is associated with a discharge dam. This scour protection and the associated discharge dam comprises existing and approved Mount Pleasant Operation infrastructure within the Bengalla Mine Disturbance Boundary.

In summary, the only elements of the Project that would be within the MJPLCA would be in two limited and discrete locations where mine infrastructure *already exists* or is *already approved* (i.e. MOD4 approval and/or within Bengalla Mine disturbance area). The discussion of the MJPLCA has been included in the HHA principally to assist consent agencies to understand these physical relationships.

Item 14

Part 6.31 of the HHA recommends the preparation of a Heritage Interpretation Plan (HIP) within one year of obtaining development consent for the Project.

The lack of physical access to the mine area by the general public does not preclude implementation of the outcomes of the HIP. This is a matter that the HIP would address (e.g. online or virtual 'access' to the heavily controlled landscape, off-site exhibitions). In addition, the identification of relevant audience(s) for future interpretation measures would be one of the key outcomes of the HIP, as well as the identification of a series of interpretation 'measures' that are to be implemented for communicating key stories, heritage values, and themes. The HIP would also facilitate the collation of the data generated by previous studies, especially the VAHS (2014) report, the photographic archival records recommended in the HHA, and the oral history data generated by VAHS (2004).

Muswellbrook Shire Council

Item 35.0

It should be noted that the Mount Pleasant Operation was approved in 1999. The Project would comprise continuation of impacts on the same historical heritage sites previously approved for disturbance in 1999.

Part 5.31 of the HHA notes that the 'cultural landscape' that would be impacted by the Project is a compromised one, and many of the features that combine to make it a cultural landscape are in such poor condition that they will deteriorate significantly (even with conservation work) through natural wear and tear over the next 5-10 years. They would soon reach a point where they would cease to be part of the cultural landscape by natural causes whether the Project proceeds or not.

Items 36.0 to 40.0

The Project Noise and Blasting Assessment (Wilkinson Murray, 2020) assessed the potential impacts of on-site blasting for the Project and determined that the Maximum Instantaneous Charge (MIC) need to be reduced only when blasting within 1,010 metres (m) of historic heritage sites, and would comply at more distant historic heritage sites. It is noted that MP53 Kayuga Cemetery is located at a setback distance of 1,492 m from the Project open cut, and mining would advance westwards over time. Given the setback distance, it is very unlikely any structural damage would occur at MP53 due to the Project.

RWDI Australia (RWDI) undertook an additional assessment of the predicted blasting effects at MP53 Kayuga Cemetery (see Attachment A), following the preparation of the Project Noise and Blasting Assessment. RWDI indicated that airblast overpressure and ground vibration levels resulting from the proposed maximum blast MIC of 1,600 kg would comply with the conservative building damage vibration criterion of 10 mm/s and airblast overpressure criterion of 130 dBL (consistent with Development Consent DA 92/97 requirements).

Nonetheless, several privately-owned residences are located closer to the Project open cut than MP53 Kayuga Cemetery, which are subject to a more stringent human comfort criteria (vibration criterion of 5 mm/s and airblast overpressure criterion of 115 dBL).

Blast management measures for the Mount Pleasant Operation are described in the existing approved Blast Management Plan (BMP) and would continue to be implemented for the Project. The existing BMP requires MACH to undertake blast vibration monitoring either at a nearby historical heritage site or at representative locations when blasting is within 500 m of the site using portable or permanent monitoring device. The existing BMP also includes a contingency plan in the event that the relevant blast criterion is considered to have been exceeded. The BMP would be reviewed and updated to address the Project, subject to the conditions of any Development Consent for the Project.

In addition, it is noted that MP53 Kayuga Cemetery is located within the Dartbrook Mine's Mining Authorities Area, and Dartbrook Mine's Development Consent (DA 231-07-2000) states:

> …details of the measures to mitigate any potential impacts resulting from the mine on the heritage homesteads Old Kayuga, New Kayuga, Riverview, the McIntyre family cemetery, Kayuga Cemetery and the Kayuga Estate and details of any maintenance procedures proposed to preserve their heritage value in accordance with the NSW Heritage Council requirements.

Heritage NSW Feedback

Item 1

HNSW notes that a series of test excavations were conducted for MACH Energy in 2017-2018 for several sites identified by VAHS 2014 as retaining archaeological potential. These included MP12, MP10, MP8, and MP17. Results for MP10 and MP12 have been received. HNSW notes that the remaining testing reports (MP8, MP17, and MP12) remain outstanding and MACH Energy is requested to provide copies of those reports to the Heritage Council of NSW.

Item 2

The Extent Heritage assessment relied on historical research conducted by VAHS in 2014. A copy of the VAHS 2014 report was not supplied for reference. The Extent assessment does not appear to have included any more detailed historical research to clarify or resolve outstanding questions raised by VAHS in its report. The absence of detailed historical research for sites as part of an assessment does not fully align with Heritage Council requirements for preparing an historical archaeological assessment. HNSW notes that there is an assumption that the level of historical research set out by VAHS is adequate and the assessment of significance and management may require further refinement.

Item 3

Section 5 of the Extent assessment includes impacts to items that it has concluded (through additional assessment) do not retain significance. It is unclear why Section 5 includes recommendations for these items. This section could be revised to remove these items for clarify and updated as part of the Project's RTS phase.

Item 4

The reassessment concluded to a number of sites, where a well is present it would not require further investigation (e.g. MP13, MP23, MP25, MP38). It is unclear if these wells contain any artefacts, objects or deposits which would be 'relics' under the Heritage Act 1977.

Extent argued in each case that 'the well would not constitute a relic under the Heritage Act, being rather a work under the legislation' (Extent 2020). This is only party correct; 'environmental heritage' as defined under s.4 of the Heritage Act 1977 is interpreted to mean that each item is mutually exclusive, therefore a relic is not a work. That interpretation is provided in the Guideline 'Assessing Significance for Historical Archaeological Sites and Relics' (2009). There is no definition for a 'work' under the Heritage Act 1977.

Extent has concluded in most instances that these sites have a low potential for relics elsewhere, however it is unclear if the wells contain artefacts. If present, would the artefacts retain research potential and be considered relics? HNSW requests that the Extent assessment reviews the sites which contain wells to clarify this question or the presence of relics and further management. This is requested for the Project's RTS phase.

Item 5

The assessment for MP49(a-c) should be reviewed to confirm the conclusions for the site based on the existing levels of research. It is noted that its current phasing and likely occupation is linked predominantly to the Weidmann family from the late 19th century, rather than a much earlier time period. The Extent argument is based on a limited timeline source from VAHS 2014 and does not fully explain an argument for limited research potential. Clarification about the historical research and significance for this item (MP49) is requested for the Project's RTS phase.

Item 6

Appendix H is a Heritage Assessment, it was not a detailed Historical Archaeological Assessment prepared in accordance with the Guidelines published by the Heritage Council of NSW.

Heritage NSW Feedback

While Section 6 contains recommendations for further archaeological management, the Project will require the preparation of an Archaeological Research Design and Excavation Methodology (ARDEM) to manage disturbance to historical archaeological relics. The ARDEM would enable clearer assessment of research values (at a local/state level) and comparative analysis of the archaeological resource, which would guide preparation of appropriate research questions. The ARDEM should be prepared by a suitably qualified historical archaeologist, in accordance with Heritage Council Guidelines and policy. It should address all sites where archaeological relics are anticipated as identified by Extent (2020) and include the additional response requested by this letter. The ARDEM should include an unexpected finds protocol for management of areas where relics are not identified, or Extent has identified they would not be found.

The ARDEM should be provided for the Project's RTS phase to allow appropriate guidance on archaeological management to DPIE.

Item 7

Extent's assessment identified sites MP23 (Devine's) and MP27 (Thorndale) may contain unconfirmed potential for child burials. If of significance, these remains may also be relics under the Heritage Act 1977, however this is not clear from the summary research presented. Legislative requirements within the Public Health Act and Public Health Regulation (and definition of a 'relic' under the Heritage Act 1977) have been updated since the publication of the 1998 Heritage Council Guideline 'Skeletal Remains'. If human remains are identified, NSW Health are likely to require the names and next of kin to seek approval for exhumation (where require by the SSD). Exhumation is approved under the Public Health Regulation 2012. The timing of these activities (investigation), and appropriate and sensitive management of discovery of human remains including contact with relatives, should be appropriately factored into the Project, if approved. Relevant commitments and requirements should be updated for the Project's RTS phase.

Item 8

The following 3 sites should be reassessed to clarify their current level of heritage significance based on the VAHS and Extent assessments. Existing records reviewed by Heritage NSW indicate that the following may have been underassessed and that their significance may be at a state level, even though not currently listed on the SHR under the Heritage Act 1977. For example, there are existing assessments which note Negoa as an item of state significance under the assessment criteria. It is essential that items of state significance are managed commensurate with their significance. Mach Energy has demonstrated this process with its treatment of the Kayuga Cemetery and the Kayuga Bridge, which is appropriate.

A more detailed analysis of these sites, against other heritage assessments prepared for the Hunter Valley such as the Hunter Estates: A Comparative Heritage Study of Pre-1850s Homestead Complexes in the Hunter Region by Clive Lucas Stapleton and Partners Pty Ltd (2013) should be undertaken. This should specifically clarify their heritage significance. This piece of work is requested for the Project's RTS phase.

Negoa Estate (MP41)

Rosebrook (MP38)

Overdene (Overton) (MP52)

Item 9

The Project has committed to a Blast Management Plan (2019) which establishes blasting activities for the Project would be designed to manage and limit ground disturbance to 10mm/s at historic heritage sites. This accords to the German DIN 4150 standard.

It is unclear if there would be checks in place to ensure that monitoring takes places to confirm the 10mm/s vibration limit and to include structural assessments for each heritage item which will be

Heritage NSW Feedback
protected and managed by the mine. It is also unclear if any damage identified would be rectified with appropriate materials commensurate with the item's significance and phasing e.g. MP38 (Rosebrook), MP52 (Overdene/Overton), MP50 (Waitomo)* and MP41 (Negoa). *It is noted that Waitomo is not identified as potentially state significance but is included in this list to request the comment is considered and addressed.
Item 10 MP41 (Negoa) is outside the SSD boundary. It is unclear how the commitment to preparing an appropriate Conservation Management Plan, which is supported, would be achieved. The CMP should identify, assess, and guide management of the place's significant values according to existing Heritage Council guidance. Suitable uses should be identified that are appropriate for the item and would not negatively impact its significance. Management should address the above vibration monitoring requirements. These aspects should be updated for the Project's RTS phase.
Item 11 Management commitments for MP38 (Rosebrook) advise that a Conservation Management Plan should be prepared, which is supported. This document should identify, assess and guide management of the place's significant values, in line with previous assessment, and the additional requirements set out in this letter. The CMP should follow existing Heritage Council of NSW guidance on its preparation. Management should also address the above vibration monitoring requirements. Suitable uses should be identified that are appropriate for the item and would not negatively impact its significance. Section 6.15 may not be correct as Heritage Act 1977 approvals under s.139 for disturbing relics does not apply to approved SSD projects. These aspects should be updated for the Project's RTS phase.
Item 12 MP52 (Overdene/Overton) is 700 m outside the SSD boundary and managed under a separate planning approval. It is unclear how this approval would achieve actions such as the adaptive reuse that is recommended. It is recommended that the item's significance values are used to guide any planning/management decisions in future.
Item 13 Assessment of impact to the Muswellbrook-Jerry Plains Landscape Conservation Area as presented by Extent (s.4.30.1) indicates that there is no impact as the works have already been approved. If they have already been approved, it remains unclear why there would be two discrete areas where this project intersects. Either those parts of the Project require approval, or they do not. It is requested that the assessment is revised to clarify the impact of this project on the MJPLCA for the current SSD project, not previous approvals unless related to this project. If there is no further impact, it is requested that is clearly set out in the Project's RTS phase.
Item 14 Extent has recommended the preparation of a Heritage Interpretation Plan (HIP) for Mt Pleasant Mine. In terms of ensuring the broader dissemination of why this area forms part of a significant historical cultural landscape and includes some highly significance historical land occupation in the Hunter Valley, public dissemination of this information would be hugely beneficial. However, it is noted that the mine is a heavily controlled landscape and it is unclear who the audience would be, what actual benefit the HIP would bring as it would be unlikely to be broadly disseminated. It is requested that this aspect of the project's commitments, the preparation of a HIP, is clarified with further advice for the Project's RTS phase.

Muswellbrook Shire Council Feedback

Item 35.0

The demolition of the additional places of local significance would remove the homesteads from the Mount Pleasant cultural landscape, and the cumulative effect would be to convert the modified rural landscape, north of the existing Bengalla Mine, into a purely mining landscape.

The Heritage Impact Assessment supports demolition of the many structures on the basis that the buildings are derelict. Many of these buildings have been in the ownership of Coal and Allied and subsequently Mach Energy since the 1990s, and the neglect of these buildings has advanced the state of dereliction considerably in that time.

Items 36.0 to 40.0

As identified in the EIS:

- Kayuga Cemetery is the oldest cemetery in the Upper Hunter, first set aside by Archdeacon Scott in 1828 with the first known burial in 1831.
- The cemetery remained in use up until at least 1956 and during that time, has been three periods of use: the convict period (1831-1842), Scottish settlers and labourers, and condition purcahse settlers and labourers (post-1861).

The VAHS report (2014:673) also concludes:

The Kayuga Cemetery is highly significant. It is the oldest in the Upper Hunter Valley and the only one where serving convicts have their graves marked with impressive headstone. This cemetery has the potential to provide us with a much better understanding of convicts and their value to the community. There is also value in studying the burial patterns of the settlers and the role a small country cemetery played in the community.

Accordingly, Kayuga Cemetery is identified as a place state heritage significance.

The EIS suggests that responsbility for the Cemetery's conservation rests with the relevant owner, Muswellbrook Shire Council. However, Council is not proposing to set off eight blasts per week, on average, close to the Cemetery. The Proponent does bear responsibility for ensuring that blasting activities do no increase damage to the remaining headstones in the Cemetery.

Given the age of the headstones, they are 'fragile' and at more risk of topppling and damage than, say, a nearby dwelling.

Council requests that the Proponent be required to:

- Engage a specialist in monuments/headstone conservation to undertake a condition assessment of the headstones in the Cemetery;
- Undertake urgent remedial work identified by the expert prior to mining operations commencing; and

A part of the BMP for the Mine, include a strategy to monitor, mitigated and manage the effects of blasting on the Cemetery, including details of baseline (i.e. pre-blasting) and ongoing risk-based dilapdiation or damage surveys and repair programs.

Attachment A – Potential Blasting Effects at MP53 Kayuga Cemetery (RWDI Australia Pty Ltd 2021)

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May 20, 2021

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Newcastle West NSW 2302

Dear Chris

Re: Mount Pleasant Optimisation Project – Potential Blasting Effects at Kayuga Cemetery

Introduction

RWDI Australia (RWDI), under the name of Wilkinson Murray, prepared the noise and blasting assessment for the Mount Pleasant Optimisation Project (the Noise and Blasting Assessment), which assessed airblast overpressure and ground vibration levels from blasting at surrounding dwellings, historic heritage sites and public infrastructure. MACH Energy Australia Pty Ltd (MACH Energy) has subsequently requested additional information regarding predicted blasting effects at Kayuga Cemetery, which is classified as a state significant historic heritage site.

This letter provides an overview of potential blasting required for the Project, a summary of our methodology for determining blast impacts and predictions of airblast overpressure and ground vibration levels at Kayuga Cemetery (shown as MP53 in **Figure 1**).

Blasting Criteria

There are no criteria relating to the potential for structural and cosmetic damage to historic heritage sites such as Kayuga Cemetery from blasting vibration and airblast overpressure. As such, a vibration criterion of 10 millimetres per second (mm/s) and airblast overpressure criterion of 130 decibels (dB) are nominated, which are consistent with the criteria used for historic heritage sites in the Noise and Blasting Assessment. These criteria are considered conservative for Kayuga Cemetery.

Figure 1: Location of Kayuga Cemetery (MP53)

Prediction Methodology

Airblast overpressure and ground vibration levels from blasting are related to the "scaled distance" from the blast, which is defined as:

Scaled distance = $\frac{D}{W^{1/3}}$ for airblast overpressure; and

Scaled distance = $\frac{D}{W^{1/2}}$ for ground vibration.

where D is the distance from the blast (m), and W is the Maximum Instantaneous Charge (MIC) of explosive (kilograms [kg] of ammonium nitrate fuel oil [ANFO] equivalent).

Predictive curves relating scaled distance to overpressure and ground vibration levels have been derived from measurements conducted at numerous sites, typically at a distance varying between 2 and 7 kilometres (km).

For this assessment, data from over 7,600 records of blasts undertaken in the Hunter Valley have been used to derive relationships between scaled distance and overpressure or vibration. These relationships are designed to predict not the mean level of overpressure or vibration, as in a standard "site law", but the 95th percentile value, representing the level that would be exceeded by only 5% of blasts, given the use of current blast practice and the current level of variability in overpressure or vibration for the same scaled distance.

The raw data, and the derived prediction curves that are appropriate up to distances of 10 km, are shown in Appendix L of the Noise and Blasting Assessment.

For overpressure, a curvilinear relationship with log (Scaled Distance [SD]) was adopted as a best fit for the data:

Overpressure (dB) = $201.1 - 62.313\ log(SD) + 10.79\ (log(SD))^2$

where SD is the overpressure-scaled distance (as per formula given above).

For vibration, a linear relationship with log (Peak Particle Velocity) was derived:

Log (PPV) = $3.015 - 1.4359\ log(SD)$

where SD is the vibration-scaled distance (as per formula given above).

Overpressure is calculated in dBL (or Linear Peak), which is the maximum level of air pressure fluctuation measured in decibels without frequency weighting[1].

Vibration and overpressure records for blasts conducted at the Mount Pleasant Operation between January 2017 and October 2020 were analysed and the 95th percentile "site law" relationships between scaled distance and vibration/overpressure were found to be consistent with those derived from the 7,600 blast monitoring records undertaken in the Hunter Valley.

Predicted Blasting Effects

Based on the predictive equations outlined above, airblast overpressure and ground vibration levels have been predicted at the Kayuga Cemetery and are presented in **Table 1**. Predictions are based on the proposed maximum blast MIC of 1,600 kg, which is representative of deep overburden blasts with the maximum potential impact.

Table 1: Predicted Airblast Overpressure and Ground Vibration at Kayuga Cemetery

Structure	Approx. Distance to Disturbance Area (m)	Airblast Overpressure (dBL)		Ground Vibration (mm/s)	
		Prediction	Criterion	Prediction	Criterion
Kayuga Cemetery	1470	117.8	130	5.9	10

Results indicate that airblast overpressure and ground vibration levels resulting from the proposed maximum blast MIC of 1,600 kg would easily comply with the conservative criteria Wilkinson Murray (RWDI) applied to historic heritage sites.

It should be noted that privately-owned receivers at the southern end of Kayuga (i.e. receivers 143b, 147, 156a, 157a and 159) are closer to the open cut pit when compared with the cemetery and would be subject to more stringent criteria to ensure the minimisation of human annoyance from blasting (115 dBL for overpressure and 5 mm/s for vibration).

[1] Frequency weightings are often applied to sound measurements to ensure the measured parameter is indicative of the level experienced by the human auditory system (e.g. such as A-weighted decibels typically used for assessing noise impacts from developments).

As such, and as described in the Noise and Blasting Assessment, blast MICs would need to be reduced to maintain compliance with the relevant human comfort criteria when blasting at the closest part of the open cut to Kayuga.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully

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