BHP

MT ARTHUR COAL MINE
MODIFICATION 2

Modification Report

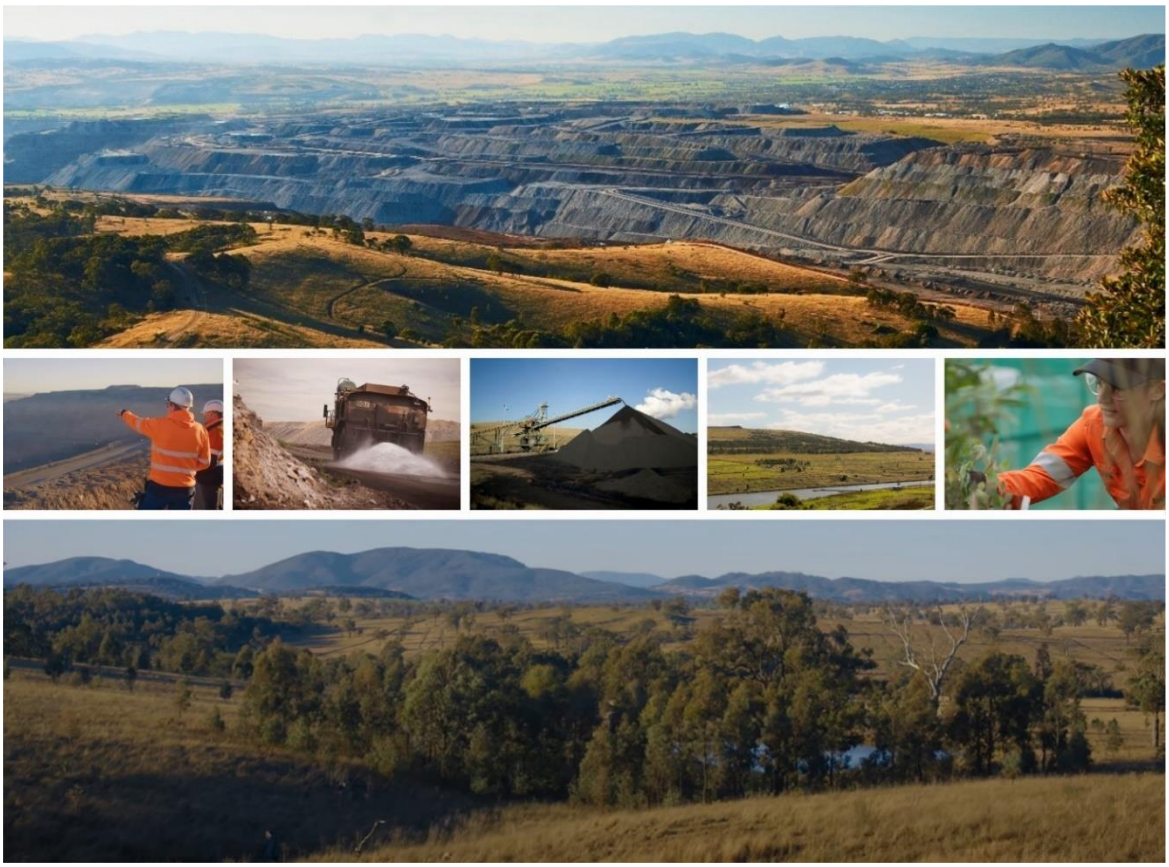
September 2023

Resource Strategies

BHP

Mt Arthur Coal Mine Modification 2 Modification Report

September 2023



EXECUTIVE SUMMARY

The Mt Arthur Coal Mine is an existing open cut coal mining operation located approximately 5 kilometres south-west of Muswellbrook, within the Muswellbrook Local Government Area in the Upper Hunter Valley of NSW.

The Mt Arthur Coal Mine is owned and operated by Hunter Valley Energy Coal Pty Ltd (HVEC), a wholly owned subsidiary of BHP.

The Mt Arthur Coal Mine is currently approved to operate until 30 June 2026 in accordance with condition 5 of Schedule 2 of Project Approval MP 09_0062 (MP 09_0062).

HVEC is proposing to modify MP 09_0062 for the Mt Arthur Coal Mine to allow for the extension of open cut mining operations until 30 June 2030 (hereafter referred to as the Modification). The Modification is being sought under section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979*.

This Modification Report has been prepared to support the modification application in consideration of the *State Significant Development Guidelines* (Department of Planning and Environment [DPE], 2022), in particular *Appendix E – Preparing a Modification Report* (DPE, 2022).

Plate ES-1 Mt Arthur Coal Rehabilitated Waste Emplacement in Background

Strategic Considerations

BHP has undertaken a structural review of its lower grade metallurgical and thermal coal assets. At the culmination of this review, BHP announced the Mt Arthur Coal Pathway to Closure in June 2022, whereby the mine continues to operate to 2030 to allow time for the planning of the closure phase.

Consistent with this, HVEC is proposing to modify MP 09_0062 for the Mt Arthur Coal Mine to allow for the extension of mining operations until 30 June 2030.

The decision by BHP to retain the Mt Arthur Coal Mine within its portfolio of assets provides the opportunity to proceed with a managed process to cease mining in June 2030 with associated socio-economic benefits for the existing workforce, contractors and suppliers to the Mt Arthur Coal Mine arising from the additional four years of mining operations sought via the Modification.

BHP has commenced a Transition and Mine Closure Project in parallel to the Modification to help facilitate an orderly and equitable transition to closure. The Transition and Mine Closure Project is not part of the Modification, however in the absence of the Modification, closure would commence in 2026 rather than in 2030.

In order to assist with the Transition and Mine Closure Project, and in particular to encourage alternate mine land re-use options, the Modification incorporates some flexibility to relocate existing and proposed offset areas (including rehabilitation areas [Plate ES-1]), however does not seek to reduce the substantial biodiversity benefits that the approved landform and associated offsets will deliver.

Although alternate mine land re-use options, such as renewable energy (Plate ES-2) and recreation areas are being investigated and evaluated, they do not form part of the Modification and would be subject to separate assessment and approval.

Given operations would continue for a further four years, the Modification would result in $1,033 million in net present value (NPV) terms in net benefits to NSW, comprising $483 million in NPV terms in royalties to NSW (Appendix J).

Plate ES-2 Potential Solar Alternate Mine Land Re-Use

Description of the Modification

The Modification includes the following changes to the approved Mt Arthur Coal Mine:

- four-year extension of mining activities to 30 June 2030;
- reduction in the approved open cut mining rate from 32 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal to a maximum of 25 Mtpa ROM coal (similar to current actual ROM coal production);
- reduction in the cumulative open cut and underground ROM coal handling rate from 36 Mtpa to 29 Mtpa;
- reduction in maximum total (open cut and underground) coal rail transportation from 27 Mtpa of product coal to 20 Mtpa, and a reduction in train movements from 30 to 20 movements per day;
- minor extension (25 hectare) of the approved disturbance area in the north-west corner of the operation predominantly to allow for access and ancillary infrastructure (refer to *Modification Area* within Figure ES-1);
- an overall reduction (387 hectare) in approved disturbance, as some previously approved disturbance areas are no longer intended to be disturbed (refer to *Impact Minimisation Area* within Figure ES-1); and
- revised final landform and final void configuration, including an overall reduction in the approved height of the northern overburden emplacement areas and the final landform (to reflect the current actual height).

The Modification would result in a net decrease in approved disturbance of 387 ha, and key landforms (northern overburden emplacement areas) would be lower by approximately 20 m relative to the currently approved final heights.

Stakeholder Engagement Overview

HVEC has consulted with a number of stakeholders during the development of this Modification Report, including:

- key State government agencies;
- local council;
- the local community;
- Aboriginal stakeholders;
- non-government organisations;
- the Mt Arthur Coal Community Consultive Committee; and
- neighbouring mine operators.

Key comments raised during consultation have been considered and addressed in preparation of this Modification Report.

The view of many stakeholders was that the decision by BHP to retain the Mt Arthur Coal Mine is positive in that it provides the opportunity to proceed with a managed process to cease mining in June 2030 and allow time for the orderly planning for closure, while providing ongoing socio-economic benefits to the region.

Summary of Assessment of Impacts

HVEC has undertaken a review of the potential environmental impacts of the Modification. A summary of the environmental outcomes and the government policies under which they are assessed in this Modification Report is provided in Table ES-1.

Generally, impacts were found to be a continuation of existing impacts (within approved/licenced limits) for an additional four years. Impacts associated with disturbance within the Modification Area can be considered minor, noting avoidance measures have been considered and residual impacts are proposed to be managed and/or offset. By comparison to the 25 ha Modification Area, there would be a reduction in approved disturbance of 412 ha, resulting in a net decrease of 387 ha.

The approved final land uses at the Mt Arthur Coal Mine comprise a combination of woodland and agricultural land uses. The Modification conceptual final landform facilitates a continuation of these land uses (Figure ES-2). Consistent with stakeholder feedback, the Modification conceptual final landform has also been designed to minimise sterilisation of future alternate mine land re-uses (Plate ES-3), subject to satisfying existing rehabilitation and offset commitments.

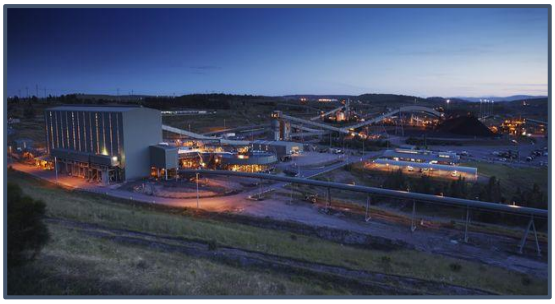
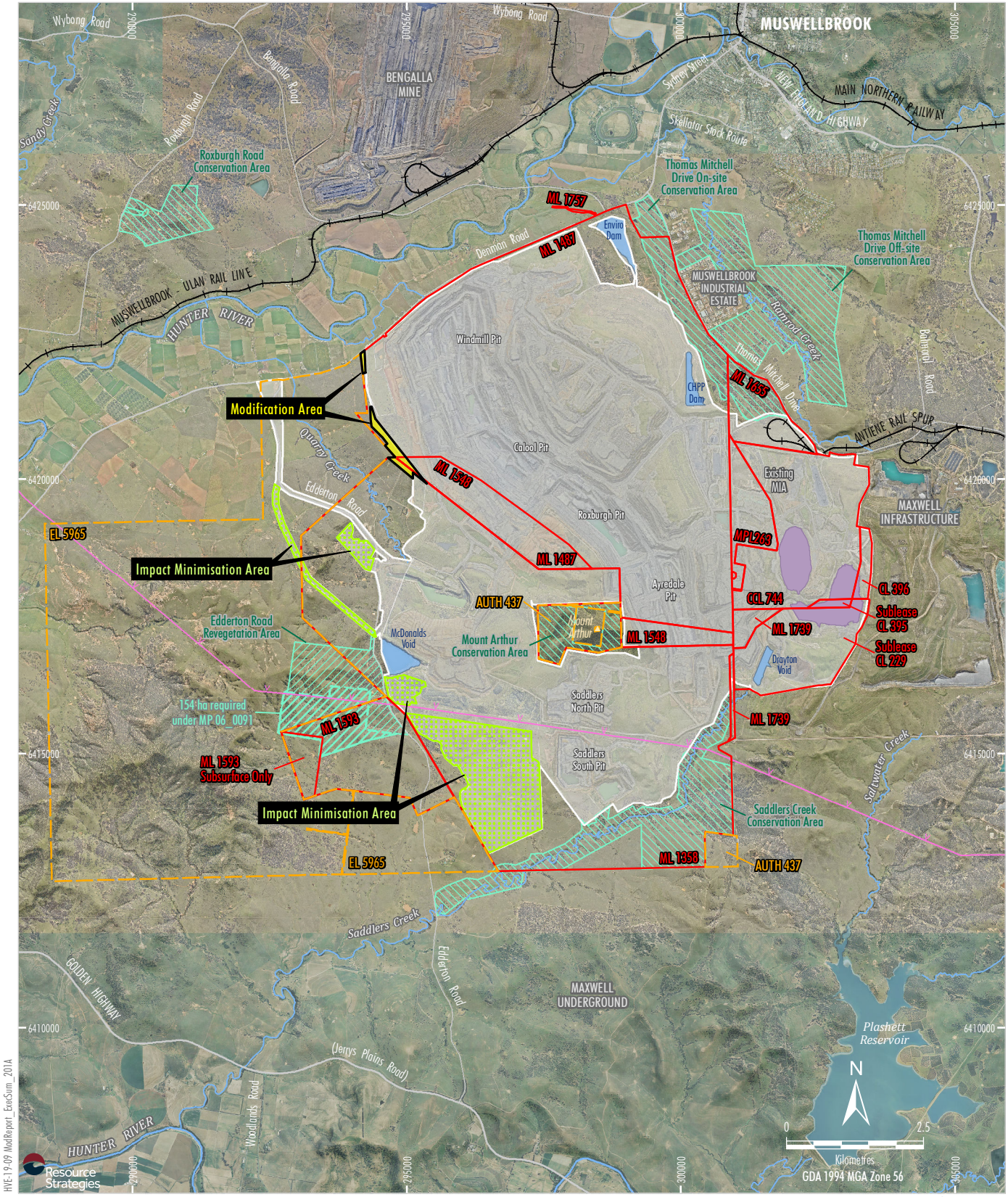


Plate ES-3 Potential Infrastructure Alternate Mine Land Re-Use



HVE-19-09 ModReport_ExecSum_201A

Source: BHP (2023); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing 500kV Electricity Transmission Line
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approximate Extent of Existing/Approved Surface Development
- Tailings Storage Facility
- Water Storage
- Modification Area
- Impact Minimisation Area

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Modification General Arrangement

Figure ES-1

Table ES-1
Key Environmental Assessment Findings

Aspect	Key Policies Considered	Key Outcomes
Noise and Blasting	*Noise Policy for Industry*	✓ No new noise and/or blasting exceedances at privately owned dwellings that are not subject to existing acquisition or mitigation-upon-request conditions.
Air Quality and Greenhouse Gas Emissions	*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* *National Greenhouse Accounts Factors*	✓ No new air quality exceedances at privately owned dwellings that are not subject to acquisition-upon-request conditions. ✓ Scope 1 and 2 emissions estimated to be approximately 0.13% of Australian greenhouse gas emissions. ✓ Management of greenhouse gas emissions under the Safeguard Mechanism.
Social	*Social Impact Assessment Guideline for State Significant Projects*	✓ Response from community – the Modification provides the opportunity to plan and prepare for cessation of mining and commencement of closure process. ✓ The Modification would allow for continued socio-economic benefits including an additional four years of employment for the existing workforce.
Biodiversity	*Biodiversity Assessment Method 2020*	✓ Avoidance considered and implemented. Decrease in disturbance (412 ha), net decrease of 387 ha. ✓ 25 ha of vegetation clearance (minor compared to existing Mt Arthur Coal Mine disturbance), which would be offset by HVEC. ✓ Vegetation clearance limited to the greatest extent possible whilst providing optimised mining opportunities to 2030.
Aboriginal Cultural Heritage	*Aboriginal cultural heritage consultation requirements for proponents 2010*	✓ Comprehensive assessment and engagement with registered Aboriginal stakeholders. ✓ Direct disturbance to three Aboriginal cultural heritage sites comprised of two artefact scatters and one isolated find, which are agreed to be of low archaeological significance. ✓ Management of Aboriginal cultural heritage as per the Aboriginal Heritage Management Plan.
Visual Amenity	–	✓ Landforms (northern overburden emplacement areas) lower than approved height. ✓ The Modification would result in a minor change in visual impact at the Mt Arthur Coal Mine.
Surface Water	Landcom “Blue Book”	✓ Minor changes to the site water management system. ✓ No material changes to on and off-site surface water impacts from the Modification (compared to MP 09_0062).
Groundwater	*NSW Aquifer Interference Policy*	✓ Limited incremental groundwater drawdown compared to MP 09_0062.
Road Transport	*Guide to Traffic Generating Developments*	✓ Existing road network accommodates future traffic demands associated with the Modification.
Economics	*Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*	✓ Approximately $483 million in NPV terms in royalties to NSW. ✓ Approximately $210 million in NPV terms disposable income payments to the Mt Arthur Coal Mine workforce. ✓ Overall net benefit of approximately $1,033 million in NPV terms to NSW.

Transition to Closure

BHP is planning for transition to closure of the Mt Arthur Coal Mine. Referred to as the Transition and Mine Closure Project, this work aspires to create a positive legacy from BHP mining in the Hunter Valley, aligned to BHP's Social Value Framework and the Equitable Change and Transition principles. This work is separate but complementary to the Modification, however initial concepts are shown in Figure ES-3.

Closure of the Mt Arthur Coal Mine would result in associated socio-economic impacts, particularly for the workforce and businesses in Muswellbrook. The Transition and Mine Closure Project will seek to minimise socio-economic impacts on the community through consultation, engagement, planning, support and adaptive management approaches.

A significant portion of feedback received from consultation undertaken for the Modification focused on a preference for beneficial alternate mine land re-uses for the site, namely ongoing uses that generate continued significant economic activity.

There are many potential opportunities for alternate mine land re-uses given the attributes of the site such as access to power and electricity transmission infrastructure, water (Plate ES-4), transport accessibility, existing workforce and land. Alternate mine land re-use does not form part of the Modification and would be subject to separate approvals.

Plate ES-4 Mt Arthur Coal Water Storage

Conclusion

The assessment of the Modification has been undertaken against the backdrop of BHP's decision to proceed with a managed process to cease mining in June 2030.

The Modification presents a range of positive socio-economic effects, but also environmental impacts which have been assessed to be largely a continuation of the existing impacts, which would continue to occur in accordance with existing conditions, management measures and consistent with current guidelines and policies.

The Modification conceptual final landform has been designed in consideration of achieving similar or improved environmental outcomes as approved (Figure ES-2).

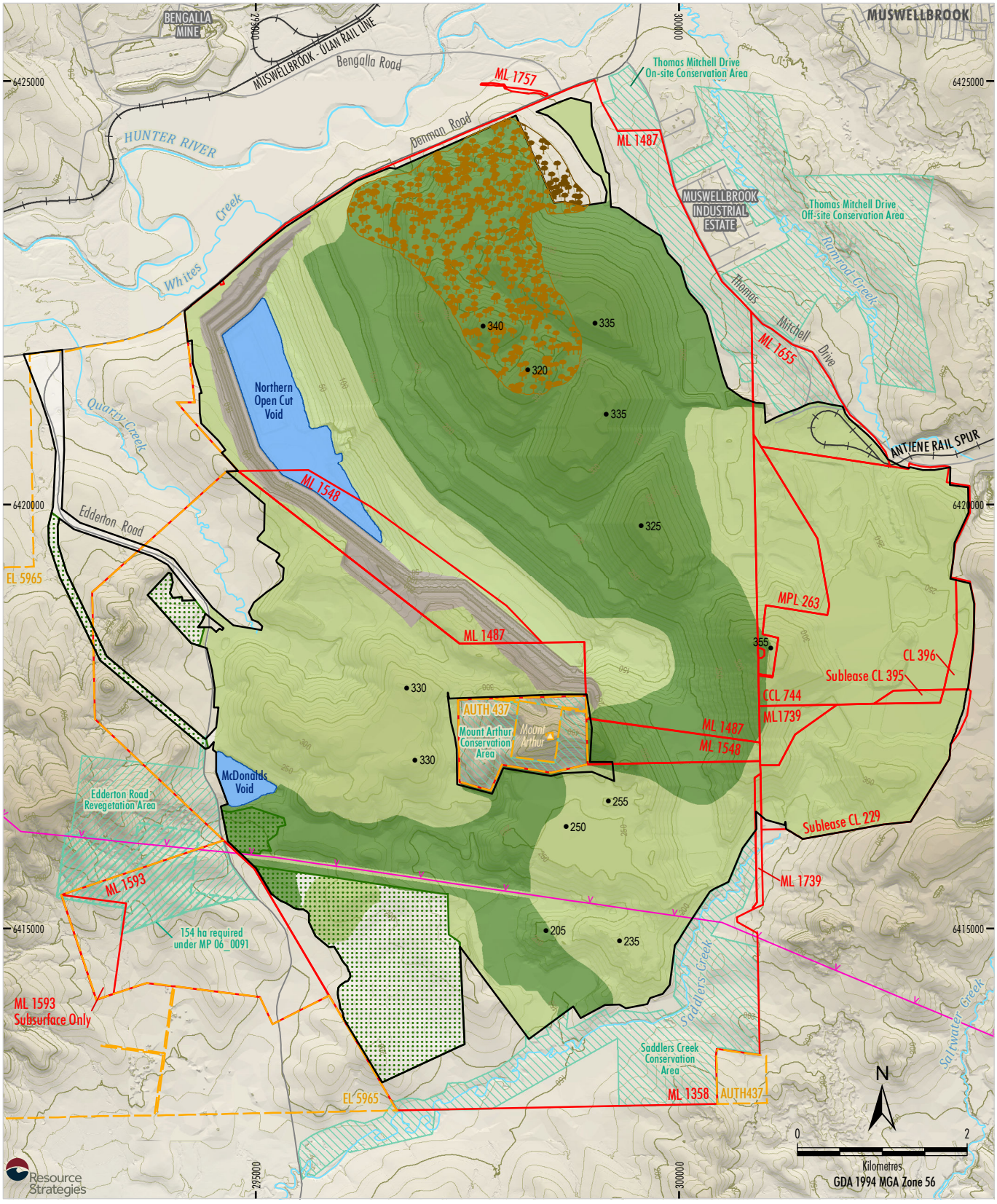
The Modification would provide for the continuation of employment of the existing workforce (Plate ES-5), with approximately 2,200 full-time-equivalent direct operational jobs. The Modification would involve $483 million in NPV terms of incremental royalty payments.

The message from the majority of stakeholders was for BHP to appropriately plan for closure, which the Modification will in-part assist by providing the Transition and Mine Closure Project an additional four years of continued operations.

The additional time will allow the Transition and Mine Closure Project to evaluate opportunities to provide for beneficial alternate mine land re-uses for the site, namely ongoing uses that generate continued significant economic activity (Figure ES-3).

In weighing up the main environmental impacts (costs and benefits) associated with the proposal, as assessed and described in this Modification Report, the Modification, on balance, is considered to have merit and be in the public interest.

Plate ES-5 Mt Arthur Coal Workforce



Source: BHP (2023); NSW Spatial Services (2023)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing 500kV Electricity Transmission Line
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approximate Extent of Modified Surface Development
- Impact Minimisation Area *
- Existing Remnant Woodland
- Box-Gum Woodland Establishment Area
- Woodland Corridor #
- Pasture Area
- Remnant Highwall
- Water Storage
- •320 Approximate Elevation (m AHD)

* Remnant Woodland within approved disturbance area (including the Impact Minimisation Area) forms part of woodland corridor area obligations under Project Approval MP 09_0062.

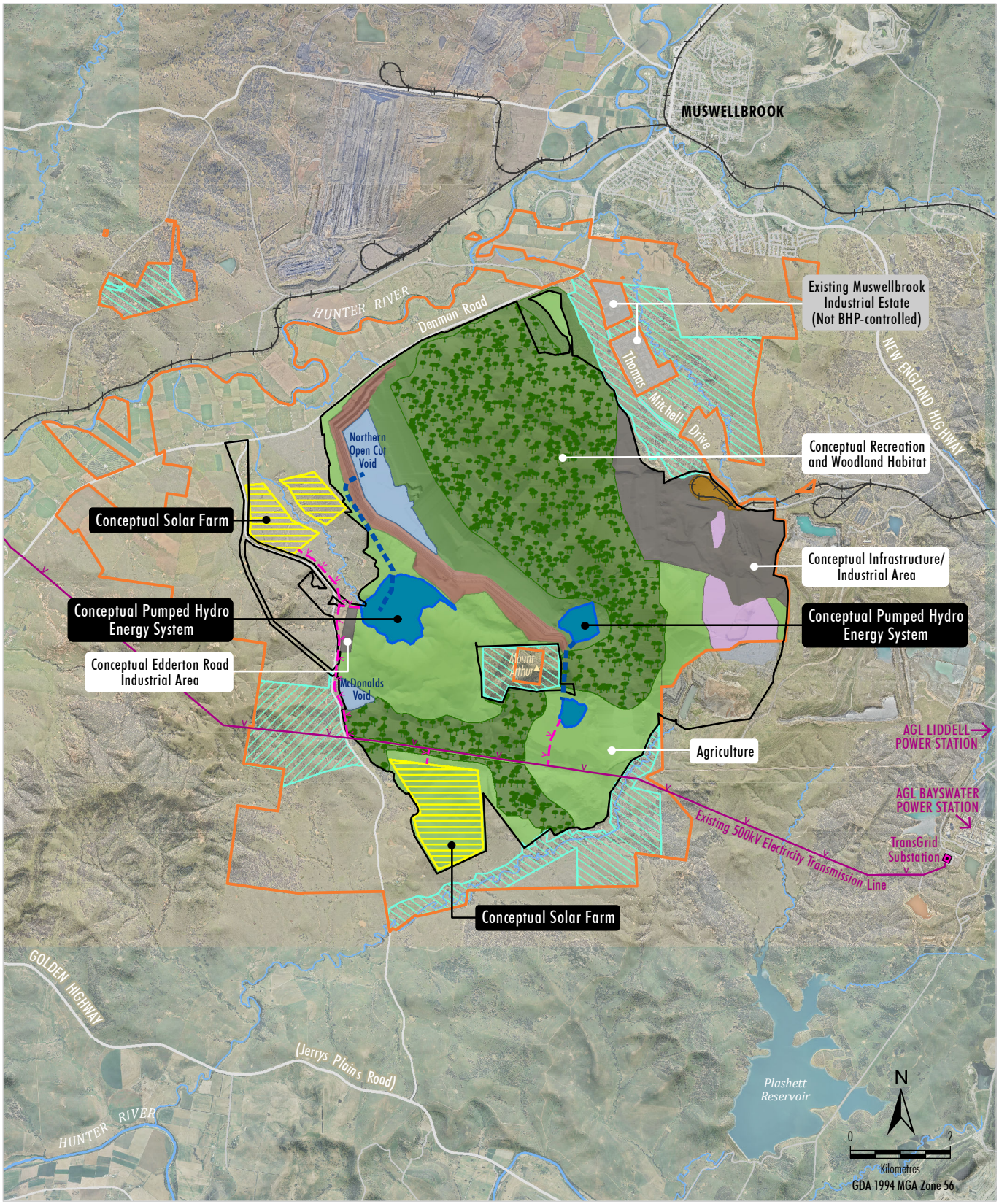
The conceptual distribution of woodland corridors has been planned to satisy the offset requirements of Project Approval MP 09_0062 that relate to rehabilitation. The final distribution of woodland on the final landform would be subject to detailed design.

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Conceptual Final Landform

Figure ES-2



HVE-19-09 ModReport_ExecSum_203A

Source: BHP (2023); NSW Spatial Services (2023)

LEGEND

- Approximate Extent of BHP-controlled Land
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approximate Extent of Modified Surface Development
- Final Void Remnant Highwall
- Final Void Water Storage
- Rehabilitated Tailings Areas
- Infrastructure Area
- Rail Facility
- Agricultural Areas
- Recreation and Woodland Establishment Habitat
- Woodland Buffer Area
- Existing 500kV Electricity Transmission Line
- Potential Electricity Transmission Line Alignment
- Potential Tunnel Alignment
- Potential Pumped Hydro Energy system
- Potential Solar Farm Area

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Alternate Mine Land Re-use Plan - Conceptual Land Use Options

Figure ES-3

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (CONTINUED)

LIST OF PLATES

LIST OF ATTACHMENTS

LIST OF APPENDICES

1 INTRODUCTION

The Mt Arthur Coal Mine is an existing open cut coal mining operation located approximately 5 kilometres (km) south-west of Muswellbrook, within the Muswellbrook Local Government Area (LGA) in the Upper Hunter Valley of New South Wales (NSW) (Figure 1-1).

The Mt Arthur Coal Mine is owned and operated by Hunter Valley Energy Coal Pty Ltd (HVEC), a wholly owned subsidiary of BHP. The Mt Arthur Coal Mine is currently approved to operate until 30 June 2026 in accordance with condition 5 of Schedule 2 of Project Approval MP 09_0062 (MP 09_0062).

HVEC is proposing to modify MP 09_0062 for the Mt Arthur Coal Mine to allow for the extension of open cut mining operations until 30 June 2030 (hereafter referred to as the Modification).

The Modification is being sought under section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). HVEC is the applicant for the Modification (Section 1.4).

This Modification Report has been prepared to support the modification application in consideration of the *State Significant Development Guidelines* (Department of Planning and Environment [DPE], 2022a), in particular *Appendix E – Preparing a Modification Report* (DPE, 2022b).

1.1 SUMMARY OF THE APPROVED MT ARTHUR COAL MINE

1.1.1 History of the Mt Arthur Coal Mine

Coal mine development at the Mt Arthur Coal Mine commenced in the early 1960s in the Bayswater No. 2 Open Cut mining area. Coal production progressively increased and approval to extract coal from the Bayswater No. 3 Open Cut mining area was granted in 1994.

In May 2001, the Mt Arthur North Open Cut operation was approved to extract up to 15 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. The approval also allowed for the construction and use of associated infrastructure and facilities.

In March 2006, HVEC lodged an application to extend the Mt Arthur South Pit. The application was assessed in the *Mt Arthur Coal Proposed South Pit Extension Project Environmental Assessment* (Umwelt Australia Pty Limited, 2007) and was approved by the Minister for Planning in January 2008.

HVEC received approval for the Mt Arthur Underground Project in December 2008 (Project Approval MP 06_0091 [MP 06_0091]).

In 2009, HVEC lodged an application under Part 3A of the EP&A Act to extend open cut operations and consolidate existing approvals for open cut mining operations and surface infrastructure. The application was assessed in the *Mt Arthur Coal Consolidation Project Environmental Assessment* (HVEC, 2009) (the Consolidation Project) and was approved by the Minister for Planning in September 2010 (MP 09_0062).

In 2013, HVEC submitted an application to modify MP 09_0062 to extend the mine life of the Mt Arthur Coal Mine (Modification 1), and was subsequently approved in September 2014. The approval of Modification 1 to MP 09_0062 authorised the extraction of up to 32 Mtpa of ROM coal from the open cut operations until 30 June 2026.

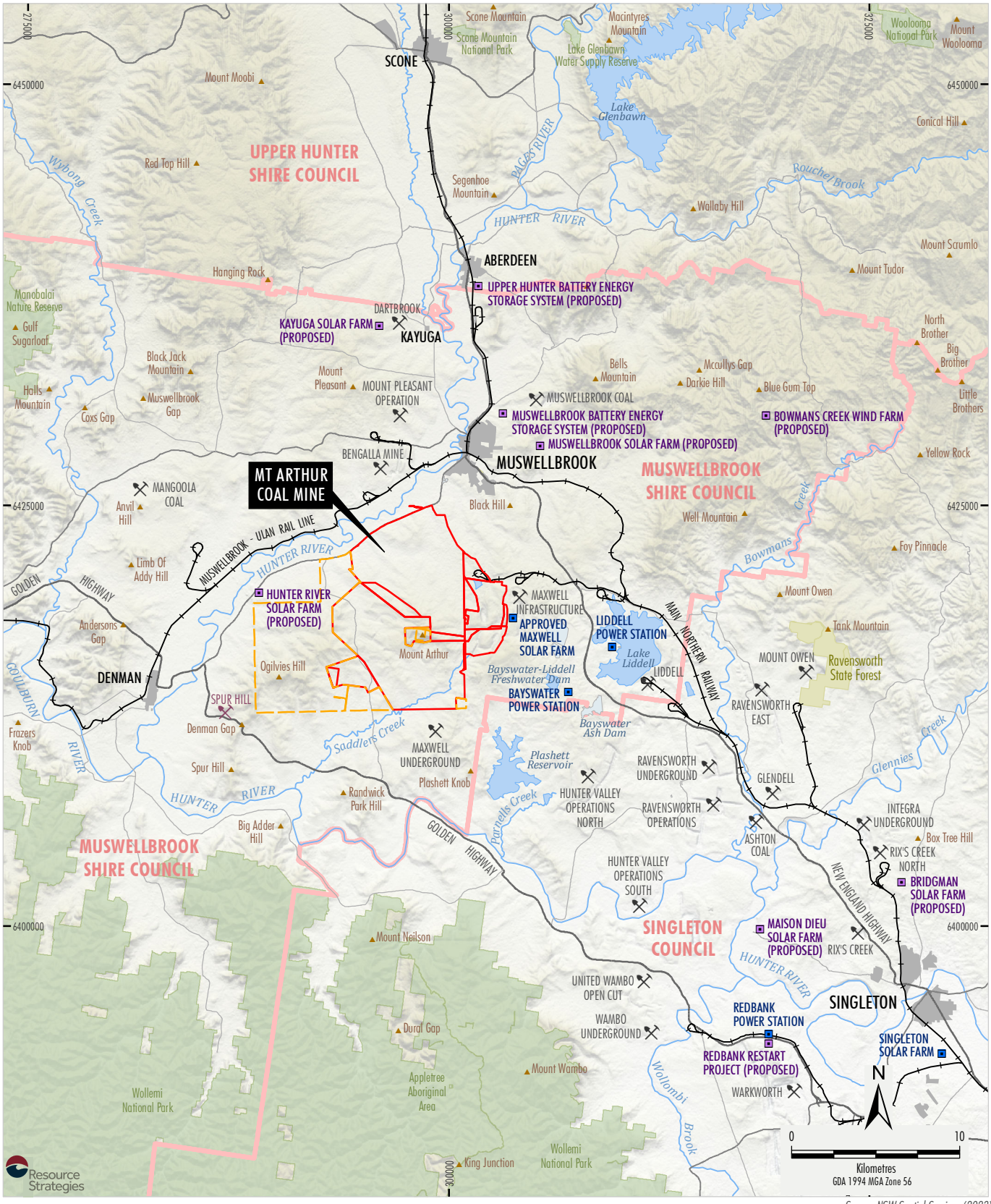
1.1.2 Existing Mining Areas

In accordance with condition 6 of Schedule 2 of MP 09_0062, the existing Mt Arthur Coal Mine has approval to handle up to 36 Mtpa in total (including ROM coal from underground operations [which is not operational]).

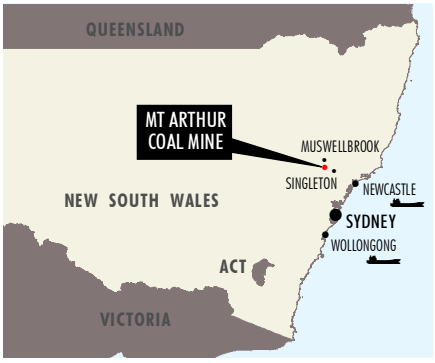
The Mt Arthur Coal Mine is located in the Hunter Coalfields in the northern section of the Sydney Basin. The existing Mt Arthur Coal Mine coal resource lies within the Permian Wittingham Coal Measures.

Open cut mining at the Mt Arthur Coal Mine occurs within the Windmill Pit, Calool Pit, Roxburgh Pit and Ayredale Pit (formerly referred collectively as the Northern Open Cut), as well as Saddlers North Pit and Saddlers South Pit (formerly known as the Southern Open Cut) (Figure 1-2). ROM coal extracted from the open cut pits is hauled to the existing Coal Handling and Preparation Plant (CHPP) for handling and processing (Plate 1-1). A general arrangement of the approved Mt Arthur Coal Mine is shown on Figure 1-2.

Plate 1-1 Mt Arthur Coal CHPP



Source: NSW Spatial Services (2023)



LEGEND

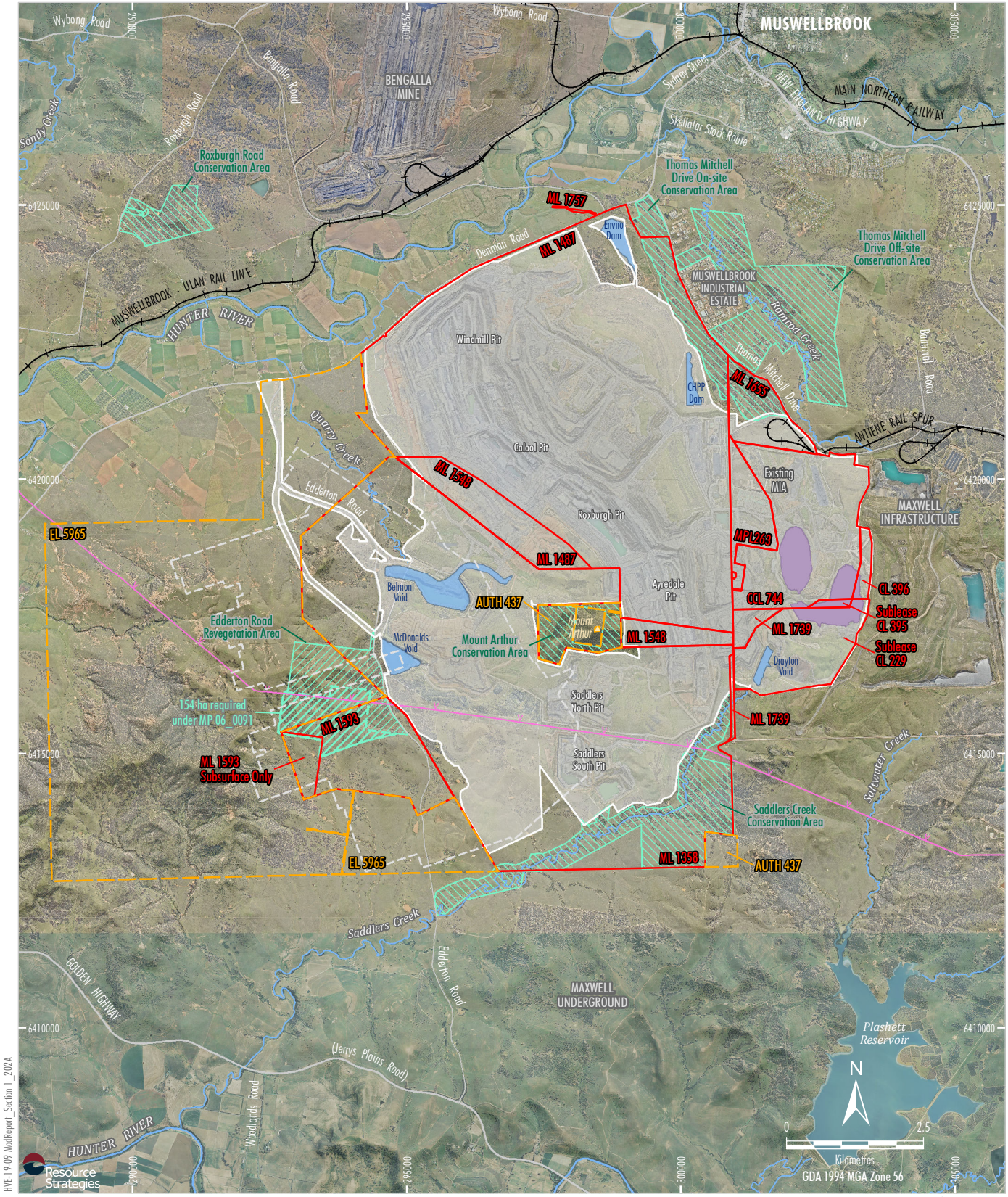
- State Forest
- National Parks and Wildlife Estate
- Local Government Area
- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Mining Operation
- Proposed Mining Operations (Application Lodged)
- Existing/Approved Energy Generation Site
- Proposed Energy Generation Site

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Regional Location

Figure 1-1



HVE-19-09 ModReport_Section 1_202A

Source: BHP (2023); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing 500kV Electricity Transmission Line
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approved Mt Arthur Underground Project
- Approximate Extent of Existing/Approved Surface Development
- Tailings Storage Facility
- Water Storage

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Approved Mt Arthur Coal Mine

Figure 1-2

1.1.3 Coal Processing

The CHPP is approved to process up to 36 Mtpa of ROM coal from open cut and underground operations at the Mt Arthur Coal Mine to produce saleable, thermal coal for export and occasional domestic markets.

The CHPP area includes:

- coal handling areas (ROM pads, ROM dump stations and raw coal stockpiles – including stacking and reclaiming equipment);
- coal preparation plant (two coal processing modules, including a washery building, thickener and reagent farm, coarse reject load-out bin); and
- product coal stockpiles, reclaim and conveyors.

Export quality product coal (and occasional domestic market coal[1]) is loaded onto trains at the rail loading facility for transport to the Port of Newcastle via the Antiene Rail Spur and Main Northern Railway.

Coarse rejects produced by the CHPP are disposed within the overburden emplacement areas, consistent with the recommendations by Geo-Environmental Management Pty Ltd (GEM) (2012).

Tailings (or fine rejects) are stored in the existing (west cut) tailings storage facilities (TSFs) (Figure 1-2), which is approved to be constructed in a series of stages up to a maximum embankment level of 280 metres (m) Australian Height Datum (AHD) (Gilbert & Associates Pty Ltd, 2013).

1.1.4 Overburden Emplacements

Development of the northern overburden emplacement areas are approved to an average of 360 m AHD (maximum height of 375 m AHD). Saddlers Pit overburden emplacement areas are approved to an average height of up to 250 m AHD. The southern out-of-pit overburden emplacement is also approved to an average height of 360 m AHD.

1.1.5 Water Management

A site water management system is implemented to maintain water supply for site requirements and to reduce the risk of off-site water quality impacts.

The key objectives of the existing water management strategy for the Mt Arthur Coal Mine are to:

- Maintain a low risk of uncontrolled discharge occurring from the water management system.
- Minimise the need to discharge water to the Hunter River by maximising re-use on site.
- Minimise the need to extract water from the Hunter River by optimising the re-use and recycling of water on-site and by maximising the use of water recovered from treated effluent at the Muswellbrook Recycled Water Treatment Works.
- Minimise risks of disruption to mining operations by efficient mine dewatering.
- Ensure that effective control over emission of airborne particulates is uninterrupted by maintaining a reliable water supply.
- Ensure uninterrupted operation of the CHPP by maintaining a reliable water supply.

1.1.6 Disturbance Area

The total Mt Arthur Coal Mine approved disturbance area encompasses approximately 6,710 hectares (ha). Rehabilitation is undertaken progressively to facilitate a safe, stable and non-polluting final landform, including the remaining mining voids, which incorporate natural micro-relief and natural drainage lines to improve linkages with the surrounding natural landforms (Plate 1-2).

An aerial view of the existing Mt Arthur Coal Mine key infrastructure and operational components is shown on Plate 1-3.

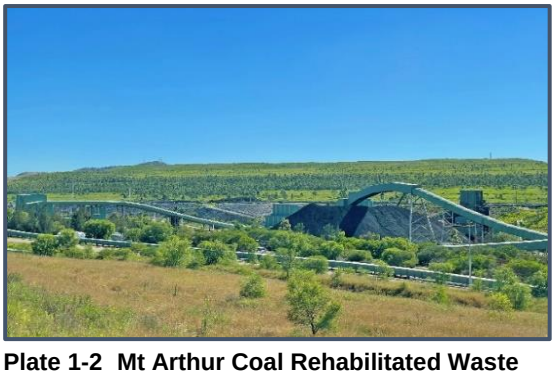
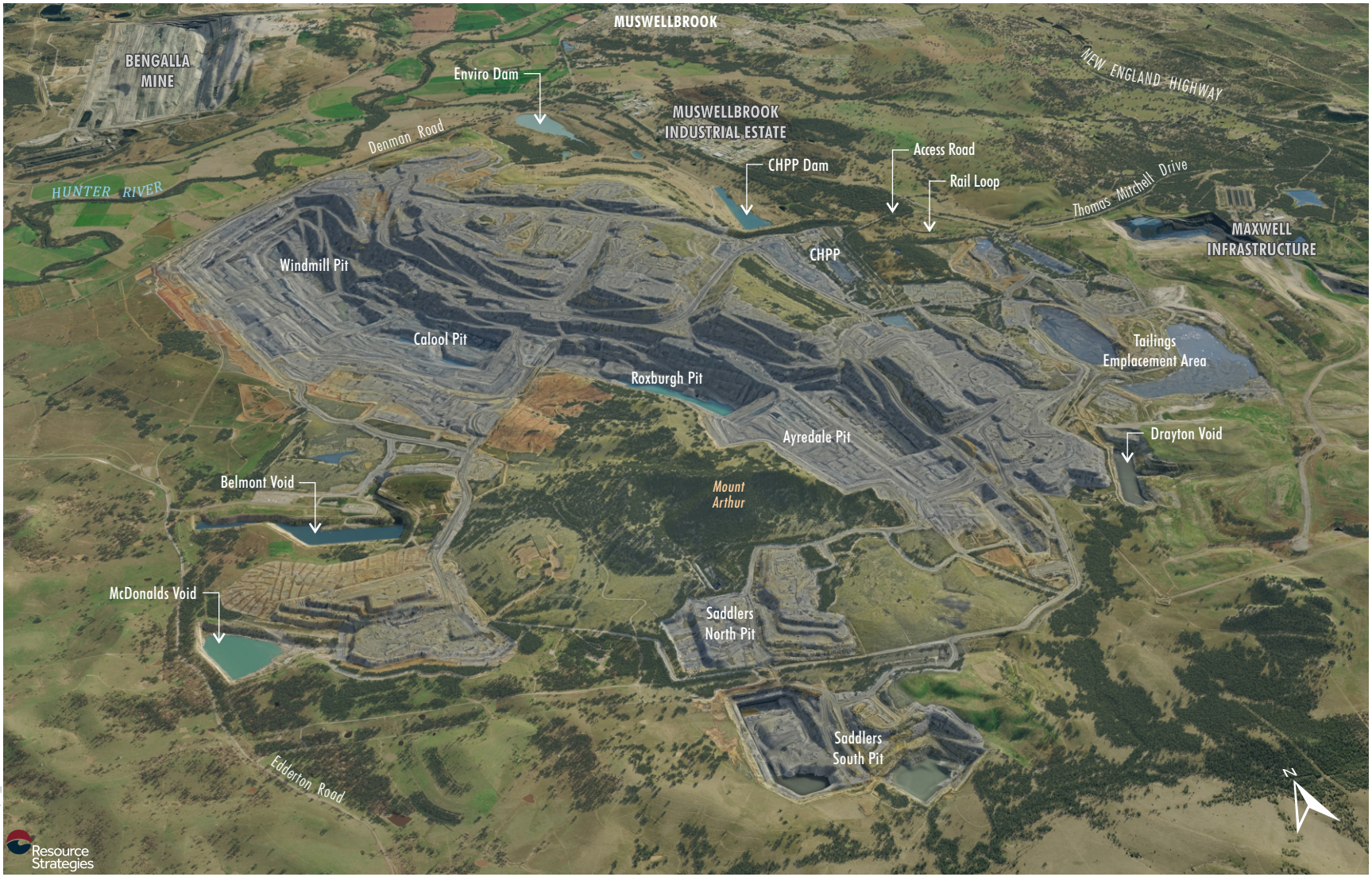


Plate 1-2 Mt Arthur Coal Rehabilitated Waste Emplacement in Background

[1] Such as the recent direction by the Minister for Energy for coal suppliers to reserve a portion of product coal for the domestic market.



HVE-19-09 ModReport_002A

Source: BHP (2023), Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Oblique Aerial View of the Mt Arthur Coal Mine

Plate 1-3

1.1.7 Workforce

The total workforce required for peak production is approximately 2,600 employees and contractors, with a workforce of approximately 240 full-time equivalent (FTE) personnel required during peak construction phases (HVEC, 2009). However, in recent years, operational employment numbers have been approximately 2,200 FTE positions.

1.1.8 Mt Arthur Underground Project

The Mt Arthur Underground Project was approved in 2008 under MP 06_0091. The Mt Arthur Underground Project comprises longwall mining operations in five coal seams, with transport of ROM coal by conveyor for processing at the CHPP. A maximum of 8 Mtpa of ROM coal may be sourced from the underground operations.

ROM coal from underground operations is approved to be transported to the Mt Arthur Coal Mine until 31 December 2030 under MP 06_0091.

Underground mining at the Mt Arthur Underground Project has not commenced and ROM coal from the underground has not been handled at the open cut CHPP. HVEC has no current intent to commence underground mining.

Figure 1-3 illustrates the approved Mt Arthur Coal Mine production limits incorporating underground operations.

1.2 OVERVIEW OF THE MODIFICATION

1.2.1 Background to the Modification

BHP undertook an extensive review of the Mt Arthur Coal Mine including considering offers received through a Divestment Review, mine life planning and resource quality, as well as financial performance. It was concluded by BHP that Mt Arthur Coal's commercial viability was limited beyond 2030.

As a result of the above, in June 2022, HVEC announced a decision to cease mining activities at the Mt Arthur Coal Mine in 2030, as part of a plan to provide a pathway to closure of the operation. Accordingly, HVEC is seeking a modification of the Mt Arthur Coal Mine MP 09_0062 for a four-year extension of open cut mining activities at the Mt Arthur Coal Mine to 30 June 2030 (the Modification).

While the Mt Arthur Coal Mine is currently authorised to extract up to 32 Mtpa from open cut mining operations, the Mt Arthur Coal Mine has not operated at maximum production over the period of financial year (FY) 2015 to FY2022, with actual mining rate being between approximately 20 Mtpa to 25 Mtpa.

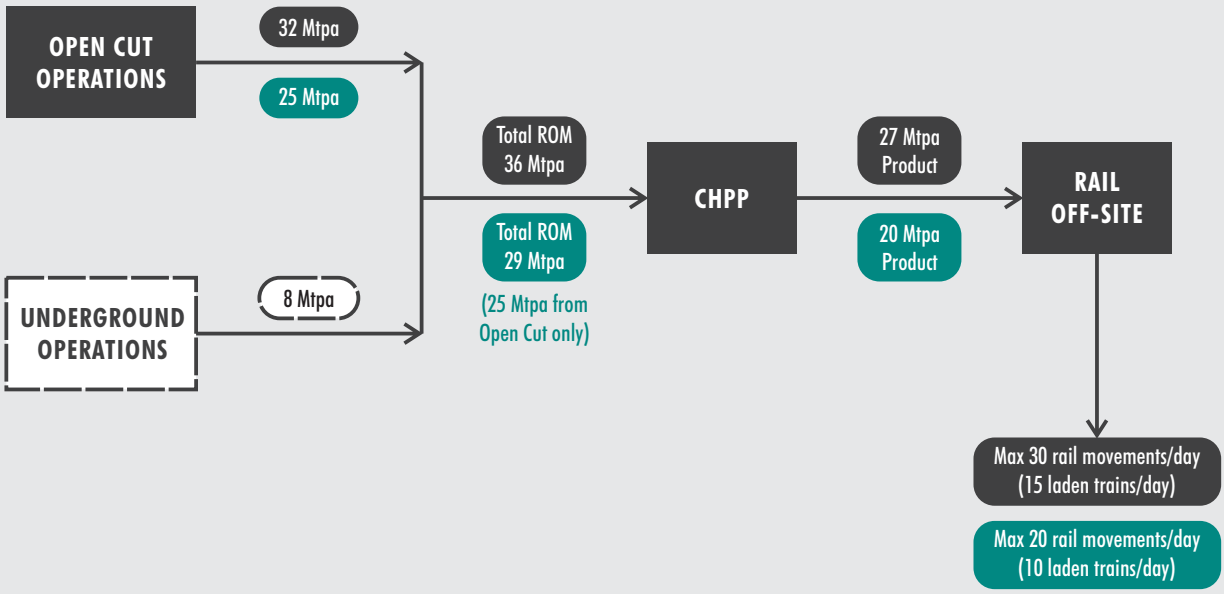
Accordingly, as part of the Modification, the mining rate to 2030 would be more reflective of current rates.

1.2.2 Description of the Modification

The modified Mt Arthur Coal Mine would be wholly located within the approved Development Application Area[2] (DA Area) listed in Appendix 1 of MP 09_0062, and would include the following changes to the approved Mt Arthur Coal Mine (Section 3):

- four-year extension of mining activities to 30 June 2030;
- reduction in the approved open cut mining rate from 32 Mtpa of ROM coal to a maximum of 25 Mtpa ROM coal (similar to current actual ROM coal production) (Figure 1-3);
- reduction in the cumulative open cut and underground ROM coal handling rate from 36 Mtpa to 29 Mtpa (Figure 1-3);
- reduction in maximum total (open cut and underground) coal rail transportation from 27 Mtpa of product coal to 20 Mtpa, and a reduction in train movements from 30 to 20 movements per day (Figure 1-3);
- minor extension (25 ha) of the approved disturbance area in the north-west corner of the operation predominantly to allow for access and ancillary infrastructure (refer to *Modification Area* within Figure 1-4);
- an overall reduction (387 ha) in approved disturbance, as some previously approved disturbance areas are no longer intended to be disturbed (refer to *Impact Minimisation Area* within Figure 1-4); and
- revised final landform and final void configuration, including an overall reduction in the approved height of the northern overburden emplacement areas and the final landform (to reflect the current actual height).

[2] Referred to as the existing approved Site under MP 09_0062 (being the land listed in Appendix 1 of MP 09_0062).



HVE-19-09 MOD2_ModReport_Section 1_004F

Resource Strategies

Source: BHP (2023)

LEGEND

Approved Underground Project Approval MP 06_0091

Approved Project Approval MP 09_0062

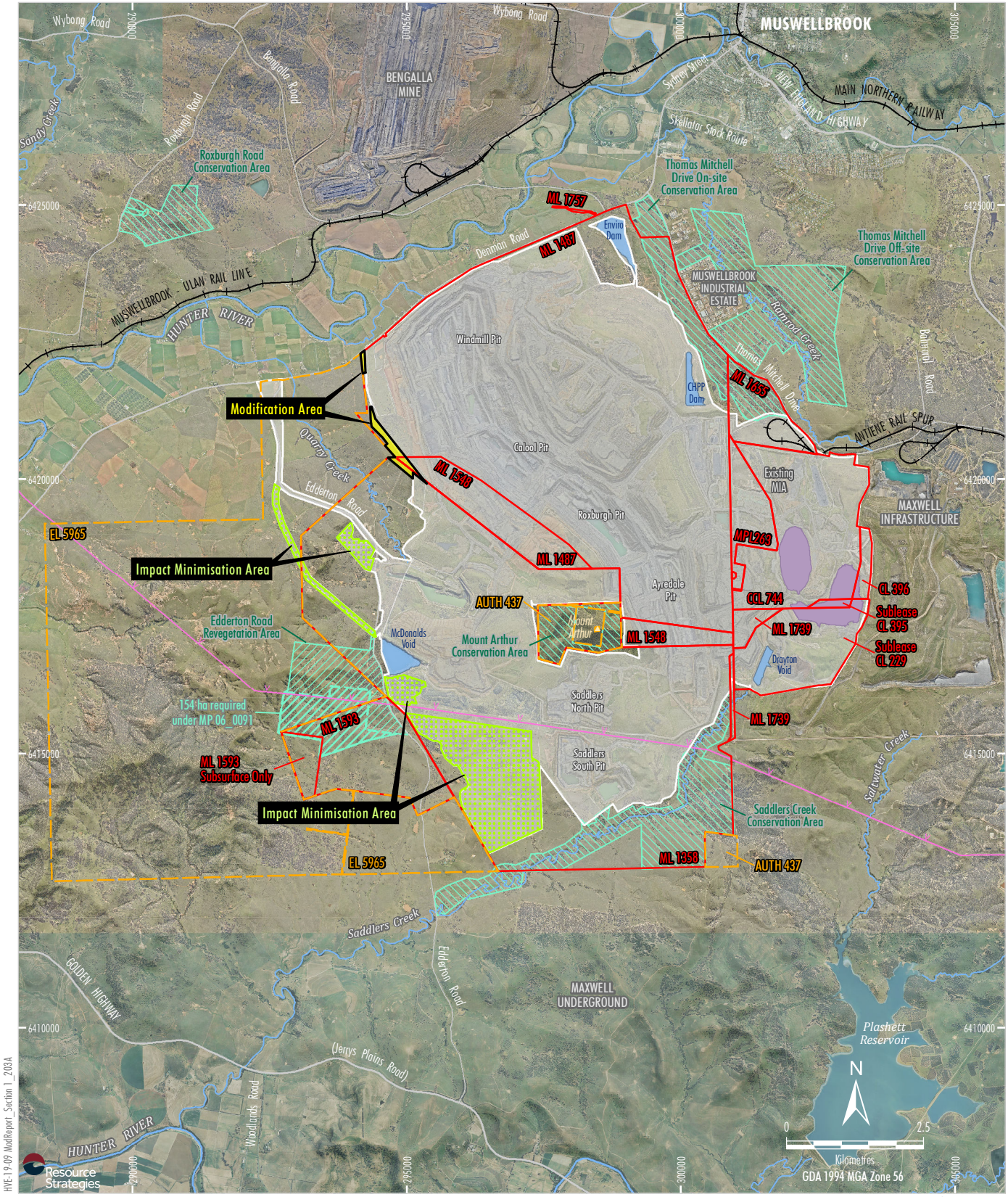
Modification to Project Approval MP 09_0062

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Coal Production Limit Schematic

Figure 1-3



Source: BHP (2023); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing 500kV Electricity Transmission Line
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approximate Extent of Existing/Approved Surface Development
- Tailings Storage Facility
- Water Storage
- Modification Area
- Impact Minimisation Area

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Modification General Arrangement

Figure 1-4

The Modification would involve no change to:

- existing mining tenements;
- existing coarse rejects and tailings management;
- existing workforce;
- the existing explosives facility;
- existing site accesses;
- existing electricity supply and distribution;
- existing offset and rehabilitation objectives;
- existing services, plant and equipment; and
- the existing hours of operation and associated activities (undertaken 24 hours per day, seven days a week).

The Modification general arrangement is shown on Figure 1-4 and discussed further in Section 3.

All freehold land associated with the Modification is owned by BHP (Figures 1-5a and 1-5b).

1.2.3 Requirement for the Modification

The Modification is required to allow for continued mining operations at the Mt Arthur Coal Mine until 30 June 2030, and would provide time to plan and prepare for the cessation of coal mining in 2030, and undertake the work necessary to meet transition and closure objectives.

Changes in the progressive rehabilitation and final landform as part of the Modification are required to reflect mining to 30 June 2030.

Further detail regarding why the Modification is required, including analysis of feasible alternatives and consequences of the Modification not proceeding is provided in Section 2.

1.3 INTERACTION WITH OTHER DEVELOPMENTS

Interaction between the Mt Arthur Coal Mine open cut operations and the Mt Arthur Underground Project is detailed in Section 1.1.8.

There would be no change to the interactions between surrounding mining and energy developments (with the exception of the Antiene Rail Spur), and these have been considered below for the purposes of cumulative assessment.

1.3.1 Antiene Rail Spur

The Antiene Rail Spur is owned by the Antiene Joint Venture, which is currently managed by BHP and Maxwell Ventures (Management) Pty Ltd (Maxwell), a wholly owned subsidiary of Malabar Resources Limited (Malabar).

The Antiene Rail Spur services the Maxwell Underground Mine Project and the Mt Arthur Coal Mine to transport product coal via the Main Northern Railway to the Port of Newcastle for export.

Following commissioning in 1983, the use of the Antiene Rail Spur was governed by two separate planning approvals, granted individually to Drayton Mine and Mt Arthur Coal Mine in November 2000. These were Development Consents DA 106-04-00 and DA 105-04-00, respectively.

In 2010, BHP consolidated a number of their existing planning approvals; subsequently, DA 105-04-00 was surrendered, and the relevant conditions were incorporated into MP 09_0062.

The section of the Antiene Rail Spur used to service the Maxwell Underground Mine Project is approved to operate under DA 106-04-00 until November 2025.

Accordingly, the Antiene Rail Spur operates under the Mt Arthur Coal Mine MP 09_0062 as well as the Maxwell Underground Mine Project DA 106-04-00.

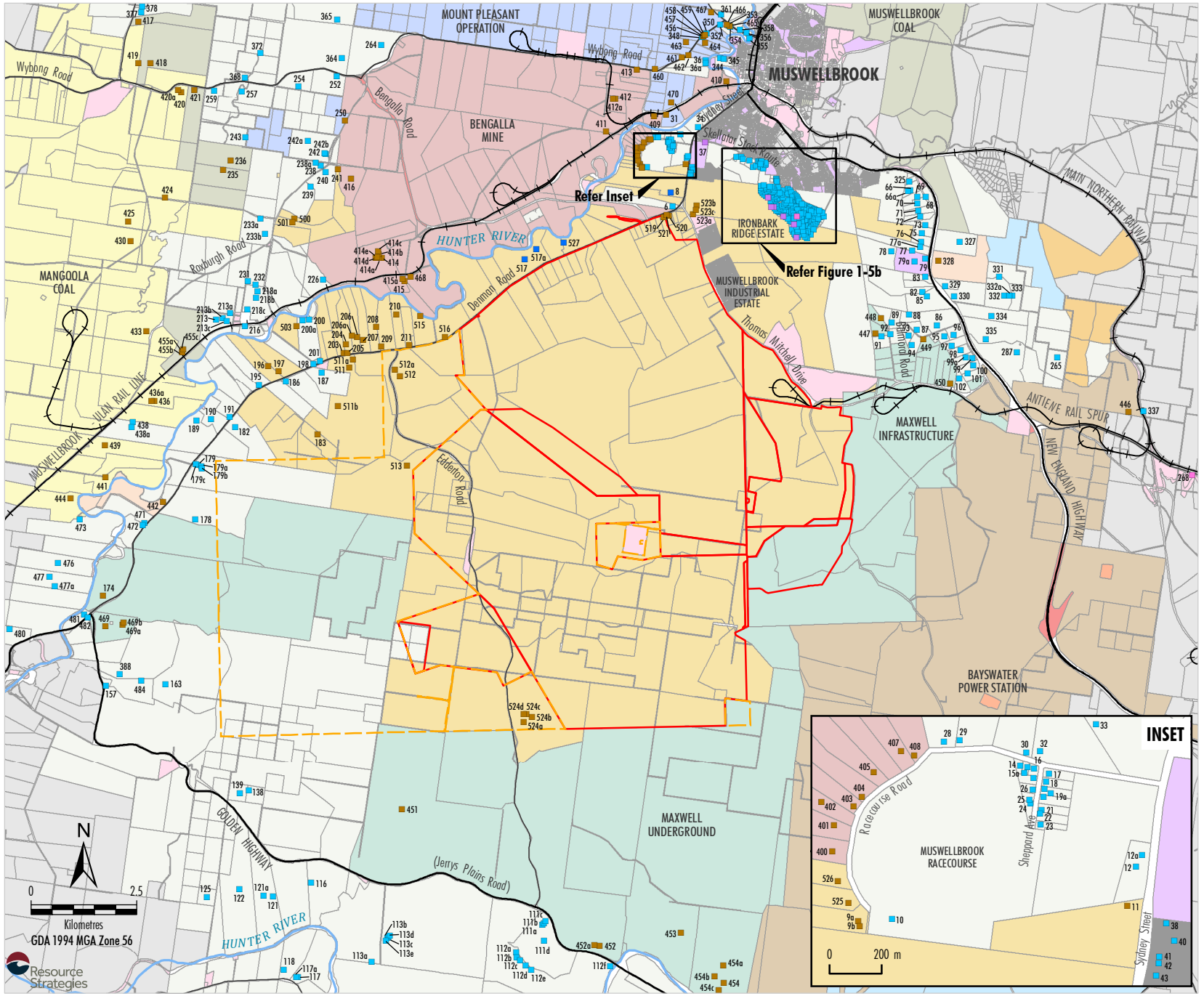
The Modification would allow for the continued use of the Antiene Rail Spur until 30 June 2030. The Modification would not impact the Maxwell Underground Mine Project and its capacity to export coal via the Antiene Rail Spur.

The Antiene Rail Spur DA 106-04-00 was modified on 18 September 2023 to extend the operating life of the Antiene Rail Spur until 30 June 2047.

1.3.2 Maxwell Infrastructure and Underground

The Maxwell Infrastructure and Maxwell Underground Mine Project are owned and operated by Maxwell.

Development Consent SSD-9526 for the Maxwell Underground Mine Project was granted by the NSW Independent Planning Commission in December 2020.



LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Mt Arthur-controlled
- Maxwell-controlled
- Bengalla-controlled
- AGL-controlled
- Mount Pleasant-controlled
- Mangoola-controlled
- Glencore-controlled
- HVO-controlled
- Industrial Zone
- Muswellbrook Coal-controlled
- Other Mining/Resource Company-controlled
- Crown/The State of NSW
- Muswellbrook Shire Council
- Transport for NSW
- TransGrid
- Privately-owned Land
- Owner not Identified

Dwellings

- Mine-owned Receiver
- The State of NSW (Crown)
- Muswellbrook Shire Council
- Heritage Listed Dwelling
- Privately-owned Receiver

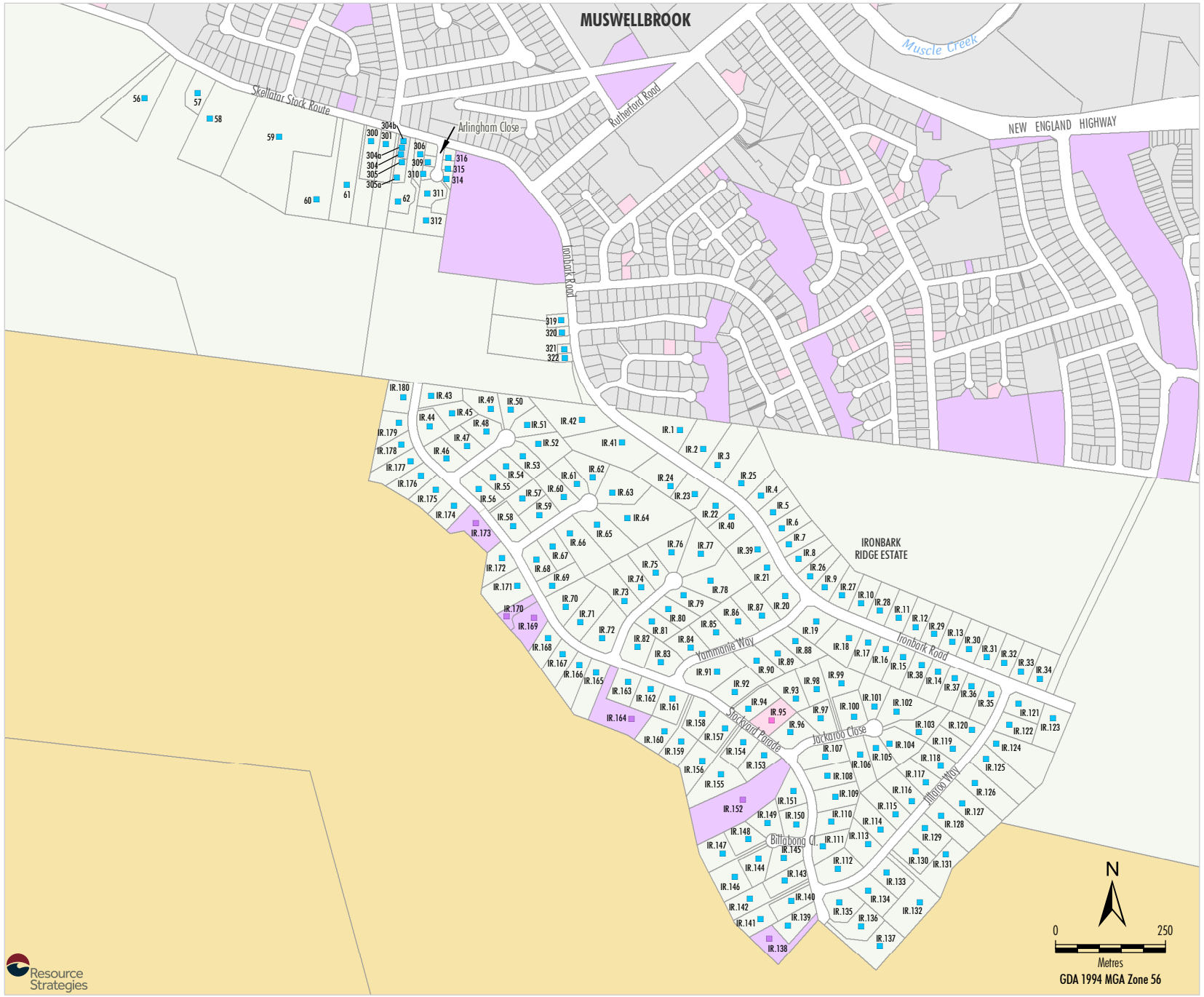
Source: BHP (2023); NSW Spatial Services (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Land Ownership Overview

Figure 1-5a



LEGEND

- Mt Arthur-controlled
- Crown/The State of NSW
- Muswellbrook Shire Council
- Privately-owned Land
- Owner not Identified

Dwellings

- The State of NSW (Crown)
- Muswellbrook Shire Council
- Privately-owned Receiver

Refer Figure 1-5a for Overview.

Source: NSW Spatial Services (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Land Ownership
Inset

Figure 1-5b

The Maxwell Underground Mine Project is an underground mining operation that is approved to extract up to 8 Mtpa of ROM coal for a period of 26 years (until 2047).

In February 2018, the ownership of the former Drayton Mine (now the Maxwell Underground Mine Project) was formally transferred to Malabar. The substantial existing infrastructure at the Maxwell Underground Mine Project is approved for handling, processing and transportation of coal for the life of the Maxwell Underground Mine Project. The existing Maxwell infrastructure includes train load-out facilities and a rail loop connecting to the Antiene Rail Spur.

1.3.3 Maxwell Solar Project

The Maxwell Solar Project (SSD-9820) was approved in August 2020. The Maxwell Solar Project will comprise the installation of a solar plant with a capacity of 25 megawatts (MW) at the Maxwell Infrastructure (directly east of the Mt Arthur Coal Mine), which will supply electricity to the Maxwell Underground Project and/or the National Energy Market.

1.3.4 Bengalla Mine

Bengalla Mining Company operates the existing Bengalla Mine, which is an open cut coal mine located 2 km north of the Mt Arthur Coal Mine (Figure 1-1).

Bengalla Mine is approved to produce up to 15 Mtpa of ROM coal until 28 February 2039, under SSD-5170, as modified.

1.3.5 Mangoola Coal

Mangoola Coal Operations Pty Limited (wholly owned by Glencore) owns and operates Mangoola Coal, which is an open cut coal mine located approximately 10 km north-west of the Mt Arthur Coal Mine (Figure 1-1).

Mangoola Coal is approved to mine up to 13.5 Mtpa of ROM coal until 31 December 2030 under SSD-8642, as modified.

1.3.6 Mount Pleasant Operation

The Mount Pleasant Operation is an open cut coal mine and associated infrastructure, located approximately 8 km north of the Mt Arthur Coal Mine (Figure 1-1).

The Mount Pleasant Operation produces thermal coal and has an approved operational capacity of up to 21 Mtpa until 22 December 2048, under SSD-10418 (State approval granted September 2022).

1.3.7 Dartbrook Mine

The Dartbrook Mine is an underground coal mine located approximately 13 km north of the Mt Arthur Coal Mine, which was placed in care and maintenance in 2007. Approval to extend the life of the Dartbrook Mine for an additional five years was granted in March 2022. Dartbrook Mine could therefore recommence operations and continue until 5 December 2027.

1.3.8 Liddell and Bayswater Power Stations

The Liddell and Bayswater power stations, both owned by AGL Macquarie Pty Limited, a subsidiary of AGL Energy Limited (AGL), are located south-east of the Mt Arthur Coal Mine (Plate 1-4).

Plate 1-4 Mt Arthur Coal Infrastructure (foreground) and AGL Power Stations (background)

The Liddell Power Station was commissioned in 1969, and comprised four 500 MW generating units producing approximately 8,000 gigawatt hours (GWh) of electricity annually whilst operational.

The Bayswater Power Station, commissioned in 1985, utilises four 660 MW generating units to produce approximately 15,000 GWh of electricity annually.

The Liddell Power Station commenced the first stage of closure works in April 2022, with full closure in April 2023, and closure of the Bayswater Power Station is planned for 2030 to 2033.

1.3.9 Bowmans Creek Wind Farm

Bowmans Creek Wind Farm is a proposed wind farm located at Bowmans Creek, north-east of Mt Arthur Coal Mine (Figure 1-1).

The proposed Bowmans Creek Wind Farm would involve the construction and operation of approximately 70 to 80 wind turbines rated at approximately 1.5 MW to 5 MW.

1.3.10 Liddell Battery and Bayswater Ancillary Works

The Liddell Battery and Bayswater Ancillary Works Project (SSD-8889679) was approved in March 2022, and will consist of a grid-connected battery energy storage system with capacity of up to 500 MW and 2 GWh, decoupling works required for alternative connection arrangements for the Liddell switching station, and upgrades to ancillary infrastructure at Bayswater.

1.3.11 Spur Hill Underground Coking Coal Project

Spur Hill Underground Coking Coal Project is located adjacent to the Maxwell Underground Project (south-west of the Mt Arthur Coal Mine). It is owned by Malabar. Secretary's Environmental Assessment Requirements for the Spur Hill Underground Coking Coal Project were issued in 2014 (approval has not been sought and the project is not operational). It is noted that the EPBC Referral (EPBC 2014/7239) was withdrawn in November 2022.

1.3.12 Cumulative Assessment Approach

The approach taken for cumulative assessment in this Modification Report has been informed by the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPE, 2022c). This guideline nominates two general approaches to cumulative impact assessment, namely:

- Incremental type assessment, whereby the incremental impacts of the Modification are added to the baseline condition.
- Cumulative type assessment, where the Modification is combined with the effects of other developments and assessed against key thresholds.

The *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPE, 2022c) provides some important commentary regarding assessment approach:

> *The cumulative impact assessment undertaken for a particular State significant project is to be proportionate to the scale and potential significance of the cumulative impacts of the project combined with the impacts of other relevant future projects.*
>
> *This assessment is to focus on the key matters that could be materially affected by the cumulative impacts of the project and other relevant future projects – not on every conceivable cumulative impact on every matter.*
>
> *…*
>
> *It is critical to strike the right balance between pragmatism (or what is practical and reasonable) and precaution, and to remember that the cumulative impact assessment is not an end in itself: its primary purpose is to inform decision-making on the project and to ensure that the implications of approving the project are properly understood.*

It is also noted that approved projects need not be included for cumulative assessment purposes where the proponent has made a public statement that the project is no longer proceeding:

> *In some instances, relevant future projects may not need to be included in the CIA. For example, where the proponent of an approved project has made a public statement that the project is no longer proceeding. The proposed approach to assessment in these instances should be outlined in the scoping document.*

In the case of the Mt Arthur Underground Project, HVEC has no current intent to commence underground mining, hence the underground mining component has not been included in cumulative impact assessments (e.g. the Groundwater Assessment). Notwithstanding, as MP 09_0062 includes the approval to process and transport underground coal and this Modification seeks to extend the life of MP 09_0062 for a further four years, processing of underground coal has been included in cumulative impact assessment in respect of air quality and greenhouse gas emissions.

Similarly, as the Spur Hill Underground Coking Coal Project is not approved and the EPBC Referral withdrawn, it is also not included in cumulative impact assessments.

1.4 APPLICANT DETAILS

HVEC (ABN: 39 062 894 464) is the applicant for the Modification. The contact details for HVEC are:

Hunter Valley Energy Coal Pty Ltd
Level 14, 480 Queen Street
Brisbane QLD 4000

Website: https://www.bhp.com/

The Mt Arthur Coal Mine is located at 500 Thomas Mitchell Drive, Muswellbrook NSW 2333.

1.5 STRUCTURE OF THIS DOCUMENT

An outline of the main text sections of this Modification Report is presented below:

Section 1	Provides a summary of the Mt Arthur Coal Mine and an overview of the Modification.
Section 2	Describes the strategic context for the Modification.
Section 3	Provides a description of the Modification.
Section 4	Outlines the statutory provisions relevant to the Modification.
Section 5	Describes the consultation and engagement undertaken in relation to the Modification and ongoing community involvement.
Section 6	Details the environmental assessment of the Modification and describes the existing environmental management systems and measures that would be available to manage and monitor any potential impacts.
Section 7	Provides a justification of the Modification.
Section 8	Lists the documents referenced in the main text of this Modification Report.

Attachments to the main text are also provided as follows:

Attachment 1	Proposed Changes to Project Approval MP 09_0062
Attachment 2	Alternate Mine Land Re-Use Prospectus
Attachment 3	Detailed Statutory Compliance Reconciliation Table
Attachment 4	Community Consultation

Appendices A to J provide supporting information as follows:

Appendix A	Noise and Blasting Assessment
Appendix B	Air Quality Impact and Greenhouse Gas Assessment
Appendix C	Social Impact Assessment
Appendix D	Biodiversity Development Assessment Report
Appendix E	Aboriginal Cultural Heritage Assessment
Appendix F	Landscape and Visual Impact Assessment
Appendix G	Surface Water Assessment
Appendix H	Groundwater Assessment
Appendix I	Road Transport Assessment
Appendix J	Economic Assessment

2 STRATEGIC CONTEXT

This section outlines the strategic context for the Modification and summarises the strategic need and potential benefits of the Modification.

2.1 REGIONAL CONTEXT

HVEC has been operating the Mt Arthur Coal Mine for over 20 years, and since its commencement as Bayswater No. 2 in the 1960s, the Mt Arthur Coal Mine has played an important role in the region from a social and economic perspective.

The Mt Arthur Coal Mine is located in the Hunter Coalfields within the Sydney Basin which forms the target resource of major coal developments in the Hunter region.

Prospecting for coal at the Mt Arthur Coal Mine and surrounds commenced in the early 1960s, with exploration and production progressively increasing in the 1990s. The Mt Arthur Coal Mine is now situated in a mining precinct surrounded by several other coal, resource and energy projects.

The Mt Arthur Coal Mine is situated within the Upper Hunter region, which has a long history of rural land use for a variety of agricultural and industrial activities, predominantly grazing and coal mining. The current dominant land uses within and adjacent to the existing Mt Arthur Coal Mine mining lease boundaries include open cut mining, power generation and industrial activities, agriculture (including regionally mapped equine and viticulture critical industry clusters [CICs]), rural dwellings and residential areas in Muswellbrook.

Agriculture was a significant pre-mining land use at the Mt Arthur Coal Mine. The areas adjacent to and within the Modification Area were predominantly suited to cattle grazing.

2.2 PROJECT CONTEXT

2.2.1 Consideration of Initial Options

HVEC is the holder of Exploration Licence (EL) 5965, providing the opportunity to recover additional coal resources beyond 2026, either by BHP or another applicant.

BHP initially undertook a range of initial steps to prepare an application to seek approval to mine until 2045 to recover additional coal resource within EL 5965.

In August 2020, BHP commenced a review of its lower grade metallurgical and thermal coal assets, including the Mt Arthur Coal Mine. As part of this process, divestment and trade sale options were considered. In reviewing trade sale options for the Mt Arthur Coal Mine, an engagement process was undertaken with potential alternate applicants.

BHP formed the view that a potential new owner needed to be equipped to operate the Mt Arthur Coal Mine with the same rigorous approach to safety, the environment, progressive rehabilitation and community engagement that BHP has been committed to since it acquired the Mt Arthur Coal Mine in 2001.

Against the backdrop of fluctuating commodity prices, a new owner would have faced many challenges. The Mt Arthur Coal Mine has been economically challenged for a number of years. Despite a coal price strengthening in 2021 and 2022, the Mt Arthur Coal Mine is a highly complex site due to the steep monocline, a known geological feature of the operation. Analysis by BHP indicated declining value post 2030 as mining approaches the monocline, which deepens the pit, increases the proportion of mined waste rock versus coal produced and increases haulage requirements, resulting in higher costs beyond 2030.

A longer-term outlook on the financial viability of the Mt Arthur Coal Mine led BHP to conclude that the most feasible option was to undertake a pathway to closure, rather than risk sudden and unexpected closure in the future by BHP or another applicant.

BHP announced the Mt Arthur Coal Pathway to Closure in June 2022, whereby a Scoping Letter was subsequently submitted to the DPE in October 2022 for the Modification.

2.2.2 Justification for the Modification

The decision by BHP to retain and close the Mt Arthur Coal Mine in 2030 provides the time necessary for an equitable transition and mine closure for the workforce and nearby community, mindful of the associated socio-economic impacts. The Modification would provide an additional four years to plan for and execute an effective transition and secure additional socio-economic benefits for the existing workforce, contractors and suppliers to the Mt Arthur Coal Mine during this time.

In addition, while the approval of Modification 1 authorised the extraction of up to 32 Mtpa, the Mt Arthur Coal Mine has not operated at the approved maximum rate of production, instead typically operating at between approximately 20 Mtpa to 25 Mtpa.

Accordingly, under current approvals, the coal reserves approved to be mined at the Mt Arthur Coal Mine (prior to the end of the currently approved mine life in 2026) would not be mined.

Further, when considering actual and forecast ROM coal production rates to 2030, total ROM coal production with the Modification (i.e. 2030) would remain below total approved ROM coal production if the maximum approved mining rate (32 Mtpa) had been achieved between 2015 (the year following approval of Modification 1) and 2026.

The Modification's four-year extension of coal mining from 30 June 2026 to 30 June 2030 proposes recovery of coal resources within the existing and approved disturbance extent beyond 2026, at a rate similar to current coal extraction (i.e. up to 25 Mtpa from the open cut).

The Modification Area is:

- very minor relative to the approved disturbance extent (Figure 1-2);
- much smaller (25 ha) than the Impact Minimisation Area (412 ha), with resulting net decrease in disturbance of 387 ha; and
- required to facilitate minor open cut pit extension and supporting water management and ancillary infrastructure.

2.2.3 Benefits of the Modification

Socio-Economic Benefits

The Modification would allow for the continuation of operational employment for the current Mt Arthur Coal workforce (approximately 2,200 FTE positions) and the direct and indirect flow on economic effects beyond 30 June 2026.

The Modification would also allow for continued investment into community businesses and support to economic, social and environmental activities within the region. During the reporting period of 2022, Mt Arthur Coal voluntarily contributed approximately $358,000 to the local community (BHP, 2022a).

Through the Local Buying Program, HVEC continues to engage and support small eligible local businesses through procuring goods and services, with a combined total contribution of approximately $16 million in FY2021 to FY2022 across the Muswellbrook, Upper Hunter and Singleton Shires (BHP, 2021a). The Modification would facilitate the continuation of these types of benefits for a further four years.

The Modification would result in $1,033 million in net present value (NPV) terms in net benefits to NSW, comprising $483 million in NPV terms in royalties to NSW (Appendix J).

Final Landform and Land Use

As current mining has not progressed at the peak production rate anticipated in Modification 1, and given the original intention to mine well beyond 2026 (i.e. to 2045), the actual landform in 2030 (or 2026) would be generally similar, however, would not be identical to the final landform shown in Modification 1.

The Modification proposes a revised configuration of the final landform which allows for a more practicable distribution of land use between pasture and woodland corridors to suit potential post-mining activities (Section 3.10), with pasture located on flatter areas and woodland targeted on steeper slopes.

The revised final landform would enable a transition to a combination of agricultural and environmental conservation land uses. Other alternate mine land re-uses that may emerge would be subject to further evaluation, however, the distribution of land uses proposed as part of the Modification has been planned to minimise sterilisation of future alternate mine land re-uses, while achieving existing revegetation and offset commitments.

All surface infrastructure at the Mt Arthur Coal Mine will be removed from the site unless a documented post-mining use that would make use of that infrastructure has been identified and agreed with relevant stakeholders[3]. Consequently, disturbed areas associated with existing infrastructure will be managed and revegetated in accordance with the Rehabilitation Management Plan (BHP, 2021b) (RMP) and the approved Rehabilitation Strategy (BHP, 2023a).

Other benefits of the revised landform include:

- net decrease in overall disturbance areas of approximately 387 ha via the Impact Minimisation Area;
- decrease in maximum northern overburden emplacement height by approximately 20 m AHD;
- geomorphic design principles for selected external facing dumps; and
- reduction in the number of voids (from three to two).

2.2.4 Analysis of Feasible Alternatives

Mining to 2045 within EL 5965

BHP undertook initial steps to prepare an application to seek approval to mine until 2045, however after further evaluation of economic and financial factors, it was concluded by BHP that Mt Arthur Coal's commercial viability was limited beyond 2030 (Section 2.2.1).

HVEC also considered that commencing the closure process at the end of the current approved mine life (i.e. 30 June 2026) did not allow sufficient time to plan for closure, and that substantial economic benefits would not be realised as a result.

Modification Area

During the scoping phases of the Modification, BHP initially considered a 35 ha new disturbance area in the north-western extent of the Windmill Pit. However, this has been reduced to the current Modification Area (25 ha) in consideration of further review of operational requirements, and outcomes of environmental surveys for the Modification, particularly Aboriginal cultural heritage and biodiversity.

HVEC also considered no new disturbance associated with the Modification, however the new disturbance area is required to facilitate a minor change in the final pit crest, maximise the efficient extraction of the coal resource, and for the purposes of supporting ancillary, access and water management infrastructure.

2.2.5 Consequences of the Modification not Proceeding

In the absence of the Modification:

- the Mt Arthur Coal Mine would cease coal extraction in 2026;
- operational employment and direct flow-on economic effects would cease in 2026;
- the final landform changes such as backfilling Belmont Void may not occur (Section 3.10); and
- community preparedness for the reduced operational employment and reduced direct flow-on economic effects would be challenged.

There would be continued environmental impacts associated with ongoing mining operations beyond 2026 (albeit at reduced rates compared with the current approved operation) and additional disturbance, however this Modification Report outlines the reasons why the impacts can be considered acceptable when compared to current NSW Government Policy.

[3] Consistent with the rehabilitation objectives for surface infrastructure as per Table 14 of MP 09_0062.

2.3 STRATEGIC STATEMENT ON COAL EXPLORATION AND MINING IN NSW

The *Strategic Statement on Coal Exploration and Mining in NSW* (the Statement) outlines how the NSW Government will continue to support responsible resource development for the benefit of the State (NSW Government, 2020). The Statement recognises the value of coal production to the NSW economy, including:

- The long history of coal mining in NSW and its close ties with regional communities in the Hunter region.
- The potential for coal production to provide significant benefits to local communities, including jobs and investment.
- Coal production's significant contributions to export earnings as the State's biggest single export earner.
- Facilitating beneficial post-mining land uses representing an opportunity for NSW to harness the existing infrastructure, skilled workforce and transport links from mines approaching closure, to continue economic activity on mined land.

The Modification would allow further access to the State's coal resources. Whilst the Mt Arthur Coal Mine would cease mining beyond 30 June 2030, the four-year extension as part of the Modification aligns with the objectives of the Statement.

Mining, Exploration and Geoscience (MEG) (within the Department of Regional NSW) released the *Practical guide: Post mining land use* (MEG, 2023) (the Practical Guide) in January 2023 to assist the Statement in providing practical guidance for mining lease holders regarding post-mining (or alternate) land use planning (as per the fourth bullet point listed above). The Modification would be consistent with the Practical Guide by facilitating beneficial post-mining land uses through a more practical distribution of land use between pasture and woodland corridors.

3 DESCRIPTION OF THE MODIFICATION

3.1 OVERVIEW

The Modification is wholly located within the approved DA Area listed in Appendix 1 of MP 09_0062 and would comprise the following components:

- four-year extension of mining activities to 30 June 2030;
- reduction in the approved open cut mining rate from 32 Mtpa of ROM coal to a maximum of 25 Mtpa ROM coal (similar to current actual ROM coal production);
- reduction in the cumulative open cut and underground ROM coal handling rate from 36 Mtpa to 29 Mtpa;
- reduction in maximum total (open cut and underground) coal rail transportation from 27 Mtpa of product coal to 20 Mtpa, and a reduction in train movements from 30 to 20 movements per day;
- minor extension (25 ha) of the approved disturbance area in the north-west corner of the operation predominantly to allow for access and ancillary infrastructure;
- an overall reduction (387 ha) in approved disturbance, as some previously approved disturbance areas are no longer intended to be disturbed; and
- revised final landform and final void configuration, including an overall reduction in the approved height of the northern overburden emplacement areas and the final landform (to reflect the current actual height).

The Modification would involve no change to:

- existing mining tenements;
- existing coarse rejects and tailings management;
- existing workforce;
- the existing explosives facility;
- existing site accesses;
- existing electricity supply and distribution;
- existing offset and rehabilitation objectives;
- existing services, plant and equipment; and
- the existing hours of operation and associated activities (undertaken 24 hours per day, seven days a week).

Table 3-1 provides a comparison between the existing approved operations at the Mt Arthur Coal Mine and the changes proposed in this Modification.

Attachment 1 details the proposed changes to the conditions within MP 09_0062 proposed as part of this Modification, in accordance with *State Significant Development Guidelines* (DPE, 2022a), in particular *Appendix E – Preparing a Modification Report* (DPE, 2022b).

3.2 OPEN CUT MINING OPERATIONS

3.2.1 Geology

The Mt Arthur Coal Mine is located in the Hunter Coalfields in the northern section of the Sydney Basin, comprising Late Permian aged sediments. The existing Mt Arthur Coal Mine coal resource lies within the Permian Wittingham Coal Measures.

The Wittingham Coal Measures and relevant target seams would continue to be mined within the existing Mt Arthur Coal Mine.

A minor additional extension of the Windmill Pit crest into the Modification Area would target the same coal seams as currently mined in the Windmill Pit.

3.2.2 Mining Method and Schedule

Conventional truck and shovel open cut strip and terrace mining methods would continue to be used at the Mt Arthur Coal Mine for a further four years until 2030.

There would be a minor westward extension of the Windmill Pit as part of the Modification, with the remaining disturbance area required for access, ancillary and water management infrastructure to support existing mining operations.

Table 3-1
Overview of the Approved Mt Arthur Coal Mine and the Proposed Modification

Component	Approved Mt Arthur Coal Mine MP 09_0062	Proposed Modification
Life-of-Mine	Approval for open cut mining to 30 June 2026.	Open cut mining for an additional four years until 30 June 2030.
Site Entrance	Various site accesses off Thomas Mitchell Drive and Edderton Road.	Unchanged.
Mining Method and Resource	Continuation of conventional truck and shovel open cut strip and terrace mining in the Windmill, Calool, Roxburgh, Ayredale and Saddlers (north and south) Pits.	Unchanged.
Annual ROM Coal Production Rate	Up to 32 Mtpa of ROM coal from the open cut mining operations.	Reduction in approved extraction, handling and processing of ROM coal from the open cut mining operations to 25 Mtpa (i.e. from 32 Mtpa).
Coal Processing Rate	CHPP processing of up to 36 Mtpa of ROM coal (including underground coal).	Continued use of the CHPP to facilitate the processing of up to 29 Mtpa of ROM coal from the total complex (including underground coal) (i.e. reduction from 36 Mtpa to 29 Mtpa).
Mining Areas	Open cut mining including the Northern Open Cut Pits (Windmill, Calool, Roxburgh and Ayredale) and Southern Open Cut Pits (Saddlers).	Minor extension of the Windmill Pit, predominantly for access and ancillary infrastructure.
Overburden Emplacement	Development of northern overburden emplacement height to an average of 360 m AHD (maximum height of 375 m AHD). Development of Bayswater No 3 (Saddlers Pit) overburden emplacement height up to 250 m AHD. Development of Sublease Coal Lease (CL) 229 and Sublease CL 395 emplacement area up to 360 m AHD. Development of an out-of-pit overburden emplacement area up to 360 m AHD.	No requirement to develop the southern section of the out-of-pit emplacement. Reduction in height of the northern emplacement (from an average of approximately 360 m AHD to an average of approximately 340 m AHD).
Disturbance Areas	Total Mt Arthur Coal Mine disturbance area of approximately 6,710 ha.	Modification Area of 25 ha. Decrease in net total disturbance of approximately 387 ha (via the Impact Minimisation Area). The revised total for the Mt Arthur Coal Mine would be approximately 6,323 ha.
Mining Tenements	Mining Leases (MLs) 1548, 1487, 1358, 1655, 1739, 1757, and 1593, Mining Purpose Lease (MPL) 263, Sublease CLs 229 and 395, CL 396 and Consolidated Coal Lease (CCL) 744.	Unchanged.
Coarse Rejects and Tailings Management	Deposition of tailings in the tailings emplacement area at Bayswater No. 2. Approval to dispose tailings in the void within Sublease CL 229. The tailings emplacement area is approved to be constructed in a series of stages up to 280 m AHD. Disposal of coarse rejects within overburden emplacement areas.	Unchanged.
Product Coal Transport	Transport of up to 27 Mtpa product coal via rail. Maximum of 30 rail movements (or 15 laden train departures) per day.	Reduced transport of product coal to 20 Mtpa from the Mt Arthur Coal Mine. Maximum of 20 rail movements (or 10 laden train departures) per day.
Employment	Total workforce of approximately 2,600 FTE employees during peak production. A workforce of approximately 240 FTE employees during peak construction phases.	Continuation of a total workforce of approximately 2,200 FTE positions.

Table 3-1 (continued)
Overview of the Approved Mt Arthur Coal Mine and the Proposed Modification

Component	Approved Mt Arthur Coal Mine MP 09_0062	Proposed Modification
Hours of Operation	All coal operations and associated activities undertaken 24 hours per day, seven days a week. Construction on-site may be on a 24-hour, seven-day roster consistent with operational requirements.	Unchanged.
Explosives Facilities	Fully bunded on-site explosives magazine for the storage of detonators and other materials.	Unchanged.
Progressive Rehabilitation	Progressive rehabilitation of areas consistent with the approved RMP and Rehabilitation Strategy (BHP, 2023a).	Unchanged.
Final Landform	**Voids:** Approval for three final voids (i.e. Northern Open Cut Void, Belmont Void and McDonalds Void).	**Voids:** Retention of final voids. Reduction in number of final voids from three to two, comprising the Northern Open Cut Void and McDonalds Void. Change in location and shape of the Northern Open Cut Void due to proposed continuation of mining to 30 June 2030. The currently approved Belmont Void would be backfilled.
	Emplacements: Final landform associated with out-of-pit and in-pit waste rock emplacements. Requirement to rehabilitate waste rock emplacements consistent with the approved RMP and Rehabilitation Strategy (BHP, 2023a).	**Emplacements:** No change to the requirement to rehabilitate waste rock emplacement areas. No requirement to develop or rehabilitate the southern out-of-pit emplacement area (Impact Minimisation Area). Reduction in final height of northern emplacement by approximately 20 m AHD.
	Tailings: Tailings dam dewatering and capping undertaken consistent with the RMP, Rehabilitation Strategy (BHP, 2023a) and Tailings Management Strategy approved at the time of closure.	**Tailings:** No change to tailings decommissioning and capping strategy.
	Infrastructure: All surface infrastructure decommissioned and removed unless a post-mining land use has been established and approved by the Resources Regulator in consultation with surrounding landholders (condition 41A of Schedule 3 of MP 09_0062).	**Infrastructure:** Unchanged. Surface infrastructure would be decommissioned and removed unless agreed upon by the Resources Regulator. This includes any additional infrastructure within the Modification Area.
Final Land Use	Supporting native ecosystem (woodland) and agriculture (pasture) meeting existing offset requirements.	No change to land uses comprising woodland corridors and pasture areas. Revised location of land use areas developed to meet existing offset and rehabilitation requirements.

The Modification would involve the continuation of coal extraction for a further four years. Open cut operations would occur at a rate of up to 25 Mtpa, which is a 7 Mtpa reduction from the currently approved 32 Mtpa.

An indicative production schedule for the modified Mt Arthur Coal Mine is provided in Table 3-2. Figures 3-1 and 3-2 show the progression of open cut mining between 2026 and 2030 proposed as part of the Modification.

Mining of exposed coal seams at the Mt Arthur Coal Mine typically involves excavators or front-end loaders ripping and pushing coal and parting material and would be supported by a fleet of haul trucks which transport ROM coal to the CHPP for processing.

As part of the Modification, there would be a reduction in mining and processing rate, as well as reduction in the number of associated mobile fleet items as mining reaches 2030.

3.2.3 Overburden Management

Overburden material would continue to be removed using excavators and electronic shovel, with haul trucks utilised to haul the material to in-pit and out-of-pit emplacement areas.

Due to the Mt Arthur Coal Mine not reaching its maximum approved production capacity, there has been a decrease in the amount of waste rock being handled, leading to lower dump heights at the Mt Arthur Coal Mine.

Accordingly, the Modification is proposing a reduction in the approved height of the northern emplacement areas from an average of approximately 360 m AHD, to an average of approximately 340 m AHD.

Additionally, the southern section of the out-of-pit emplacement area would no longer be required, contributing to the net decrease in approved disturbance of approximately 387 ha due to the Modification.

3.2.4 Geochemical Management of Waste Rock, Tailings and Coarse Rejects

As the Modification involves only a minor extension of the Windmill open cut pit, the existing overburden and interburden geochemical characteristics would remain the same for the Modification. Accordingly, existing management measures would remain, in particular (Dames and Moore, 2000):

- the selective mining and burial of overburden and interburden associated with the coal seams within the overburden emplacements such that the outer 5 m of the final surfaces comprises only non-acid forming material;

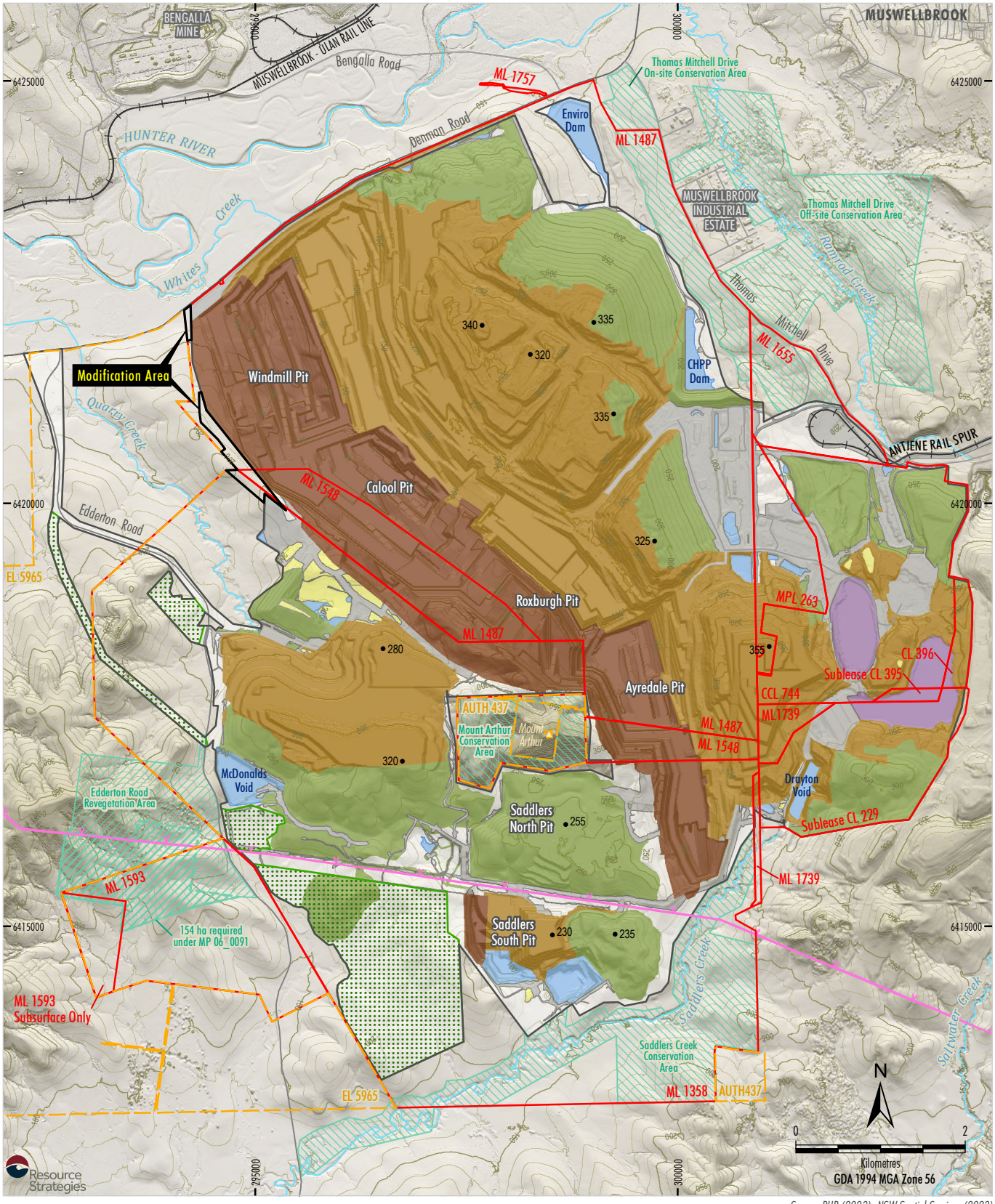
Table 3-2
Indicative Modification Coal Processing and Coal Production Schedule

	Component (Mt)	Financial Year (FY) (Mtpa)				
		Up to FY2026	FY2027	FY2028	FY2029	FY2030
Approved UG MP 06_0091*	ROM Coal Extraction	≤8	≤8			
Approved OC MP 09_0062	ROM Coal Extraction (OC)	32	-	-	-	-
	ROM Coal Extraction (OC+UG)	36	-	-	-	-
	Product Coal (OC+UG)	27	-	-	-	-
Modification to MP 09_0062	ROM Coal Extraction (OC)	-	25	24	25	16
	Product Coal (OC)	-	19	17	18	13
	ROM Coal Handling (OC+UG*)	-	≤29			
	Product Coal Handling (OC+UG*)	-	≤20			

UG = Underground, OC = Open Cut

* The Mt Arthur Coal Underground Project never commenced ROM extraction and HVEC has no intention to commence underground operations. Accordingly, there is no current interaction with the open cut operations at the Mt Arthur Coal Mine. However, as the Underground Project coal tonnages are approved under MP 09_0062 (up to 4 Mtpa of product coal), it is proposed these are retained as part of the Modification.

Note Open cut operations would occur at a rate up to 25 Mtpa; forecast production is indicative only.



Source: BHP (2023); NSW Spatial Services (2023)

LEGEND

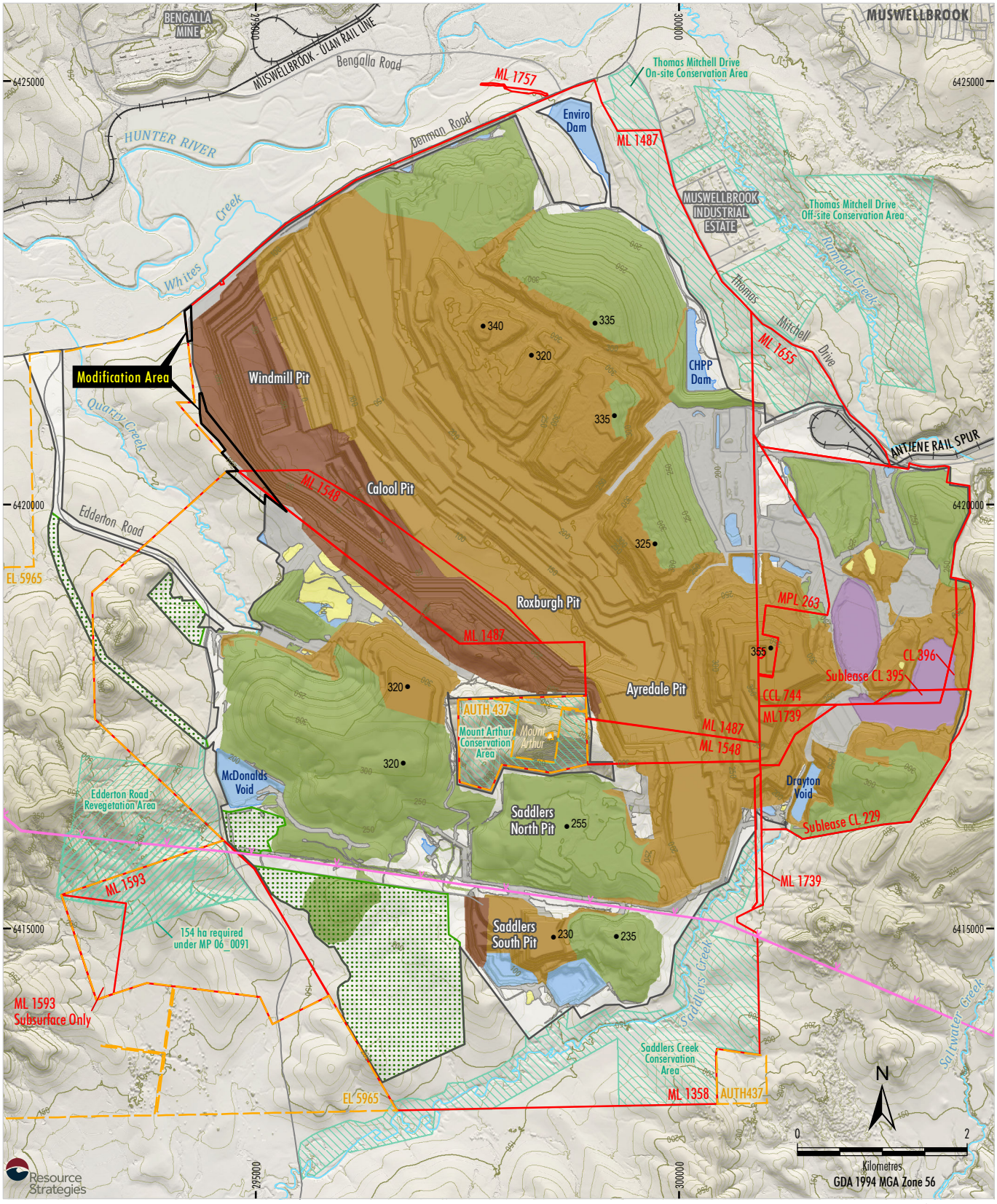
- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Existing 500kV Electricity Transmission Line
- Approximate Extent of Existing/Approved Surface Development
- Modification Area
- Impact Minimisation Area
- Active Mining Area
- Overburden Emplacement Area
- Tailings Storage Facility
- Infrastructure Area
- Topsoil Stockpile
- Rehabilitation Area
- Water Management Area
- •320 Approximate Elevation (m AHD)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Conceptual General Arrangement
Year 2026

Figure 3-1



Source: BHP (2023); NSW Spatial Services (2023)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Existing 500kV Electricity Transmission Line
- Approximate Extent of Existing/Approved Surface Development
- Modification Area
- Impact Minimisation Area
- Active Mining Area
- Overburden Emplacement Area
- Tailings Storage Facility
- Infrastructure Area
- Topsoil Stockpile
- Rehabilitation Area
- Water Management Area
- 320 Approximate Elevation (m AHD)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Conceptual General Arrangement
Year 2030

Figure 3-2

- final emplacement surfaces (top and batter slopes) would be treated with gypsum and/or constructed of material that is known to be non-sodic or to only have low sodicity; and

- due to the predicted elemental enrichment identified within selected overburden, pH, electrical conductivity (EC), total suspended solids (TSS), total alkalinity/acidity, sulphate, arsenic, mercury, antimony, selenium, and molybdenum would be included in the suite of water quality parameters monitored in dams containing runoff from overburden areas.

Similarly, existing tailings and coarse rejects geochemical management measures would remain for the Modification. This includes compaction and burial of the disposed tailings and coarse rejects within the overburden emplacements covered with a minimum material thickness of 5 m (GEM, 2012).

Detailed geochemical test work would be completed on representative samples of the tailings and coarse rejects in order to confirm the geochemical risks of these materials to be disposed of. Should this testwork show that alternative strategies may be appropriate for the effective management of tailings and coarse rejects (e.g. a reduced cover thickness within the overburden emplacements or use of coarse reject in TSF capping/closure), these would be determined and applied on a risk-basis in consultation with the Resource Regulator.

3.2.5 Infrastructure Areas

The Modification would utilise the existing infrastructure (Figures 3-1 and 3-2), with the exception of minor additional ancillary infrastructure within the Modification Area (Section 3.3).

3.2.6 Hours of Operation

Consistent with the approved Mt Arthur Coal Mine, open cut mining activities and associated mobile equipment movements would continue to be undertaken 24 hours per day, seven days per week, subject to compliance with relevant environmental management criteria.

3.3 MODIFICATION AREA

As part of the Modification, an additional 25 ha of land would be disturbed, resulting in a minor increase to the footprint of the Windmill Pit. This is a reduction in area from what was originally considered during the scoping phase, and results in reduced potential impacts to both Aboriginal cultural heritage and biodiversity values.

Potential impacts that may result from the Modification Area are discussed in Section 6 and Appendices A to J.

The Modification Area is ultimately required for the purposes of:

- Construction of ancillary infrastructure including access roads, and associated highwall infrastructure to support minor increase in open cut pit extent and continued coal extraction.
- Construction and use of water management infrastructure for pit dewatering including a clean water diversion, dirty water drain and bund, and associated pipelines.

Key infrastructure and mining components required within the Modification Area are shown on Figure 3-3.

3.4 WATER SUPPLY AND WATER MANAGEMENT

The existing water management system at the Mt Arthur Coal Mine would continue to support ongoing mining activities.

The existing surface water runoff controls to prevent clean water runoff from entering open cut mining operation areas would be retained and where necessary upgraded for the Modification.

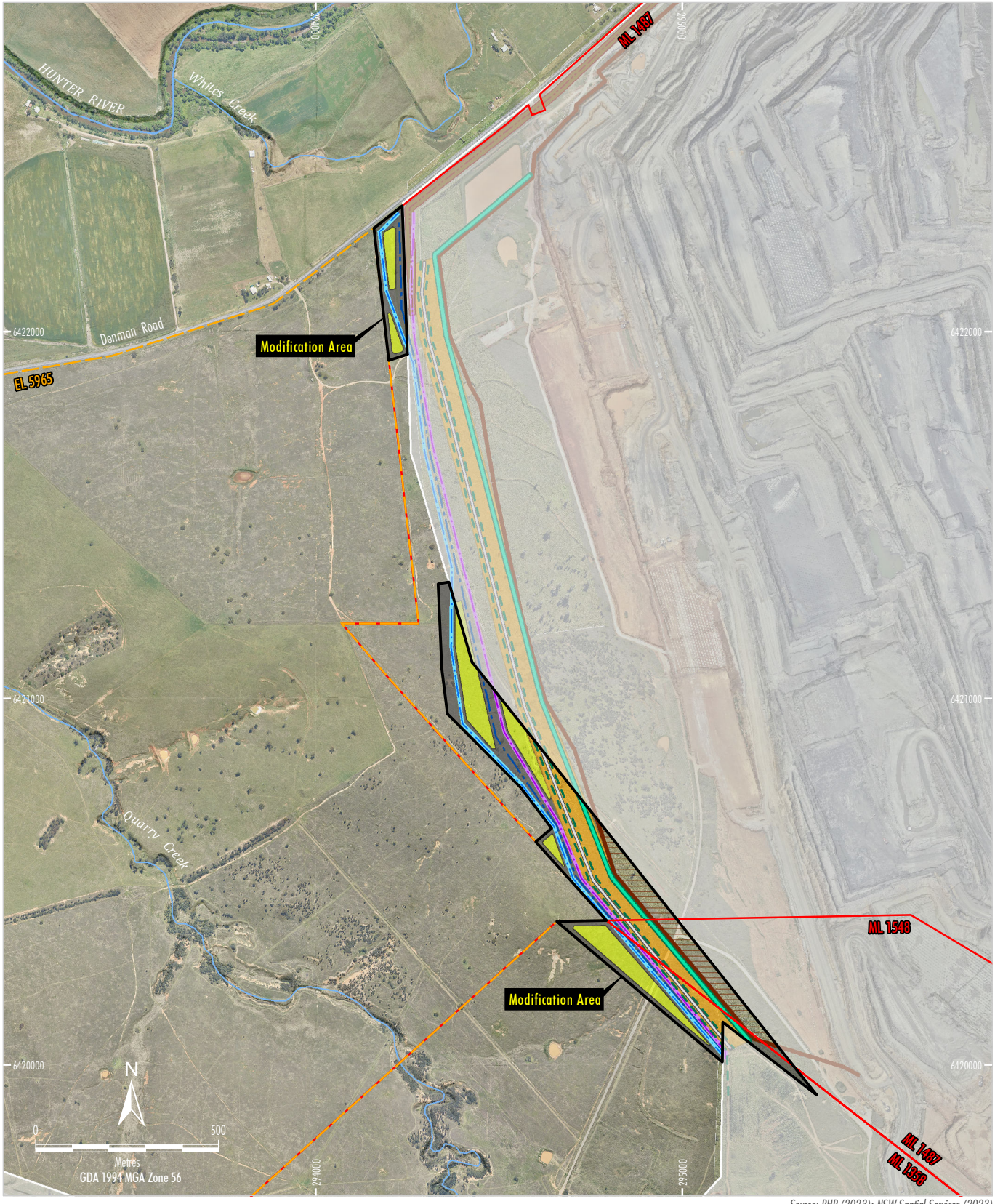
Additional clean water runoff control structures would be constructed to manage surface water reporting to and from the Modification Area in the north-west portion of the mine (as described in Section 3.3).

A description of the water management system for the Modification is provided in the Surface Water Assessment prepared by ATC Williams (Appendix G).

3.5 CHPP AND REJECTS MANAGEMENT

The existing CHPP has sufficient capacity to process the ROM coal at the rates proposed to be mined under the Modification, hence no CHPP upgrades are proposed.

Consistent with existing operations, coarse rejects produced by the CHPP would continue to be disposed within the overburden emplacement areas.



Source: BHP (2023); NSW Spatial Services (2023)
Aerial Mosaic: MAC (2022-2020)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Approximate Extent of Existing/Approved Surface Development
- Modification Area
- Existing Flood Levee
- Existing Groundwater Cut-off Wall

Proposed Infrastructure

- Final Highwall
- Light Vehicle Road
- Highwall Safety Bund and Fence
- Haul Road Windrow
- Pipeline
- Clean Water Diversion
- Dirty Water Drain and Bund
- Highwall Corridor including Haul Road (approx 80 m)
- Temporary Topsil Stockpile
- Open Cut Mining
- General Infrastructure Area #

General infrastructure includes access and haul roads, and laydown and other infrastructure areas.

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Modification Area

Figure 3-3

3.6 TAILINGS STORAGE FACILITIES

The embankment wall of the West Cut Void is approved to be raised to provide sufficient capacity for the quantities of tailings predicted to be produced under the Modification.

To allow for an effective, safe and successful closure of the Mt Arthur Coal Mine TSF, secondary flocculation (also known as double floccing) is planned pre-closure. Secondary flocculation of coal tailings is considered to be a best industry practice and leads to an improved TSF closure outcome in that it reduces the time period between mining cessation of active deposition and the ability to undertake closure activities including surface layer filling to create a final landform (ATC Williams, 2022).

3.7 PRODUCT COAL RAIL MOVEMENTS

The approved Mt Arthur Coal Mine is permitted to transport up to 27 Mtpa of product coal via rail, with a maximum of 30 rail movements (or 15 laden train departures) per day.

As part of the Modification, transport of the product coal volumes from the Mt Arthur Coal Mine would decrease from the approved rate of 27 Mtpa to 20 Mtpa, with a maximum of 20 rail movements (or 10 laden train departures) per day.

A Rail Loop Duplication is approved under conditions 48A and 48B of Schedule 3 of MP 09_0062.

3.8 WORKFORCE

The total workforce required for peak production is approximately 2,600 employees and contractors (HVEC, 2009). However, in recent years, the Mt Arthur Coal Mine has operated with approximately 2,200 FTE positions.

The Modification would facilitate continuity of employment for these 2,200 FTE positions between 2026 and 2030.

3.9 WASTE MANAGEMENT

The existing Mt Arthur Coal Waste Handling and Disposal Procedure would continue to be implemented for the Modification. Consistent with Environmental Protection Licence (EPL) 11457, heavy vehicle tyres would continue to be buried in the waste rock emplacement above the existing water table.

In addition, subject to any requirements in the EPL, other sources of inert waste generated from licensed activities on-site may be disposed of in a similar manner.

3.10 FINAL LANDFORM AND LAND USE

An RMP and Rehabilitation Strategy (BHP, 2023a) is in place for the approved Mt Arthur Coal Mine, which satisfies condition 44 of Schedule 3 MP 09_0062. The RMP and Rehabilitation Strategy (BHP, 2023a) aim to achieve progressive rehabilitation objectives that would sustain final land use outcomes as conceptually shown in Appendix 7 of MP 09_0062.

The RMP and Rehabilitation Strategy (BHP, 2023a) would continue to be implemented at the Mt Arthur Coal Mine to ensure rehabilitation obligations are fulfilled. The approved RMP and Rehabilitation Strategy (BHP, 2023a) would be revised to include the Modification Area (including the proposed extension in mine life). The revised RMP would describe how rehabilitation would be undertaken, provide detailed rehabilitation performance and completion criteria and address all aspects of rehabilitation including mine closure, final landforms and final land use.

3.10.1 Approved Final Landform

Key components of the approved conceptual final landform are associated with:

- final voids, including:
  - McDonalds Void;
  - Northern Open Cut Void; and
  - Belmont Void.
- overburden emplacements (up to an average of 360 m AHD);
- decommissioned and capped TSFs; and
- infrastructure areas where infrastructure has been decommissioned and removed (infrastructure may be retained where an ongoing use is determined[3]).

Progressive rehabilitation and management of these areas are described in the RMP and Rehabilitation Strategy (BHP, 2023a).

Final land uses for the approved Mt Arthur Coal Mine are a combination of agriculture and native vegetation (including to satisfy existing offset commitments).

3.10.2 Unchanged Aspects of the Current Conceptual Final Landform

Overall, the Modification would not significantly change the current conceptual final landform.

Aspects of the Modification conceptual final landform that are the same relative to the current conceptual final landform include (Table 3-1):

- retention of McDonalds Void and Northern Open Cut Void in the landform;
- location and size of the McDonalds Void;
- rehabilitated waste rock emplacement areas;
- decommissioned and capped TSFs;
- decommissioned and removed infrastructure (unless an alternative use is determined[3]); and
- final landform objectives (safe, stable and non-polluting).

3.10.3 Modification Conceptual Final Landform

The proposed mining to 2030 for the Modification would necessitate some changes to the conceptual final landform.

Figures 3-1 and 3-2 display the progression of mining operations and rehabilitation proposed for the Modification in 2026 and 2030. Figure 3-4 displays the conceptual final landform incorporating the proposed post-mining land use configuration.

As mine planning, coal resource geology and geotechnical studies are regularly being reviewed and refined as part of the operation, the actual final landform at the Mt Arthur Coal Mine may be different to what is presented conceptually on Figure 3-4.

Progressive rehabilitation and final landform planning would be undertaken by HVEC as documented in the RMP and Rehabilitation Strategy (BHP, 2023a).

Overall, the revised conceptual final landform has been designed in consideration of achieving similar or improved environmental outcomes as approved.

Relative to the conceptual final landform in MP 09_0062, the key changes for the Modification are (Table 3-1):

- reduction in the number of voids from three to two, comprising McDonalds Void and Northern Open Cut Void;
- change in location and shape of the Northern Open Cut Void;
- reduction in height of the northern emplacement areas by approximately 20 m AHD;
- decrease in net disturbance by approximately 387 ha (via the Impact Minimisation Area); and
- reconfiguration of post-mining land use areas (location of woodland corridors).

These elements are described below.

Final Voids

Final voids are areas that remain as a residual depressed landform feature in portions of the active mining pits where no backfilling of overburden and interburden material would occur.

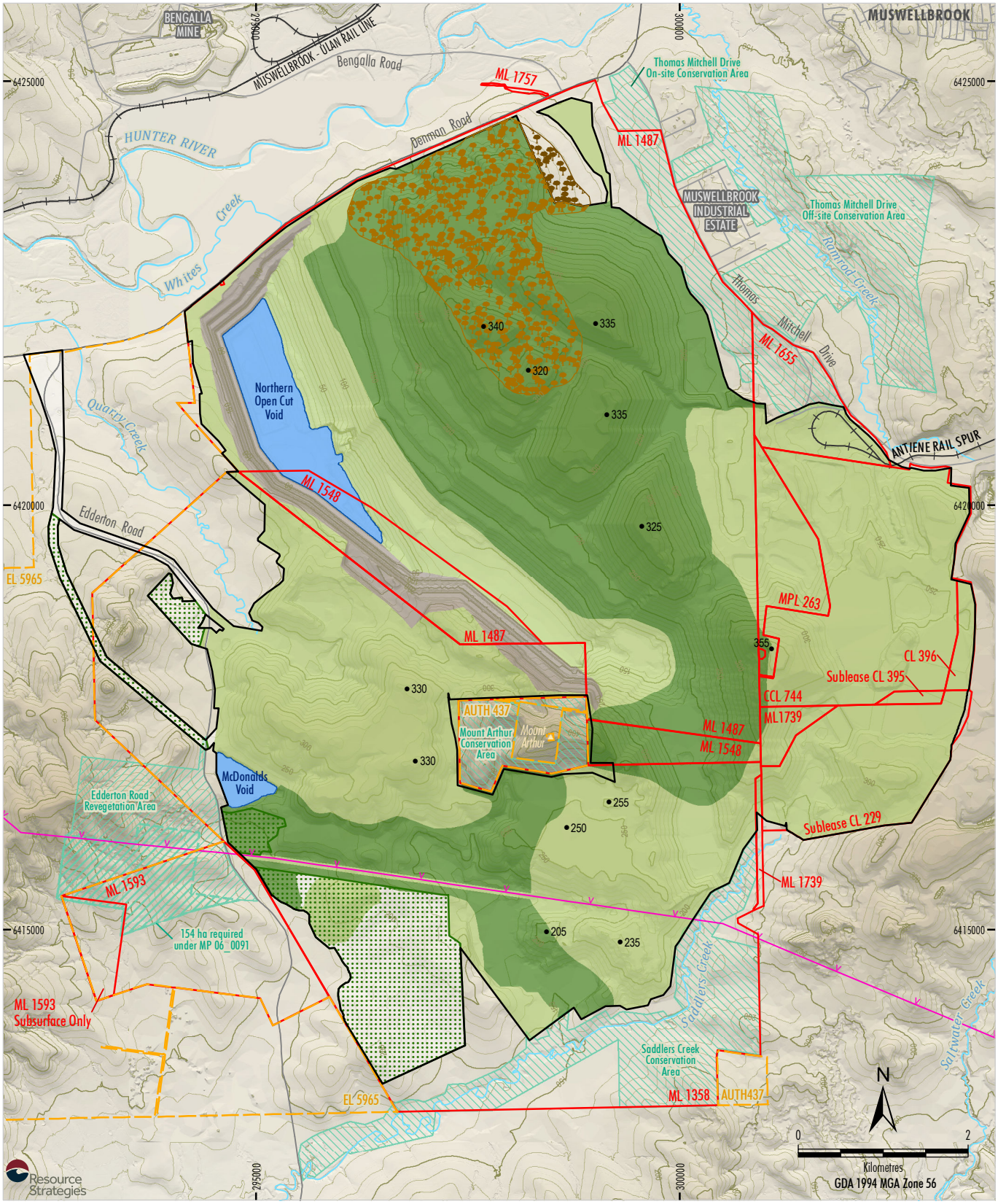
Mt Arthur Coal Mine is approved for three final voids; the Northern Open Cut Void (encompassing the Windmill, Calool and Roxburgh Pits), Belmont Void and McDonalds Void.

The Modification would reduce the number of final voids from three to two, with Belmont Void backfilled and rehabilitated as part of the final landform.

The final voids that would remain in place as part of the Modification are detailed below.

McDonalds Void

McDonalds Void is located west of Saddlers North Pit and is proposed to be left open as a final void to be used as a future water storage option, as currently approved.



Source: BHP (2023); NSW Spatial Services (2023)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing 500kV Electricity Transmission Line
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approximate Extent of Modified Surface Development
- Impact Minimisation Area *
- Existing Remnant Woodland
- Box-Gum Woodland Establishment Area
- Woodland Corridor #
- Pasture Area
- Remnant Highwall
- Water Storage
- •320 Approximate Elevation (m AHD)

* Remnant Woodland within approved disturbance area (including the Impact Minimisation Area) forms part of woodland corridor area obligations under Project Approval MP 09_0062.

\# The conceptual distribution of woodland corridors has been planned to satisy the offset requirements of Project Approval MP 09_0062 that relate to rehabilitation. The final distribution of woodland on the final landform would be subject to detailed design.

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Conceptual Final Landform

Figure 3-4

Northern Open Cut Void

The Northern Open Cut Void, located within Windmill, Calool and Roxburgh Pits, is approved as a final void. As part of the Modification, the Northern Open Cut Void would be re-positioned further north-west to reflect mining to 2030.

The Northern Open Cut Void has been designed to be long-term geotechnically stable (BHP, 2023b), remain within the existing flood levee, groundwater cut-off wall and highwall safety bund (Figure 3-3), and to achieve similar or improved environmental outcomes as currently approved, namely to remain a long-term groundwater sink (Appendix H).

As described in HVEC (2013a), following completion of mining, Whites Creek would be re-established to drain off-site in accordance with existing conceptual design principles.

Waste Rock Emplacements

The majority of the conceptual final landform is associated with out-of-pit and in-pit waste rock emplacement areas. The Modification does not significantly affect the spatial extent of the waste rock emplacement areas relative to what is currently approved, with the exception of the Impact Minimisation Area, where the southern out-of-pit emplacement is no longer intended to be disturbed.

In addition, the Modification is proposing a reduction in the final height of the northern emplacement (from an average of approximately 360 m AHD to an average of approximately 340 m AHD) to reflect actual waste rock emplacement heights.

Geomorphic design would be applied to the outer faces of selected final waste rock emplacements to improve final landform design.

Impact Minimisation Area – Southern Out-of-Pit Emplacement Area

As part of the Modification, HVEC would not disturb 412 ha within the approved disturbance area, as the approved southern out-of-pit emplacement area as well as the Edderton Road Realignment (Impact Minimisation Area), are no longer required. The Impact Minimisation Area (Figure 1-4) includes portions of previously mined and rehabilitated land approved to be re-disturbed for the southern out-of-pit emplacement area.

Land Use Areas

Following necessary backfilling, shaping and geomorphic design, the proposed conceptual final landform (Figure 3-4) would be suitable to meet existing rehabilitation objectives and post-mining land use management areas.

In the absence of BHP or a third-party applicant seeking approval for an alternate mine land re-use, the post-mining land uses would remain generally the same as those currently approved and previously contemplated, supporting native ecosystem (woodland) and agriculture (grazing). The final land use objectives of the Modification are to create a mixture of pasture areas suitable for grazing as well as large tracts of self-sustaining woodland.

Within the constraints of existing revegetation commitments, final land use areas developed for the Modification target woodland establishment on steep slopes, and pasture rehabilitation on flatter areas considering future potential agricultural use.

Other potential land uses that may emerge would be subject to further evaluation, however, the distribution of land uses proposed as part of the Modification has been planned to minimise sterilisation of future post-mining or alternate land uses, while achieving existing revegetation and offset commitments.

All surface infrastructure at the Mt Arthur Coal Mine will be removed from the site unless a documented post-mining use that would make use of that infrastructure has been identified and agreed with relevant stakeholders[3]. Consequently, disturbed areas associated with existing infrastructure will be managed and revegetated in accordance with the RMP and Rehabilitation Strategy (BHP, 2023a).

Native Ecosystem (Woodland)

In accordance with condition 41A of Schedule 3 of MP 09_0062, HVEC must:

> *Restore at least 2,642 hectares of self-sustaining woodland ecosystems in accordance with the rehabilitation plan, including at least 500 ha of White Box Yellow Box Blakely's Red Gum Woodland.*

Additionally, Commonwealth approval (EPBC 2011/5866) requires the rehabilitation of 1,915 ha of woodland corridors, including at least 500 ha of Box-Gum Woodland. The 500 ha Woodland requirement under EPBC 2011/5866 includes 299.2 ha to be improved to State 1 condition under the *State and Transition Model* (Rawlings. et al, 2010) and meet the listing advice for EPBC listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community.

The conceptual final landform and land uses depicted on Figure 3-4 would comply with the rehabilitation objectives consistent with both State and Commonwealth approvals.

Remnant woodland within the approved disturbance extent (including the Impact Minimisation Area) forms part of woodland corridor area obligations (i.e. 2,642 ha).

The revised location of woodland corridors also allow for connectivity between existing offset areas to the south and east of the Mt Arthur Coal Mine, and the Mount Arthur Conservation Area.

Native Ecosystem (woodland) establishment would incorporate different species combinations in accordance with conditions 38(a) and 38(b) of Schedule 3 of MP 09_0062, which focus on the establishment of significantly threatened plant communities and species, meeting the requirement of 2,642 ha of woodland ecosystems, including 500 ha of Box-Gum Woodland.

MP 09_0062 requires the appropriate long-term security of offsets. The Modification proposes the timing for making suitable arrangements for long-term security of woodland be at least two years prior to cessation of rehabilitation activities, rather than two years prior to the cessation of mining activities (Attachment 1). This is to allow a suitable timeframe prior to the completion of rehabilitation activities for the re-establishment of woodland.

Further discussion on native woodland progressive rehabilitation objectives and final landform outcomes is provided in the RMP and Rehabilitation Strategy (BHP, 2023a) (which would be updated to include the Modification). Plate 3-1 shows current rehabilitation monitoring undertaken at the Mt Arthur Coal Mine.

Pasture (Grazing)

Rehabilitated pasture landscapes would aim to support a financially viable and environmentally sustainable livestock grazing operation.

Condition 41A of Schedule 3 of MP 09_0062 states that HVEC must:

> *Rehabilitate at least 33 ha of Class II agricultural capability land in the area identified in the rehabilitation plan (see Appendix 7).*
>
> *Rehabilitate other areas identified for agricultural use in the rehabilitation plan to sufficient agricultural capability to support grazing.*

To comply with condition 41A of Schedule 3 of MP 09_0062, the modified conceptual final landform would incorporate agriculture areas rehabilitated to at least 33 ha of Class II agricultural capability. The remaining agricultural areas would be rehabilitated to Class VI capability or better to facilitate grazing. Native grass species typical of the local area would also be used in pastoral grassland establishment.

3.10.4 Rehabilitation Management Plan

The RMP for the Mt Arthur Coal Mine prepared in accordance with the amendment to the NSW *Mining Regulation 2016* enacted on 2 July 2021 under the NSW *Mining Act 1992*, would be reviewed and amended as necessary to reflect the Modification.

The RMP and Rehabilitation Strategy (BHP, 2023a) would be updated where required to accommodate minor variations in the final landform in the future. The RMP and Rehabilitation Strategy (BHP, 2023a) would identify variations to rehabilitation methodologies where those variations would assist to achieve similar rehabilitation objectives and do not materially change previously described rehabilitation outcomes and potential impacts.

Plate 3-1 Rehabilitation Monitoring at the Mt Arthur Coal Mine

Should variations to rehabilitation methodologies be proposed, a conceptual description of the revised methods would be provided, along with assessment of any relevant potential impact, including consideration of the geochemistry of materials used, surface water, groundwater and the overall suitability of the landform to deliver approved rehabilitation objectives.

3.11 TRANSITION TO CLOSURE

HVEC is planning for transition from operations to a responsible closure of the Mt Arthur Coal Mine. Referred to as the Transition and Mine Closure Project, this work aspires to create a positive legacy from BHP mining in the Hunter Valley, aligned to BHP's Social Value Framework and Equitable Change and Transition principles. This work is separate but complementary to the Modification as shown in Figure 3-5.

3.11.1 Socio-Economic Implications of Closure

Closure of the Mt Arthur Coal Mine would result in associated socio-economic impacts (Appendix C), particularly for the workforce and businesses in Muswellbrook. The Transition and Mine Closure Project will seek to minimise socio-economic impacts on the community through consultation, engagement, planning, support and adaptive management approaches.

Notwithstanding, closure of the Mt Arthur Coal Mine would occur regardless of the Modification. The Modification, if approved, would have the benefit of deferring closure for four years until 2030, providing the additional time necessary to aid the planning and coordination for workforce and community transition (Plate 3-2), as well as optimisation of alternate mine land re-uses for sustainable and economically diversified outcomes for the region. Section 6.7.4 describes the mitigation and management measures that would be considered as part of the mine closure planning.

Plate 3-2 Workforce Closure Planning at the Mt Arthur Coal Mine

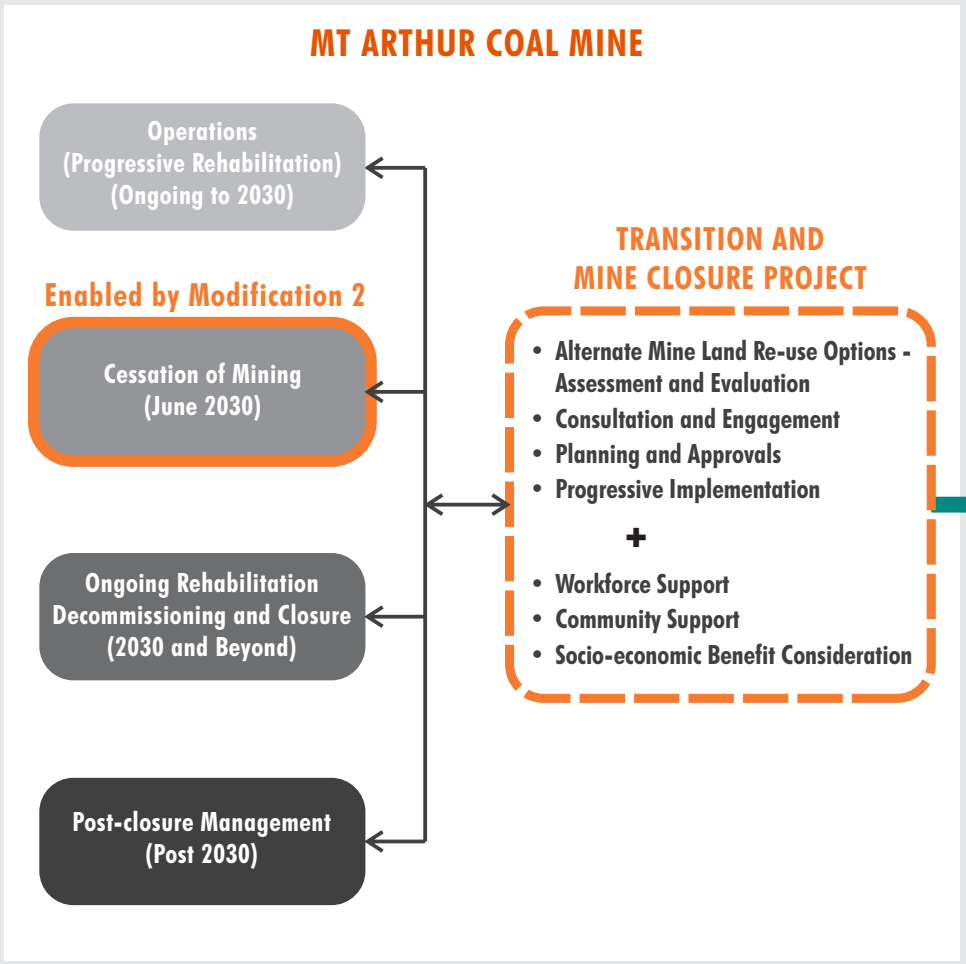
3.11.2 Alternate Mine Land Re-Uses

A significant portion of feedback received from consultation undertaken for the Modification (as discussed in Section 5) focused on a preference for beneficial alternate mine land re-uses for the site, ideally ongoing uses that generate continued significant economic activity.

There are many potential opportunities for alternate mine land re-uses given the attributes of the site such as access to power and electricity transmission infrastructure, water, transport accessibility, existing workforce and land. Attachment 2 provides a summary of the key attributes of the site and potential future uses.

The Modification conceptual final landform has been designed to minimise sterilisation of future alternate mine land re-uses, subject to satisfying existing rehabilitation and offset commitments. Alternate mine land re-uses do not form part of the Modification, and would be subject to separate approvals.

Notwithstanding, to provide opportunities to facilitate potential future land uses, it is considered appropriate to incorporate flexibility into the MP 09_0062 to relocate existing and proposed offset areas (including rehabilitation areas), subject to demonstrating equivalent or superior biodiversity outcomes, if preferred alternative land uses are identified through ongoing consultation with the community, Council and regulatory stakeholders through the Transition and Mine Closure process (Attachment 1). In addition, MP 09_0062 provides opportunities to retain mine infrastructure as part of the final land use where an ongoing use is determined.



HVE-19-09 MOD2_ModReport_Section 3_004E

Resource Strategies

Source: After Commonwealth of Australia

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Transition and Mine Closure Project
Schematic

Figure 3-5

4 STATUTORY CONTEXT

This section outlines the statutory requirements relevant to the assessment of the Modification.

In accordance with the *State Significant Development Guidelines* (DPE, 2022a), in particular, *Appendix E - Preparing a Modification Report* (DPE, 2022b), Attachment 3 provides a detailed statutory compliance table for the Mt Arthur Coal Mine incorporating the Modification that identifies all the relevant statutory requirements and the relevant sections in this Modification Report that address these requirements.

4.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The EP&A Act and the NSW *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) sets the framework for planning and environmental assessment in NSW.

Assessment Pathway

The potential environmental impacts of the Mt Arthur Coal Mine were assessed in the Consolidation Project lodged in 2009.

MP 09_0062 was granted by the then NSW Minister for Planning in September 2010.

MP 09_0062 was subsequently modified in 2014 following approval of Modification 1 under section 75W of Part 3A of the EP&A Act (now repealed).

HVEC is now seeking to modify MP 09_0062 under section 4.55(2) of the EP&A Act.

Section 4.55(2) of the EP&A Act relevantly provides:

> ***4.55 Modification of consents—generally***
>
> *…*
>
> *(2) Other modifications*
>
> *A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if –*
>
> *(a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and*
>
> *(b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and*
>
> *(c) it has notified the application in accordance with –*
>
> *(i) the regulations, if the regulations so require, or*
>
> *(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and*
>
> *(d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.*

Substantially the Same Development

Clause 3BA(6) of Schedule 2 of the NSW *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* relevantly provides:

> ***3BA Winding-up of transitional Part 3A modification provisions on cut-off date of 1 March 2018 and other provisions relating to modifications***
>
> *…*
>
> *(6) In the application of section 4.55(1A) or (2) or 4.56(1) of the Act to the following development, the consent authority need only be satisfied that the development to which the consent as modified relates is substantially the same development as the development authorised by the consent (as last modified under section 75W) –*
>
> *(a) development that was previously a transitional Part 3A project and whose approval was modified under section 75W,*

Therefore, the consent authority is required to be satisfied that the proposal (by this Modification) to modify Mt Arthur Coal Mine MP 09_0062 is substantially the same development as the development as last modified under section 75W of the EP&A Act (Modification 1).

The Modification would:

- not alter the purpose for which development is carried out, nor the general appearance and function of mining operations;
- result in no change to the DA Area listed in Appendix 1 of MP 09_0062;
- extend the life of mine operations by four years, allowing a total of 20 years (ending in June 2030) rather than the 16 years (ending in June 2026) approved by Modification 1;
- involve a minor extension (25 ha) of open cut mining operations and ancillary infrastructure adjacent to the approved operations (and remain within the existing DA Area);
- be within existing mining and coal lease boundaries;
- involve no change to:
  - existing coarse rejects and tailings management;
  - existing workforce;
  - the existing explosives facility;
  - existing site accesses;
  - existing electricity supply and distribution;
  - existing offset and rehabilitation objectives;
  - existing services, plant and equipment;
  - the processing method;
  - the transportation method; and
  - the hours of operation and associated activities.
- not require additional surface infrastructure (with the exception of minor ancillary and water management infrastructure to support mining operations within the Modification Area);
- not increase the Mt Arthur Coal Mine's ROM coal extraction rate, rather the Modification would result in a reduction in the coal extraction rate, and a consequential reduction in the processing rate and daily train movements for transportation of product coal during the four years to June 2030, as compared with the rates and movements approved by Modification 1;
- result in an overall decrease in disturbance footprint, relative to the approved Mt Arthur Coal Mine surface disturbance extent (via the Impact Minimisation Area); and
- result in the retention of final voids, rehabilitated waste rock emplacement areas, decommissioned and capped TSFs and final landform objectives as part of the final landform. It is noted that the Modification would lead to a reduction in the approved number of final voids (from three to two) and a reconfiguration of the distribution of post-mining land use areas (location of woodland corridors).

For the reasons outlined above, the consent authority can be satisfied that the proposal by this Modification to modify Mt Arthur Coal Mine MP 09_0062 is substantially the same development as the development as last modified under section 75W of the EP&A Act (as modified by Modification 1).

4.1.1 NSW Environmental Planning and Assessment Act 1979 Objects

Section 1.3 of the EP&A Act describes the objects of the EP&A Act as follows:

(a) *to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,*

(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,

(c) to promote the orderly and economic use and development of land,

…

(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,

(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),

…

(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,

(j) to provide increased opportunity for community participation in environmental planning and assessment.

The Modification is considered to be generally consistent with the objects of the EP&A Act, as it:

- would contribute to the financial resilience of the Mt Arthur Coal Mine which would be achieved through efficient extraction of existing available coal resources for an additional four years;
- would allow for the continuation of operational employment, continued investment into community businesses and support to economic, social and environmental activities within the region, thereby promoting social and economic welfare of the community;
- would facilitate ecologically sustainable development (ESD), as economic efficiencies can be achieved with no change to the accepted emissions-based environmental performance measures;
- would include implementation of avoidance to limit impacts on biodiversity and Aboriginal cultural heritage items (noting there would be residual impacts within the Modification Area); and
- would be developed in a manner that incorporates community engagement, with a wide range of stakeholders consulted through the preparation of this Modification Report (Section 5).

4.1.2 Evaluation under Section 4.55(3) of the Environmental Planning and Assessment Act 1979

Section 4.55(3) of the EP&A Act states:

> (3) *In determining an application for modification of a consent under this section, the consent authority must take into consideration such of the matters referred to in section 4.15(1) as are of relevance to the development the subject of the application. The consent authority must also take into consideration the reasons given by the consent authority for the grant of the consent that is sought to be modified.*

As required by section 4.55(3) of the EP&A Act, Section 4.1.3 provides an evaluation of the Modification under section 4.15(1) of the EP&A Act. In addition, the consent authority must also take into consideration the reasons given by the consent authority for the grant of the consent that is sought to be modified.

For the Consolidation Project, the consent authority (Minister for Planning) noted that the application would result in some adverse environmental impacts; including significant dust and/or noise impacts, clearing of endangered ecological communities, visual and groundwater impacts. However, the then Department of Planning noted that the impacts could be adequately mitigated, managed, offset and/or compensated for and recommended a broad range of conditions. The Department of Planning noted that:

> *the project would represent a logical extension of the existing mine complex, would make use of existing infrastructure and facilities, and would provide major economic and social benefits for the Hunter region and NSW*

Ultimately the Department of Planning cited the major economic and social benefits for the Hunter region and NSW and found that the benefits of the project would sufficiently outweigh the residual costs and found that the project was in the public interest and should be approved subject to conditions.

For Modification 1, the consent authority (Planning Assessment Commission) made specific reference to 'the Secretary's Environmental Assessment Report as well as submissions made to Department and Commission during the public meeting'. The Planning Assessment Commission determined to approve the modification subject to conditions.

This Modification represents a continuation of socio-economic benefits associated with the Mt Arthur Coal Mine, which were cited by the Department of Planning in the justification for the approval of MP 09_0062. While there would be a continuation of adverse impacts for an additional four years, the majority of these impacts would continue at a reduced rate relative to the currently approved operations and could be managed in accordance with existing conditions of approval imposed by the Minister for Planning.

While the Modification would involve 25 ha of additional disturbance, avoidance measures have been considered with residual impacts to biodiversity to be offset in accordance with the *Biodiversity Conservation Act 2016* (BC Act), noting also that the Modification would result in a net reduction in previously approved disturbance, as some areas approved for disturbance are no longer intended to be disturbed (Section 3.10.3).

4.1.3 Evaluation under Section 4.15(1) of the Environmental Planning and Assessment Act 1979

In evaluating the Modification, the consent authority is required to take into consideration the matters referred to in section 4.15(1) of the EP&A Act as are of relevance to the development, which is the subject of the Modification, including:

> ***(1) Matters for consideration—general***
>
> *In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application—*
>
> *(a) the provisions of—*
>
> *(i) any environmental planning instrument, and*
>
> *(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and*
>
> *(iii) any development control plan, and*
>
> *(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and*
>
> *(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),*
>
> *(v) (Repealed)*
>
> *that apply to the land to which the development application relates,*
>
> *(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,*
>
> *(c) the suitability of the site for the development,*
>
> *(d) any submissions made in accordance with this Act or the regulations,*
>
> *(e) the public interest.*

This Modification Report has been prepared to address the matters in section 4.15(1) of the EP&A Act, as follows:

- Consideration of the requirements of relevant environmental instruments is provided in Section 4.3.
- Clause 2.10 of the *State Environmental Planning Policy (Planning Systems) 2021* states that development control plans do not apply to State Significant Developments.
- This Modification Report has been prepared in consideration of the relevant provisions of the EP&A Regulation.
- The existing Voluntary Planning Agreement with Muswellbrook Shire Council under MP 09_0062 would continue to apply to the modified Mt Arthur Coal Mine.
- A description of the existing environment, an assessment of the potential environmental impacts associated with the Modification, and a description of the potential measures to avoid, mitigate, rehabilitate, remediate, monitor and/or offset the potential impacts of the Modification are described in Section 6 and Appendices A to J.
- The suitability of the site for the development has been assessed previously, in the context of MP 09_0062. The suitability and assessment of the final landform proposed by the Modification has been considered in Section 3.
- Consideration of whether, on evaluation, the Modification is considered to be in the public interest is provided in Section 7.

4.2 OTHER RELEVANT NSW LEGISLATION

In addition to the EP&A Act, the following NSW legislation may be applicable to the Mt Arthur Coal Mine, incorporating the Modification:

- *Aboriginal Land Rights Act 1983*;
- BC Act;
- *Biosecurity Act 2015*;
- *Contaminated Lands Management Act 1997*;
- *Crown Land Management Act 2016*;

- *Dangerous Goods (Road and Rail Transport) Act 2008*;
- *Dams Safety Act 2015*;
- *Electricity Supply Act 1995*;
- *Fisheries Management Act 1994*;
- *Heritage Act 1977*;
- *Mining Act 1992*;
- *National Parks and Wildlife Act 1974* (NPW Act);
- *Native Title Act 1993*;
- *Protection of the Environment Operations Act 1997* (PoEO Act);
- *Roads Act 1993*;
- *Water Management Act 2000* (WM Act); and
- *Work Health and Safety Act 2011*.

Relevant licences or approvals required under these Acts would continue to be obtained for the Mt Arthur Coal Mine, incorporating the Modification, where required.

4.2.1 Biodiversity Conservation Act 2016

The BC Act provides the approach to be followed for conducting an assessment of a development's impacts on threatened species and ecological communities.

Potential impacts of the Modification on threatened species and biodiversity are described in Section 6.8 and Appendix D. The Modification would offset unavoidable residual impacts on ecology consistent with the BC Act requirements.

Potential ecological impacts and the associated offset liability for unavoidable residual impacts from the Modification have been assessed in accordance with the *Biodiversity Assessment Method* (DPIE, 2020a) (BAM), which sets a standard that would result in no net loss of biodiversity value in NSW.

4.2.2 Dams Safety Act 2015

The *Dams Safety Act 2015* requires that Dams Safety NSW ensures that any risk that may arise in relation to dams (including any risks to public safety and to the environment and economic assets) are of a level that is acceptable to the community. Dams Safety NSW may, by order published in the Gazette, declare a dam or proposed dam to be a declared dam for the purposes of this Act.

Mt Arthur Coal Mine has three declared dams under the *Dams Safety Act 2015*; McDonalds Void, the Environmental Dam, and the TSF (i.e. West Cut Void).

HVEC conducts annual Dam Safety Standard Reporting on declared dams within the Mt Arthur Coal Mine including McDonalds Void, the Environmental Dam and the TSF and this would continue for the Modification.

4.2.3 National Parks and Wildlife Act 1974

The NPW Act contains provisions for the protection and management of national parks, historic sites, nature reserves and Aboriginal heritage in NSW.

An Aboriginal Cultural Heritage Assessment (ACHA) has been undertaken for the Modification by Niche Environment and Heritage Pty Ltd (Niche) (2023) to assess the potential impacts of the Modification on Aboriginal cultural heritage (Appendix E).

4.2.4 Protection of the Environment Operations Act 1997

The PoEO Act and the *Protection of the Environment Operations (General) Regulation 2022* set out the general obligations for environmental protection for development in NSW, which is regulated by the Environmental Protection Authority (EPA).

Operations and monitoring at the Mt Arthur Coal Mine are currently undertaken in accordance with EPL 11457 held by HVEC issued under the PoEO Act.

No additional EPLs would be required since the Modification is a continuation of scheduled activities wholly within the existing premises.

4.2.5 Mining Act 1992

The objects of the *Mining Act 1992* are to encourage and facilitate the discovery and development of mineral resources in NSW, having regard to the need to encourage ESD.

The Mt Arthur Coal Mine, incorporating the Modification would operate wholly within existing mining and coal leases. There would be no need for the amendment or variation of the existing authorities or the issue of new authorities under the *Mining Act 1992.*

The Modification does not propose any change to the existing DA Area as per MP 09_0062. The Mt Arthur Coal Mine is partially located within sublease CL 229 and CL 395, which are held by Maxwell.

Section 380AA of the Mining Act specifies restrictions on planning applications for coal mining, relevantly including:

> *(1) An application for development consent, or for the modification of a development consent, to mine for coal cannot be made or determined unless (at the time it is made or determined) the applicant is the holder for an authority that is in force in respect of coal and the land where mining for coal is proposed to be carried out, or the applicant has the written consent of the holder of such an authority to make an application.*
>
> *…*

Mining activities for the Modification would be located within existing MLs held by HVEC (ML 1487, ML 1358 and ML 1548) and would continue for an additional four years. No coal extraction is proposed within sublease CL 229 and CL 395 and therefore consent of the tenement holder is not required under section 380AA. The use of the TSFs and emplacement activities would continue within sublease CL 229 and CL 395 for an additional four years as part of the Modification.

4.2.6 Water Management Act 2000

The WM Act contains provisions for the licensing, allocation, capture and use of water resources.

Under the WM Act, water sharing plans establish rules for sharing water between different users and between the various environmental sources (namely rivers or aquifers).

HVEC would continue to obtain and hold licences required under the WM Act for licensable take (Section 6.12 and Appendix H).

4.3 ENVIRONMENTAL PLANNING INSTRUMENTS

Detailed assessment under the relevant provisions of key environmental planning instruments is included in the statutory compliance table provided in Attachment 3.

4.3.1 Muswellbrook Local Environmental Plan 2009

Local Environmental Plan Aims

Clause 1.2 of Part 1 of the *Muswellbrook Local Environmental Plan 2009* (Muswellbrook LEP) outlines the aims of the plan, with the following of particular relevance to the Modification:

> *…*
>
> *(a) to encourage the proper management of the natural and human-made resources of Muswellbrook by protecting, enhancing or conserving –*
>
> *(i) productive agricultural land, and*
>
> *(ii) timber, minerals, soils, water and other natural resources, and*
>
> *(iii) areas of significance for nature conservation, and*
>
> *…*
>
> *(v) places and buildings of archaeological or heritage significance,*
>
> *…*

(c) to promote ecologically sustainable urban and rural development,

…

(f) to protect and conserve –

(i) soil stability by controlling development in accordance with land capability, and

(ii) remnant native vegetation, and

(iii) water resources, water quality and wetland areas, natural flow patterns and their catchment and buffer areas,

(g) to provide a secure future for agriculture by expanding Muswellbrook's economic base and minimising the loss or fragmentation of productive agricultural land,

(h) to allow flexibility in the planning framework so as to encourage orderly, economic and equitable development while safeguarding the community's interests and residential amenity, and to achieve the objectives of each zone mentioned in Part 2 of this Plan.

The Modification has regard to the aims of the Muswellbrook LEP, as the Modification:

- would not directly impact any NSW Government mapped biophysical strategic agricultural land that is not already disturbed by the approved Mt Arthur Coal Mine or within an existing ML;
- would contribute to the financial resilience of the Mt Arthur Coal Mine which would be achieved through efficient extraction of existing available coal resources for an additional four years;
- would involve the development of a mineral resource (coal) in a manner that would avoid or mitigate potential impacts on the environment (including soils, groundwater, surface remnant vegetation and other biodiversity values) (Section 6);
- would result in no direct impact to known places and buildings of archaeological or heritage significance (Section 6); and
- conceptual final landform comprises rehabilitated pasture landscapes that would aim to support a financially viable and environmentally sustainable livestock grazing operation.

Permissibility

The Mt Arthur Coal Mine DA Area (listed in Appendix 1 of MP 09_0062) covers land zoned under the Muswellbrook LEP as (Figure 4-1):

- Zone RU1 (Primary Production);
- Zone C3 (Environmental Management); and
- Zone SP2 (Infrastructure) (associated with the Antiene Rail Spur).

The Modification results in a minor extension of active mining within the existing DA Area within Zone RU1 (Primary Production).

Open cut mining is permitted with consent within Zone RU1 (Primary Production) land under the Muswellbrook LEP.

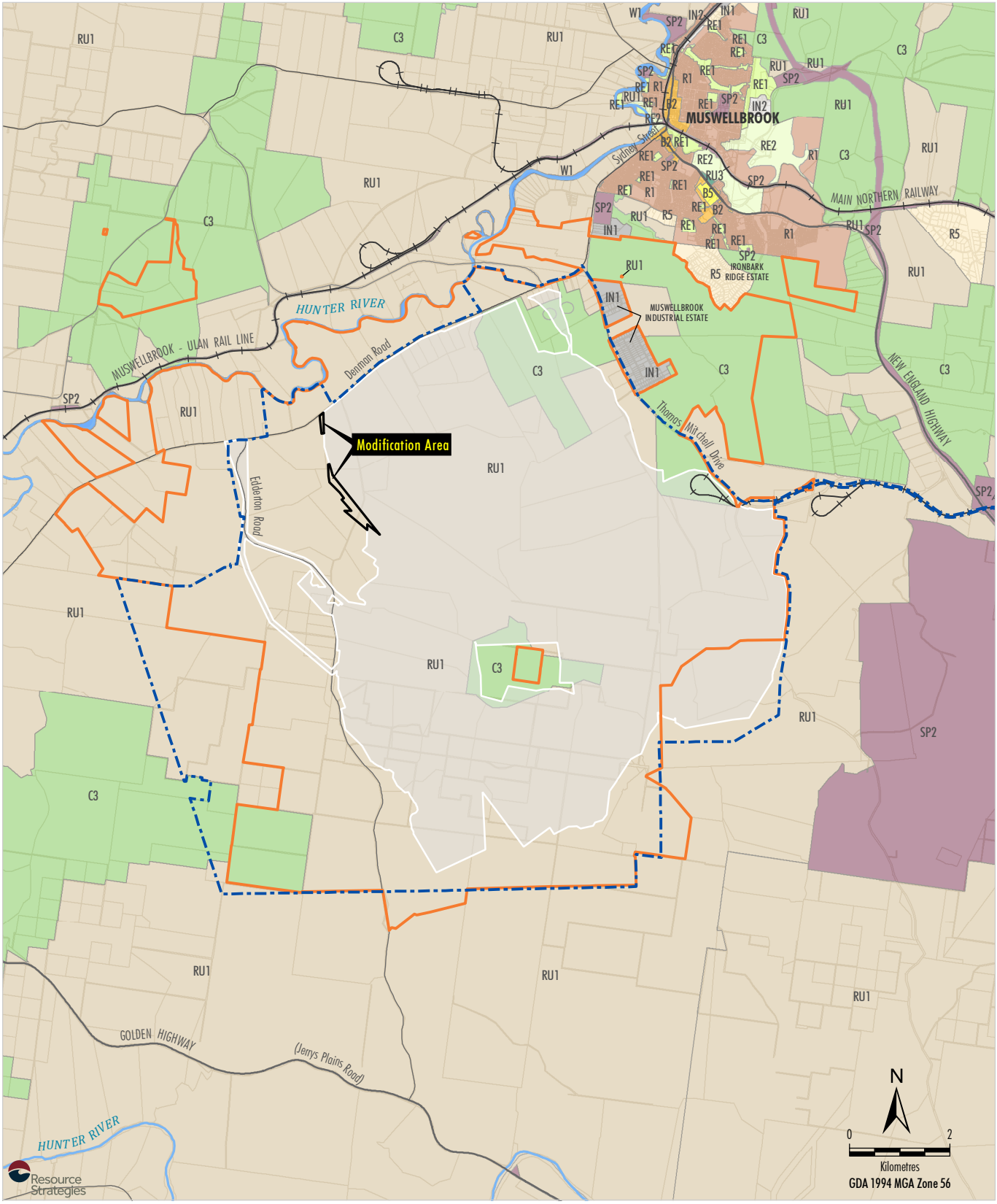
SP2 zoned land within the DA Area is associated with the Antiene Rail Spur. As discussed in Section 1.3, the Antiene Rail Spur is owned by the Antiene Joint Venture, which is currently managed by BHP and Maxwell, a wholly owned subsidiary of Malabar. The Modification would allow for the continued use of the Antiene Rail Spur until 30 June 2030, within Zone SP2.

As a result of the application of the *State Environmental Planning Policy (Resources and Energy) 2021* (the Resources and Energy SEPP), open cut mining is also permissible with consent on land in Zone C3 under the Muswellbrook LEP.

The Resources and Energy SEPP applies to the State. Clause 2.6 of Part 2.1 of the Resources and Energy SEPP gives it primacy where there is any inconsistency between the provisions in the Resources and Energy SEPP and the provisions in any other environmental planning instruments subject to limited exceptions, which are not enlivened by the Modification.

The practical effect of clause 2.6 of Part 2.1 for the Modification is that the provisions of the Resources and Energy SEPP will prevail over those contained in the Muswellbrook LEP, to the extent of any inconsistency.

Clauses 2.8 and 2.9 of Part 2.2 of the Resources and Energy SEPP provide what types of mining development are permissible without development consent and what types are permissible only with development consent.



Source: NSW Spatial Services (2023); DPE (2023)

LEGEND

- Development Application Area
- Approximate Extent of BHP-controlled Land
- Lot Boundary
- Approximate Extent of Existing/Approved Surface Development
- Modification Area

Land Zoning

B2	Local Centre
B5	Business Development
R1	General Residential
R5	Large Lot Residential
IN1	General Industrial
IN2	Light Industrial
RU1	Primary Production
SP2	Infrastructure
RU4	Natural Waterways
W1	Forestry
C3	Environmental Management
RE1	Public Recreation
RE2	Private Recreation

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Muswellbrook LEP Zoning

Figure 4-1

Clause 2.9(1) states:

> ***2.9 Development permissible with consent***
>
> *(1) Mining*
>
> *Development for any of the following purposes may be carried out only with development consent –*
>
> *…*
>
> *(b) mining carried out –*
>
> *(i) on land where development for the purposes of agriculture or industry may be carried out (with or without development consent), or*
>
> *(ii) on land that is, immediately before the commencement of this section, the subject of a mining lease under the Mining Act 1992 or a mining licence under the Offshore Minerals Act 1999*,
>
> *…*
>
> *(d) facilities for the processing or transportation of minerals or mineral bearing ores on land on which mining may be carried out (with or without development consent), but only if they were mined from that land or adjoining land,*
>
> *...*

'Extensive agriculture' is permissible under the Muswellbrook LEP without consent in Zone C3 (Environmental Management). Clause 2.6(1)(b)(i) of the Resources and Energy SEPP provides that development for the purposes of 'mining' may be carried out with consent on land where development for the purposes of agriculture is permissible.

Therefore, while open cut mining in Zone C3 is prohibited under the Muswellbrook LEP, the Resources and Energy SEPP prevails and provides that mining can be carried out with consent on these lands.

In addition, consistent with Clause 2.9(1)(b)(i) of the Resources and Energy SEPP, land within Zone C3 is subject to approved mining leases and therefore mining can be carried out with consent.

Further, mining operations within Zone C3 is already approved under MP 09_0062. The Modification Area is entirely located within Zone RU1 (permitted with consent), accordingly no new disturbance is proposed within Zone C3 as part of this Modification.

Local Environmental Plan Zone Objectives

Zone objectives are principally relevant to a consent authority's decision in determining a development application, whereas this application is for a Modification. Nevertheless for completeness the LEP zone objectives are assessed below.

Zone RU1 (Primary Production)

The objectives of the RU1 (Primary Production) Zone are as follows:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To protect the agricultural potential of rural land not identified for alternative land use, and to minimise the cost to the community of providing, extending and maintaining public amenities and services.*
- *To maintain the rural landscape character of the land in the long term.*
- *To ensure that development for the purpose of extractive industries, underground mines (other than surface works associated with underground mines) or open cut mines (other than open cut mines from the surface of the flood plain), will not –*

  (a) destroy or impair the agricultural potential of the land or, in the case of underground mining, unreasonably restrict or otherwise affect any other development on the surface, or

  (b) detrimentally affect in any way the quantity, flow and quality of water in either subterranean or surface water systems, or

  (c) visually intrude into its surroundings, except by way of suitable screening.

- *To protect or conserve (or both) –*

  (a) soil stability by controlling development in accordance with land capability, and

  (b) trees and other vegetation, and

  (c) water resources, water quality and wetland areas, and their catchments and buffer areas, and

  (d) valuable deposits of minerals and extractive materials by restricting development that would compromise the efficient extraction of those deposits.

The Modification is not inconsistent with the objectives of Zone RU1 as the Modification:

- would involve the development of a natural resource (coal);
- does not propose any new disturbance outside of existing mining or coal lease tenements;
- would involve a net reduction in approved surface disturbance extent not intended to be disturbed for mining purposes (thereby minimising the fragmentation of resource lands);
- would involve an extension of the mine life and efficient extraction of existing available coal resources for an additional four years;
- would incorporate measures to avoid and mitigate potential impacts on groundwater and surface water systems, including water quality (Sections 6.11 and 6.12 and Appendix G and Appendix H);
- biodiversity impacts have been assessed in accordance with the BAM, which sets a standard that would result in no net loss of biodiversity values in NSW; and
- would allow further access to the State's coal resources. Whilst the Mt Arthur Coal Mine would cease mining beyond 30 June 2030, the four-year extension as part of the Modification would not have a detrimental impact on current or future extraction or recovery of coal.

Zone SP2 (Infrastructure)

The objectives of the SP2 (Infrastructure) Zone are as follows:

- *To provide for infrastructure and related uses.*
- *To prevent development that is not compatible with or that may detract from the provision of infrastructure.*
- *To recognise existing railway land and to enable future development for railway and associated purposes.*
- *To prohibit advertising hoardings on railway land.*

  …

The Modification is compatible with the continued operation of the Antiene Rail Spur and the Main Northern Railway.

HVEC would continue to consult with the Australian Rail Track Corporation (ARTC) and rail service providers to manage potential rail interactions (Section 5).

Zone C3 (Environmental Management)

The objectives of Zone C3 (Environmental Management) are as follows:

- *To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.*
- *To provide for a limited range of development that does not have an adverse effect on those values.*
- *To maintain, or improve in the long term, the ecological values of existing remnant vegetation of significance including wooded hilltops, river valley systems, major scenic corridors and other local features of scenic attraction.*
- *To limit development that is visually intrusive and ensure compatibility with the existing landscape character.*
- *To allow agricultural activities that will not have an adverse impact on the environmental and scenic quality of the existing landscape.*
- *To promote ecologically sustainable development.*
- *To ensure that development in this zone on land that adjoins land in the land zoned C1 National Parks and Nature Reserves is compatible with the objectives for that zone.*

The Modification is not inconsistent with the objectives of Zone C3 as:

- There would be no new disturbance activities within Zone C3 proposed as part of the Modification.
- The Modification conceptual final landform comprises large tracts of self-sustaining woodland to improve ecological value in the region post-mining at the Mt Arthur Coal Mine.
- The Modification is expected to result in negligible levels of visual impact at relevant sensitive receivers and would not incrementally increase cumulative visual impacts (Appendix F).
- The Modification would not change existing conservation agreements in place for the Mount Arthur Conservation Area (located within Zone C3).

4.4 COMMONWEALTH LEGISLATION

4.4.1 Overview

The Modification is an application under State legislation, namely the EP&A Act. For context, a summary is provided below of Commonwealth legislation relevant to the operation of the Mt Arthur Coal Mine.

4.4.2 Environment Protection and Biodiversity Conservation Act 1999

The objective of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance (MNES).

Proposals that are likely to have a significant impact on MNES are defined as a controlled action under the EPBC Act. Such a proposal must be referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) to determine whether or not the action is a controlled action.

The Mt Arthur Coal Mine is a controlled action approved to be undertaken in accordance with EPBC 2011/5866 (Consolidation Project Approval Decision) and EPBC 2014/7377 (Modification 1 Approval Decision).

Potential impacts of the Modification on flora and fauna have been assessed in the Biodiversity Development Assessment Report (BDAR) (Appendix D) and summarised in Section 6.6.

The potential impacts of the Modification on water resources have been assessed in the Surface Water Assessment (Appendix G) and Groundwater Assessment (Appendix H), and summarised in Sections 6.11 and 6.12, respectively.

Development of the Modification Area, as part of the Modification (the proposed action) will be separately referred to the Commonwealth Minister to determine whether it is a controlled action and if so, to obtain the requisite approval under the EPBC Act.

4.4.3 National Greenhouse and Energy Reporting Act 2007

The Commonwealth *National Greenhouse and Energy Reporting Act 2007* (NGER Act) introduced a single national reporting framework for the reporting and dissemination of corporations' greenhouse gas emissions and energy use.

Clause 3 of the NGER Act defines the objects of the Act:

> *(1) The first object of this Act is to introduce a single national reporting framework for the reporting and dissemination of information related to greenhouse gas emissions, greenhouse gas projects, energy consumption and energy production of corporations to:*
>
> *(b) inform government policy formulation and the Australian public; and*
>
> *(c) meet Australia's international reporting obligations; and*
>
> *(d) assist Commonwealth, State and Territory government programs and activities; and*
>
> *(e) avoid the duplication of similar reporting requirements in the States and Territories.*
>
> *(2) The second object of this Act is to contribute to the achievement of Australia's greenhouse gas emissions reduction targets by ensuring that each of the following outcomes (the safeguard outcomes) are achieved:*
>
> *(a) net covered emissions of greenhouse gases from the operation of a designated large facility do not exceed the baseline applicable to the facility;*

(b) total net safeguard emissions for all of the financial years between 1 July 2020 and 30 June 2030 do not exceed a total of 1,233 million tonnes of carbon dioxide equivalence;

(c) net safeguard emissions decline to:

(i) no more than 100 million tonnes of carbon dioxide equivalence for the financial year beginning on 1 July 2029; and

(ii) zero for any financial year to begin after 30 June 2049;

(d) the 5-year rolling average safeguard emissions for each financial year that begins after 30 June 2024 are lower than the past 5-year rolling average safeguard emissions for that financial year;

(e) the responsible emitter for each designated large facility has a material incentive to invest in reducing covered emissions from the operation of the facility;

(f) the competitiveness of trade-exposed industries is appropriately supported as Australia and its regions seize the opportunities of the move to a global net zero economy.

Additionally, the Safeguard Mechanism (underpinned by the Commonwealth *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015*) was established through the NGER Act.

The Safeguard Mechanism provides baseline emissions and offset requirements for applicable facilities, whereby facilities are required to achieve this baseline or otherwise account for emissions in exceedance of the baseline (e.g. carbon offsets). The Mt Arthur Coal Mine is regulated as a single facility under the NGER Act and the Safeguard Mechanism, and is operated in accordance with a calculated emissions baseline.

Greenhouse gas emissions from the Mt Arthur Coal Mine are currently measured and reported annually, which would continue for the Modification, using a site-specific Scope 1 fugitive emissions intensity. The site-specific Scope 1 fugitive emissions intensity is calculated in accordance with Method 2 of the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (NGER Measurement Determination) based on detailed gas content and composition testing.

Climate Change Act 2022

The Commonwealth *Climate Change Act 2022* (Climate Act) outlines Australia's greenhouse gas emissions reduction targets. Clause 10 of Part 2 of the Climate Act states:

(1) Australia's greenhouse gas emissions reduction targets are as follows:

(a) reducing Australia's net greenhouse gas emissions to 43% below 2005 levels by 2030:

…

(b) reducing Australia's net greenhouse gas emissions to zero by 2050.

Clause 3 of the Climate Act defines the objects of the Act:

(aa) to advance an effective and progressive response to the urgent threat of climate change drawing on the best available scientific knowledge; and

(a) to set out Australia's greenhouse gas emissions reduction targets which contribute to the global goals of:

(i) holding the increase in the global average temperature to well below 2°C above pre-industrial levels; and

(ii) pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels; and

(b) to promote accountability and ambition by requiring the Minister to:

(i) prepare annual climate change statements; and

(ii) cause copies of those statements to be tabled in each House of the Parliament; and

(c) to ensure that independent advice from the Climate Change Authority informs:

(i) the preparation of annual climate change statements; and

(ii) the greenhouse gas emissions reduction targets to be included in a new or adjusted nationally determined contribution.

Safeguard Mechanism Reforms

The *Safeguard Mechanism (Crediting) Amendment Act 2023* was introduced by the Australian Parliament in April 2023, and amends relevant Acts (including the NGER Act) to alter the Safeguard Mechanism to facilitate progressive declines in greenhouse gas emissions, consistent with the objects of the Climate Act.

The reforms of the Safeguard Mechanism apply a declined rate to facilities' baselines so that they are reduced gradually on a trajectory consistent with achieving Australia's net emission reduction targets of 43 percent (%) below 2005 levels by 2030 and net zero by 2050 (DCCEEW, 2023a). The reformed Safeguard Mechanism came into effect on 1 July 2023.

Due to the relatively short remaining duration for operations at the Mt Arthur Coal Mine, no specific major avoidance measures are proposed as part of the Modification to comply with the reforms of the Safeguard Mechanism. Alternatively, BHP would purchase and surrender ACCUs and Safeguard Mechanism Credits to manage potential emissions in excess of the baseline.

Greenhouse gas emissions are further addressed in Section 6.6 and Appendix B.

4.4.4 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) was introduced to ensure the preservation and protection from injury or desecration of areas or objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginal people in accordance with Aboriginal tradition.

The Minister for the Environment and Water, responsible for the ATSIHP Act, has received an application made under section 10 of the ATSIHP Act of relevance to the Modification Area. The application seeks long term preservation and protection of a significant Aboriginal area being the areas known as the Mount Pleasant Operation and The Pocket, near Muswellbrook.

Under section 10 of the ATSIHP Act, where the Minister for the Environment and Water:

> *(a) receives an application made orally or in writing by or on behalf of an Aboriginal or a group of Aboriginals seeking the preservation or protection of a specified area from injury or desecration;*
>
> *(b) is satisfied:*
>
> *(i) that the area is a significant Aboriginal area; and*
>
> *(ii) that it is under threat of injury or desecration;*
>
> *(c) has received a report under subsection (4) in relation to the area from a person nominated by him or her and has considered the report and any representations attached to the report; and*
>
> *(d) has considered such other matters as he or she thinks relevant;*
>
> *he or she may, by legislative instrument, make a declaration in relation to the area.*

The specified area outlined in the section 10 application overlies the entire Modification Area, as well as portions of the existing Mt Arthur Coal Mine.

The Minister for the Environment and Water is currently in the process of reviewing relevant documentation to inform a decision in response to the section 10 application.

If the Section 10 application was to be successful, it would adversely affect mining operations at the approved and modified Mt Arthur Coal Mine.

5 ENGAGEMENT

This section provides an overview of the engagement conducted during the preparation of this Modification Report, the key issues raised, and any changes to existing engagement at the approved Mt Arthur Coal Mine that would be required as a result of the Modification.

HVEC and BHP are committed to continuing open and constructive dialogue with the local community and stakeholders.

As noted in Section 2, in June 2022, BHP announced the intent to commence a pathway to closure of the Mt Arthur Coal Mine in 2030. As part of ongoing engagement regarding the pathway to 2030, BHP has commenced engagement activities, which will continue for the next several years. Further information on the pathway to closure is located here:

https://www.bhp.com/what-we-do/global-locations/australia/nsw-mt-arthur-coal-mine-hunter-valley/mt-arthur-coal-pathway

The below subsections focus on engagement undertaken specifically for the Modification rather than the pathway to closure.

5.1 ENGAGEMENT APROACH

The engagement undertaken during the preparation of this Modification Report has been undertaken in consideration of *Undertaking Engagement Guidelines for State Significant Projects* (DPE, 2022d).

Feedback obtained through engagement with key stakeholders has provided the opportunity to identify issues of concern or interest and to consider these issues within this Modification Report.

Key objectives of the engagement undertaken for the Modification are to:

- engage with key government and public stakeholders about the Modification;
- seek input from key stakeholders on elements of the Modification; and
- continue the ongoing dialogue between HVEC, BHP and key stakeholders regarding the Mt Arthur Coal Mine, incorporating the Modification.

Consultation would continue during the assessment of the Modification by the NSW Government.

HVEC has consulted with a range of stakeholders including State and local government agencies, infrastructure and service providers, surrounding mines and the local community to obtain feedback on the proposed assessment approach, potential impacts and proposed mitigation and management measures for the Modification (Sections 5.2 to 5.7).

HVEC continues to consult with relevant stakeholders on a regular basis in relation to the Modification and the ongoing mining activities at the Mt Arthur Coal Mine.

5.2 FEDERAL GOVERNMENT AGENCIES

5.2.1 Commonwealth Department of Climate Change, Energy, the Environment and Water

Development of the Modification Area, as part of the Modification (the proposed Action) will be separately referred to the Commonwealth Minister to determine whether it is a controlled action and if so, to obtain the requisite approval under the EPBC Act.

At the time of lodging the EPBC Referral for the proposed Action, HVEC will consult with the DCCEEW.

5.3 STATE GOVERNMENT

5.3.1 NSW Department of Planning and Environment

HVEC held a meeting with DPE in July 2022 to provide an initial briefing on the Modification.

Subsequently, a Scoping Meeting was also held with DPE in August 2022 regarding the Modification, proposed approval pathway and the proposed scope of the environmental assessment.

A Scoping Letter was submitted to DPE in October 2022.

A further meeting was held with DPE in July 2023 to discuss potential alternate mine land re-use opportunities which are being explored, although do not form part of this Modification. These opportunities are presented in Attachment 2.

Additionally, a pre-lodgement meeting was held with DPE in August 2023 to provide an overview of the key assessment outcomes of the Modification and seek feedback from DPE prior to lodgement.

Feedback received from DPE has been incorporated into this Modification Report (Table 5-1).

HVEC would continue to consult with DPE throughout the Modification assessment process to respond to any issues raised during the Modification exhibition process.

5.3.2 Other NSW Government Agencies

A meeting with the Mine Development Panel (MDP) under the MEG took place in November 2022. Primary comments received during the MDP meeting were in regard to the functionality of the final landform design, which is further discussed in Section 3.

A meeting was conducted with the Resources Regulator's Rehabilitation and Securities Panel in July 2022. Feedback received from the Resources Regulator was focused on rehabilitation and final landform design, which is further discussed in Section 3.

In December 2022, HVEC provided a briefing letter to the following State government agencies providing a description of the Modification and proposed scope of environmental assessment:

- MEG;
- Resources Regulator;
- DPE – Water;
- NSW Department of Primary Industries (DPI) – Fisheries:
- DPI – Agriculture;
- DPE – Crown Lands;
- Biodiversity, Conservation and Science Directorate (BCD);
- EPA;
- Transport for NSW (TfNSW);
- NSW Health;
- Hunter Local Land Service;
- Dam Safety NSW; and
- Heritage NSW.

No specific feedback was provided by these agencies in response to the briefing letter.

In August 2023, HVEC met with the following agencies prior to lodgement of the Modification Report to provide an overview of the key environmental assessment outcomes:

- DPE;
- Resources Regulator;
- DPE-Water
- BCD;
- EPA; and
- Net Zero Emissions Modelling Team (within DPE's Climate and Atmospheric Science).

Feedback received from the above agencies was incorporated within this Modification Report where relevant. Key comments received from each of the above agencies during the pre-lodgement meetings are summarised in Table 5-1.

5.4 LOCAL GOVERNMENT AGENCIES

The Mt Arthur Coal Mine is located within the Muswellbrook Shire LGA. HVEC provided a briefing letter to the Muswellbrook Shire Council in March 2023 to provide an overview of the Modification.

HVEC offered to meet with the Muswellbrook Shire Council to discuss details of the proposed Modification, and invited the Muswellbrook Shire Council to provide any comments or feedback.

In August 2023, HVEC conducted a pre-lodgement meeting with the Muswellbrook Shire Council to provide an overview of the key environmental assessment outcomes. Feedback received from the Muswellbrook Shire Council primarily related to amenity impacts and final landform, which are further discussed in Sections 3 and 6 and Appendices A and B.

Representatives of the Muswellbrook Shire Council are also members of the Community Consultative Committee (CCC) for the Mt Arthur Coal Mine (Section 5.7.2). The Muswellbrook Shire Council and CCC were similarly consulted through the Social Impact Assessment (SIA) consultation process for the Modification, as described in Section 6.7.

HVEC would continue to consult with the Muswellbrook Shire Council during the Modification assessment process to respond to any issues or concerns. Briefing and pre-lodgement letters were also distributed to the Upper Hunter Shire Council and Singleton Council in March 2023 and September 2023.

Table 5-1
Summary of Key Regulator Comments

Summary of Comment	Relevant Section in Modification Report	Response
DPE requested a sensitivity analysis on the greenhouse gas emission cost-benefit analysis be included as part of the Economic Assessment.	Appendix J	Appendix J includes relevant review of the NSW Treasury guidelines and includes sensitivity analysis of the greenhouse gas cost–benefit analysis.
DPE and DPE-Water noted that the geotechnical stability of the final landform would be a key focus.	Section 3	Regular geotechnical analysis of the approved Mt Arthur Coal Mine is undertaken by HVEC to assess the long-term stability of mine landforms. Through this, geotechnical studies have been prepared to specifically assess the geotechnical stability of the final highwall proposed as part of the Modification final landform.
DPE supported the proposed avoidance as part of the Modification and requested clarification within the BDAR is included to demonstrate mitigation.	Section 6.8 and Appendix D.	The BDAR includes a detailed description of the measures that have been evaluated and adopted to avoid or minimise impacts on biodiversity values.
Resources Regulator noted that the Modification could seek flexibility where possible in terms of materials and techniques required to fulfil rehabilitation obligations.	Section 3.10	The Modification is not specifically seeking to change the rehabilitation obligations, however any variations to rehabilitation techniques and materials would be sought through future update to the Rehabilitation Strategy (BHP, 2023a).
Resources Regulator and Muswellbrook Shire Council noted that a recently closed mine had left over stockpiled coal for processing after the planned closure date, and recommended that this be considered as part of the Modification.	Attachment 1	HVEC has requested a minor change to the footnote of condition 5 of Schedule 2 of MP 09_0062 in this regard.
DPE-Water recommended that the Groundwater Assessment considers the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) (2023) *Draft National Minimum Groundwater Monitoring Guidelines*, *Information guidelines for proponents preparing coal seam gas and large coal mining development proposals* (IESC, 2018), the *NSW Aquifer Interference Policy* (NSW Government, 2012) and other relevant groundwater guidelines.	Section 6.12 and Appendix H	SLR Consulting Australia Pty Ltd (SLR) has prepared a Groundwater Impact Assessment (Appendix H) which assesses potential groundwater impacts of the Modification inconsideration of relevant groundwater guidelines.
DPE-Water requested consideration of the Northern Open Cut Void position in relation to its proximity to Hunter River alluvium.	Appendix H	Post-mining groundwater impacts through numerical recovery modelling of the proposed final landform (incorporating the Northern Open Cut Void) has been investigated as part of the Groundwater Assessment (Appendix H). Residual void groundwater inflows and levels are described in detail within Appendix H.
EPA queried how the Safeguard Mechanism reforms would apply to the Mt Arthur Coal Mine.	Section 6.6	Section 6.6 provides further detail on how the Safeguard Mechanism currently applies to the Mt Arthur Coal Mine, as well as compliance in regard to the reforms of the Safeguard Mechanisms. Section 6.6 also provides a comparison in relation to the Modification predicted emissions and the NSW declining emissions.
EPA recommended that a comparison be made between the Modification emissions estimates and the declining NSW emission targets to 2030.		

Table 5-1 (continued)
Summary of Key Regulator Comments

Summary of Comment	Relevant Section in Modification Report	Response
EPA noted that climate change assessment requirements are being prepared and will be applied when assessing the Modification.	-	BHP will respond to any climate change related submission from the EPA during the Response to Submissions phase.
BCD recommended including potential Legless Lizard (*Delma vescolineata)* credit requirements within BDAR in consideration of potential 'Threatened' listing under the BC Act.	Section 6.8 and Appendix D	Table 9 of the BDAR provides possible credit values based on Biodiversity Risk Weighting for the Legless Lizard (*Delma vescolineata)* in consideration of the uncertainty regarding its potential listing under the BC Act.
Muswellbrook Shire Council requested clarification as to whether the retention of existing noise criteria would be acceptable to the EPA.	Section 6.4 and Appendix A.	The Modification would be subject to existing noise criteria in accordance with MP 09_0062. This approach was outlined within the Scoping Letter, and there will be ongoing engagement with the EPA to ensure that the existing noise criteria is acceptable. Noise management at the Mt Arthur Coal Mine is currently undertaken in accordance with the Mt Arthur Coal Mine Noise Management Plan (BHP, 2023c) (NMP).
Muswellbrook Shire Council queried whether blasting within the Modification Area would trigger closures along Edderton Road.	Section 6.4 and Appendix A.	The Modification would not result in any changes to existing blasting practices (undertaken in accordance with the Mt Arthur Coal Blast Management Plan (BHP, 2021c) (BMP). The Blast Control Area would be extended as part of the Modification, however no additional road closures would be required.
Muswellbrook Shire Council queried the extent of the final landform highwall and its location in relation to Denman Road.	Section 3	The proposed final landform highwall would be located further north towards Denman Road. Geotechnical studies have been undertaken to assess the stability of the highwall in relation to factor of safety.

5.5 INFRASTRUCTURE AND SERVICE PROVIDERS

In March 2023, briefing letters were distributed to the following infrastructure and service providers to provide a description of the Modification and the proposed scope of environmental assessment:

- ARTC;
- Newcastle Coal Infrastructure Group;
- Hunter Valley Coal Chain Coordinator;
- Newcastle Ports Corporation;
- Telstra; and
- Ausgrid.

Pre-lodgement letters were also distributed to the above infrastructure and service providers in September 2023.

No specific comments related to the Modification were received from the above infrastructure and service providers in response to both the briefing and pre-lodgement letters.

5.6 SURROUNDING MINING OPERATIONS

In March 2023, briefing letters were distributed to the following mining operations in the vicinity of the Mt Arthur Coal Mine to provide a description of the Modification and the proposed scope of environmental assessment:

- Bengalla Mine;
- Dartbrook Mine;
- Mount Pleasant Operation;
- Maxwell Mine;
- Mangoola Coal; and
- Muswellbrook Coal.

Pre-lodgement letters were also distributed to the above surrounding mining operations in September 2023.

No specific comments related to the Modification were received from any surrounding mining operations in response to both the briefing and pre-lodgement letters.

5.7 COMMUNITY ENGAGEMENT

5.7.1 Community Organisations and Businesses

In March 2023, briefing letters were distributed to the following community organisation agencies to provide a description of the Modification and the proposed scope of environmental assessment:

- Godolphin Kelvinside Stud;
- Coolmore Stud;
- Hunter Thoroughbred Breeders Association;
- Hunter Renewal;
- Muswellbrook Shire Local & Family History Society;
- Business Singleton;
- Muswellbrook Chamber of Commerce and Industry;
- Scone Chamber of Commerce and Industry;
- Warbuton Estate Agents;
- Home in Place;
- TAFE NSW;
- Hunter Valley Wine & Tourism Association;
- Upper Hunter Community Services;
- Muswellbrook Police Citizens Youth Club; and
- C-RES.

Pre-lodgement letters were also distributed to the above community organisations in September 2023.

No specific comments related to the Modification were received from these community organisations in response to both the briefing and pre-lodgement letters.

5.7.2 Community Consultive Committee

HVEC liaises with the local community through the established CCC for the Mt Arthur Coal Mine.

The Mt Arthur Coal Mine CCC meets quarterly. HVEC provided a briefing regarding the Modification and updates at the CCC meetings in August 2022, November 2022, February 2023 and August 2023.

Minutes for the Mt Arthur Coal CCC meetings are made publicly available on the Mt Arthur Coal website.

5.7.3 Aboriginal Stakeholders

HVEC consulted with Aboriginal stakeholders as part of the ACHA prepared for the Modification. Consultation was conducted with reference to the *Aboriginal cultural heritage consultation requirements for proponents 2010* (Department of Environment, Climate Change and Water [DECCW], 2010a) and the NPW Act.

Further detail on consultation with Aboriginal stakeholders, and how comments have been considered, is provided in Section 6.9 and Appendix E.

5.7.4 Social Impact Assessment

Square Peg Social Performance Pty Ltd (SquarePeg) (2023) undertook consultation activities in support of the SIA for the Modification (Appendix C), in addition to broader consultation activities conducted by HVEC.

Consultation in support of the SIA included:

- meetings with the Muswellbrook Shire Council;
- meetings with local residents, community, Aboriginal stakeholders, service providers, industry groups and local businesses and suppliers (Plate 5-1); and
- meetings with the Mt Arthur Coal CCC.

Further detail on the SIA consultation activities is provided in Section 6.7 and Appendix C.

Plate 5-1 Engagement with Nearby Landowners

5.7.5 Public Consultation

The Mt Arthur Coal website provides access to relevant environment and community information, including compliance reports and approval documents.

Several information sheets have been distributed via the BHP website or in-person informing the community of the Modification. A copy of the information sheets and other relevant consultation material is provided in Attachment 4.

The Mt Arthur Community Response Line (1800 882 044) allows members of the public to contact HVEC with enquiries or complaints.

A copy of this Modification Report will be made available on the NSW Major Projects website as well as the Mt Arthur Coal website, as below:

https://www.bhp.com/sustainability/environment/regulatory-information

5.8 STAKEHOLDER VIEWS

Feedback from the community was largely received during the SIA consultation process.

Table 5-2 summarises key community stakeholder comments received during engagement undertaken for the Modification and also provides a description of how the comments have been considered in the Modification Report.

Issues raised and feedback received from the local community has been considered during the preparation of this Modification Report.

In September 2023, pre-lodgement letters were distributed and BHP engaged face-to-face with stakeholders who, as a result of outcomes of key environmental assessments, were likely to be affected from the Modification (primarily new stakeholders in the affectation zone for noise and air quality).

5.9 ENGAGEMENT TO BE CARRIED OUT

Following lodgement of the Modification Report and during the proposed modified life of the Mt Arthur Coal Mine (i.e. until June 2030), HVEC would continue to consult with a range of stakeholders (particularly during the Transition and Mine Closure Project) in consideration of *Undertaking Engagement Guidelines for State Significant Projects* (DPE, 2022d).

Public exhibition of the Modification Report would also allow the community and any interested stakeholders to provide a submission in support of the Modification, commenting on aspects of the Modification, or objecting to the Modification.

Table 5-2
Summary of Key Community Stakeholder Views on the Modification

Category	Stakeholder Views	How addressed
Modification Justification	• Several stakeholders viewed the Modification as an opportunity to plan and prepare for the cessation of mining and commencement of the closure process.	As viewed by many stakeholders, the decision by BHP to retain the Mt Arthur Coal Mine provides the opportunity to proceed with a managed process to cease mining in June 2030 and provides an additional four years to plan and prepare, with associated socio-economic benefits for the existing workforce, contractors and suppliers to the Mt Arthur Coal Mine. Further detail as to why the Modification is required is provided in Section 2 and Section 7.
	• Some stakeholders identified that the Modification represents a logical continuation of mining operations and acknowledged HVEC's existing contributions and support of community, local businesses and expenditure.	
	• Few stakeholders considered the four-year extension unnecessary and believed the Mt Arthur Coal Mine should close in 2026.	

Table 5-2 (continued)
Summary of Key Community Stakeholder Views on the Modification

Category	Stakeholder Views	How addressed
Impacts from the Modification	• Some stakeholders who experience direct environmental impacts from the Mt Arthur Coal Mine were concerned whether the Modification would increase these existing impacts.	The Modification would not result in a significant increase in existing impacts compared to the approved Mt Arthur Coal Mine, however existing impacts associated with the Mt Arthur Coal Mine would continue for an additional four years. Further detail on the specific environmental impacts of the Modification is provided in Section 6 and Appendices A to J.
	• Very few stakeholders were concerned with the Modification Area, and were primarily interested in the continuation of existing amenity impacts.	Amenity impacts such as noise, dust, and lighting would primarily be a continuation of existing impacts associated with the Mt Arthur Coal Mine for an additional four years. Appendix A, B and F, and Section 6 provided further detail on the extent of amenity impacts as a result of the Modification.
Closure	• Many of the existing workforce that were consulted raised concerns regarding their future employment at the Mt Arthur Coal Mine.	The Modification would allow for the extension of operational employment for the current Mt Arthur Coal workforce (approximately 2,200 FTE positions). As recommended by SquarePeg (2023), BHP would offer upskilling or reskilling opportunities for the workforce in preparation for closure of the Mt Arthur Coal Mine. BHP would engage in open communication with key stakeholders including the workforce as part of the Transition and Mine Closure Project.
	• Stakeholders expressed their concerns regarding how the closure of the Mt Arthur Coal Mine would affect community organisations who received funding from BHP, as well as community involvement and participation.	The Modification would allow for continued investment into community businesses and support to economic, social and environmental activities within the region for an additional four years. BHP would engage in open communication with key stakeholders including the BHP funded organisations and businesses during the Transition and Mine Closure Project. The conceptual final landform proposed as part of the Modification includes pasture rehabilitation on flatter areas to allow for future potential agricultural use.
Final Landform	• Several stakeholders were more interested in the closure aspect of the Mt Arthur Coal Mine, and wanted to know what would happen to the land after 2030.	The closure of the Mt Arthur Coal Mine would lead to opportunities to develop other productive uses at the Mt Arthur Coal Mine, which may contribute to economic diversification in the region. Attachment 2 – Alternate Mine Land Re-use Prospectus provides a snapshot into potential opportunities to facilitate the continued utilisation of the land at the Mt Arthur Coal Mine to allow for alternate mine land re-uses such as recreation and renewable energy generation (these do not form part of this Modification and would be subject to separate assessment and approval).
	• Some stakeholders indicated a preference for some areas of the final landform to be reinstated to agricultural land, as well as other potential beneficial uses of the rehabilitated Mt Arthur Coal Mine, including recreation, tourism or industry.	
	• Many stakeholders expressed their interest to be consulted and included in future land use exploration at the Mt Arthur Coal Mine.	

6 ENVIRONMENTAL ASSESSMENT

6.1 IDENTIFICATION OF THE KEY ISSUES

HVEC has undertaken a risk-based review of the potential environmental impacts of the Modification to identify key potential environmental issues requiring assessment.

The key potential environmental impacts of the Modification are generally related to the minor increase in disturbance extent (25 ha) (Modification Area), as well as the continuation of existing impacts of the approved Mt Arthur Coal Mine for an additional four years.

The identification of key risks was also informed by a review of the Mt Arthur Coal complaints summary (Figure 6-1); whereby noise, blasting, air quality and lighting related complaints are the most common complaint type. From review of Figure 6-1, it is noted that complaints peaked in FY2016 with the average number of complaints received since FY2015 being 71. Complaints have been lower than average for the last three years.

The key issues identified are described below:

- Continued noise (including road traffic and rail noise) impacting amenity for local residents in Muswellbrook and along Denman Road.
- Continued blasting impacting amenity for local residents in Muswellbrook and along Denman Road.
- Continued potential greenhouse gas emissions.
- Incremental loss of biodiversity and disruption to threatened flora and fauna.
- Continued traffic impacts on the local road network between 2026 and 2030.
- Final void water quality and the void's hydraulic function as a water source or sink.
- Continued potential dust generation contributing to elevated dust and emission levels impacting private landholders.
- Proposed changes to the final landform and rehabilitation.
- Impacts of climate change on the rainfall and ongoing weather impacts on the operation.
- Impacts of potential uncontrolled releases to waterways and water storage capacity.
- Disturbance of Aboriginal artefacts, sites or places of cultural significance.

An assessment of the potential environmental impacts of the Modification is provided in Sections 6.4 to 6.15 and the relevant appendices for:

- noise and blasting (Appendix A);
- air quality and greenhouse gas (Appendix B);
- social and community infrastructure (Appendix C);
- biodiversity (Appendix D);
- Aboriginal cultural heritage (Appendix E);
- visual (Appendix F);
- surface water (Appendix G);
- groundwater (Appendix H);
- road transport (Appendix I); and
- economic (Appendix J).

Sections 6.4 to 6.15 and the relevant appendices include a description of the methodology undertaken for each assessment, the existing environment, an assessment of the potential impacts of the Modification, and, where relevant, a description of measures that would be implemented to avoid, minimise and/or mitigate the potential impacts.

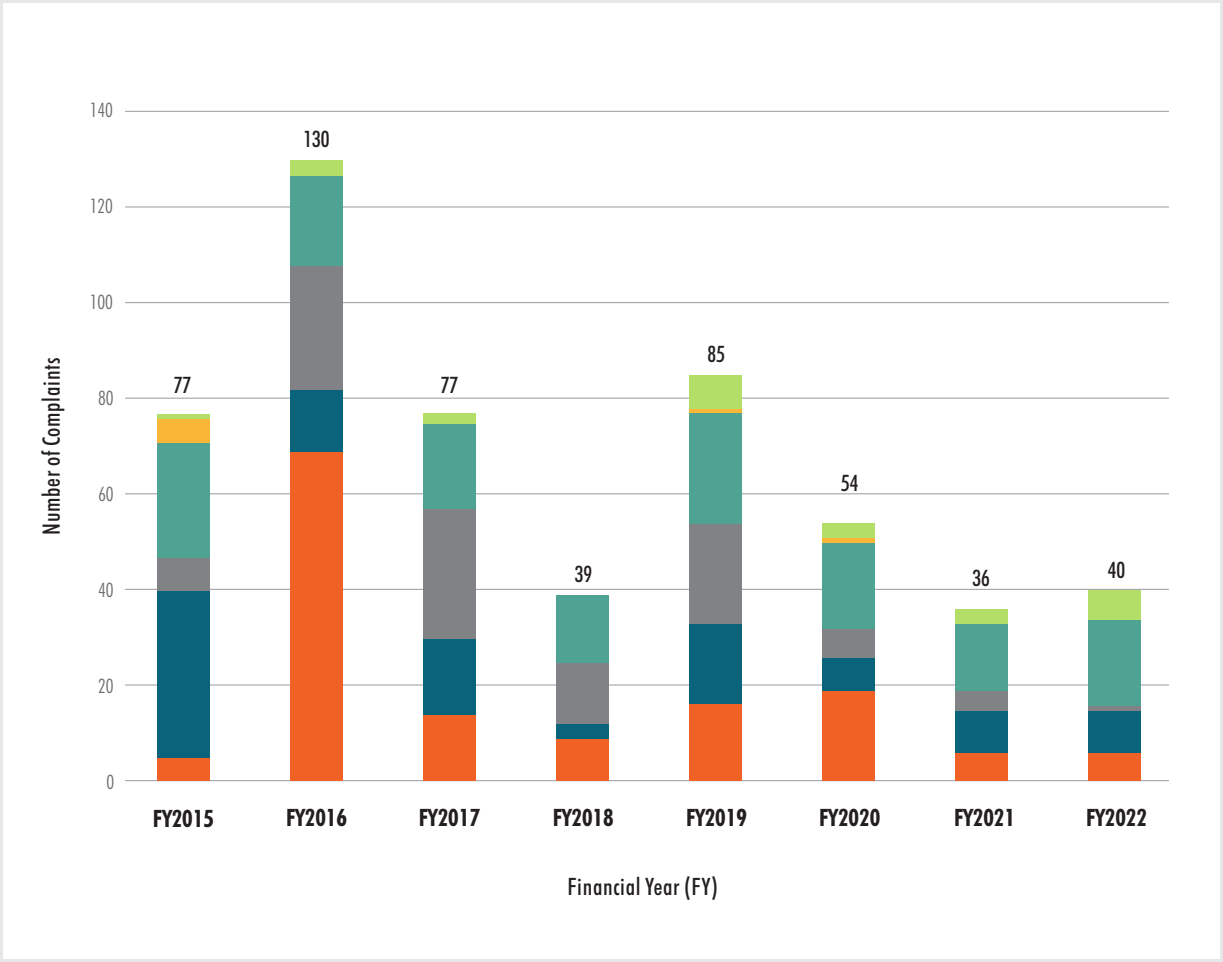
6.2 CLIMATE

This sub-section describes local and regional climate conditions. The greenhouse gas emissions associated with the Modification are assessed in Section 6.6.

Long-term meteorological data for the region are available from nearby Bureau of Meteorology (BoM) meteorological stations (Figure 6-2, Table 6-1 and Table 6-2).

Local meteorological data are also available from site weather stations WS09 (which is operated in accordance with EPL 11457) and WS10 (off-site) (Figure 6-2).

WS09 and WS10 monitors a number of meteorological parameters, including temperature, humidity, rainfall, wind speed and wind direction.



Source: HVEC (2022)

LEGEND
- Noise Related
- Blasting Related
- Air Quality
- Lighting
- Spontaneous Combustion
- Other

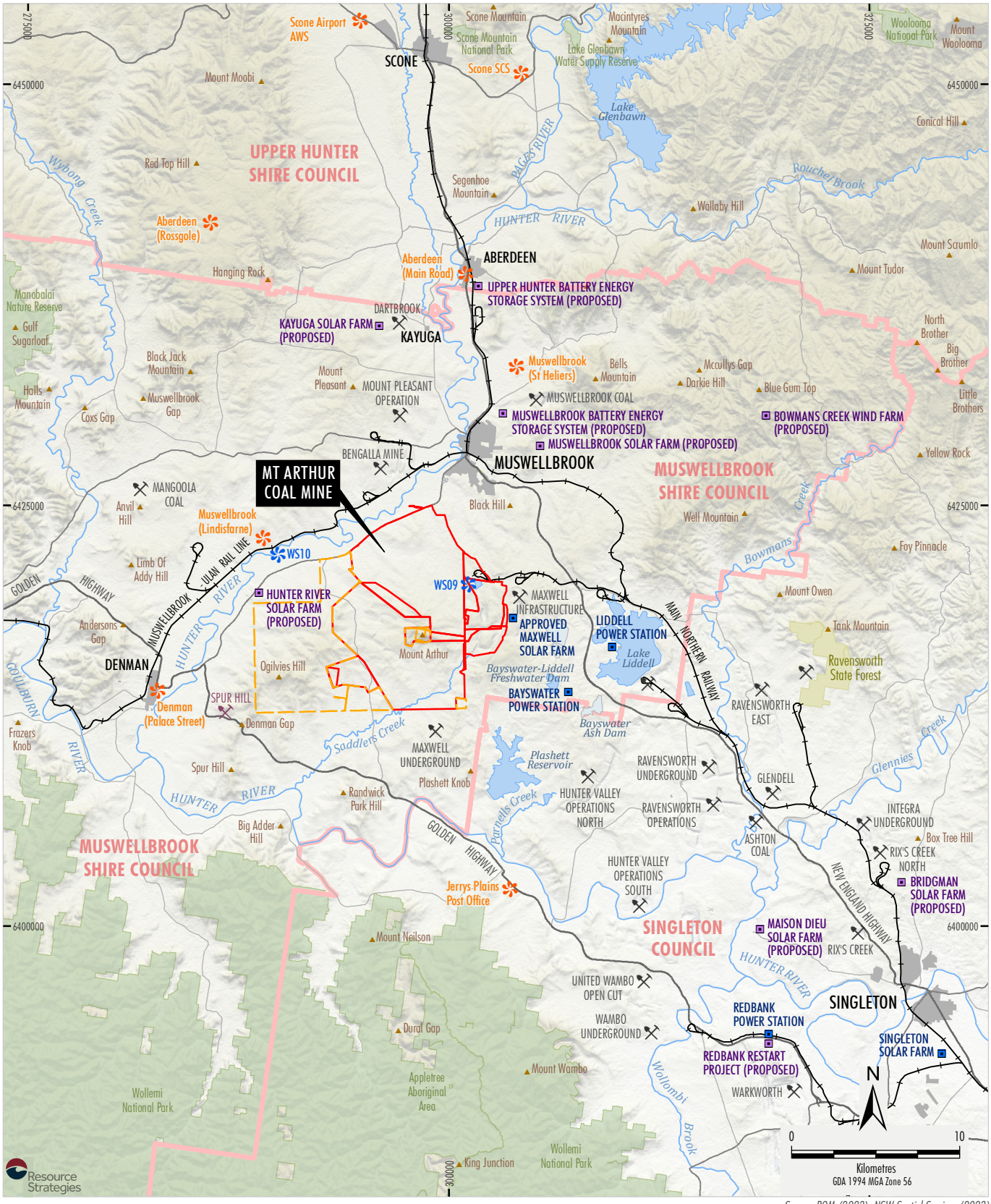
BHP

MT ARTHUR COAL MINE MODIFICATION 2

Complaints Summary

Figure 6-1

Resource Strategies



Source: BOM (2023); NSW Spatial Services (2023)

LEGEND

- State Forest
- National Parks and Wildlife Estate
- Local Government Area
- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Mining Operation
- Proposed Mining Operations (Application Lodged)
- Existing/Approved Energy Generation Site
- Proposed Energy Generation Site
- BoM Meteorological Station
- Site Meteorological Station

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Regional Meteorological Monitoring Sites

Figure 6-2

Table 6-1
Meteorological Data Summary – Rainfall and Evaporation

Period of Record	Long-term Average Monthly Rainfall (mm)						Average Monthly Rainfall (mm)		Average Monthly Pan Evaporation (mm)
	Muswellbrook (St. Heliers) (61374) 1992 to 2022	Scone SCS (61089) 1950 to 2018	Aberdeen (Rossgole) (61065) 1926 to 2022	Denman (Palace Street) (61016) 1926 to 2014	Muswellbrook (Lindisfarne) (61168) 1960 to 2022	Jerrys Plains Post Office (61086) 1884 to 2014	Site Weather Station (WS09) 2018 to 2022	Site Weather Station (WS10) 2018 to 2022	Scone SCS (61089) 1950 to 2019
January	60.2	81.8	87.8	72.2	78.0	77.1	43.0	54.0	217.0
February	64.7	73.4	80.9	66.5	61.2	73.1	56.0	42.0	173.6
March	68.7	53.1	71.8	54.2	63.9	59.7	110.0	92.0	151.9
April	37.8	38.6	51.2	40.1	36.2	44.0	27.0	38.0	108.0
May	41.4	45.2	49.7	36.3	40.2	40.7	16.0	27.0	71.3
June	50.8	45.8	56.0	42.4	37.7	48.1	34.0	31.0	48.0
July	38.1	35.8	44.5	38.8	32.7	43.4	44.0	50.0	58.9
August	37.4	38.2	44.2	34.7	31.0	36.1	33.0	35.0	86.8
September	45.4	38.1	48.0	38.9	39.6	41.7	30.0	30.0	120.0
October	46.8	56.3	63.9	48.0	51.9	51.9	50.0	48.0	158.1
November	77.1	62.5	71.2	55.5	60.1	61.9	51.0	62.0	186.0
December	67.6	67.2	77.7	64.6	64.2	67.5	60.0	55.0	223.2
Annual Average	**656.9**	**636.0**	**747.2**	**591.8**	**611.3**	**644.5**	**554.0**	**562.0**	**1606.0**

Source: BoM (2023)

Table 6-2
Meteorological Data Summary – Temperature, Humidity and Wind Speed

Period of Record	Long-term Average Daily Temperature (°C)						Average Daily Temperature (°C)				Average Relative Humidity (%)		Average Wind Speed (km/h)	
	Scone SCS (61089)		Jerrys Plains Post Office (61086)		Scone Airport AWS (61363)		Site Weather Station (WS09)		Site Weather Station (WS10)		Scone AWS (61363)			
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	9.00 am	3.00 pm	9.00 am	3.00 pm
	1952 to 2018		1957 to 2014		1990 to 2023[1]		2019 to 2022		2019 to 2022		1990 to 2023[1]		1990 to 2023[1]	
January	17.0	31.4	17.1	31.8	17.1	31.8	16.1	37.8	15.3	41.0	70	41	11.3	19.2
February	16.8	30.0	17.2	30.9	16.6	30.6	14.6	36.4	12.8	38.5	77	47	10	18.7
March	14.7	28.0	15.0	28.9	14.4	28.1	12.7	33.2	11.0	34.6	82	47	8.9	18.6
April	11.4	24.6	11.0	25.3	10.1	24.6	8.0	28.5	4.4	30.5	77	49	8.2	18
May	8.0	20.3	7.4	21.3	6.6	20.4	3.1	25.2	0.5	26.8	81	51	7	16.1
June	6.0	17.0	5.3	18.0	4.7	17.1	1.6	21.0	-1.3	25.5	86	58	7.5	16
July	4.7	16.5	3.8	17.4	3.4	16.7	1.5	20.7	-1.5	22.2	83	55	7	16.5
August	5.5	18.5	4.4	19.4	3.7	18.8	2.7	23.6	-0.9	25.3	73	47	9.9	18.7
September	7.9	21.7	7.0	22.9	6.7	22.2	5.3	28.3	3.0	28.9	66	44	11.4	18.9
October	10.8	25.2	10.3	26.3	9.7	25.3	8.4	31.4	5.5	33.2	62	42	12.7	19.1
November	13.3	27.9	13.2	29.1	13.0	28.1	9.4	34.3	7.1	36.5	66	43	12.7	20.6
December	15.7	30.4	15.7	31.2	15.3	30.2	13.0	38.8	11.5	40.6	67	42	11.9	20
Annual Average	**11.0**	**24.3**	**10.6**	**25.2**	**10.1**	**24.5**	**7.9**	**29.7**	**5.5**	**31.7**	**74**	**47**	**9.9**	**18.4**

Source: BoM (2023).
[1] Until the end of July 2023

A summary of meteorological data in the vicinity of the Mt Arthur Coal Mine relevant to the environmental studies in this Modification Report is provided below.

6.2.1 Rainfall Data and Statistics

Table 6-1 provides a summary of long-term rainfall data from regional BoM weather stations. The long-term average annual rainfall in the region ranges from approximately 592 millimetres (mm) to 747 mm, with the driest months being April, July and August and the wettest month typically being January.

Table 6-1 also provides a summary of rainfall data from WS09 and WS10. The average annual rainfall recorded on-site for the period 2018 to 2022 is approximately 554 mm for WS09 and 562 mm for WS10.

6.2.2 Evaporation Data and Statistics

Table 6-1 shows long-term pan evaporation data from the Scone SCS weather station. When compared to long-term average rainfall, the rate of evaporation exceeds rainfall on an annual average basis, as well as for all monthly averages.

6.2.3 Temperature Data and Statistics

Table 6-2 provides long-term average temperature data from several BoM weather stations. The long-term average monthly temperature ranges from a minimum of 3.4 degrees Celsius (°C) in July to a maximum of 31.8°C in January.

Table 6-2 also shows the monthly average minimum and maximum temperatures recorded at WS09 and WS10 between 2019 and 2022. At WS09 the minimum recorded average temperature is 1.5. C in July, while the maximum monthly average temperature is 38.8°C in December. For WS10, the minimum recorded average temperature is -1.5°C in July, while the maximum monthly average temperature is 41.0°C in January.

6.2.4 Humidity Data and Statistics

Humidity levels exhibit some variability and seasonal fluctuations across the year (Table 6-2). Mean relative humidity levels at 9 am range from 62% in October to 86% in June. Mean relative humidity levels at 3 pm range from 41% in January to 58% in June.

6.2.5 Wind Direction and Speed

As part of the Air Quality Impact and Greenhouse Gas Assessment (Todoroski Air Sciences [TAS], 2023) (Appendix B), windroses were developed using wind direction and wind speed data from weather Scone Airport Weather Station (AWS).

For Scone AWS, wind speeds have a relatively similar spread between the 9 am and 3 pm conditions throughout the year. Mean 9 am wind speeds range from 7.0 kilometres per hour (km/h) in May and July to 12.7 km/h in October and November. Mean 3 pm wind speeds range from 16.0 km/h in June to 20.6 km/h in November.

For the WS09 weather station (Figure 6-2), on an annual basis, winds typically flow along a north-northwest to a south-east axis, with very few winds arising from the north-east and south-west quadrants (Appendix B).

At WS10, winds are more varied and wind speeds are relatively lower in comparison to the WS09 weather station. Winds from the south-east dominate the distribution (Appendix B).

6.3 LAND RESOURCES

6.3.1 Landforms and Topography

Landforms in the vicinity of the Mt Arthur Coal Mine are characterised by the broad floodplain of the Hunter River flanked by the undulating foothills and ridges of the surrounding terrain.

The topography in the vicinity of the Mt Arthur Coal Mine is gently undulating to hilly, dominated by Mount Arthur (482 m AHD), located within the mine operational area (under an existing conservation agreement), and Mount Ogilvie (468 m AHD), located to the west of the Mt Arthur Coal Mine. To the north of the Mt Arthur Coal Mine, the alluvial flats of the Hunter River have an elevation of approximately 120 m AHD which gently slope up to approximately 230 m AHD at Macleans Hill and becoming progressively steeper in the vicinity of Mount Arthur and Mount Ogilvie.

6.3.2 Land Uses

The Mt Arthur Coal Mine is situated within the Upper Hunter region, which has a long history of rural land use for a variety of agricultural and industrial activities, predominantly grazing and coal mining (HVEC, 2013b).

The current dominant land uses within and adjacent to the existing ML boundaries include open cut coal mining, power generation and industrial activities, agriculture (including viticulture and thoroughbred breeding), rural residential and residential areas.

Agricultural activities conducted in the Modification Area include cattle grazing (HVEC, 2013b). There is no evidence of crop production for grains (irrigated or unirrigated) or intensive horticulture in the Modification Area.

6.3.3 Agricultural Resources

A description of agricultural resources in relation to the Modification 1 disturbance extent (approximately 355 ha) is detailed in the Agricultural Impact Statement prepared by HVEC (2013b).

HVEC (2013b) concluded that the residual impacts on grazing agricultural lands would be, at State and regional levels, very minor. As this study was conducted on land adjacent to the Modification Area, its findings are relevant to the Modification.

Further, as the Modification Area (25 ha) is significantly smaller than the Modification 1 disturbance extent, it follows that the Modification would have a very minor impact on the agricultural resources of the State.

There are no regionally mapped CICs within the Modification Area (Figure 6-3). A small portion of regionally mapped biophysical strategic agricultural land lies within the northern extent of the Modification Area, however as this area is within an existing ML, a Site Verification Certificate is not required.

6.3.4 Soil Resources and Management

A description of soil resources in relation to the Modification 1 disturbance extent is detailed in the Soil and Land Resource Assessment prepared by GSS Environmental (2012) (appended to the Agricultural Impact Statement [HVEC, 2013b]).

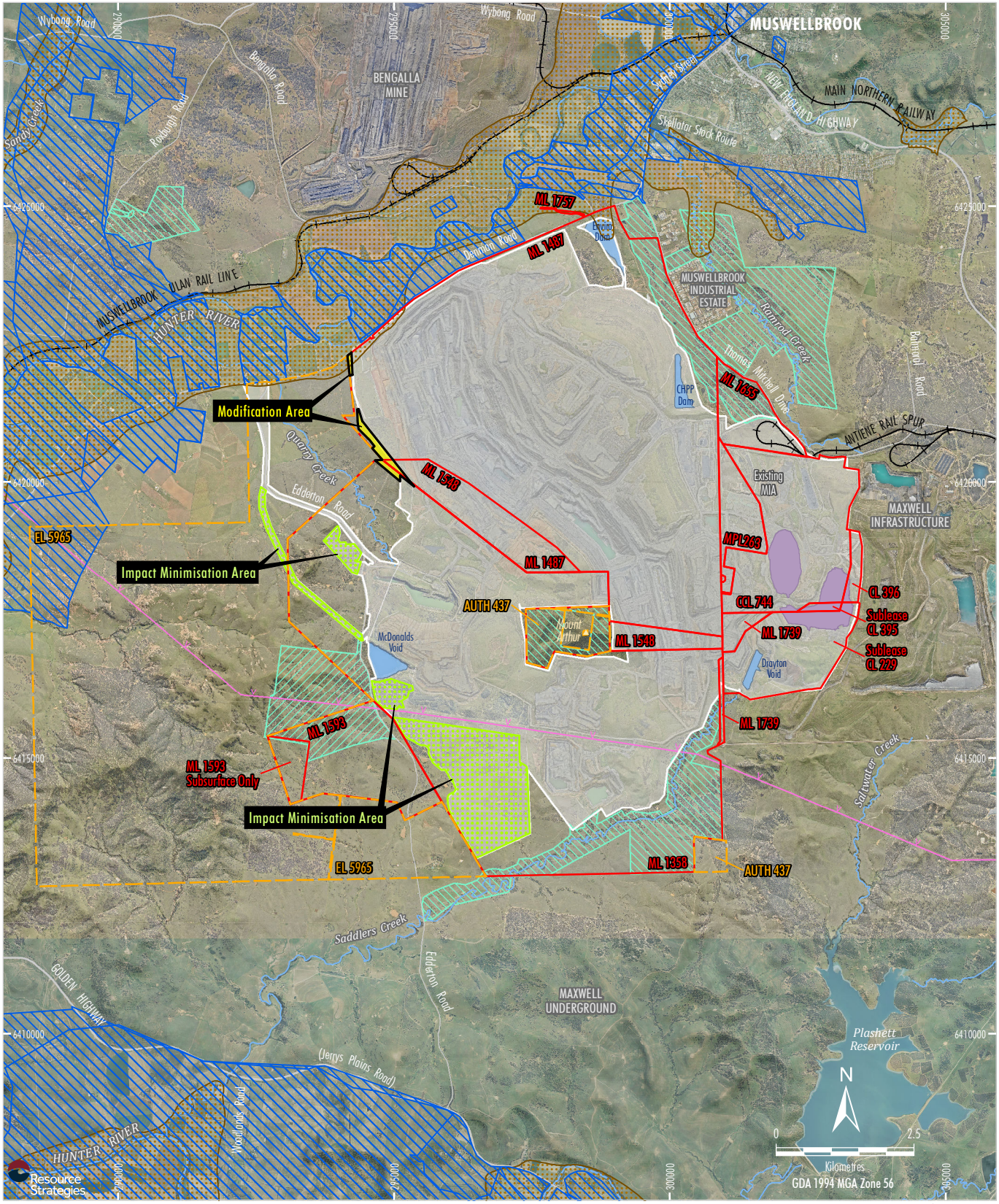
Figure 6-4 presents the regional soil landscape mapping provided by DPIE (2020b). The Modification Area overlies the Bayswater, Liddell and Hunter soil landscape units (Figure 6-4). Each soil landscape has a low to moderate risk of sheet and gully erosion on slopes (DPIE, 2020b).

GSS Environmental (2012) describes a topsoil stripping strategy indicating recommended stripping depths for topsoil salvage and re-use as topdressing in rehabilitation. GSS Environmental (2012) also provides details in relation to topsoil management for soil that is stripped, stored and used as a topdressing material for rehabilitation.

A summary of the topsoil management measures described in GSS Environmental (2012) is provided below:

- Topsoil should be maintained in a slightly moist condition during stripping. Where practicable, material should not be stripped in either an excessively dry or wet condition.
- Grading or pushing soil into windrows with graders or dozers for later collection for loading into rear dump trucks by front-end loaders, are examples of preferential, less aggressive soil handling systems. This minimises compression effects of the heavy equipment (i.e. scrapers) that is often necessary for economical transport of soil material.
- Where possible, direct placement on areas being prepared for rehabilitation is a preferred option to stockpiling, but where this is not practical, stockpiling measures should be observed.
- The surface of soil stockpiles should be left in as coarsely structured a condition as possible in order to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming.
- As a general rule, maintain a maximum stockpile height of 3 m.
- If long-term stockpiling is likely (i.e. greater than 3 months), seed and fertilise stockpiles as soon as possible.
- Prior to re-spreading stockpiled topsoil, an assessment of weed infestation on stockpiles should be undertaken to determine if individual stockpiles require herbicide application and/or “scalping” of weed species prior to topsoil spreading.
- An inventory of available soil should be maintained to ensure adequate topsoil materials are available for planned rehabilitation activities.

The above recommendations by GSS Environmental (2012) have been implemented at the Mt Arthur Coal Mine, would continue to apply for the Modification and are documented in the Mt Arthur Coal Land Management Procedure.



HVE-19-09 MOD2_ModReport_Section 6_2090

Source: BHP (2023); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

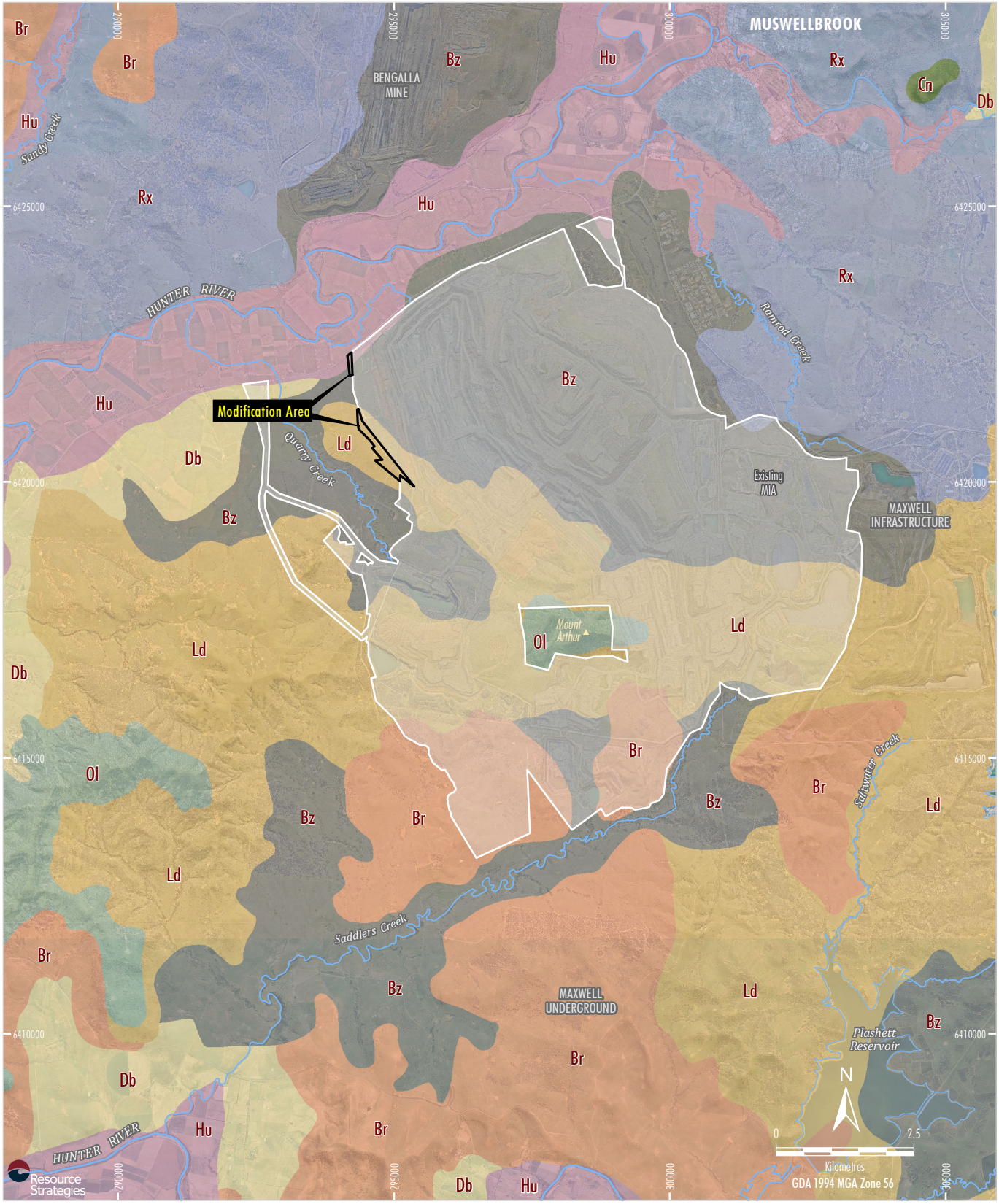
- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing 500kV Electricity Transmission Line
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approximate Extent of Existing/Approved Surface Development
- Tailings Storage Facility
- Water Storage
- Modification Area
- Impact Minimisation Area
- Regionally Mapped Biophysical Strategic Agricultural Land
- Equine/Viticulture Critical Industry Cluster

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Regionally Mapped Biophysical Strategic Agricultural Land and Critical Industry Clusters

Figure 6-3



Source: BHP (2023); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

Approximate Extent of Existing/Approved Surface Development

Modification Area

Soil Landscapes

- Br Brays Hill
- Bz Bayswater
- Cn Colonel
- Db Dartbrook
- Hu Hunter
- Ld Liddell
- Ol Ogilvie
- Rx Roxburgh

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Regional Soil Landscapes

Figure 6-4

6.4 NOISE AND BLASTING

A Noise and Blasting Assessment for the Modification was undertaken by RWDI Consulting Engineers and Scientists (RWDI) (2023) and is presented in Appendix A.

A description of the existing noise, compliance and complaints is provided in Section 6.4.2. Section 6.4.3 describes the applicable criteria relevant to the Noise and Blasting Assessment. Section 6.4.4 details potential noise and blasting impacts associated with the Modification, including cumulative impacts. Sections 6.4.5 and 6.4.6 outline mitigation and adaptive management measures for the Modification, respectively.

6.4.1 Methodology

The Noise and Blasting Assessment (Appendix A), which includes an assessment of operational noise, rail noise, road traffic noise, cumulative noise and blasting impacts, was conducted in consideration of the following guidelines:

- *Noise Policy for Industry* (EPA, 2017) (NPfI).
- *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (Australian and New Zealand Environment Council, 1990).
- *Assessing Vibration: a technical guideline* (NSW Department of Environment and Conservation, 2006).
- *NSW Road Noise Policy* (DECCW, 2011) (RNP).
- *Voluntary Land Acquisition and Mitigation Policy* (NSW Government, 2018a) (VLAMP).
- *Rail Infrastructure Noise Guideline* (EPA, 2013) (RING).

6.4.2 Existing Environment

Compliance and Complaints

A review of the Mt Arthur Coal Mine routine noise monitoring results was conducted by RWDI (2023) and is presented in Appendix A.

A summary of the noise complaints received annually from FY2015 to FY2022 is provided on Figure 6-1.

Operational Noise Performance

RWDI (2023) undertook a review of attended compliance noise monitoring results from FY2016 to FY2022. These results indicated compliance with the relevant noise criteria, with the exception of one minor 1 decibel (dB) exceedance on 18 October 2021 at monitoring site NP04 (Appendix A).

The highest number of noise-related complaints occurred in FY2016. However, the monitoring results suggested that no unusual noise generating mining operations were undertaken during that period (Appendix A).

The number of complaints reduced significantly from FY2017 onward and remained under 20 per year. A total of six noise-related complaints were recorded in FY2022 (Appendix A).

For all complaint records, results at the nearest real-time monitors showed that the relevant noise criteria were met, and no exceedances were recorded (Appendix A).

Blasting Performance

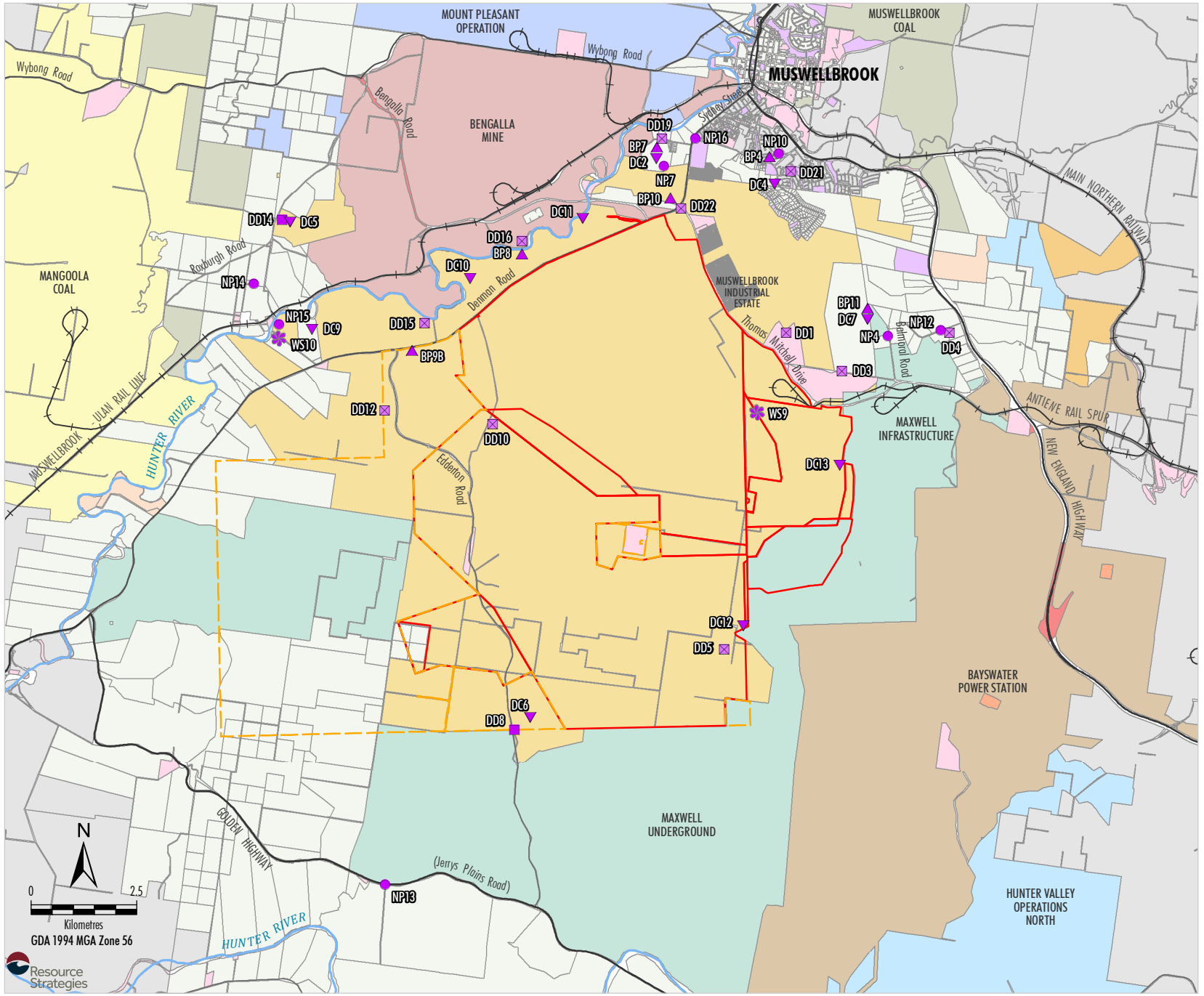
Blast compliance monitoring is undertaken at six permanent monitoring sites surrounding the Mt Arthur Coal Mine (shown as locations BP04, BP07, BP08 [internal use only], BP09B, BP10 and BP11) (Figure 6-5).

Review of blast compliance monitoring results from FY2016 to FY2022 indicated compliance with the relevant blast criteria, with the exception of four blast overpressure exceedances and one exceedance of ground vibration criteria for public infrastructure over the seven-year review period (Appendix A). Overall, blast events did not exceed the 5% allowable exceedance limits for both ground vibration and airblast overpressure during FY2016 to FY2022.

The number of blast-related complaints remained under 20 during the FY2016 to FY2022 period, with nine complaints recorded in FY2022 (Appendix A). Further detail on noise and blasting-related complaints is provided in Appendix A.

Noise and Blasting Management and Monitoring Regime

Noise monitoring at the Mt Arthur Coal Mine is carried out at eight locations surrounding the site, representative of the different noise-sensitive residential areas (shown as locations NP4, NP7, NP10, NP12, NP13, NP14, NP15 and NP16 on Figure 6-5).



LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Mt Arthur-controlled
- Maxwell-controlled
- Bengalla-controlled
- AGL-controlled
- Mount Pleasant-controlled
- Mangoola-controlled
- Glencore-controlled
- HVO-controlled
- Industrial Zone
- Muswellbrook Coal-controlled
- Other Mining/Resource Company-controlled
- Crown/The State of NSW
- Muswellbrook Shire Council
- Transport for NSW
- TransGrid
- Privately-owned Land
- Owner not Identified

Monitoring Sites

- Weather Station
- Noise Monitoring Site
- Blast Monitoring Site
- Air (TEOM) Monitoring Site
- Depositional Dust Gauging Station
- Depositional Dust Gauging Station (Decommissioned)

Source: BHP (2023); NSW Spatial Services (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Mt Arthur Coal Mine
Noise, Blasting and Air Quality (Dust) Monitoring Sites

Figure 6-5

Operational noise management at the Mt Arthur Coal Mine is currently undertaken in accordance with the Mt Arthur Coal Noise Management Plan (BHP, 2023c) (NMP) which outlines (Appendix A):

- noise criteria;
- noise management and control measures;
- noise monitoring programs;
- consultation and communication approaches;
- the Trigger Action Response Plan (TARP) for managing elevated noise levels; and
- management of exceedances and complaints.

Compliance noise monitoring conducted for the Mt Arthur Coal Mine includes (Appendix A):

- attended compliance noise monitoring undertaken on a monthly basis;
- continuous real-time monitoring to actively manage noise emissions on-site; and
- sound power level monitoring for operational mobile fleet associated with critical open cut pit areas and haul routes to assist to achieve best practice noise suppression.

Blast monitoring conducted for the Mt Arthur Coal Mine is undertaken through a web-based blast monitoring system that provides real-time vibration and overpressure data from permanent blast monitoring sites as shown on Figure 6-5.

Blast management at the Mt Arthur Coal Mine is undertaken in accordance with the BMP, which outlines (Appendix A):

- blast criteria;
- blast activity design;
- blast management and control measures;
- blast monitoring and reporting regimes; and
- exceedance protocol, emergency response and complaint handling.

HVEC regularly reviews noise and blast management practices to identify opportunities to improve and continue implementing best practice noise and blast management, minimise potential noise and blast impacts, and ensure compliance with the noise and blast criteria in MP 09_0062 (Appendix A).

6.4.3 Applicable Noise and Blasting Criteria

Operational Noise Criteria

The NPfI recommends two noise assessment criteria, 'intrusiveness' and 'amenity', both of which are relevant for the assessment of noise as a result of the Modification (Appendix A). Cumulative noise impacts are assessed against the amenity criteria, while the Mt Arthur Coal Mine noise impacts are assessed against the noise impact assessment criteria (i.e. intrusiveness criteria) consistent with MP 09_0062 (Table 6-3).

Cumulative Noise Criteria

Under the NPfI, HVEC is required to consider cumulative operational noise generated by the Modification and other nearby industrial sources.

The amenity noise criteria are relevant in the context of controlling cumulative noise impacts resulting from the concurrent operation of the Mt Arthur Coal Mine and the other potential sources of industrial noise (e.g. the Bengalla Mine and Mount Pleasant Operation located north of the Mt Arthur Coal Mine). The relevant recommended equivalent continuous noise level for a period ($L_{Aeq,Period}$) amenity noise criteria for the rural noise amenity area are presented in Table 6-4.

Road Noise

Condition 6 of Schedule 3 of MP 09_0062 requires HVEC to take all reasonable and feasible measures to ensure that the traffic noise generated by the Mt Arthur Coal Mine does not exceed the traffic noise impact assessment criteria as per MP 09_0062 (Table 6-5).

Blasting

The blasting impact assessment criteria is provided in Table 6-6.

Consistent with MP 09_0062, blasting on-site would only occur between the hours of 8.00 am and 5.00 pm Monday to Saturday (excluding public holidays).

Table 6-3
Project Approval MP 09_0062 Noise Impact Assessment Criteria

Receiver Zone[1]	Location	Day ($L_{Aeq,15min}$)	Evening ($L_{Aeq,15min}$)	Night ($L_{Aeq,15min}$)	Night ($L_{A1,1min}$)
A	Antiene Estate	37	40	38	45
B	Skelletar Stock Route, Thomas Mitchell Drive, Denman Road East	39	38	37	45
C	Racecourse Road	41	40	39	45
D	Denman Road North-west, Roxburgh Vineyard (north-east), Roxburgh Road (north-east)	37	36	35	45
E	South Muswellbrook	39	39	39	45
F	Denman Road West, Roxburgh Vineyard (west), Mangoola Road	37	36	35	45
G	East Antiene, New England Highway	41	40	39	45
H	South of Mine	35	35	35	45

Source: Appendix A.

[1] Refer to Figure 6-6

L_{Aeq} = equivalent continuous noise level.

Day: 7:00 am to 6:00 pm; Evening: 6:00 pm to 10:00 pm; Night: 10:00 pm to 7:00 am.

Table 6-4
NPfI Cumulative Noise Criteria

Receiver	Noise Amenity Area	Time of day	$L_{Aeq,Period}$, dBA	$L_{Aeq,15min}$, dBA
Residential	Rural	Day	50	53
		Evening	45	48
		Night	40	43

Source: Appendix A.
Day = 7.00 am to 6.00 pm (Monday to Saturday), and 8.00 am to 6.00 pm (Sundays and public holidays); Evening = 6.00 pm to 10.00 pm; Night = the remaining periods.

Table 6-5
Project Approval MP 09_0062 Road Traffic Noise Criteria

Road	Day / Evening ($L_{Aeq,1hr}$)	Night ($L_{Aeq,1hr}$)
Thomas Mitchell Drive	60	55
Denman Road, east of Thomas Mitchell Drive	60	55
Denman Road, west of Thomas Mitchell Drive	55	50

Source: Appendix A.

Day: 7:00 am to 6:00 pm; Evening: 6:00 pm to 10:00 pm; Night: 10:00 pm to 7:00 am.

Note: Traffic noise generated by the Mt Arthur Coal Mine assessed and measured in accordance with the relevant procedures in the RNP.

Table 6-6
Project Approval MP 09_0062 Blasting Impact Assessment Criteria

Location	Airblast Overpressure - Peak (dBL)	Ground Vibration – Peak Particle Velocity (mm/s)	Allowable Exceedance
Residence on privately-owned land	120	10	0%
	115	5	5% of the total number of blasts in a financial year
Public Infrastructure	-	50	0%

Source: Appendix A.

Note: An alternative limit for public infrastructure may be determined by the Secretary in accordance with the structural design methodology in Australian Standard (AS) 2187.2-2006, or another methodology acceptable to the Secretary.

Mm/s = millimetres per second.

6.4.4 Potential Impacts

Given the location of the Modification Area (i.e. a minor extension to the north-west of the Mt Arthur Coal Mine), the Noise and Blasting Assessment (Appendix A) has focussed on the potential noise and blasting impacts at private residences to the north and north-west of the Mt Arthur Coal Mine during the period of proposed extended operations (FY2027 to FY2030).

Appendix A included assessment of the following potential impacts:

- on-site operational noise;
- off-site road noise;
- off-site rail noise; and
- on-site blasting.

These aspects are discussed further below.

Residential receivers surrounding the Mt Arthur Coal Mine are grouped into eight receiver zones (Zones A to H) for noise assessment purposes (Figure 6-6 and Table 6-3).

Operational Noise Assessment

RWDI (2023) considered one indicative mine plan year (scenario) to represent the Modification. The mine plan as per the FY2030 scenario was chosen to represent potential worst-case impacts with consideration of:

- the location of the Modification Area and the potential to generate noise at the sensitive receiver locations, where operations are at the westernmost extent; and
- production from FY2029 was used as it would be the last full production year (maximum coal extraction, handling and processing rate of 25 Mtpa) scheduled before operations cease on 30 June 2030.

Assessment of Meteorological Conditions

The noise modelling completed for the Modification was based on meteorological data obtained from the on-site weather station (WS09) for the five-year period January 2016 to December 2020 (Appendix A).

RWDI (2023) assessed the meteorological data in accordance with Fact Sheet D of the NPfI to determine the significance of noise-enhancing meteorological conditions (Appendix A).

Based on the analysis of the meteorological data, moderate to strong inversions have conservatively been assumed as a significant noise-enhancing condition for the night-time period. For the moderate to strong inversion periods, the default wind speed of 0.5 metres per second has conservatively been applied in all applicable directions (i.e. as a source-to-receiver wind directions) (Appendix A).

Further details on the meteorological condition analysis undertaken by RWDI (2023) are provided in Appendix A.

Low-frequency Noise Assessment

A low-frequency noise (LFN) assessment was conducted for the Modification to ascertain whether any private receivers should be subject to a modifying factor correction due to dominant low-frequency content prior to comparing to the relevant Mt Arthur Coal Mine noise criteria.

The LFN assessment examined likely noise levels at a selection of key representative receivers in different residential zones based on overall 'C' weighted and 'A' weighted predicted noise levels (Appendix A).

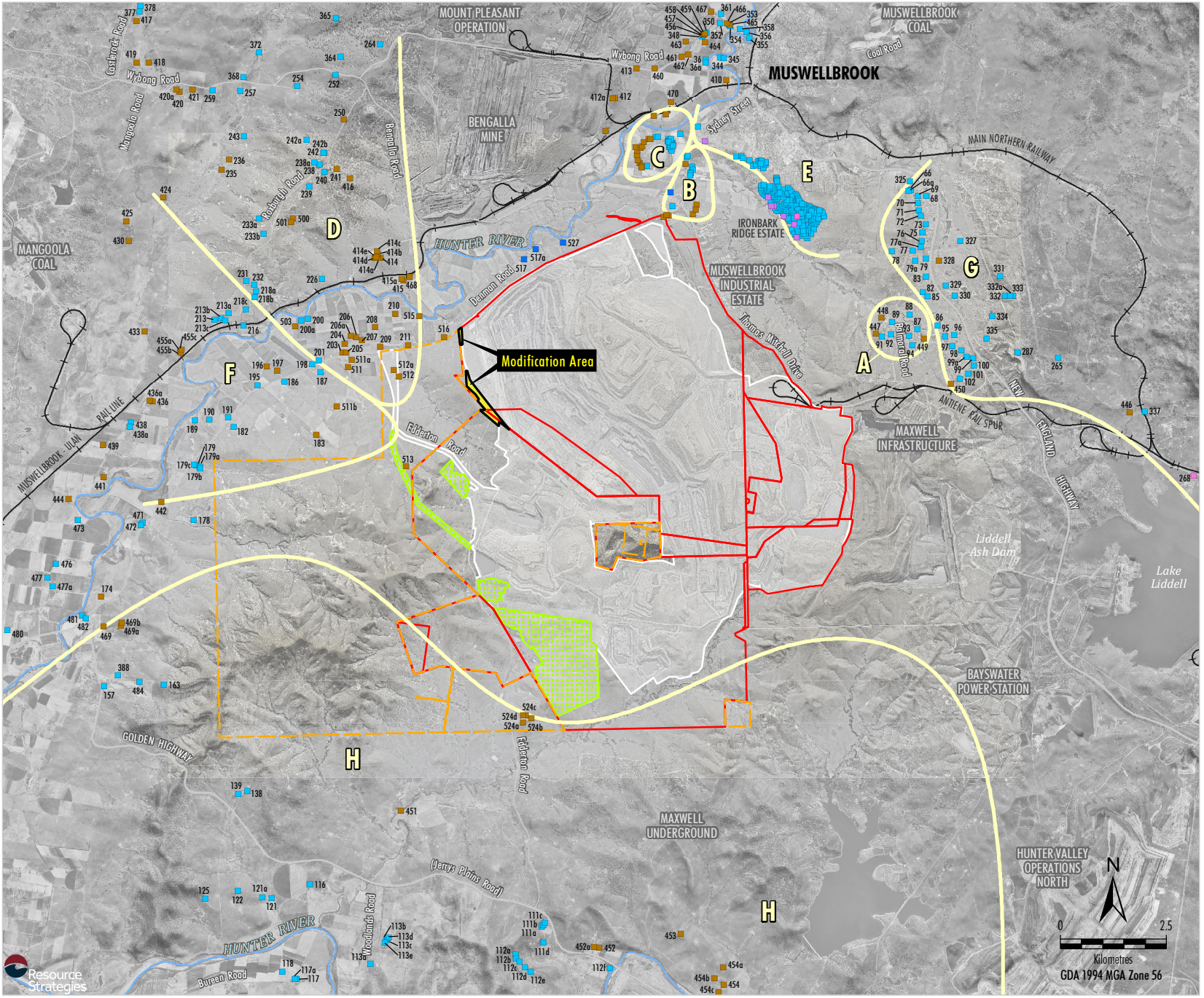
Consistent with the results from other desktop LFN assessments of comparable operations, the LFN assessment for the Modification indicated the potential for unbalanced spectra (Appendix A).

However, when compared with the relevant LFN threshold levels provided in Table C2 of the NPfI, all spectra were found to be below the LFN threshold curve (Appendix A). Accordingly, it is unlikely that any of the receivers surrounding Mt Arthur Coal Mine would be subject to dominant LFN and no modifying factor correction for LFN is warranted for the Modification (Appendix A).

Predicted Operational Noise Levels

Predicted $L_{Aeq,15min}$ operational noise levels at all identified receivers are presented in Appendix A. Results reflect the worst-case scenario (FY2030 location of mining at FY2029 production levels) under the applicable NPfI meteorological conditions resulting in the maximum predicted noise levels.

Noise results indicate that noise predictions are expected to comply with the day and evening noise impact assessment criteria at all privately-owned receivers. Accordingly, the Modification is not expected to impact on the acoustic amenity of the surrounding community during the day and evening periods (Appendix A).



Source: BHP (2023); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Receiver Zones Overview

Figure 6-6

Night-time predictions show exceedances of the noise impact assessment criteria at three privately-owned receivers (all within receiver Zone D). A summary of these receivers is provided in Table 6-7. The receivers are grouped according to noise impacts as interpreted by the VLAMP (NSW Government, 2018a) and the NPfI.

The exceedance level ascribed to the receivers listed in Table 6-7 is reflective of the modelled scenario where the most impact has the potential to occur under most noise enhancing meteorological conditions. As noted by RWDI (2023), it is expected that those receivers may at times be subject to lesser impact and/or no impact during the life of the Modification.

The predicted noise levels at receivers 200, 200a and 226 north-west of the Mt Arthur Coal Mine are indicative of the proactive mitigation measures that would be implemented, in accordance with the TARP for night-time and evening periods during the adverse and very noise enhancing meteorological conditions (Appendix A).

Indicative worst-case noise contours for the night-time operations under adverse meteorological conditions are presented in Figure 6-7. The three privately-owned receivers predicted to exceed the 35 A-weighted decibels (dBA) night-time criteria are highlighted on Figure 6-7. As noted in RWDI (2023), it is expected that those receivers may at times be subject to lesser impact and/or no impact during the life of the Modification.

Receiver 226 is already subject to acquisition upon request rights for predicted air quality impacts in accordance with MP 09_0062. Receivers 200 and 200a are currently afforded the right to additional air quality mitigation upon request conditions under MP 09_0062. It is anticipated that receivers 200 and 200a would be afforded the right to additional noise mitigation upon request should the Modification be approved (Appendix A).

The noise predictions were similar to the results of the *Mt Arthur Coal Open Cut Modification Noise & Blasting Assessment* (Wilkinson Murray, 2013) prepared for Modification 1. However, the meteorological conditions used are more noise enhancing than those used in Modification 1 (Appendix A).

Cumulative Noise Levels

Cumulative noise impacts resulting from the interaction between the Mt Arthur Coal Mine (with the Modification) and neighbouring operations were assessed against the NPfI's recommended amenity criteria (Table 6-4) (Appendix A). The cumulative noise criteria (both $L_{Aeq,Period}$ and $L_{Aeq,15min}$ values) are provided in Table 6-4. The DPE's *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPE, 2022e) were considered in the preparation of the cumulative assessment.

The methodology used for the cumulative assessment was to logarithmically sum the predictive day, evening and night-time noise predictions for each mine for all identified privately-owned receivers. The overall cumulative noise levels were then assessed against the relevant recommended NPfI amenity noise levels (Appendix A).

When considering the maximum noise emissions modelled for the FY2030 scenario, all cumulative noise level predictions comply with the amenity noise levels during the day, evening and night-time assessment periods (Appendix A).

Road Noise

Road traffic noise for the Modification was assessed against the road traffic noise criteria in MP 09_0062 (Table 6-5) and recommended in the RNP.

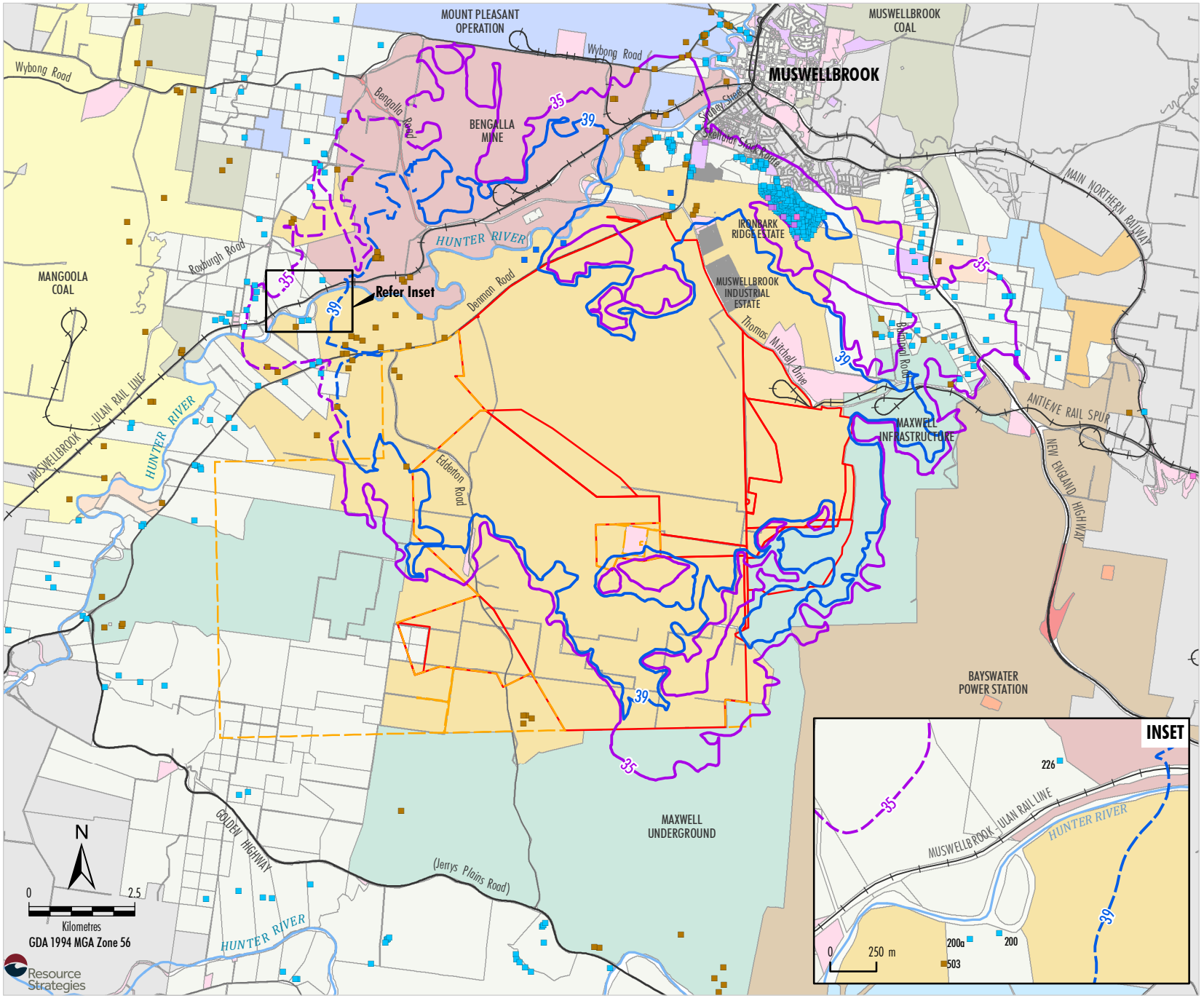
RWDI (2023) undertook an analysis of peak hour traffic volumes from the Mt Arthur Coal Mine incorporating the Modification as provided by The Transport Planning Partnership (TTPP) for day and night-time peak hours, respectively.

Table 6-7
Summary of Potential Night-Time Exceedances at Privately-Owned Residential Receivers – FY2030

Zone	Exceedance Level	Privately-Owned Receivers[1]
Noise Management Zone	1 to 2 dB	-
	3 to 5 dB	Receivers 200[2], 200a[3] and 226[4]

Notes:

1. To identify the locations of these receivers, refer to Figure 6-6 and 6-7.
2. This receiver has the right to additional air quality mitigation upon request in MP 09_0062 for the approved Mt Arthur Coal Mine.
3. Receiver 200a is assumed to be subject to the same rights as receiver 200.
4. This receiver is subject to acquisition upon request conditions in MP 09_0062 for the approved Mt Arthur Coal Mine for predicted air quality impacts.



Source: BHP (2023); RWDI (2023); NSW Spatial Services (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Mt Arthur Coal Mine
Predicted Night-time Noise Contours (Mitigated) $L_{Aeq\ (15\ min)}$ 2030

Figure 6-7

To allow assessment with the noise criteria recommended by the RNP, 2030 total daily traffic projections were provided by TTPP for non-Mt Arthur Coal-related traffic and traffic associated with the Mt Arthur Coal Mine incorporating the Modification. Appendix A provides a description of the total traffic volumes for the day and night-time assessment periods, respectively (Appendix A).

Based on future traffic volumes, peak hour traffic noise levels at the closest privately-owned residential receivers to Denman Road (east of Thomas Mitchell Drive) were assessed. Noise predictions for comparison against MP 09_0062 criteria are shown in Table 6-8 (Appendix A).

The other section of Denman Road and Thomas Mitchell Drive did not warrant particular assessment as residential receivers along Denman Road west of Thomas Mitchell Drive and east of Edderton Road are mine-owned or in the affectation zone for noise (Appendix A). Further, west of Edderton Road, the Denman Road volumes are diluted due to Mt Arthur-related traffic travelling along Edderton Road, as such no further assessment was warranted west of Edderton Road (Appendix A).

As shown in Table 6-8, noise results indicate that road traffic noise levels generated by the Mt Arthur Coal Mine with the Modification are expected to exceed the night-time MP 09_0062 road traffic noise criterion of 55 dBA by 5 dB at receiver 12 (Appendix A).

Road traffic noise predictions at the next closest receiver, receiver 33, would comply with all relevant MP 09_0062 road traffic noise criteria. RWDI (2023) concluded that all other privately-owned residential receivers would comply with the criteria.

It is noted that the VLAMP states that voluntary mitigation measures do not apply for noise impacts resulting from traffic on public roads and also that the NMP describes the difficulty with measuring HVEC generated traffic noise to facilitate assessment against the MP 09_0062 criteria.

Rail Transportation Noise

The Modification proposes a reduction to the transport of approved product coal from 27 Mtpa to 20 Mtpa, which would result in a corresponding decrease of approved train movements from 30 to 20 movements per day.

Given the proposed reduction in approved rail movements associated with the Modification, rail transportation noise from the Mt Arthur Coal Mine on the Antiene Rail Spur and the broader state rail network would continue for an additional four years at a reduced rate when compared to currently approved levels.

It is noted that a contemporary assessment of potential noise impacts from rail traffic generation on the Antiene Rail Spur was conducted by Wilkinson Murray (2019) in accordance with the RING in the *Antiene Rail Spur Life Extension Modification* (Malabar, 2023) (a recent approval to extend the life of the Antiene Rail Spur Development Consent DA 106-04-00).

Since HVEC trains also use this rail spur, the findings of Malabar (2023) remain relevant to rail noise associated with the Modifications.

Key rail noise findings were (Malabar, 2023):

> *The rail traffic noise assessment considered a maximum case rail movement scenario that included the maximum potential cumulative rail movements of the Maxwell Project and Mt Arthur Mine (Appendix A).*
>
> *No exceedances of the RING criteria for non-network rail lines are predicted at any privately-owned receivers due to the cumulative rail movements of the Maxwell Project and Mt Arthur Mine when considering local noise-enhancing meteorology (Appendix A).*

Table 6-8
Modification Traffic Noise Prediction (under Project Approval MP 09_0062)

Road	Closest Privately Owned Receiver	Predicted Level, $L_{Aeq,1hr}$ (dBA)	
		Day Peak Hour	Night Peak Hour
Denman Road, east of Thomas Mitchell Drive	Receiver 12	56	60
	Receiver 33	45	48

Source: Appendix A.

Note: All predictions include building facade reflection correction.

Blasting Assessment

Consistent with the BMP, the section of Denman Road within 500 m of blasting activities would continue to be closed and public access would be restricted during blasting events by use of road closure signs and sentries at either end of the roadway in order to avoid potential flyrock impacts (Appendix A).

As shown in Appendix 5 of MP 09_0062, HVEC has implemented two existing Blast Control Areas at the Mt Arthur Coal Mine required to comply with the relevant blasting criteria.

RWDI (2023) has undertaken an assessment of blasting within the proposed open cut pit extent within the Modification Area. Based on the extension in open cut mining within the Modification Area, it is recommended by RWDI that the western Blast Control Area be extended (Figure 6-8) (Appendix A).

6.4.5 Mitigation and Management Measures

Noise and blasting management measures for the Mt Arthur Coal Mine are described in the NMP and the BMP.

HVEC applies a comprehensive suite of noise mitigation and management measures on-site which are described in the NMP. The below mitigation and management measures as described in the NMP would continue for the Modification, including (BHP, 2023c):

- Use of contemporary acoustic design methods for the CHPP such as extensive cladding of bins, crushers, conveyors and the washery.
- Noise suppression, currently fitted on all major mobile equipment where reasonable and feasible.
- Continued use of noise bunds to control noise transmission.
- Mobile equipment is operated in less exposed areas during the evening and night.
- Implementation of additional pro-active and reactive mitigation measures based on the predictive modelling system and real-time monitoring and in accordance with the TARP.

The approved NMP and BMP would be updated to incorporate recommended management measures as proposed within Appendix A.

6.4.6 Adaptive Management

The TARP utilised at the Mt Arthur Coal Mine and outlined in the NMP would be updated for the Modification, where relevant.

The TARP would continue to be used to assist with the management of noise for the additional four years proposed as part of the Modification. Noise enhancing meteorological conditions would be identified by a combination of noise and meteorological monitoring and meteorological forecasting, where noise monitoring indicates the trend in actual noise levels at a location and meteorological monitoring and forecasting indicates the likelihood that the current trend would continue or intensify over the ensuing period (BHP, 2023c).

If and when the real-time monitoring and meteorological forecasting system predicts elevated noise levels at receivers, mine operators would facilitate the modification of dozer, dumping and hauling operations (BHP, 2023c).

If an exceedance of the noise criteria is likely to occur, HVEC would refer to the TARP which may require temporary shutdowns, for example shutdowns of specific dozer, dumping and haulage operations to minimise noise impacts (BHP, 2023c).

6.5 AIR QUALITY

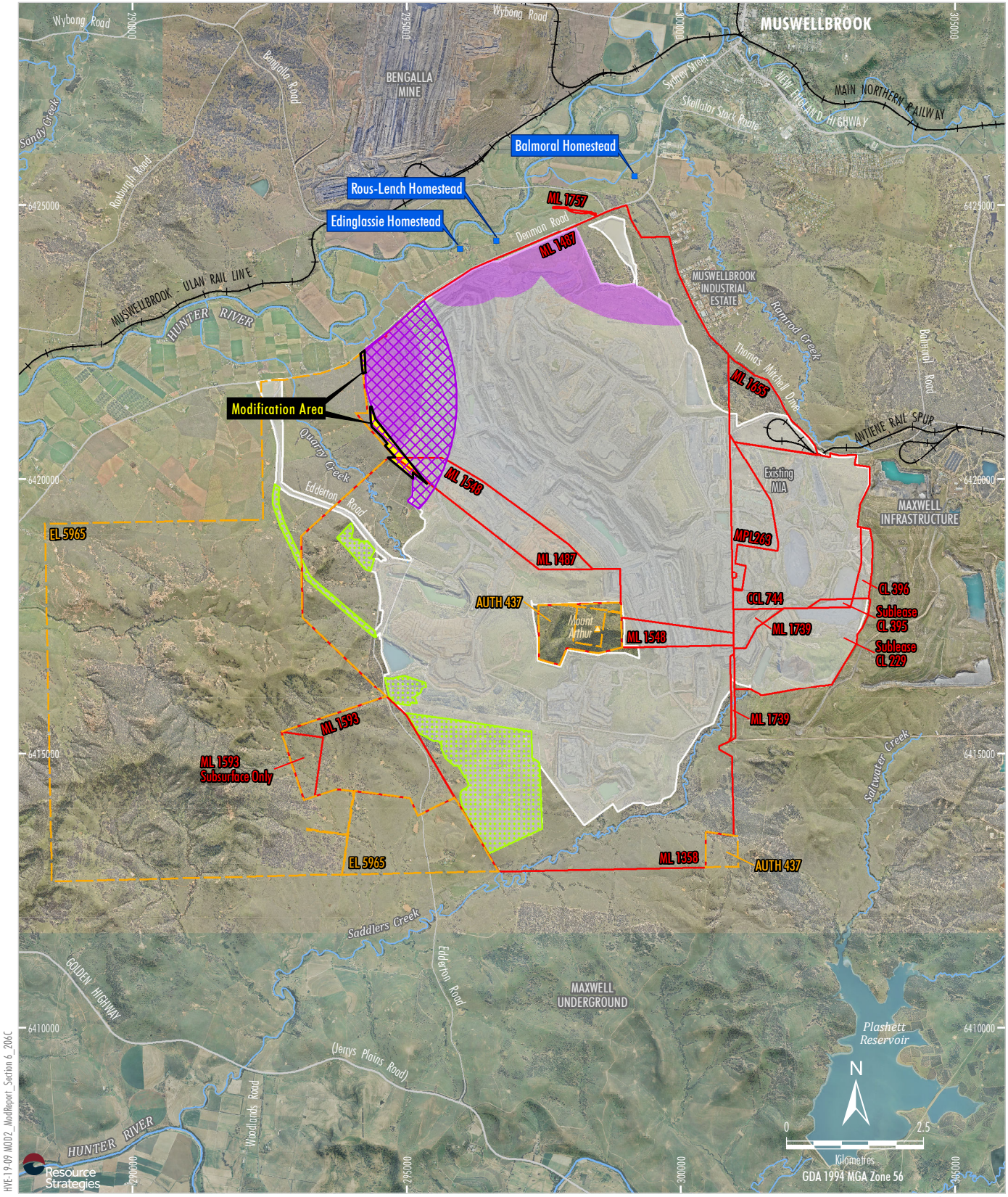
An Air Quality Impact and Greenhouse Gas Assessment for the Modification was undertaken by TAS (2023) and is presented as Appendix B.

Section 6.5.1 outlines the methodology for the Air Quality Impact Assessment. A description of the air quality assessment criteria and existing environment in the vicinity of the Modification is provided in Sections 6.5.2 and 6.5.3, respectively. Section 6.5.4 describes the potential air quality impacts of the Modification, including cumulative impacts, while Sections 6.5.5 and 6.5.6 outlines mitigation and adaptive management measures proposed by TAS (2023).

6.5.1 Methodology

The air quality assessment criteria within the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2022) (the Approved Methods) were adopted for the assessment of impacts at any privately-owned receivers.

The predicted air quality (dust) impacts from the Modification have also been assessed against the relevant criteria and procedures in the VLAMP.



HVE-19-09 MOD2_ModReport_Section 6_206C

Source: BHP (2023); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Approximate Extent of Existing/Approved Surface Development
- Modification Area
- Impact Minimisation Area
- Existing Blast Control Area
- Recommended Blast Control Zone
- Heritage Listed Dwelling

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Location of Key Historic Heritage Sites and Blast Control Areas

Figure 6-8

6.5.2 Applicable Criteria

Project Approval MP 09_0062 Limits

A summary of the applicable air quality impact criteria for the Mt Arthur Coal Mine consistent with MP 09_0062 is presented in Table 6-9 and Appendix B.

Approved Methods Criteria

Mining activities within the Modification Area have the potential to generate particulate matter (e.g. dust) emissions in the form of (Appendix B):

- total suspended particulate matter (TSP);
- particulate matter with an equivalent aerodynamic diameter of 10 micrometres (µm) or less (PM_{10}) (a subset of TSP); and
- particulate matter with an equivalent aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$) (a subset of TSP and PM_{10}).

Table 6-10 describes the Approved Methods air quality impact assessment criteria that was adopted by TAS (2023) for the assessment of impacts at any residence on privately owned land.

NSW Voluntary Land Acquisition and Mitigation Policy

Voluntary mitigation rights may apply as per the VLAMP where, even with best practice management, the development contributes to exceedances of the criteria at any residence on privately-owned land or workplace on privately-owned land.

Table 6-9
Project Approval MP 09_0062 Air Quality Criteria

Pollutant	Averaging period	[d] Impact Assessment Criterion	[d] Acquisition Criterion
Total suspended particulates (TSP)	Annual	[a] 90 µg/m³	[a] 90 µg/m³
Particulate matter <10µm (PM_{10})	Annual	[a] 30 µg/m³	[a] 30 µg/m³
	24-hour	[a] 50 µg/m³	[a] 150 µg/m³
			[b] 50 µg/m³
[c] Deposited dust	Annual	[b] 2 g/m²/month	[b] 2 g/m²/month
		[a] 4 g/m²/month	[a] 4 g/m²/month

Source: Appendix B.

a. Total impact (i.e incremental increase in concentrations due to the project plus background concentrations due to all other sources);

b. Incremental impact (i.e. incremental increase in concentrations due to the Mt Arthur Coal Mine and the Modification on its own);

c. Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003 *Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method*; and

d. Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.

µg/m³ = micrograms per cubic metre, µm = micrometres and g/m²/month = grams per square metre per month.

Table 6-10
Approved Methods and VLAMP Air Quality Impact Assessment Criteria

Pollutant	Averaging Period	Impact	Impact Assessment Criterion[a]	Acquisition Criterion[b]
Total Suspended Particulates (TSP)	Annual	Total	90 µg/m³ [c]	90 µg/m³ [c]
Particulate matter <10µm (PM_{10})	Annual	Total	25 µg/m³ [c]	25 µg/m³ [c]
	24-hour	Total	50 µg/m³ [c]	50 µg/m³ [d]
Particulate matter <2.5µm ($PM_{2.5}$)	Annual	Total	8 µg/m³ [c]	8 µg/m³ [c]
	24-hour	Total	25 µg/m³ [c]	25 µg/m³ [d]
Deposited dust	Annual	Incremental	2 g/m²/month	2 g/m²/month
		Total	4 g/m²/month	4 g/m²/month

Source: Appendix B.

a. Approved Methods impact assessment criteria (EPA, 2022).

b. VLAMP acquisition criteria (NSW Government, 2018a).

c. Criterion is cumulative (i.e. includes background concentrations and all other sources).

d. Criterion is Mt Arthur Coal and the Modification-only (with up to 5 allowable exceedances over the life of the development).

µg/m³ = micrograms per cubic metre and g/m²/month = grams per square metre per month

Table 6-10 describes the VLAMP acquisition criteria for the assessment of impacts at any residences on privately-owned land.

Environment Protection Licence 11457

EPL 11457 includes condition O3 requiring the majority of dust-generating activities to be caried out in a manner that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust.

The condition is stated below (Appendix B):

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

O3.2 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

O3.3 All trafficable areas, coal storage areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust.

This condition would continue to apply to the Modification.

6.5.3 Existing Environment

Local Meteorological Conditions

TAS (2023) reviewed long-term climatic data from the nearest operating BoM weather station, being Scone Airport AWS, to characterise the local climate in the proximity of the Mt Arthur Coal Mine. A summary of the relevant climate data is provided in Section 6.2.

Ambient Air Quality

Relevant air quality monitoring sites within and surrounding the Mt Arthur Coal Mine include Tapered Element Oscillating Microbalances (TEOMs) and dust deposition gauging stations as shown on Figure 6-5.

A review by TAS (2023) of the TSP, PM_{10} and $PM_{2.5}$ monitoring results indicated that the highest PM_{10} concentrations were recorded in the 2018, 2019 and 2020 periods, which are tributed to the drought period and widespread bushfires affecting NSW in those years.

Similar to the PM_{10} monitoring data, there was a significant increase in the frequency of 24-hour average $PM_{2.5}$ exceedances in 2019 and 2020, predominantly due to smoke associated with the 2019 and 2020 bushfires (Appendix B).

Ambient air quality monitoring captures particulate matter from sources including existing active mining operations, commercial and industrial sources (including power generation), agriculture, other localised particulate matter sources (e.g. wood heaters, vehicles using unsealed roads and wind erosion of exposed areas) and regional particulate matter sources (e.g. bushfires and dust storms) (Appendix B).

Air Quality Management and Monitoring Programme

The existing Mt Arthur Coal Mine operates in accordance with the approved Air Quality Management Plan (BHP, 2019a) (AQMP).

The AQMP includes management and mitigation measures, air quality monitoring requirements currently undertaken at the Mt Arthur Coal Mine and a complaints response protocol (BHP, 2019a).

Relevant operational control measures are summarised as follows (BHP, 2019a):

- Reshape, topsoil and rehabilitate completed overburden emplacement areas as soon as practicable.
- Implementation of the TARP to reduce real-time dust levels.
- Application of dust suppressant on hardstand areas used regularly for access.
- Temporarily vegetate exposed surface of unused overburden emplacement areas.
- Maintain unsealed coal handling areas in a moist condition.
- Apply dust suppressant on major haul roads.
- Use of water (i.e. wet suppression) to minimise dust emissions.
- All roads are speed limited (i.e. to limit dust generation from movements on unsealed roads).
- Drill rigs fitted with water sprays.

- Assessment of weather conditions prior to blasting.
- Conveyors shielded and water sprays fitted at transfer points.
- Water sprays on plant feed and clean coal stockpiles.
- Raw coal hopper bins shielded (to reduce wind erosion) and water sprays fitted.

The TARP is a reactive dust mitigation strategy which includes alarms to alert staff of the potential for dust impacts to arise. High dust concentration alarms trigger the implementation of dust management actions that appropriately modify any mining activities depending on weather conditions (BHP, 2019a). Alarm triggers are set on a range of time intervals to ensure excessive dust levels due to operations do not occur (Appendix B).

The actions can include modifying on-site operations, causing dust levels recorded at monitoring locations to achieve the criterion level, or rescheduling operations that are likely to have a significant off-site impact due to adverse weather conditions (Appendix B).

Previous Assessments

A number of air quality and greenhouse gas assessments have previously been undertaken for the Mt Arthur Coal Mine, including:

- *Air Quality Impact Assessment – Mt Arthur Coal Consolidation Project* (PAEHolmes Environmental Consultants [PAEHolmes], 2009).
- *Air Quality and Greenhouse Gas Assessment – Mt Arthur Coal Open Cut Modification* (PAEHolmes, 2013).

Community Complaints

As shown in Figure 6-1, air quality related community complaints reduced progressively from FY2017 to FY2022, with only one complaint received in FY2022 relating to air quality. As a result, a review of the air quality monitoring data was undertaken by HVEC personnel, and no exceedances were noted (Appendix B).

6.5.4 Potential Impacts

Modelling Scenarios

The assessment considers one indicative mine plan year (scenario) to represent the Modification. Similar to the Noise and Blasting Assessment (Section 6.4.4), the mine plan for FY2030 along with the production rate for FY2029 was chosen to represent potential worst-case impacts.

Emissions Inventory

An air quality emissions inventory was prepared for the indicative mine plan for FY2030 and production levels for FY2029 in consideration of the proposed activities.

The major emission sources are predicted to be associated with the following activities (Appendix B):

- hauling of waste rock and ROM coal in trucks on unpaved roads (including diesel particulate emissions);
- handling and loading/unloading of waste rock, ROM coal and product coal;
- wind erosion of exposed areas; and
- dozer operations.

A full description of the dispersion model methodology and emission inventories is provided in Appendix B.

Dispersion Modelling Results

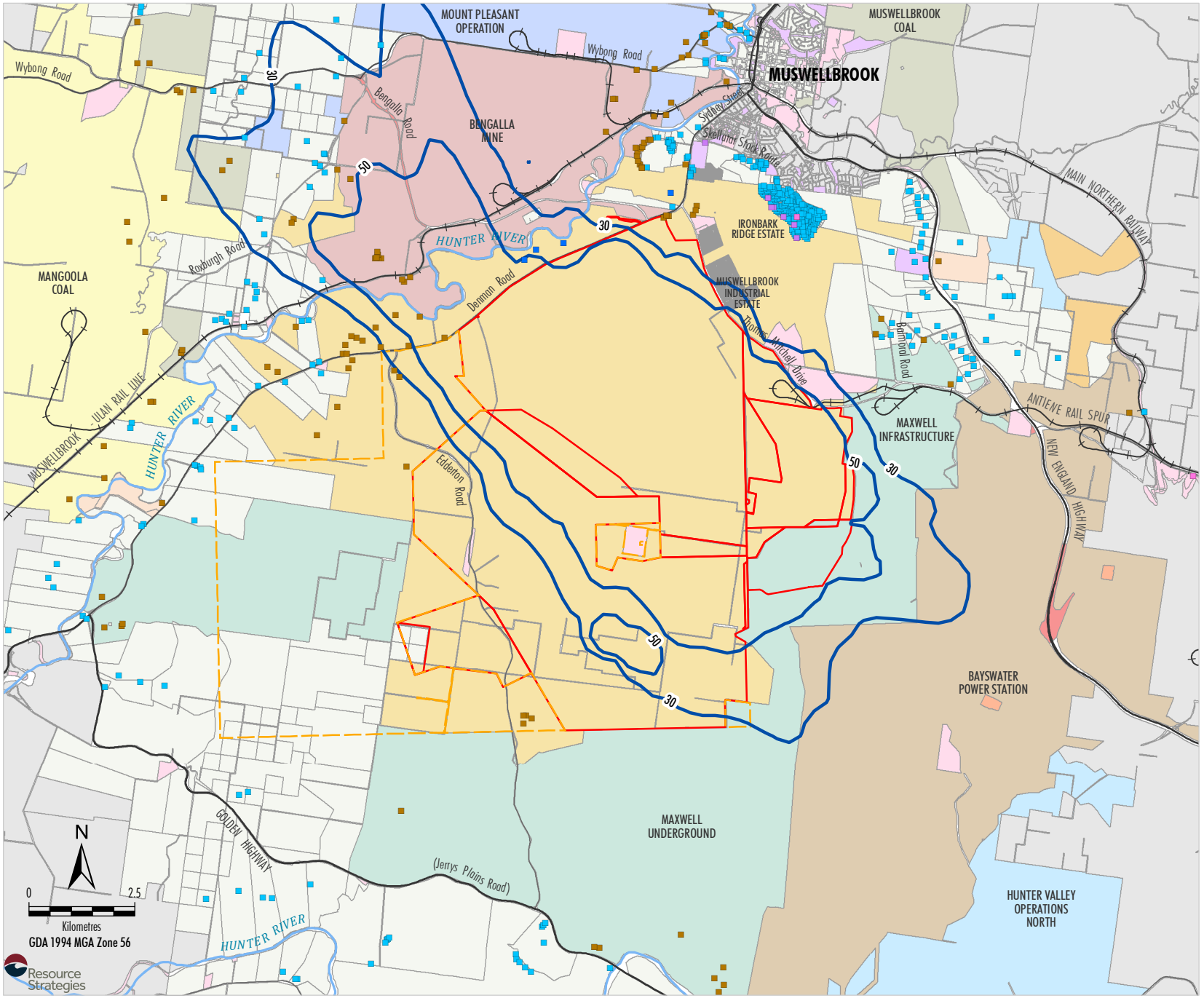
The CALPUFF modelling system was used by TAS (2023) to assess potential air quality impacts associated with the Modification, as per previous assessments for the Mt Arthur Coal Mine and in accordance with the Approved Methods (Appendix B).

Modification-only (Incremental) 24-hour Average Impacts

There are no privately-owned receivers where Modification-only (incremental) 24-hour average impacts are predicted to exceed the relevant Approved Methods impact assessment criteria for PM_{10} (as shown on Figure 6-9) and $PM_{2.5}$.

Cumulative 24-hour Average Impacts

With the application of the TARP and incorporation of real-time and predicted management systems, no privately-owned receivers are predicted to exceed the cumulative 24-hour average PM_{10} or $PM_{2.5}$ criteria (Appendix B).



LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Mt Arthur-controlled
- Maxwell-controlled
- Bengalla-controlled
- AGL-controlled
- Mount Pleasant-controlled
- Mangoola-controlled
- Glencore-controlled
- HVO-controlled
- Industrial Zone
- Muswellbrook Coal-controlled
- Other Mining/Resource Company-controlled
- Crown/The State of NSW
- Muswellbrook Shire Council
- Transport for NSW
- TransGrid
- Privately-owned Land
- Owner not Identified

Dwellings

- Mine-owned Receiver
- The State of NSW (Crown)
- Muswellbrook Shire Council
- Heritage Listed Dwelling
- Privately-owned Receiver

Air Quality Contours

- Maximum 24-hour Average PM_{10} Air Quality Contour

Source: BHP (2023); Todoroski Air Sciences (2023); NSW Spatial Services (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Maximum 24-hour Average PM_{10} Air Quality Contours

Figure 6-9

Cumulative Annual Average Impacts

Compliance is predicted at all private receivers, with the exception of receiver 264 (Table 6-11). It is noted that this receiver has existing acquisition upon request rights under MP 09_0062 and also the Bengalla Mine (SSD-5170). It is also noted that the Modification incremental predictions are relatively low at this receiver and exceedance of the criteria would occur without the Modification.

Summary

More than 500 receivers were considered in the Air Quality Impact Assessment. TAS (2023) concluded one privately-owned receiver (receiver 264) would exceed the cumulative annual-average PM_{10} metric air quality criteria.

This predicted exceedance would occur as a result of background dust levels. This receiver has existing acquisition upon request rights for air quality under MP 09_0062.

Coal Transport

As a result of the Modification, the approved annual product coal production rate would be reduced. Rail movements along the existing route would continue for four years for the Modification at a reduced rate when compared to the currently approved rail movements (Appendix B).

HVEC would continue to control dust emissions from rail wagons to minimise emissions where possible through application of appropriate mitigation measures such as streamlining and consistent profiling of the coal surface within the rail wagons, minimising spillage and parasitic loading, and regular collection and cleaning of any coal spillage consistent with existing operations (Appendix B).

Blast Fume Emissions

TAS (2023) concluded there is no specific or unusual circumstance associated with the Modification that would lead to any changes in blast fume emissions or that would alter the current potential risk of impacts from blasting (Appendix B).

Best practice blast management measures would be applied in accordance with the BMP such that blasting activities would continue to be managed to minimise the risk of impacts (Section 6.4) (Appendices A and B).

6.5.5 Mitigation and Management Measures

Air Quality Management Plan

The AQMP would be updated to include the Modification, including updates to the predictive and real-time air quality management system and associated response protocols, where required.

Blast Management Plan

HVEC would continue to implement the blast fume management measures detailed in the BMP for the Mt Arthur Coal Mine, in accordance with the *Code of Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting* (Australian Explosives Industry and Safety Group Inc., 2011).

6.5.6 Adaptive Management

The AQMP describes key operational control measures to manage potential air quality exceedances. The TARP is a key air quality control measure listed within the AQMP to mitigate the generation of excessive dust emissions.

The Mt Arthur Coal Mine meteorological monitoring stations would report wind conditions at the time, allowing personnel to evaluate the likely origin of the elevated dust levels (i.e. on-site or off-site sources), enabling appropriate mitigation and response measures to be implemented in accordance with the TARP.

The TARP facilitates the reasonable modification of mining activities to mitigate excessive dust emissions from mining activities to avoid exceedances of the criteria (BHP, 2019a).

Table 6-11
Cumulative Annual Average Modelling Results

Dust metric	Receptor ID	Existing rights to acquisition upon request?	Modification only annual ave. (µg/m³)	Other mines + background (µg/m³)	Cumulative annual ave. (µg/m³)	Criteria (µg/m³)
PM_{10}	264	Yes[1]	3.2	26.7	29.9	25

Source: Appendix B.
[1] Under MP 09_0062 and Bengalla Mine (SSD-5170).

Alert triggers are automatically generated when high wind speeds and wind direction within the Mt Arthur Coal Mine area of influence combined with mining activities have contributed to excessive dust. Three tiers of alarms (Level 1, Level 2 and Level 3) based on risk and controls measures (as described in Section 6.5.3) are put in place depending on the alarm level (BHP, 2019a).

In addition, Mt Arthur Coal Mine personnel would undertake visual inspections of stockpiles and exposed areas (if triggered under the TARP). In the event that any substantial dust plumes are observed, additional dust management measures would be implemented including (BHP, 2019a):

- request of water cart/s to identified areas of exceedance;
- modify grader operations;
- reschedule blast activities;
- modify dumping operations; and
- communicate dust risk to whole of mine site.

Air quality adaptive management measures would include response to any community issues of concern or complaints, including discussions with relevant landowners and/or refinement of on-site air quality mitigation measures and mine operating procedures.

6.6 GREENHOUSE GAS

6.6.1 Methodology

Greenhouse gas emissions associated with the Modification have been assessed in Appendix B in accordance with relevant *National Greenhouse Accounts Factors* (NGA Factors) (DCCEEW, 2023b).

The following sub-sections provide:

- a description of relevant greenhouse gas policies (Section 6.6.2) and greenhouse gas emission scopes (Section 6.6.3);
- a quantitative assessment of potential direct and indirect greenhouse gas emissions of the Modification and comparison of the Modification emissions to Australian and NSW greenhouse gas emissions (Section 6.6.4); and
- mitigation and abatement measures (Section 6.6.5).

6.6.2 Relevant Greenhouse Gas Policies

International

The *Paris Agreement* is a legally binding international treaty on climate change, which was adopted by 196 Parties in 2015. The Paris Agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 ˚C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 ˚C.

Under the *Paris Agreement*, each Party is required to prepare, communicate and maintain Nationally Determined Contributions (NDC) that would contribute to the long-term goals of the *Paris Agreement* (United Nations Framework Convention on Climate Change, 2022).

Australia is a Party to the *Paris Agreement*. Australia's NDC is committing to reduce greenhouse gas emissions 43% below 2005 levels by 2030 and its target to achieve net zero emissions by 2050.

Commonwealth

The NGER Act introduced a single national reporting framework for the reporting and dissemination of corporations' greenhouse gas emissions and energy use. The Safeguard Mechanism (underpinned by the Commonwealth *National Greenhouse and Energy Reporting [Safeguard Mechanism] Rule 2015*) was established through the NGER Act and provides baseline emissions and offset requirements for applicable facilities that emit over 100,000 tonnes of carbon dioxide equivalent (t CO2-e) per year such as the Mt Arthur Coal Mine.

The Safeguard Mechanism sets a baseline level of emissions for facilities. If a facility exceeds its baseline level, it is generally required to surrender Australian Carbon Credit Units (ACCUs) equivalent to the exceedance to the Clean Energy Regulator.

In 2023, the Commonwealth Government commenced a process to introduce reforms to facilitate greater abatement and/or offset requirements. The Safeguard Mechanism Reforms (DCCEEW, 2023a) introduced an amendment to the NGER Act and other legislation (i.e. the Climate Act) to establish the framework to give effect to key elements of the reforms, such as introducing a requirement for facilities to achieve greenhouse abatement via downward adjustment of baseline levels in-line with best practice in the particular industry.

The reforms apply a decline rate to a facility's baselines so that they are reduced predictably and gradually over time (4.9% per year) on a trajectory consistent with achieving Australia's emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050 (DCCEEW, 2023a).

For the coal industry, DCCEEW (2023c) noted that:

- For existing facilities the default value is currently calculated using greater weighting to the site-specific intensity.
- The effect of the reforms will be that in 2029 and 2030, the baseline for existing facilities will be a 50:50 split between the calculated industry average value and a facility's site-specific emissions intensity, in recognition that the variability in emissions intensity is widest in the coal sector compared to all other sectors.

A draft coal production variable of 0.0653 t CO_2-e per tonne ROM coal has also been announced (Climate Change and Energy, 2023). For comparison, the Modification's emissions intensity is 0.023 t CO_2-e, however this requires independent audit and verification during FY2024.

New South Wales

The NSW Government released the *NSW Climate Change Policy Framework* (Office of Environment and Heritage [OEH], 2016), which commits NSW to the 'aspirational long-term objective' of achieving net-zero emissions by 2050.

The NSW Climate and Energy Action (within DPE) published the *Net Zero Plan Stage 1: 2020 – 2030* (DPIE, 2020c) (the Net Zero Plan) in March 2020, which describes how, over the next decade, the NSW Government intends to work towards its objective of achieving net-zero emissions by 2050. NSW also has an objective to reduce emissions by 70% by 2035 compared to 2005 levels.

This includes a commitment from the NSW Government to conduct reporting under the Net Zero Plan (e.g. reporting on greenhouse gas emissions reductions achieved, forecasts and economic impact analyses), in addition to reporting of greenhouse gas emissions under the NGER Act.

The EPA *Climate Change Action Plan 2023-26* (EPA, 2023) (Climate Change Action Plan) includes an action to progressively place greenhouse gas limits on new or existing EPLs. These will be informed by emission targets to be identified for key industries and are proposed to be implemented in consideration of reporting under the NGER Act (to reduce duplication of reporting).

BHP

BHP's *Climate Transition Action Plan 2021* (BHP, 2021d) outlines BHP's strategic approach to reduce greenhouse gas emissions within BHP operations to net-zero by 2050 and to support greenhouse gas emissions reductions by suppliers and customers, to pursue net-zero within the BHP supply chain.

BHP also has set a medium-term target to reduce its operational emissions by at least 30% by 2030 on the way towards its longer-term goal to achieve net-zero operational greenhouse gas emissions by FY2050 (BHP, 2022a).

6.6.3 Greenhouse Gas Emission Scopes

Under the *Greenhouse Gas Protocol* (World Business Council for Sustainable Development [WBCSD] and World Resources Institute [WRI], 2020), the establishment of operational boundaries involves identifying emissions associated with an entity's operations, categorising them as direct or indirect emissions, and identifying the scope of accounting and reporting for indirect emissions.

Three 'Scopes' of emissions (Scopes 1, 2 and 3) are defined for greenhouse gas accounting and reporting purposes as detailed below (WBCSD and WRI, 2020).

Scope 1 – Direct Greenhouse Gas Emissions

Direct greenhouse gas emissions are those emissions that are principally the result of the following types of activities undertaken by an entity, including (WBCSD and WRI, 2020):

- Generation of electricity, heat or steam – these emissions result from combustion of fuels in stationary sources (e.g. boilers, furnaces, turbines).
- Physical or chemical processing – most of these emissions result from manufacture or processing of chemicals and materials (e.g. the manufacture of cement, aluminium or waste processing).

- Transportation of materials, products, waste, and employees – these emissions result from the combustion of fuels in entity owned/controlled mobile combustion sources (e.g. trucks, trains, ships, aeroplanes, buses and cars).
- Fugitive emissions – these emissions result from intentional or unintentional releases (e.g. equipment leaks from joints, seals, packing, and gaskets; methane emissions from coal mines and venting, and methane leakages from gas transport).

Scope 2 – Electricity Indirect Greenhouse Gas Emissions

Scope 2 emissions are a category of indirect emissions that account for greenhouse gas emissions associated with the generation of purchased electricity consumed by the entity (WBCSD and WRI, 2020).

Scope 3 – Other Indirect Greenhouse Gas Emissions

Scope 3 emissions are those emissions that are the consequence of the activities of an entity, but which arise from sources not owned or controlled by that entity. Some examples of Scope 3 emissions provided in the *Greenhouse Gas Protocol* are those from the extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services (WBCSD and WRI, 2020).

Scope 3 emissions have been identified as resulting from the purchase of diesel, liquified petroleum gas, petroleum-based oils and greases, electricity for use on-site and the transport of and final use of product coal (WBCSD and WRI, 2020).

For the purpose of assessment, emissions generated in all three scopes defined above provide a suitable approximation of the total greenhouse gas emissions generated from the Modification (Appendix B).

6.6.4 Potential Impacts

Direct and indirect greenhouse gas emissions associated with the Modification have been estimated by TAS (2023) using published emissions factors from the NGA Factors (DCCEEW, 2023b) and site-specific data.

Emissions have been estimated by TAS (2023) on an annual basis (i.e. maximum forecast production has been considered and emissions are calculated for all Modification operational years [FY2027 to FY2030] and the decommissioning phase). All of the relevant consumption data (e.g. diesel consumption forecasts) are included in Appendix B to allow the calculations to be verified.

Key potential greenhouse gas emission sources associated with mining operations during the Modification are detailed in Appendix B. Table 6-12 summarises the emissions associated with the Modification based on Scopes 1, 2 and 3 (Appendix B).

The estimated annual greenhouse emissions for Australia during 2020 was approximately 498 million tonnes of carbon dioxide equivalent (Mt CO_2-e) (DCCEEW, 2023d). In comparison, the estimated annual average greenhouse gas emissions for the Modification is 0.66 Mt CO_2-e (Scope 1 and 2 excluding the decommissioning phase) (Appendix B). Therefore, the annual contribution of greenhouse gas emissions from the Modification in comparison to the Australian greenhouse gas emissions for the 2020 period is estimated to be approximately 0.13% (Appendix B).

Considering Australia's NDC, assuming the 43% of 2005 emission reduction (2005 emissions are 559.1 Mt CO2-e) target is met, the Modification proportion (Scope 1 and 2) of the Australian GHG emissions for 2030 would be approximately 0.2%.

Further, the emissions intensity per unit production for the primary scheduled activity under the Schedule 1 are:

- Scope 1 = 0.023 t CO2-e/t ROM coal mined.
- Scope 2 = 0.003 t CO2-e/t ROM coal mined.

In comparison, for coal mines, the Australian government has announced a draft facility-specific (industry average) emissions intensity number of 0.0653 t CO_2-e (Minister for Climate Change and Energy, 2023).

Table 6-12
Summary of Greenhouse Gas Emissions Estimates

Period	Estimated Greenhouse Gas Emissions (Mt CO_2-e)		
	Scope 1	Scope 2	Scope 3
Annual Average*	0.58	0.08	47.55
Total for life of the Modification	2.52	0.36	190.26

Source: Appendix B
Mt CO2-e = Million tonnes of carbon dioxide equivalent.
* The annual values exclude the decommissioning phase, however the total values include the decommissioning phase.

At a State level, the estimated greenhouse emissions for NSW in the 2020 period were 132.4 Mt CO_2-e (DCCEEW, 2023e). The annual contribution of greenhouse gas emissions from the Modification (Scopes 1 and 2) in comparison to the NSW greenhouse emissions for the 2020 period is estimated to be approximately 0.5% of NSW emissions (Appendix B).

In addition, the Modification's Scope 1 proportion of projected NSW emissions in 2030 according to the NSW Net Zero Emissions Dashboard (DPE, 2023a) are:

- 0.53% of the 'base case' emission forecast (109.63 Mt CO_2-e).
- 0.81% of the 'current policy' emission forecast (71.55 Mt CO_2-e).

Economic valuation of Scope 1 and 2 greenhouse gas emissions management strategies has been considered in the Economic Assessment (Appendix J).

Scope 3 Considerations

The *Greenhouse Gas Protocol* (WBCSD and WRI, 2020) has been deliberately structured to promote appropriate accountability for emissions produced and avoid double counting of emissions. For example, the majority of the emissions associated with the Modification are Scope 3 emissions from the combustion of product coal by third parties. These same emissions would be Scope 1 emissions at the facility where the combustion of coal occurs.

As described in TAS (2023), the end use of coal produced by the Modification has been assumed to be power generation in overseas countries.

The estimated annual average Scope 3 emissions of customer entities combusting coal produced by the Modification would represent approximately 0.09% of the global greenhouse gas emissions (as at 2019) (Appendix B).

Under the Paris Agreement, each Party is required to prepare, communicate and maintain NDCs that will contribute to the long-term goals of the Paris Agreement (UNFCCC, 2020d).

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, 2020d). Each country will have its own range of opportunities and priorities to trade off various alternative emission reduction (and carbon offset) options having regard to the economic priorities and physical attributes of the country.

Table 6-13 provides a summary of the NDCs under the Paris Agreement of the current (2022) recipients of MAC product coal. It should be noted that, under the Paris Agreement, these NDCs are successive and are to be updated every five years. The review mechanisms under the Paris Agreement, therefore, provide for increasing the stringency of emission control measures as required over time to achieve the goals of the Paris Agreement.

Further to the above, the Minister for the Environment and Water (2023) has noted in the *Statement of reasons for reconsideration decision under the Environment Protection and Biodiversity Conservation Act 1999* for the Mount Pleasant Optimisation Project that a coal mine expansion or continuation would not necessarily lead to increased Scope 3 emissions, as alternative sources of coal could be sourced by electricity generators, as below:

> *I considered that it is also likely that, if the proposed action does not proceed, the prospective buyers will purchase an equivalent amount of coal from a supplier other than the proponent, which would result in an equivalent amount of GHG emissions when combusted, when compared with the amount estimated for the proposed action.*

Table 6-13
Key Potential Customer Country Current Nationally Determined Contributions

Potential Destination Country/State	Summary of NDC
Japan	Japan aims to reduce its greenhouse gas emissions by 46% in fiscal year 2030 from its fiscal year 2013 levels, setting an ambitious target which is aligned with the long-term goal of achieving net-zero by 2050. Furthermore, Japan will continue efforts in its challenge to meet the lofty goal of cutting its emission by 50%.
Malaysia	India aims to reduce emissions intensity of its gross domestic product by 45 % by 2030, from 2005 level and to achieve approximately 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030, with the help of transfer of technology and low-cost international finance.
Singapore	Singapore intends to reduce emissions to around 60 Mt $CO_{2\text{-}e}$ in 2030 after peaking its emissions earlier.
Taiwan (Republic of China)	Taiwan is not recognised as an independent sovereign nation and therefore is not a member of the United Nations and consequently cannot be a Party to the Paris Agreement. Nonetheless it has put forward an intended NDC. Taiwan has committed to a 50% reduction in greenhouse gas emissions compared to the business-as-usual projection for 2030 by 2030, or a total of approximately 214 Mt $CO_{2\text{-}e}$ in 2030.
Italy	The European Union's (EU's) current NDC target, submitted in December 2020, is to reduce emissions by at least 55% below 1990 levels by 2030 (including Land Use, Land-Use Change and Forestry [LULUCF]). This equates to around 52%-54% below 1990 levels excluding LULUCF.
Ireland	See above for the EU.
Korea	The updated and enhanced target is to reduce total national greenhouse gas emissions by 40% from the 2018 level, which is 727.6 Mt $CO_{2\text{-}e}$, by 2030. 40% reduction target is more enhanced because it is below its linear reduction pathways from 2018 to 2050. This indicates the Republic of Korea's enhanced ambition towards the goal of carbon neutrality by 2050.
Indonesia	In 2022, Indonesia submitted an enhanced NDC with increased emission reduction target from 29% in first NDC and updated NDC to approximately 32% unconditionally and from 41% in the Updated NDC to approximately 43% conditionally. This enhanced NDC is the transition towards Indonesia's second NDC which will be aligned with the Long-Term Low Carbon and Climate Resilience Strategy 2050 with a vision to achieve net-zero emission by 2060 or sooner.

Source: Government of Japan (2022), Government of India (2022), Government of Singapore (2022), Republic of China (Taiwan) (2015), European Union (2020), Government of Korea (2021) and Republic of Indonesia (2022).

6.6.5 Mitigation Measures

It is understood that the EPA expects proponents to apply the mitigation hierarchy to first avoid, then reduce and finally to offset residual emissions. For the Modification, over 80% of Scope 1 emissions are associated with diesel use (Appendix B). HVEC does not consider the capital cost associated with direct abatement measures to avoid these emissions (i.e. replacement of fleet equipment with low emissions) to be feasible for the Modification given the relatively short remaining duration for operations at the Mt Arthur Coal Mine. Accordingly, the mitigation measures described below focus on consumption reduction and other initiatives which may assist to reduce emissions.

A discussion of the Safeguard Mechanism Reforms is also provided, which may result in offsetting of emissions in excess of the baseline under the NGER Act.

Climate Change Mitigation (Greenhouse Gas) Plan

HVEC implements all reasonable and feasible greenhouse gas mitigation and management measures at the Mt Arthur Coal Mine which would continue to be applied for the Modification in accordance with the AQMP.

TAS (2023) has recommended the following reasonable and feasible measures (emissions reduction and/or energy efficiency initiatives) to reduce greenhouse gas emissions:

- consideration of ways to reduce energy consumption during project planning phases and consider practicality of more energy efficient alternatives;
- regular scheduled maintenance of equipment and plant;

- maintain records of monthly electricity use and monthly ROM coal production to allow calculation of greenhouse gas emissions; and
- turn off unnecessary lighting around the Mt Arthur Coal Mine.

As diesel fuel consumption represents the majority of estimated direct emissions (Scope 1), the existing measures (which would continue to be applied as part of the Modification) are generally focused on minimising greenhouse gas emissions through the efficient use of diesel by:

- optimising the design of haul roads to minimise the distance travelled;
- minimising the re-handling of material (i.e. coal, overburden and topsoil); and
- maintaining the mobile fleet in good operating order.

In line with the Climate Change Action Plan, HVEC would progressively review greenhouse gas emission minimisation measures to reflect updated emission reduction targets, as set by the EPA.

Greenhouse gas emissions from Mt Arthur Coal Mine would continue to be monitored and reported in accordance with HVEC's obligations under the NGER Act.

Safeguard Mechanism Reforms

As described above, due to the relatively short remaining duration for operations at the Mt Arthur Coal Mine, no specific major greenhouse gas avoidance measures are proposed as part of the Modification to comply with the reforms of the Safeguard Mechanism (DCCEEW, 2023a).

For coal mines, the Federal Government has announced a draft proposed production variable of 0.0653 t CO_2-e per tonne ROM coal (Minister for Climate Change and Energy, 2023). The Federal Government's intention is to gradually give additional weighting to the industry specific intensity (by 2029/2030, the industry average for existing facilities will be a 50:50 split between the calculated industry average value and a facility's site-specific emissions intensity [DCCEEW, 2023c]). For comparison, the Modification's Scope 1 emissions intensity is 0.023 t CO_2-e per tonne ROM coal. HVEC would purchase and surrender ACCUs and Safeguard Mechanism Credits to manage potential emissions in excess of the baseline.

Annual assessment of greenhouse gas emissions will be reported in accordance with the NGER Act and the NGER Measurement Determination.

Annual reporting would be provided to the Clean Energy Regulator by the end of October each year, provided in the manner and form in accordance with the requirements of the *Guideline – Manner and Form Sections 19 22G and 22X reports* (Clean Energy Regulator, 2021).

Climate Change Adaptation Plan

The Modification's contribution to global climate change would be in proportion to its contribution to global greenhouse gas emissions. The potential impacts of climate hazards on the environmental performance of the Modification are considered to be limited given the relatively short duration of additional operations that would result from the Modification (i.e. four additional years). It is noted that the Adapt NSW (2023) predictions for the Hunter Valley describes the following climate change affects for the period 2020 to 2039:

- maximum temperatures increase by between 0.4°C – 1°C; and
- minimum temperatures increase by 0.5°C – 0.9°C.

Further, Adapt NSW (2023) expects that rainfall will increase in autumn however will decrease in spring and winter; with fire weather to also increase in summer, spring and winter.

The Surface Water Assessment (Appendix G) has simulated the site water balance over a range of climatic conditions. The forecast supply reliability is high even under low rainfall scenarios (Appendix G). The site water balance would continue to be regularly reviewed to incorporate site water inventory levels and alterations to climate trends.

Specific bushfire prevention and fire suppression control measures are implemented in order to protect remnant vegetation communities as well as Mt Arthur Coal infrastructure (BHP, 2022a). Preventative measures include:

- fuel load assessment and reduction programs;
- the establishment and maintenance of fire breaks; and
- the prevention of ignition sources.

Fire suppression and control is achieved through on-site fire-fighting equipment, including a rescue truck and water carts, facilitated by a network of roads and vehicle access trails, which provide access to all areas of HVEC-owned land. HVEC also maintains a trained emergency response team on each shift. Fire extinguishers are fitted in vehicles and buildings.

6.7 SOCIAL AND COMMUNITY INFRASTRUCTURE

A SIA was prepared for the Modification by SquarePeg (2023) that considered the potential impacts of the Modification on social values, population and community infrastructure (Appendix C).

A description of the methodology undertaken for the SIA (Appendix C) is presented in Section 6.7.1. A summary of the existing environment, including social baseline results is provided in Section 6.7.2. Key potential Modification impacts on social values, employment and population are summarised in Section 6.7.3. Proposed mitigation and adaptive management measures are provided in Section 6.7.4, respectively.

6.7.1 Methodology

The SIA was prepared in accordance with the *Social Impact Assessment Guideline for State Significant Projects* (DPE, 2023b) (SIA Guideline) and *Technical Supplement – Social Impact Assessment for State Significant Projects* (DPE, 2023c) (SIA Technical Supplement). The consultation for the SIA was also undertaken in consideration of *Undertaking Engagement Guidelines for State Significant Projects* (DPE, 2022d).

The SIA sought to achieve three objectives (consistent with the SIA Guideline) (Appendix C):

1. Identify likely social impacts associated with the Modification, and stakeholders who may experience these impacts.
2. Assess and evaluate the identified social impacts to understand the nature and extent from the perspective of those affected.
3. Develop responses to prioritise social impacts, including management and monitoring measures.

SquarePeg (2023) assessed the potential social impacts associated with the Modification proceeding, the Modification not proceeding and cumulative combined impacts with the approved Mt Arthur Coal Mine and surrounding projects and operations.

Community Consultation

The SIA (Appendix C) was informed by consultation undertaken by HVEC since it acquired the Mt Arthur Coal Mine in 2001 and relevant Modification specialist assessments (Appendices A to J).

SquarePeg engaged with a range of stakeholders to ascertain views on existing cumulative and potential incremental social impacts of the Modification during the scoping phase.

The following consultation objectives for the SIA were developed in consideration of the SIA Guideline:

- collecting primary data about the potentially affected community (the social baseline);
- seeking stakeholder input into social impact identification and significance assessment, particularly seeking to understand how impacts may be experienced from the stakeholders perspective;
- ensuring stakeholders have an opportunity to provide feedback into project planning and design; and
- collaborating on impact evaluation and prioritisation.

Stakeholder consultation primarily relied on interviews and meetings and included consultation with (Appendix C):

- Department of Regional NSW;
- Mt Arthur Coal CCC;
- Muswellbrook Shire Council;
- Muswellbrook Chamber of Commerce and Industry;
- Aboriginal stakeholders;
- Hunter Valley Wine and Tourism Association;
- Hunter Thoroughbred Breeders Association;
- workers, contractors and suppliers;
- public and private service and infrastructure providers; and
- a selection of nearby residents and landholders.

Consultation undertaken by SquarePeg for the Modification SIA is summarised in Table 6-14. A summary of key themes and community views from this consultation is provided in Table 6-15. Further details are presented in Appendix C.

Table 6-14
Summary of SIA Stakeholder Engagement and Consultation

Stakeholder	Engagement Method
Aboriginal people and groups	• Four interviews with Aboriginal stakeholders.
Existing and in-migrating residents and businesses	• Interviews with three nearby landholders. • Interviews with four CCC members. • Interviews with eight business representatives.
Councils	• Meeting with Singleton Shire Council community and economic development officers. • Meeting with and presentation to the Muswellbrook Shire Council State Significant Development Committee.
Community, including stakeholder groups, business, cultural and environmental organisations, advocacy groups and peak bodies	• Meetings with three community organisations, including one environmental advocacy group. • Meetings with the Muswellbrook Chamber of Commerce and Industry, and Business Singleton. • Meetings with peak bodies for the wine, tourism and thoroughbred breeding industries: Hunter Valley Wine and Tourism Association and Hunter Thoroughbred Breeders Association.
Workers, contractors and suppliers	• Interviews with two workforce representatives.
Public and private service and infrastructure providers and regulatory agencies	• Meetings with emergency services, including NSW Police, NSW Fire and Rescue, and NSW Ambulance services. • Meetings and interviews with community and housing services providers Upper Hunter Community Services and Home in Place. • Meetings and interviews with one childcare centre and Muswellbrook TAFE. • Meeting with Department of Regional NSW.

Source: Appendix C.

Table 6-15
Summary of the Themes and Community Views from the SIA Consultation

Theme	Community Views
Role of Coal Mining in the Community	• Nearly all stakeholders who contributed to the SIA had some form of connection to the Mt Arthur Coal Mine or the mining industry. • Majority of the stakeholders either had a direct connection to the Mt Arthur Coal Mine as a current or past employee; or indirect connection through a relative. • Stakeholders mentioned that coal mining is a major industry in Muswellbrook and contributed to the town's identity. Other industries, particularly the equine industry were also mentioned as large contributors to the community and local economy. • Stakeholders acknowledged both the positives and negatives associated with the Mt Arthur Coal Mine, for most stakeholders the experience is positive. • Most stakeholders who had a direct or personal negative experience of mining could also see positive aspects associated with the industry.
Certainty and Ability to Plan for the Future	• Majority of the stakeholders interviewed for the SIA saw the Modification as something overwhelmingly positive, including amongst those who had negative experiences with the Mt Arthur Coal Mine. • Most stakeholders noted that the Modification largely represented a continuation of current experiences with no specific change associated with it. • Stakeholders who expressed support for the Modification related this to the additional time provided for the community to prepare for post-mining at the Mt Arthur Coal Mine (i.e. additional four years). • Stakeholders who expressed concern about negative impacts largely related these to the continuation of existing environmental impacts.
Impacts of Closure	• By contrast to the impacts of the Modification, most stakeholders thought the eventual closure of the Mt Arthur Coal Mine would impact the community significantly. • Stakeholders mentioned closure as a cumulative challenge (not just related to the Mt Arthur Coal Mine) and were concerned regarding the opportunities for the Mt Arthur Coal Mine workforce to find employment at other mine sites. • Stakeholders noted the potential impacts of closure on community organisations, housing and businesses.

Source: Appendix C.

6.7.2 Existing Environment

Throughout the late 19th century and early 20th century, mining expanded into the Hunter Valley through mining operations in Greta, Maitland, Singleton and Muswellbrook (Appendix C). Since then, the coal industry has continued to grow in the region, where in 2019, there was a total of 41 operating coal mines in the Hunter Valley, owned by 11 different companies (Appendix C).

Area of Social Influence

The SIA defines the social locality as the area where the social impacts associated with the Modification are likely to be experienced. SquarePeg (2023) considered the nature and scale of the Modification, the existing Mt Arthur Coal Mine and the built or natural features surrounding the Mt Arthur Coal Mine (consistent with the SIA Guideline).

SquarePeg (2023) identified two social localities for the Modification; primary and secondary. The primary social locality has been defined as the Muswellbrook LGA, where most stakeholders are likely to directly experience potential social, environmental and/or amenity related impacts from the Modification.

The Muswellbrook LGA had a total population of approximately 16,300 persons (at the time of the 2021 Census) (Appendix C).

The secondary social locality was defined as the remainder Hunter Valley region (Statistical Area Level 4 [SA4]), encompassing the shires of Upper Hunter, Muswellbrook, Singleton, Cessnock, Maitland, Dungog and Port Stephens.

The Hunter Valley SA4 had a total population of approximately 292,000 (at the time of the 2021 Census).

Figure 6-10 shows the Hunter Valley SA4 Region and Muswellbrook LGA region assessed as part of the SIA (Appendix C).

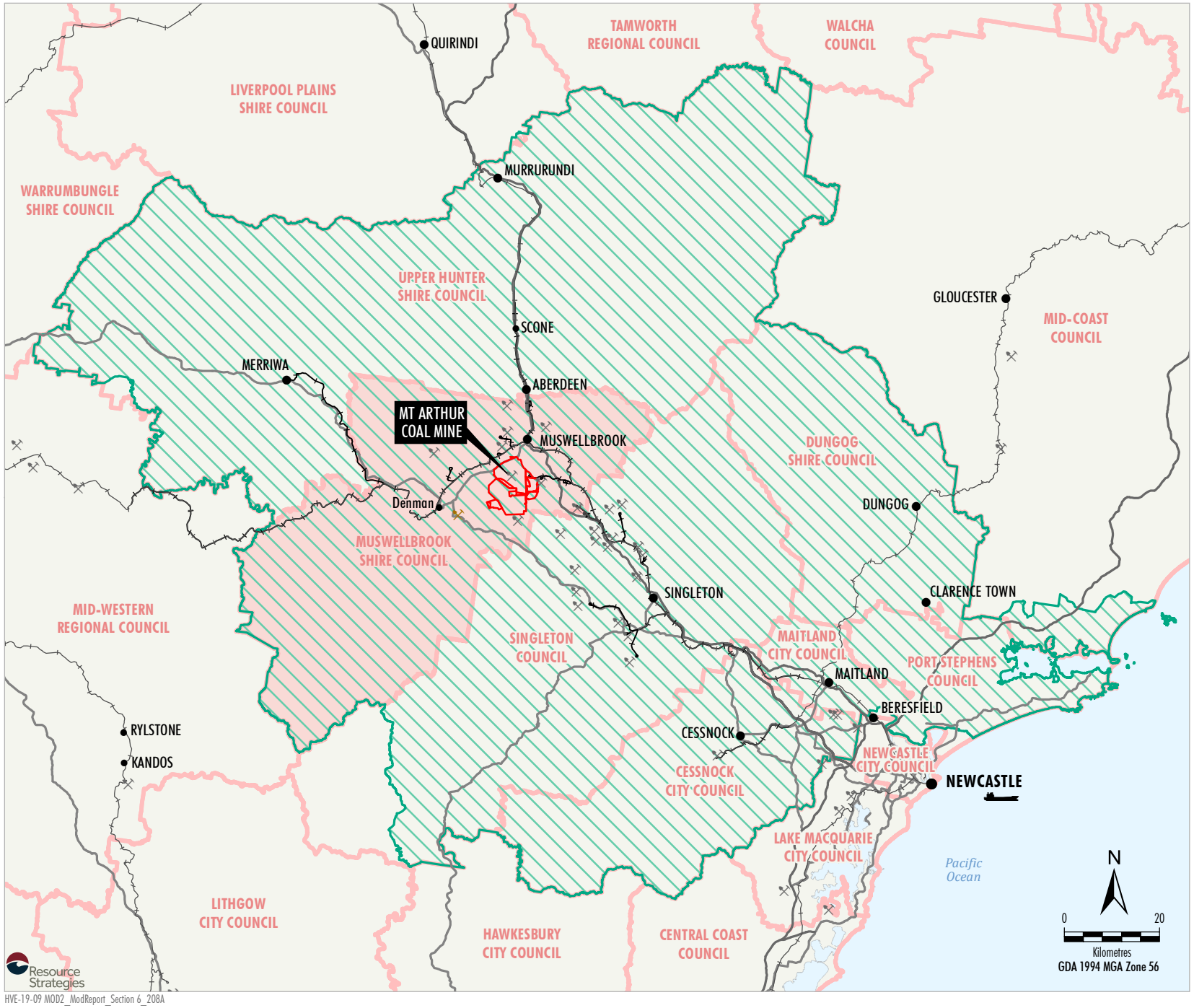
Social Baseline

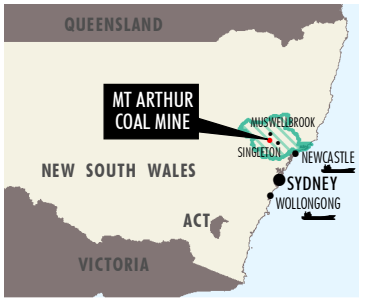
A description of the existing population profile, employment, housing, health, education and other services in the region is provided in Appendix C. This includes key local and regional social baseline findings identified during consultation.

The potential social impacts of the Modification are most likely to be experienced within the Muswellbrook LGA, which has a significant population and established social services and infrastructure within the region.

The social baseline can be summarised as follows (assessed at the time of the 2021 Census) (Appendix C):

- Approximately 34% of the Mt Arthur Coal employee workforce resided in the Muswellbrook LGA, while approximately 86% of the Mt Arthur Coal employee workforce resided in the Hunter Valley.
- According to the 2021 Census, the Muswellbrook LGA had a relatively stable population of 16,357 persons, which was predominantly male, and comparatively younger, with a median age of 37.
- Approximately 12% of the Muswellbrook LGA population were Aboriginal or Torres Strait Islander.
- Both school and non-school qualification levels in Muswellbrook were generally lower than across the Hunter Valley and NSW.
- Income levels were relatively high for a regionally based area, similar to the NSW average, although income growth in recent years has been comparably slow.
- Mining was the largest industry of employment accounting for more than one fifth of all jobs. The number of jobs in the mining industry had grown in the last five years.
- Many stakeholders talked about a high degree of transience in the Muswellbrook population, and indicators of mobility were slightly higher in Muswellbrook than across the Hunter Valley and NSW.
- Availability of housing was described by many stakeholders as the number one community need, and rental availability was very low.
- Crime levels were trending slightly up in Muswellbrook, and were slightly higher than for NSW.
- More people in the Hunter Valley and Muswellbrook reported suffering from a long-term health condition, compared to NSW.
- As described above, Muswellbrook can be transient as individuals move out of town, however overall the population is stable.





LEGEND

- Mining Operation
- Proposed Mining Operation (Application Lodged)
- Railway
- Highway
- Principal Road
- Local Government Area (LGA)
- Muswellbrook LGA
- Hunter Valley (exc Newcastle) SA4 Region
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)

Source: NSW Spatial Services (2023); Australian Bureau of Statistics (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Hunter Valley SA4 Region and the Muswellbrook LGA (Modification Region)

Figure 6-10

6.7.3 Potential Impacts

SquarePeg (2023) assessed the potential impacts of the Modification as a continuation of the social impacts currently being experienced from the Mt Arthur Coal Mine. Negative social impacts would continue to be experienced by people in close geographical proximity to the operation, while positive social impacts would continue to be experienced generally over the same and wider geographical area (Appendix C).

A number of the potential impacts identified for the Modification 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 Modification (Appendix C).

The potential impacts are described further below and cumulative impacts of the Modification with other operational, proposed or approved major projects in the region are described in Appendix C.

The potential social impacts and opportunities associated with the Modification not proceeding have also been considered in Appendix C.

Community

The Modification would provide an opportunity for the community to plan and prepare for the eventual cessation of mining at the Mt Arthur Coal Mine in 2030. Several stakeholders described this as the main benefit of the Modification (Appendix C).

The additional four years would also enable HVEC, various government agencies and other interested stakeholders to develop opportunities for the future use of the Mt Arthur Coal Mine to be productive and provide employment opportunities for the community (Appendix C).

The opportunity to plan and prepare for closure of the Mt Arthur Coal Mine was assessed as a positive, widespread impact with a high significance that is important for the Muswellbrook community and broader (Appendix C).

Culture

Continued change to the land as a result of ongoing mining operations at the Mt Arthur Coal Mine, therefore subsequent impacts on connection to Country, was the key issue of concern for representatives of the Aboriginal stakeholders who participated in engagement activities.

Appendix E presents the ACHA prepared for the Modification which assesses Aboriginal cultural heritage impacts of the Modification Area. Section 6.9 discusses the key outcomes of the ACHA.

Surroundings

Continuation of Existing Amenity Impacts

The Modification would lead to continuation of existing amenity impacts associated with the approved Mt Arthur Coal Mine, including noise, dust, blasting and light emission impacts affecting nearby landholders (Appendix C).

The above-mentioned amenity impacts were discussed amongst stakeholders in relation to their experiences during consultation, however these experiences were cumulative in nature.

A common theme for most stakeholders was that the Modification itself was not a great concern, provided it did not lead to an increase in these amenity impacts (Appendix C).

A Noise and Blasting Assessment, and Air Quality Impact and Greenhouse Gas Assessment has been prepared for the Modification and is presented in Appendices A and B. The potential impacts of the Modification on surrounding private landholders in relation to noise, blast and air quality emissions are discussed in Sections 6.4, 6.5 and 6.6.

Water Quality and Quantity for Local Water Users

A small number of stakeholders who contributed to the consultation for the SIA mentioned water-related impacts, specifically the Hunter River and potential salinity impacts. This impact was considered an existing impact with a cumulative nature (Appendix C).

Comprehensive groundwater and surface water assessments were undertaken for the Modification, which separately assess these potential impacts, and are presented in Appendices G and H. Potential impacts and recommended mitigation measures are discussed in Sections 6.11 and 6.12.

Improved Visual Impact Affecting Nearby Landholders

The Modification would lead to a reduction in the northern overburden emplacement height by approximately 20 m AHD compared to the approved Mt Arthur Coal Mine. Some stakeholders discussed the potential for improved visual amenity from this change, with one stakeholder noting this would depend on the extent of rehabilitation achieved (Appendix C).

A Landscape and Visual Impact Assessment has been prepared assessing the potential visual impact of the Modification (Appendix F) and is further discussed in Section 6.10.

Overall, most stakeholders viewed the Modification as a continuation of existing experienced impacts. Measures to avoid, mitigate and/or offset any potential environmental impacts of the Modification are described throughout this Modification Report.

Livelihoods

Continuation of Current Socio-economic Benefits

The Modification would allow for the continuation of employment at the Mt Arthur Coal Mine, and use of primary and secondary locality businesses in the Mt Arthur Coal supply chain for an additional four years. Similarly, contributions made by HVEC to community organisations through its social investment programs would continue throughout this period (Appendix C).

As discussed in Table 6-15, majority of the stakeholders interviewed for the SIA had some form of relationship with the Mt Arthur Coal Mine, indicating how widespread these benefits are on the community (Appendix C).

Further, BHP has a commitment to employment of Aboriginal and Torres Strait Islander people and females as well as purchasing from locally based and Indigenous businesses. To the extent this is implemented throughout the Modification, this benefit would spread to people and businesses who traditionally are underrepresented or may experience economic vulnerability (Appendix C).

Several stakeholders spoke about the pervasive role of mining and the Mt Arthur Coal Mine in Muswellbrook and the Hunter Valley socio-economic ecosystems. However, as with most potential impacts associated with the Modification, these were mostly talked about in current, historic or cumulative terms (Appendix C).

Overall, the socio-economic benefits associated with the Modification are likely to be widespread in the Muswellbrook community and beyond, and are of relatively high importance to many stakeholders (Appendix C).

Continuation of Current Negative Socio-Economic Impacts, at Current Levels

Some stakeholders during the consultation process mentioned the negative social and economic impacts of living in a mining dependent town, including housing shortages, economic and social divide between workers and others, and the presence of transient workers in the community (Appendix C).

The Modification would contribute to the continuation of high rental demand through continued employment of the existing workforce for an additional four years (Appendix C).

Cumulative Impacts

The potential cumulative impacts of the Modification and other potentially relevant approved and proposed projects within the Muswellbrook LGA has been considered in Appendix C.

The Mt Arthur Coal Mine is located within an existing mining precinct of the Hunter and Upper Hunter Valley, and therefore is surrounded by several mining operations.

Appendix C provides a detailed description of the interaction of surrounding operations and projects have with the Modification, and their potential cumulative impact in terms of livelihood, community and surrounding impacts.

Mine Closure

If the Modification is not approved, mining would cease in June 2026 under MP 09_0062.

As discussed above, many of the social impacts associated with the Modification are continuations of existing experiences associated with the approved Mt Arthur Coal Mine and, should the Modification not proceed, these experiences would consequently cease earlier (Appendix C).

If the Modification does not proceed, Mt Arthur Coal Mine's closure (i.e. cessation of mining operations) would see the loss of direct and indirect employment and business opportunities, which would likely be experienced as a significant loss to the mining workforce in the Muswellbrook LGA and adjoining regions.

A summary of the impacts should the Modification not proceed is provided below (and detailed further in Appendix C):

- the positive socio-economic benefits, negative noise, lighting and dust impacts, and negative social and economic effects would cease in 2026;
- impact to water quality and quantity would remain the same as the approved Mt Arthur Coal Mine; and
- the opportunity for the workforce, residents, businesses, service providers, governments and HVEC to sufficiently plan for closure would be reduced.

Intergenerational Equity Considerations

Due to the minimal scale of change and short duration of the Modification, SquarePeg (2023) concluded that it is highly unlikely any negative impacts associated with the Modification would display any intergenerational equity aspects (Appendix C).

However, the closure of the Mt Arthur Coal Mine would likely extend into future generations and, without appropriate planning, may compromise people's ability to meet their needs. Accordingly, the only social impact identified within the SIA with potential to materially affect intergenerational equity is the opportunity to plan and prepare for closure, which was noted as a positive impact in the SIA and by several stakeholders (Appendix C).

6.7.4 Mitigation and Management Measures

Mitigation and Enhancement Measures

HVEC would continue to work with local governments and the local community to minimise potential social impacts of the Modification and maximise potential opportunities.

For the impacts that represent continuations of existing impacts, no new mitigation measures are proposed. HVEC has existing management plans, procedures and personnel that address these impacts within existing operations.

SquarePeg (2023) recommends HVEC to continue to implement and improve these throughout the life of the Modification.

Mitigation and enhancement measures have been identified and would be implemented by HVEC, including the following key strategies (Appendix C):

- Continue to implement and improve the existing environmental management plans in place for the Mt Arthur Coal Mine, and update where necessary to reflect the Modification.
- Establish and provide substantial resources for a transition team which would work closely with the community and other stakeholders in the period leading up to closure, to progressively build an understanding of impacts and community priorities and develop actions to address these.
- Redirect some of the social investment programs towards initiatives that build community and business capacity to adapt to the change that would be induced by the eventual closure.

Monitoring Framework

Through existing management plans and procedures, HVEC has measures in place to monitor the impacts that represent continuations of current experiences or impacts. Outcomes of these are published in the Annual Environmental Review, monthly complaints reports, the C-Res annual report (C-Res implements BHP's Local Buying Program) and in other publications.

In light of the low to medium significance of these impacts and the low level of concern from most stakeholders, no additional monitoring measures for these impacts are proposed (Appendix C).

By contrast, SquarePeg (2023) recommends that BHP develops a comprehensive monitoring program for the impacts that relate to closure, in accordance with the framework provided in the SIA Technical Supplement.

Mine Closure Recommendations

SquarePeg (2023) identified that many impacts associated with closure are interrelated and highly contingent on decisions and actions by multiple stakeholders across multiple geographies and scales.

The following therefore provides recommendations of potential actions that HVEC could undertake to assist in closure of the Mt Arthur Coal Mine (Appendix C):

- Clear and frequent communication with key stakeholders (workforce, suppliers, local councils, community organisations and residents) regarding decisions throughout the Transition and Mine Closure Project.
- Establish and maintain a baseline of Mt Arthur Coal's contribution to the Muswellbrook and Upper Hunter communities.
- Develop an inclusive and adaptable stakeholder engagement program as part of the Transition and Mine Closure Project.
- Provide training and upskilling opportunities for the workforce, as well as ensuring workers have access to an employee assistance program to address potential mental health issues.
- Actively participate in community or government led dialogue which includes active participation of leaders from different social and economic sectors to assist in a successful transition.
- Support initiatives that build community self-organising and transition capacity.
- Build knowledge about mine closure and transition processes, particularly the social aspects of closure.

HVEC would consider the above recommendations from SquarePeg (2023) in preparation of the Transition and Mine Closure Project.

6.8 BIODIVERSITY

A BDAR has been prepared for the Modification by Resources Strategies (2023) and is presented in Appendix D. The BDAR has been peer reviewed by Dr Colin Driscoll (Hunter Eco) and the review report is presented in Appendix A of Appendix D.

A description of the methodology relevant to the BDAR is provided in Section 6.8.1 and a description of the existing environment in relation to the landscape context is detailed in Section 6.8.2. Section 6.8.3 provides an assessment of the potential impacts of the Modification on biodiversity, whilst Section 6.8.4 describes measures to offset and mitigate impacts of the Modification, respectively.

6.8.1 Methodology

Biodiversity Development Assessment Report

The BDAR (Appendix D) was prepared in accordance with the BAM established under Section 6.7 of the BC Act.

The BDAR covers the Subject Area (referred to as the Subject land within the BDAR), which is situated in the north-western extent of the Mt Arthur Coal Mine and is approximately 35 ha in size. The entire Subject Area was initially intended for proposed new surface disturbance activities including infrastructure and open cut mining.

After a review by HVEC of preliminary environmental survey outcomes (including the preliminary findings of the BDAR), the new surface disturbance area to be impacted by the Modification was refined to be the 25 ha Modification Area (referred to as the Development Footprint within the BDAR).

Extensive flora and fauna surveys have been conducted within and in the vicinity of the Modification Area in 2021, 2022 and 2023 by Hunter Eco (2023), Bolwarra Environmental Services (Bolwarra) (2023) and Future Ecology (2023). These survey reports are included in the BDAR and the relevant methodology is summarised below.

Baseline Flora Report

Hunter Eco (2023) undertook vegetation sampling and mapping within the Subject Area encompassing the Modification Area and surrounds. Surveys were undertaken in October 2022, November 2022, and July 2023. Threatened flora species searches were undertaken by Bolwarra (2023) in September, October and December 2021, and October 2022. Surveys were undertaken across nine study areas surrounding the Mt Arthur Coal Mine, including the Subject Area.

The surveys undertaken by Hunter Eco (2023) included sampling from (Appendix D):

- 13 vegetation integrity plots;
- 153 Rapid Data points; and
- identification of each individual tree within the Subject Area and surrounds.

Plant Community Types (PCTs) and vegetation zones in the Subject Area were mapped by Hunter Eco (2023) and mapping was used by Bolwarra (2023) to guide targeted surveys for threatened species and populations.

Targeted surveys for threatened species and populations listed under the BC Act and EPBC Act were undertaken by Bolwarra (2023).

A detailed description of the methodology employed by Hunter Eco (2023) and Bolwarra (2023) is provided in Appendix A of the BDAR.

Baseline Fauna Report

Future Ecology (2023) (Attachment B of the BDAR) undertook fauna surveys in the Subject Area and wider area in June, July, August, September, October and November 2021; March 2022 and July 2023. The fauna survey techniques included (Future Ecology, 2023):

- habitat assessment;
- diurnal and nocturnal bird, reptile, amphibian and reptile surveys; and
- microbat and mammal surveys through observation, listening, spotlighting call-playback acoustic recording and deployment of artificial shelter habitats.

A detailed description of the methodology employed by Future Ecology (2023) for the Modification is provided in Appendix B of the BDAR.

6.8.2 Existing Environment

Landscape Setting

The Modification Area has been cleared historically and is mostly grazing land with derived native grassland with some heavily fragmented scattered and clumped trees.

There are no State or Commonwealth mapped wetlands on, or adjacent to, the Modification Area (DCCEEW, 2023f; DECCW, 2010b).

There are no Areas of Outstanding Biodiversity Value listed under the NSW *Biodiversity Conservation Regulation 2017* associated with the Modification Area.

Native Vegetation and Threatened Ecological Communities

Two PCTs were identified within the Modification Area (Table 6-16 and Figure 6-11):

- PCT 483 *Grey Box x White Box Grassy Open Woodland on Basalt Hills in the Merriwa Region, Upper Hunter Valley* (Grey Box x White Box Grassy Woodland); and
- PCT 1655 *Grey Box - Slaty Box Shrub - Grass Woodland on Sandstone Slopes of the Upper Hunter and Sydney Basin* (Slaty Box Woodland).

The Modification Area is approximately 25 ha in size. Approximately 23 ha of the Modification Area comprises PCT 483 and approximately 1.6 ha comprises PCT 1655.

The Grey Box x White Box Grassy Woodland in the Modification Area (approximately 0.3 ha of woodland) is 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 (Box-Gum Woodland Critically Endangered Ecological Community [CEEC]) listed under the BC Act (and EPBC Act). The Modification Area also comprises approximately 22.5 ha of derived native grassland. Therefore, there is a total of approximately 22.8 ha of Box-Gum Woodland CEEC listed under the BC Act (and EPBC Act) within the Modification Area (Figure 6-11).

The Slaty Box Woodland in the Modification Area (approximately 0.4 ha) is equivalent to the *Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion* Vulnerable Ecological Community (VEC) listed under the BC Act (Slaty Gum Woodland VEC) and the *Central Hunter Valley Eucalypt Forest and Woodland* CEEC (Central Hunter Woodland CEEC) listed under the EPBC Act (Figure 6-11). The Modification Area also comprises 1.2 ha of derived native grassland (PCT 1655).

Threatened Flora Species

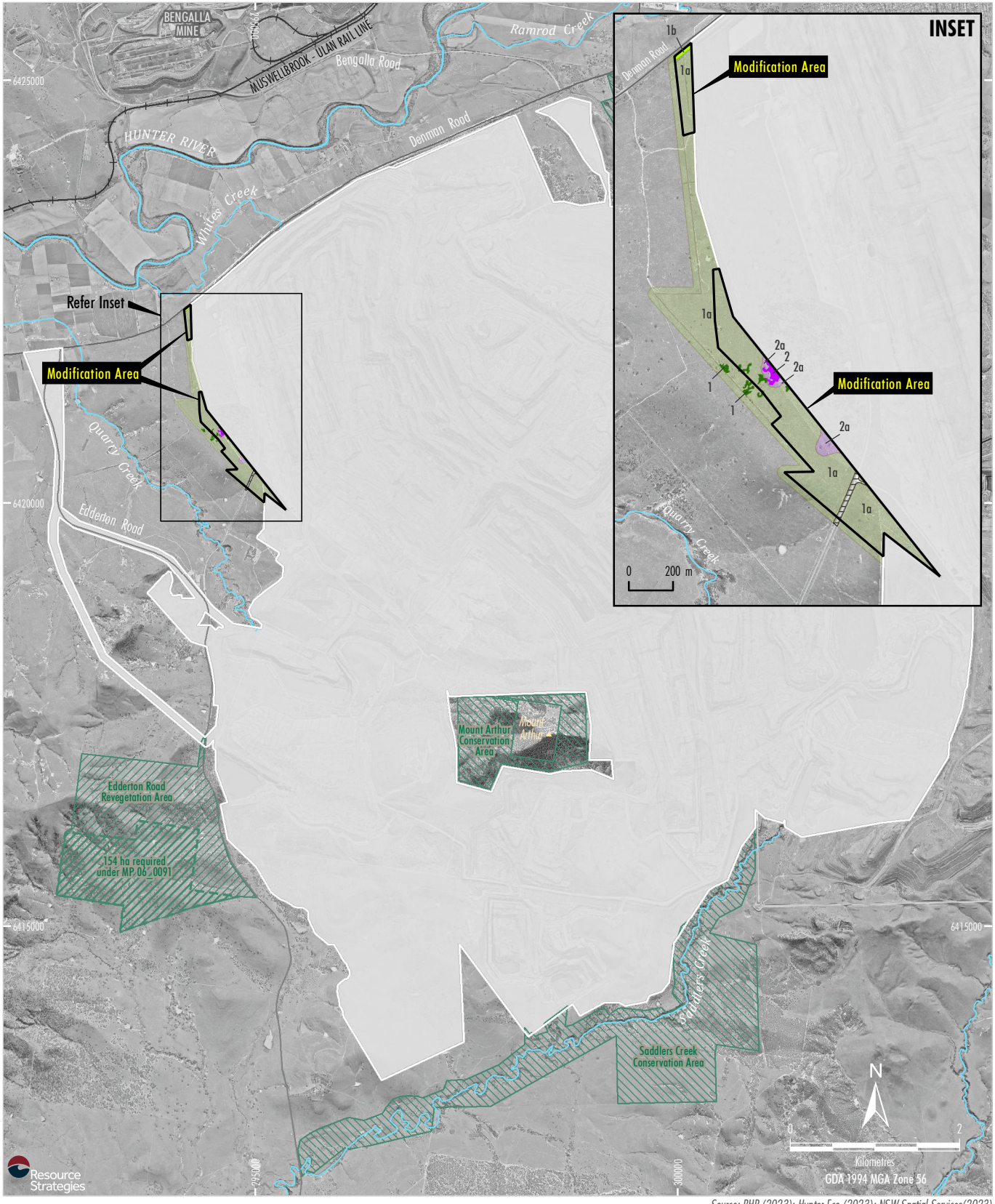
No threatened flora species or populations were recorded in the Modification Area (Appendix D).

Threatened Fauna Species

No species credit fauna species were confirmed to be present or likely to use the habitat in the Modification Area (Appendix D).

Groundwater Dependent Ecosystems

A review of the *Groundwater Dependent Ecosystems Atlas* (BoM, 2020) (GDE Atlas) was undertaken by SLR (2023). SLR (2023) concluded that there are no GDEs listed in the GDE Atlas within the Modification Area. Section 6.12 describes potential impacts on GDEs due to the Modification.



HVE-19-09 MOD2_ModReport_Section 6_216B

Source: BHP (2023); Hunter Eco (2023); NSW Spatial Services(2023)
Orthophoto Mosaic: MAC (2022-2020)

LEGEND

- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approximate Extent of Existing/Approved Surface Development
- Modification Area

Vegetation Communities

- 1. Grey Box x White Box Grassy Woodland (PCT 483) [1]
- 1a. Grey Box x White Box Grassy DNG (PCT 483) [1]
- 1b. Plantation (PCT 483)
- 2. Slaty Box Woodland (PCT 1655) [2]
- 2a. Slaty Box (DNG) (PCT 1655)
- Cleared Land

[1] Equivalent to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the BC Act (and EPBC Act)

[2] Equivalent to the Hunter Valley Footslopes Slaty Gum Woodland listed under the BC Act and the Central Hunter Valley Eucalypt Forest and Woodland CEEC listed under the EPBC Act

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Vegetation Communities within the Modification Area

Figure 6-11

Table 6-16
Plant Community Types within the Modification Area

Veg Zone	Vegetation Community (Hunter Eco, 2023)	PCT ID	Total Area (ha)
Grassy Woodlands Formation - Western Slopes Grassy Woodlands Class			
1	Grey Box x White Box Grassy Woodland [A]	PCT 483 *Grey Box x White Box Grassy Open Woodland on Basalt Hills in the Merriwa Region, Upper Hunter Valley*	0.3
1a	Derived Native Grassland [A]		22.5
1b	Plantation		0.2
Dry Sclerophyll Forests (Shrubby Sub-formation) Formation - Western Slopes Dry Sclerophyll Forests Class			
2	Slaty Box Woodland [B]	PCT 1655 *Grey Box - Slaty Box Shrub - Grass Woodland on Sandstone Slopes of the Upper Hunter and Sydney Basin*	0.4
2a	Derived Native Grassland		1.2
		Total Woodland	*0.7*
		Total Derived Native Grassland	*23.7*
		Total Plantation	*0.2*
		Overall Total Native Vegetation	**24.6**
		Cleared Land	*0.4*
		Overall Total Modification Area	**25**

Source: Appendix D.

[A] Equivalent to the Box-Gum Woodland CEEC listed under the BC Act (and EPBC Act).

[B] Equivalent to the Slaty Gum Woodland VEC listed under the BC Act and the Central Hunter Woodland CEEC listed under the EPBC Act.

6.8.3 Potential Impacts

The potential direct and indirect impacts of the Modification on biodiversity have been assessed in the BDAR and are described below.

Measures to Avoid and Minimise Impacts

As described in Section 2.2.4, during the scoping phases of the Modification, HVEC initially considered a 35 ha new disturbance area in the north-western extent of the Windmill Pit. However this would be reduced to the current Modification Area (25 ha) in consideration of further review of operational requirements, and outcomes of environmental surveys for the Modification.

HVEC also considered no new disturbance associated with the Modification, however the new disturbance area is required to facilitate a minor change in the final pit crest, maximise the efficient extraction of the coal resource, and for the purposes of supporting ancillary, access and water management infrastructure.

The proposed infrastructure in the Modification Area would be consistent with the approved Mt Arthur Coal Mine, with linear infrastructure aligned parallel to the proposed open cut pit. A highwall safety bund, haul road and water management infrastructure would be required (and constrained to) around the outside of the proposed open cut pit. Access tracks would be required to provide access to the infrastructure (Figure 3-3).

A number of topsoil stockpiles would be placed outside of the pit to facilitate rehabilitation of the adjacent final landform (when mining is completed). The spatial footprint of the topsoil stockpiles cannot be further minimised without increasing the height of the topsoil stockpiles which can reduce stability and fertility of the soil resource (Appendix D).

HVEC is proposing to decrease the total approved disturbance area by approximately 412 ha as the southern out-of-pit emplacement area, as well as the western option Edderton Road Realignment, are no longer required to be disturbed. HVEC is not seeking a reduction in biodiversity credit/offset obligations as a result of the reduction in approved disturbance.

Direct Impacts

After applying the measures to avoid and/or minimise impacts on biodiversity values as described above, the Modification would require the removal of 24.6 ha of native vegetation as outlined in Table 6-16 and shown on Figure 6-11. This comprises mostly derived native grasslands (23.7 ha), woodland (0.7 ha) and plantation (0.2 ha) (Appendix D).

The habitat in the Modification Area is typical of the surrounding landscape and loss of this habitat is unlikely to significantly impact any local fauna populations (Appendix D).

The total Mt Arthur Coal Mine disturbance area encompasses approximately 6,710 ha. The extent of the Modification Area (approximately 25 ha) is a contiguous extension of an existing open cut pit and is very minor relative to the approved disturbance extent.

Indirect Impacts

The potential for the Modification to result in indirect impacts on flora and fauna habitat and vegetation has been assessed (Appendix D). Any incremental increase in noise, dust and light spill on the adjacent habitat as a result of the Modification is unlikely to significantly impact any local fauna populations, noting that the vegetation adjacent to the Modification Area is mostly open derived native grassland. The Modification is unlikely to increase the risk of weeds and pests given control programs are implemented at the Mt Arthur Coal Mine and the minor nature of the Modification Area compared to the existing and approved Mt Arthur Coal Mine.

Prescribed Biodiversity Impacts

The Modification would not involve prescribed biodiversity impacts (Appendix D).

Serious and Irreversible Impacts

Under the BC Act, there is a small list of threatened species and communities that are considered by the NSW Government to be at risk of a Serious and Irreversible Impact (SAII) (Appendix D). These species/ecological communities are named SAII entities.

There is one entity recorded in the Modification Area that can be a 'potential SAII entity', namely the Box-Gum Woodland CEEC listed under the BC Act (Appendix D).

Key points in relation to the potential impacts on Box-Gum Woodland CEEC is follows (Appendix D):

- The Modification would result in the loss of approximately 0.3 ha of woodland and 22.5 ha of derived native grassland equivalent to the Box-Gum Woodland CEEC listed under the BC Act.
- The Modification would not change the extent of occurrence of the Box-Gum Woodland CEEC and the change in the area of occupancy is 0.00015% based on the area of occupancy in The Threatened Species Scientific Committee (TSSC) (2020).
- The Box-Gum Woodland CEEC in the Modification Area is not a good example of the community as the woodland has been heavily fragmented by past clearing and as a result it consists of a number of small patches (totalling 0.3 ha) that are isolated.
- The derived native grassland component of the community (approximately 22.5 ha) is in sub-optimal condition (VI score of 36.6 out of a possible 100) due to the past clearance and long-term use of the paddocks for grazing livestock.

A description of the actions and measures taken to avoid direct and indirect impact on the Box-Gum Woodland CEEC listed under the BC Act is provided in Appendix D.

6.8.4 Offset, Mitigation and Monitoring Measures

The Modification does not represent any new types of potential impacts on biodiversity, but rather an incremental increase within the Modification Area and continued activities within approved disturbance areas.

On this basis, no changes to existing mitigation, management and monitoring measures under the approved Mt Arthur Coal Biodiversity Management Plan (BHP, 2019b) are warranted as a result of the Modification (Appendix D).

The following general biodiversity management measures, as per the Biodiversity Management Plan (BHP, 2019b), are relevant to the Modification:

- revegetation of the post-mine landforms;
- pre-clearance surveys;
- collecting and propagating seed;
- salvaging and re-using material from the site for habitat enhancement;

- controlling weeds;
- controlling feral pests; and
- bushfire management.

As a result of running the BAM Credit Calculator, the Modification requires a total of 566 ecosystem credits for clearance within the Modification Area (Table 6-17). In addition, HVEC is cognisant that the new species of Legless Lizard (*Delma vescolineata*) has only recently been identified as a separate species, and in time, it could also potentially be listed as a threatened species under the BC Act. On this basis, HVEC is prepared to provide biodiversity offsets for the Legless Lizard (*Delma vescolineata)* should it be listed under the BC Act in the 12 months following determination of the Modification.

Table 6-17
Biodiversity Credit Requirements

Credit Type	Area (ha)	Total Credits
PCT 483 *Grey Box x White Box Grassy Open Woodland on Basalt Hills in the Merriwa Region, Upper Hunter Valley*	23	536
PCT 1655 *Grey Box - Slaty Box shrub - Grass Woodland on Sandstone Slopes of the Upper Hunter and Sydney Basin*	1.6	30
	Total	**566**

Source: Appendix D.

6.9 ABORIGINAL CULTURAL HERITAGE

An ACHA was prepared for the Modification by Niche (2023) and is presented in Appendix E.

A description of the methodology relevant to the ACHA is provided in Section 6.9.1. A description of Aboriginal heritage (archaeological and cultural) in the vicinity of the Modification Area and the consultation undertaken is provided in Section 6.9.2. Section 6.9.3 describes the assessment of the Modification with respect to potential impacts on Aboriginal cultural heritage, while Section 6.9.4 outlines the proposed mitigation measures that have been developed in consultation with the registered Aboriginal stakeholders.

6.9.1 Methodology

The ACHA has been undertaken in accordance with the relevant codes, regulations and guidelines, including (but not limited to):

- NPW Act and the *National Parks and Wildlife Regulation 2019* (NPW Regulation);
- *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010a) (the Consultation Requirements);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010c);
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011);
- *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council, 2010); and
- *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia International Council on Monuments and Sites, 2013).

Aboriginal Cultural Heritage Assessment

The ACHA (Appendix E) incorporates relevant information from previous assessments, the results of field surveys undertaken for the Modification and consultation with the Aboriginal community, including:

- results from field work and investigations previously undertaken by archaeologists and representatives of the Aboriginal community;
- search results from the Aboriginal Heritage Information Management System (AHIMS) database as well as other heritage registers;
- results from field surveys conducted by archaeologists and representatives of the Aboriginal community for the Modification in February 2023;
- a consultation program undertaken for the Modification; and
- outcomes of consultation with the Aboriginal community regarding archaeological and cultural values as part of the ACHA.

6.9.2 Existing Environment

Aboriginal History

The Modification Area is located within the administrative boundaries of the Muswellbrook LGA, the Wanaruah LALC and within the traditional country of the Wonnarua people.

The territory of the Wonnarua people extends from Aberdeen in the north, Maitland in the south-east, Cessnock in the south, and west to Wollar and Turril (Appendix E).

Prior to colonisation, the Wonnarua comprised of large groupings of individual family units and bands which came together for religious and ceremonial functions (Davidson and Lovell-Jones 1993; Appendix E). Social, religious, and economic responsibilities meant that people travelled freely within the broader area beyond their own territories to attend ceremonies, trade, and social networks with neighbouring nations (Appendix E).

Previous Archaeological Investigations

A number of Aboriginal cultural heritage surveys, assessments and salvage programs have previously been undertaken within the Mt Arthur Coal Mine and surrounds, including the Modification Area.

A detailed description of previous archaeological assessments and surveys undertaken at the Mt Arthur Coal Mine and surrounds is provided in Appendix E.

Heritage Register Searches

Searches of the following heritage registers and planning instruments were undertaken in relation to the Modification:

- AHIMS database;
- Australian World Heritage Database;
- Commonwealth Heritage List;
- National Heritage List;
- Stage Heritage Register;
- Muswellbrook LEP;
- *Muswellbrook Development Control Plan 2009*; and
- Native Title Register.

Community Consultation

Consultation with Aboriginal stakeholders regarding the existing Mt Arthur Coal Mine to date has been extensive and involved various methods including public notices, meetings, written and verbal correspondence, archaeological survey attendance and site inspections (Appendix E).

Consultation for the Modification was undertaken in accordance with the Consultation Requirements and the NPW Regulation.

A total of 72 Aboriginal stakeholders registered an interest and were consulted in relation to the Modification ACHA. A detailed account of the consultation process for the Modification is provided in Appendix E.

Table 6-18 summarises the main stages of the ACHA consultation process undertaken for the Modification. Additional information regarding consultation undertaken with the Aboriginal community is provided in Section 5.

Subject Area

The Proposed Methodology for the Modification ACHA defined a Subject Area, which was determined on the basis of a preliminary project design.

The ACHA covers the Subject Area, situated in the north-western extent of the Mt Arthur Coal Mine and is approximately 35 ha in size (Figure 6-12). The entire Subject Area was initially intended for proposed new surface disturbance activities including infrastructure and open cut mining.

However, after a review by HVEC of preliminary environmental survey outcomes (including the preliminary findings of the ACHA), the new surface disturbance area to be impacted by the Modification was refined to be the 25 ha Modification Area (Figure 6-12).

The remaining 10 ha of the Subject Area is proposed by the Modification to be avoided, where no surface disturbance is proposed (Figure 6-12). Refinement of the Modification Area resulted in the avoidance of some known Aboriginal heritage sites.

Survey Methodology

Archaeological surveys for the Modification were undertaken in February 2023 in consultation with representative Aboriginal stakeholders. The archaeological and cultural surveys were informed by the archaeological predictive model and were undertaken to ground truth sites recorded previously in addition to identifying new sites (Appendix E).

During the survey and throughout the consultation process, representatives of the Aboriginal stakeholders were asked to identify any areas of cultural significance within the Subject Area and surrounds or any cultural values relevant to the area. All cultural comments relating to the Subject Area and/or the wider region were recorded and are included in Appendix E.

Summary of Archaeological Findings

As a result of the field survey, a total of three Aboriginal cultural heritage sites were identified within the Modification Area (all newly recorded sites) (Appendix E).

All three sites were assessed as low archaeological (scientific) significance (Appendix E).

A detailed description of each Aboriginal heritage site identified in the ACHA is provided in Appendix E.

6.9.3 Cultural Values

Niche (2023) highlighted the cultural value of the Subject Area, including the important spiritual connection held by Aboriginal people today to Country through tangible and intangible values.

6.9.4 Potential Impacts

Direct Impacts

Sites located within the Modification Area have the potential to be directly impacted by the Modification (Appendix E).

The Modification would result in direct disturbance of three known Aboriginal sites, comprising (Appendix E):

- two artefact scatters (MAC-AS-1 and MAC-AS-3) assessed as being of low archaeological (scientific) significance; and
- one isolated find (MAC-IF-1) assessed as being of low archaeological (scientific) significance.

Indirect Impacts

One known Aboriginal cultural heritage site (RPS MAC GG 1038) of low archaeological (scientific) significance is located directly adjacent the Modification Area (outside the Subject Area) and has the potential to be indirectly impacted from ancillary infrastructure activities (Appendix E).

Cumulative Impacts

A consideration of the potential cumulative impacts associated with the Modification, including the existing Mt Arthur Coal Mine and other surrounding operations, has been undertaken and is presented in Appendix E.

The Modification would not cause a loss of heritage resources that could be viewed as being very rare or unique or unlikely to exist elsewhere (Appendix E). Therefore, Niche (2023) concluded that the Modification would not result in any significant cumulative impact on Aboriginal heritage in the region.

6.9.5 Mitigation Measures

The mitigation, management and monitoring measures detailed below have been developed in consultation with the Aboriginal stakeholders, in consideration of the approved management detailed in the existing Mt Arthur Coal Aboriginal Heritage Management Plan (BHP, 2020) (AHMP), cultural and archaeological significance of the Aboriginal heritage sites predicted to be impacted and the cultural significance of the area.

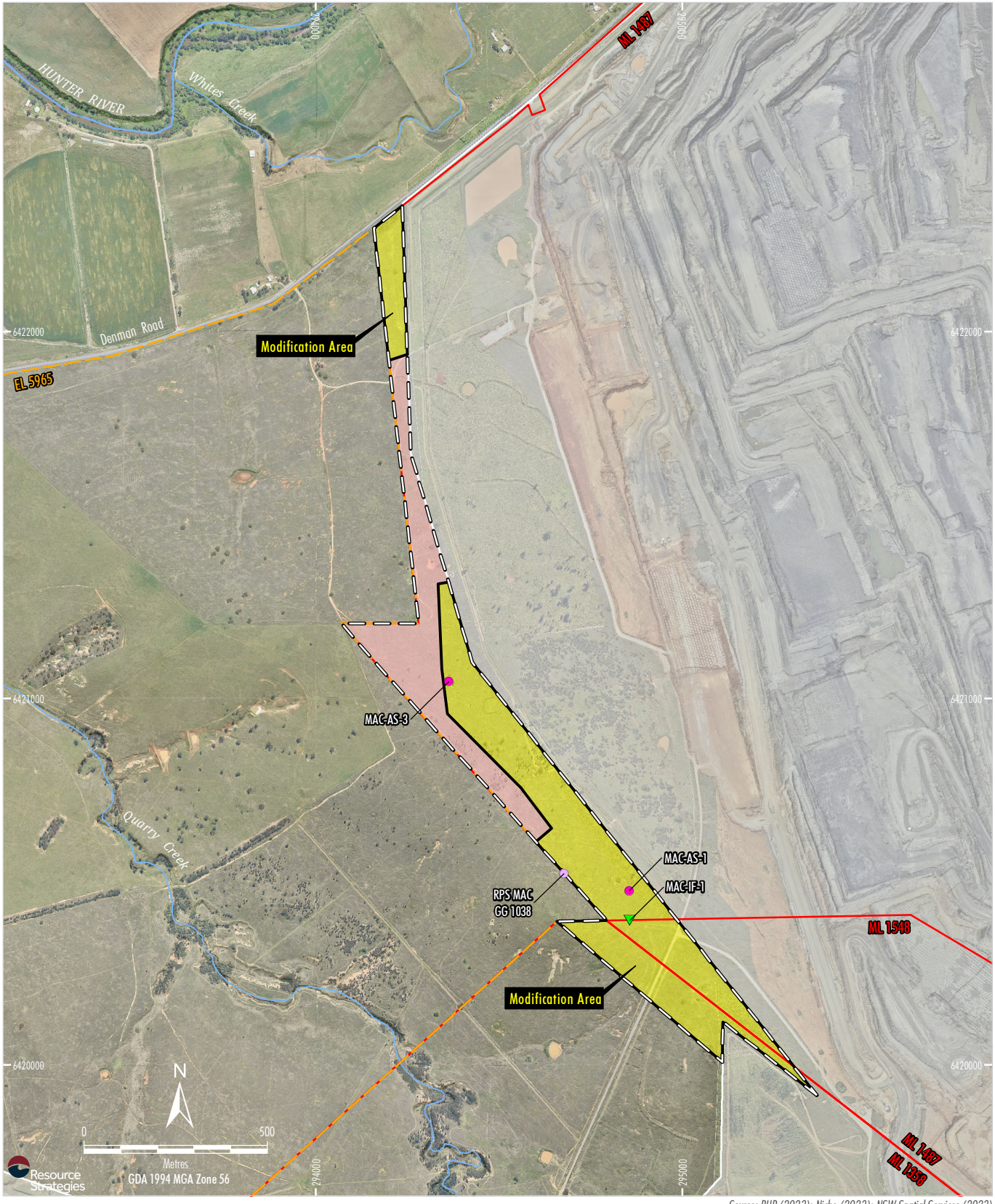
Niche (2023) has developed recommended management measures for each known Aboriginal heritage site predicted to be impacted by the Modification Area.

Table 6-18
Summary of Aboriginal Heritage Consultation Undertaken for the Modification

Date	Consultation
Notification of the Modification and Registrations	
October 2022	Letters requesting the names of Aboriginal parties or groups that may be interested in registering for the consultation process were sent to Heritage NSW, Hunter Local Land Services, Muswellbrook Shire Council, Wanaruah Local Aboriginal Land Council (LALC), Office of the Registrar (*Aboriginal Land Rights Act 1983*), National Native Title Tribunal and Native Title Services Corporation Limited, in order to identify Aboriginal stakeholders.
25 and 26 October 2022	Responses to the above request were received from Heritage NSW, Muswellbrook Shire Council, Office of the Registrar (*Aboriginal Land Rights Act 1983*), Hunter Local Land Services, National Native Tribunal and Wanaruah LALC.
22 November 2022	A public notice was placed in the *Hunter Valley News* inviting interested Aboriginal parties or groups to register for the Modification ACHA.
24 November 2022	A public notice was placed in the *Singleton Argus* inviting interested Aboriginal parties or groups to register for the Modification ACHA.
2 December 2022	Letters seeking registrations of interest were sent to the Aboriginal stakeholders identified by the above step.
	Letters were also provided to all Aboriginal stakeholders who had previously registered an interest in the existing Mt Arthur Coal Mine advising of automatic registration for the consultation process.
January 2023	A total of 72 organisations and/or individuals were registered as Aboriginal stakeholders for the Modification following completion of the registration period (December to 2022 to January 2023).
2 February 2023	A record of names of Aboriginal stakeholders was provided to Heritage NSW and the Wanaruah LALC in accordance with the Consultation Requirements (apart from the Aboriginal stakeholders who requested that their contact information not be provided).
Proposed Methodology Review	
16 January 2023	The Proposed Methodology for undertaking the ACHA was distributed to the Aboriginal stakeholders for comment.
February 2023	Feedback from the Aboriginal stakeholders in regard to the Proposed Methodology was received, and consideration was given to all comments.
Field Surveys	
19 January 2023	An invitation was sent to Aboriginal stakeholders onboarded with the HVEC field survey process to participate in field surveys for the Modification*.
21 to 23 February 2023	Aboriginal cultural heritage surveys were undertaken by archaeologists from Niche accompanied by Aboriginal stakeholders and their representatives. The cultural significance of the Subject Area and the identified Aboriginal heritage sites was discussed with the Aboriginal stakeholders and representatives.
Draft ACHA Review, Information Sessions and Site Inspection	
28 June 2023	A copy of the draft ACHA was provided to all Aboriginal stakeholders for their review and comment. The draft ACHA included outcomes of field surveys, archaeological and cultural significance assessment (based on feedback received during consultation and fieldwork), consideration of potential impacts and proposed mitigation and management measures. Feedback was requested by 27 July 2023.
28 June 2023	An invitation (distributed with the draft ACHA) was provided to all Aboriginal stakeholders to attend an information session on 12 July 2023 to discuss the findings, provide any information on cultural knowledge and/or significance, provide an opportunity to comment on the draft ACHA and to take part in a site inspection of the Subject Area.
12 July 2032	An information session and site visit of the Subject Area was conducted for the Modification draft ACHA with attendees representing BHP, Niche and Aboriginal stakeholders.
27 July 2027	All comments received on the draft ACHA (both in writing and at the information session) were considered and included in the final ACHA (Appendix E).

Source: Appendix E.

* The fieldwork participation process is described in detail in Appendix E.



Source: BHP (2023); Niche (2023); NSW Spatial Services (2023) Aerial Mosaic: MAC (2022-2020)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Approximate Extent of Existing/Approved Surface Development
- Modification Area
- No Disturbance Proposed
- Subject Area

Aboriginal Cultural Heritage Sites

- Isolated Find
- Artefact Scatter
- Previously Recorded Site (listed as destroyed)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Location of Aboriginal Cultural Heritage Sites within the Modification Area

Figure 6-12

HVEC would implement the management and mitigation measures described in Appendix E, which were detailed in the draft ACHA provided to Aboriginal stakeholders for comment and are consistent with the protocols of the existing AHMP.

Aboriginal Heritage Management Plan

The existing AHMP would be reviewed and, where necessary, updated to incorporate the extent of the Modification Area. The updated AHMP would also incorporate the recommended mitigation and management measures for the sites identified in the Modification Area, in consultation with the Aboriginal stakeholders and Heritage NSW.

Site Specific Management Measures

For those areas where Aboriginal cultural heritage sites would be subject to direct surface disturbance as a result of the Modification, a surface collection program prior to surface disturbance as part of the AHMP was recommended by Niche (2023) for the three sites within the Modification Area.

Niche (2023) has also recommended temporary fencing of RPS MAC GG 1038 to avoid any indirect impacts.

General Measures

Where the above specific mitigation and management measures are not applicable, a number of general measures have been formulated in consultation with Aboriginal stakeholders to mitigate impacts, including:

- Ongoing consultation with Aboriginal stakeholders for the life of further operations at the Mt Arthur Coal Mine, in accordance with the AHMP.
- All employees should complete relevant mandatory Aboriginal cultural heritage training and follow the Permit to Disturb procedure during works within the Modification Area.
- In the event that previously unrecorded sites are discovered at any time during disturbance activities within the Modification Area, the protocol for the management of previously unrecorded sites as detailed in Section 9.6 of the AHMP must be followed.
- In the event that human skeletal remains are discovered at any time during disturbance activities within the Modification Area, the protocol for the discovery of human remains (Section 9.7 of the AHMP) must be followed.

6.10 LANDSCAPE AND VISUAL CHARACTER

A Landscape and Visual Impact Assessment has been prepared for the Modification and is presented in Appendix F.

The Landscape and Visual Impact Assessment was prepared on the basis that the Modification would result in lower landform heights leading to no increase in visual impact compared to the approved Mt Arthur Coal Mine. The Landscape and Visual Impact Assessment was informed by visual simulations prepared by Truescape Pty Ltd (Truescape).

The methodology for preparing the Landscape and Visual Impact Assessment is described in Section 6.10.1. A description of the existing visual setting of the Modification is provided in Section 6.10.2. A description of the potential visual impacts of the Modification is provided in Section 6.10.3 and Section 6.10.4 outlines the visual impact mitigation and management measures.

6.10.1 Methodology

The potential visual impacts were assessed by evaluating the visual magnitude of changes associated with the Modification in the context of the visual sensitivity of relevant surrounding land use areas (i.e. those areas in which the Mt Arthur Coal Mine may be visible).

Visual (viewer) sensitivity is a measure to which a land use area is susceptible to the proposed change (Appendix F). The method of use of a land use area is also considered to result in various sensitivity levels.

Visual magnitude is defined as the measurement of the scale, size and character of a proposed development when compared to the existing environment (Appendix F).

Combined with sensitivity, visual magnitude provides a measurement of impact (Appendix F). The level of visual impact resulting from visual sensitivity and magnitude was determined in consideration of the matrix presented in Table 6-19.

An analysis was undertaken to identify sensitive viewpoints in the vicinity of the Mt Arthur Coal Mine. Six viewpoints were originally identified and assessed by Integral Landscape Architecture & Visual Planning (Integral) (2009) for the Consolidation Project, and were similarly assessed by Urbis Pty Ltd (Urbis) (2013) as part of Modification 1.

Table 6-19
Visual Impact Matrix

Visual Sensitivity \ Visual Magnitude	H	M	L	N
H	H	H-M	M	N
M	H-M	M	M-L	N
L	M	M-L	L	N
N	N	N	N	N

Note: H = High, H-M = High to Moderate, M = Moderate, M-L = Moderate to Low, L = Low, N = Negligible
Source: Appendix F

The same six viewpoints were assessed within Appendix F to allow for consistency and comparative purposes.

For the purposes of the Landscape and Visual Impact Assessment, visual sensitivity and visual magnitude was assessed for the Modification which incorporates the existing (and proposed) Mt Arthur Coal Mine and the Modification Area.

6.10.2 Existing Environment

The Mt Arthur Coal Mine and surrounds comprise a number of distinct land uses and landforms of varying levels of landscape quality. These include existing mining operations, existing and proposed renewable energy projects, agricultural and rural areas, commercial, industrial and residential area as well as conservation areas (Appendix F). As with most of the Hunter Valley (other than for ruggedly steep areas), the natural vegetation in and around these areas had been predominantly cleared for a variety of agricultural purposes prior to mining (Appendix F).

Land use and key landscape features that contribute to the visual character and scenic quality are detailed below in the context of the following visual settings (Figure 6-13):

- Regional Setting – land use and key landscape features located greater than approximately 5 km from the surface disturbance extent (incorporating the Modification Area) of the Mt Arthur Coal Mine.
- Sub-regional Setting – land use and key landscape features located 1 to 5 km from the surface disturbance extent (incorporating the Modification Area) of the Mt Arthur Coal Mine.
- Local Setting – land use and key landscape features located less than 1 km from existing surface disturbance extent (incorporating the Modification Area) of the Mt Arthur Coal Mine.

Regional Setting

The regional setting of the Modification possesses attributes of moderate to high scenic quality as it consists of several significant topographic features including mountain ranges and hills bordering the alluvial lands of the Hunter River (Appendix F).

The regional setting also has attributes of low scenic quality due to the presence of existing mining operations, such as the Mount Pleasant Operation, and cleared agricultural areas associated with the Hunter River Floodplain (Appendix F).

Muswellbrook (overlapping both the regional and sub-regional setting) is the largest and nearest township located approximately 5 km from the Mt Arthur Coal Mine, including the South Muswellbrook residential area (Appendix F).

Sub-regional Setting

The sub-regional setting has attributes of low scenic quality due to the presence of relatively flat, cleared land previously disturbed for agricultural purposes as well as the limited scenic attraction associated with the surrounding mining operations (Appendix F).

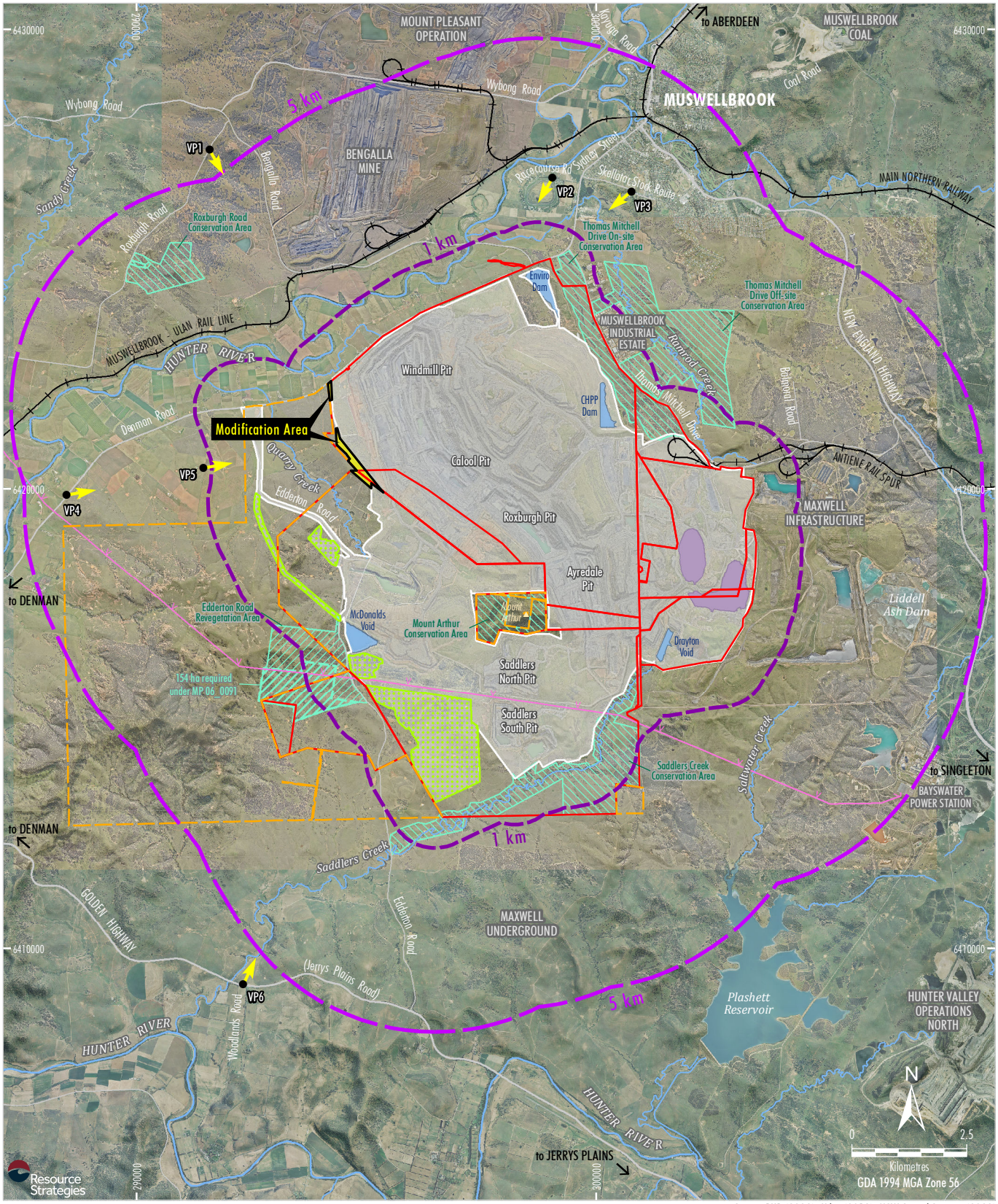
The sub-regional setting also possesses attributes of high scenic quality encompassing the mountain ridges bordering the Hunter River Floodplain (Appendix F).

Local Setting

Within the local setting, the landscape is limited to historically cleared grasslands as well as an array of slight slopes and hills. The exception to this is the summit of Mount Arthur, located within a designated conservation area in the centre of the Mt Arthur Coal Mine and is characterised by steep slopes comprising remnant woodland and forest landscapes (Appendix F).

The summit of Mount Arthur is elevated relative to the surrounding landscape and is the dominant topographic feature within the local and sub-regional vicinity of the Mt Arthur Coal Mine (Appendix F).

Considering the above, the local setting has a generally low scenic quality due to the limited key aesthetic features, with the exception of the remnant woodland associated with the summit of Mount Arthur which possesses relatively high scenic quality (Appendix F).



Source: BHP (2023); Urbis (2013); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing 500kV Electricity Transmission Line
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Tailings Storage Facility
- Water Storage
- Approximate Extent of Existing/Approved Surface Development
- Modification Area
- Impact Minimisation Area
- Viewpoint

Assessment Areas

- Local Setting (< 1 km)
- Sub-regional Setting (1 - 5 km)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Visual Settings

Figure 6-13

6.10.3 Potential Impacts

The key components of the Modification considered to have the potential to impact (positive and negative) on the visual landscape setting include (Appendix F):

- extension in open cut mining operations and overburden emplacement activities for an additional four years;
- minor extension of the approved disturbance area in the north-west corner of the operations (refer to Modification Area in Figure 6-13);
- overall reduction in approved disturbance as some previously approved disturbance areas are no longer intended to be disturbed (refer to Impact Minimisation Area within Figure 6-13); and
- revised final landform and final void configuration, including an overall reduction in the approved height of overburden emplacement areas and the final landform (to reflect the current actual height).

A description of the location of each viewpoint and potential views of the Mt Arthur Coal Mine is provided in Table 6-20. A summary of the potential visual impacts of the Modification is provided in Table 6-21.

Figures 6-14 to Figure 6-18 show the visual simulation images prepared by Truescape to demonstrate the potential visual impact of the Mt Arthur Coal Mine (incorporating the Modification Area) from five of the six viewpoints. The simulated images present potential views of existing operations from each viewpoint, where visual components would most likely contrast the existing setting.

Views of the existing Mt Arthur Coal Mine landforms from South Muswellbrook (VP3) would remain unchanged over the life of the Mt Artur Coal Mine, accordingly, simulations were not prepared for South Muswellbrook (VP3), however visual impacts for private residences in South Muswellbrook were still assessed (Appendix F).

Simulated images illustrating key mine stages (2026 and 2030) were included to represent the greatest potential for visual impact during these years. Final landform simulated images were also developed to illustrate the proposed change in land use position following cessation of mining and rehabilitation activities.

Summary of Visual Impact

Overall, the Modification would result in generally lower landforms and therefore reduced visual impacts compared to the approved Mt Arthur Coal Mine, as shown on Figures 6-14 to 6-18. Accordingly, the Modification results in a negligible visual impact from all viewpoints (Table 6-21) (Appendix F).

The Modification involves the continuation of mining for an additional four years (i.e. until 2030), leading to a continuation of available views of the approved Mt Arthur Coal Mine, which has been previously assessed by Integral (2009) and Urbis (2013).

Accordingly, whilst the Modification would have a negligible change in visual impact compared to approved operations, the Modification would ultimately lead to a delay in rehabilitation establishment.

Night-Lighting

Night-lighting impacts from the Modification were assessed on an incremental basis only, and are summarised below.

Direct Night-Lighting

It is not expected there would be any direct views of night-lighting sources from public roads and residential areas as a result of the Modification due to the distance of sensitive receivers as well as surrounding elevated areas obscuring these views. However, the Modification would result in a delay to the cessation of night-lighting due to the four year mine life extension (Appendix F).

Measures to mitigate potential impacts from direct night-lighting are discussed in Section 6.10.4.

Indirect Night-Lighting

Sky glow from the Modification has the potential to occur as a result of vehicle lights and stationary work lights. During times of high cloud cover, some reflection off the cloud base could result in further sky glow (Appendix F).

Lighting of night-time work is essential for the safety of personnel operating at the Mt Arthur Coal Mine.

The intensity, nature and degree of night-lighting for the Modification would be similar to existing night-lighting at the approved Mt Arthur Coal Mine, as well as surrounding mining operations (Appendix F). However, the Modification would result in a delay in the cessation of indirect night-lighting due to the four-year extension in mine life.

Table 6-20
Location of Viewpoints

Viewpoint	Easting	Northing	Description	Visual Setting*	Potential View of the Modification
VP1 (Roxburgh Road)	291585	6427384	Representative of potential views experienced by people travelling along Roxburgh Road.	Regional (approximately 5.6 km north of the Mt Arthur Coal Mine)	Distant views of the Mt Arthur Coal Mine are available from portions of Roxburgh Road (due to its higher elevation than surrounding areas).
VP2 (Racecourse Road)	299049	6426771	Representative of potential views from the northern perimeter of the racetrack on Racecourse Road.	Sub-regional (approximately 2.5 km north-east of the Mt Arthur Coal Mine)	Partial views of the Mt Arthur Coal Mine are available, however existing rehabilitation present reduces the visual impact of the Mt Arthur Coal Mine landforms.
VP3 (South Muswellbrook)	300765	6426470	Representative of potential views from the residential margin of South Muswellbrook.	Sub-regional (approximately 3.3 km north-east of the Mt Arthur Coal Mine)	Distant views of the Mt Arthur Coal Mine are available where intervening topography permits.
VP4 (Denman Road)	288487	6419850	Representative of potential views from Denman Road approaching from the west.	Sub-regional (approximately 4 km west of the Mt Arthur Coal Mine)	Portions of the Mt Arthur Coal Mine can be distantly seen when travelling east along Denman Road, where topography and vegetation allows. Existing bunds located along Denman Road inhibit views of the Mt Arthur Coal Mine, however partial views are available of the Mt Arthur Coal Mine northern emplacement areas when travelling directly north of the Mt Arthur Coal Mine along Denman Road in the local setting.
VP5 (Roxburgh Vineyard)	291461	6420444	Representative of potential views from Roxburgh Vineyards which has an elevated location.	Sub-regional (approximately 1.5 km west of the Mt Arthur Coal Mine)	Distant views of Mt Arthur Coal Mine are available from Roxburgh Vineyard.
VP6 (Golden Highway)	292321	6409215	Representative of potential view from the Golden Highway adjacent to Saddlers Creek.	Regional (approximately 6 km south-west of the Modification)	Views of the Mt Arthur Coal Mine are obscured by existing vegetation located along portions of the Golden Highway.

* Based on distance from the viewpoints to the closest approved surface disturbance extent of the Mt Arthur Coal Mine.
Source: Appendix F.

Table 6-21
Summary of Visual Impacts of the Modification

Viewpoint	Visual Sensitivity	Visual Magnitude	Visual Impact
Roxburgh Road (VP1)	Low	Negligible	Negligible
Racecourse Road (VP2)	Low	Negligible	Negligible
South Muswellbrook (VP3)	High	Negligible	Negligible
Denman Road (VP4)	Low	Negligible	Negligible
Roxburgh Vineyard (VP5)	Moderate	Negligible	Negligible
Golden Highway (VP6)	Low	Negligible	Negligible

Source: Appendix F.

HVE-19-09 MOD2_ ModReport_Section 6_005A

Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Roxburgh Road (VP1)
Visual Simulation

Figure 6-14

HVE-19-09 MOD2_ ModReport_Section 6_003A

Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Racecourse Road (VP2)
Visual Simulation

Figure 6-15

HVE-19-09 MOD2_ModReport_Section 6_004B

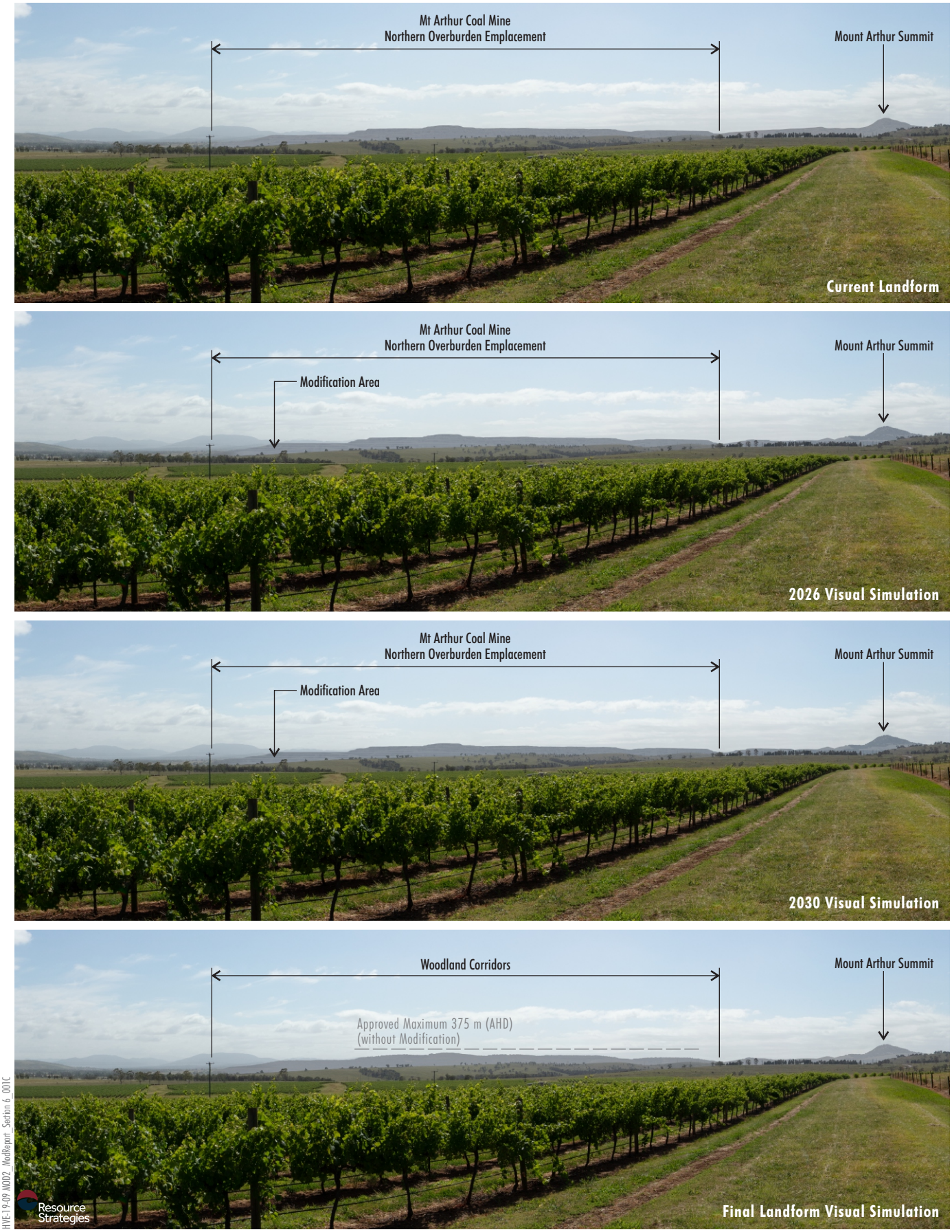
Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Denman Road (VP4)
Visual Simulation

Figure 6-16



HVE-19-09 MOD2_ModReport_Section 6_001C

Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Roxburgh Vineyard (VP5)
Visual Simulation

Figure 6-17

HVE-19-09 MOD2_ModReport_Section 6_002A

Resource Strategies

Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Golden Highway (VP6)
Visual Simulation

Figure 6-18

6.10.4 Mitigation and Management Measures

The mitigation and management measures that would be implemented for the maintenance of visual amenity for the Modification are described below.

Progressive Rehabilitation

Progressive rehabilitation would continue to be undertaken over the life of the Modification (until 2030) and in subsequent years, whereby rehabilitation and landform shaping would be conducted to create a landform suitable for the proposed land use areas (Section 3). Progressive rehabilitation and landform shaping would assist in reducing the contrast between waste rock emplacements and the surrounding environment, and would be conducted consistent with existing operations and the RMP, Rehabilitation Strategy (BHP, 2023a) and the Annual Forward Program.

Vegetative Screening

Existing vegetative screening employed by HVEC is located along portions of main and local roads in the vicinity of the Mt Arthur Coal Mine (i.e. Thomas Mitchell Drive, Edderton Road and Denman Road) and partially screen views of the Mt Arthur Coal Mine. Maintenance of existing vegetative screening would continue to be undertaken in these areas over the life of the Modification in accordance with the existing Visual Impacts Management Report (AECOM, 2015).

Night-Lighting

Measures that would be employed to mitigate potential impacts from night-lighting would include the following, consistent with existing operations (as per condition 52 of MP 09_0062) and the Visual Impacts Management Report (AECOM, 2015):

- Ensure that all external lighting associated with the Modification complies with relevant Australian Standards, including *Australian/New Zealand Standard AS/NZS 4282:2019 – Control of the obtrusive effects of outdoor lighting*.
- Restriction of night-lighting to the minimum required for operations and safety requirements.
- Use of directional lighting techniques to direct light away from sensitive viewpoints and ensuring no outdoor lights shine above the horizontal.
- Use of light shields to limit the spill of lighting. Additional mitigation measures at surrounding residences such as screening, may be developed in consultation with individual landholders, if required.

6.11 SURFACE WATER

A Surface Water Assessment has been prepared by ATC Williams (2023) for the Modification and is presented in Appendix G.

Section 6.11.2 provides a description of the existing surface water environment surrounding the Mt Arthur Coal Mine. Section 6.11.3 describes the potential impacts of the Modification on surface water resources, and Section 6.11.4 outlines mitigation and management measures for the Modification.

6.11.1 Existing Environment

Background

The potential impacts on local and regional surface water resources of the Mt Arthur Coal Mine were initially assessed by Dames and Moore (2000) as part of the *Mount Arthur North Coal Project Environmental Impact Statement* (Coal Operations Australia Limited [COA], 2000).

Subsequent to the *Mount Arthur North Coal Project Environmental Impact Statement* (COA, 2000), a number of additional studies have been undertaken to assess the potential impacts on local and regional surface water resources of the Mt Arthur Coal Mine, including surface water assessments prepared by Gilbert & Associates (2009; 2013) for the Consolidation Project and Modification 1.

Regional Hydrology

The Mt Arthur Coal Mine is located wholly within the Hunter River catchment, which is one of the six major regulated river basins in NSW and has a catchment area of approximately 22,000 square kilometres (km^2). Flow regulation in the Hunter River is provided by three main water storages; Glenbawn Dam, Glennies Creek and Lostock Dam. Glenbawn Dam also provides flood mitigation in the Hunter River with a substantial reserve storage held for this purpose (Appendix G).

Local Hydrology

Surface drainage generally consists of ephemeral creeks flowing north and south-westwards, discharging to the Hunter River. Quarry Creek and Ramrod Creek flow northwards to the Hunter River within and adjacent to existing mining operations. Saddlers Creek flows generally to the south-west and joins the Hunter River downstream of Denman (Appendix G).

The local watercourses are first order streams, with the exception of the headwaters of Saddlers Creek which are first and second order (Appendix G).

The catchments of several watercourses have previously been modified by the mining operations including Quarry Creek, Whites Creek and Ramrod Creek (Appendix G).

Flooding

An alluvial cut-off wall and flood levee has been constructed adjacent to the Windmill open cut pit, parallel to Denman Road, as shown on Figure 3-3. A flood study of the Hunter River, undertaken by Golder Associates (2018), predicted a Probable Maximum Precipitation flood level of approximately 135 m AHD in the vicinity of the cut-off wall and flood levee. ATC Williams (2023) concluded that the minimum crest elevation of the alluvial cut-off wall and flood levee is 136 m AHD. Accordingly, the risk of flood ingress to the open cut operations is extremely low (Appendix G).

Surface Water Quality

Surface water quality monitoring for the Mt Arthur Coal Mine is undertaken in accordance with the Mt Arthur Coal Water Management Plan (BHP, 2023d) (WMP). To assess environmental management performance of the Mt Arthur Coal Mine in relation to surface water resources, water quality monitoring data is recorded at the statutory monitoring sites shown on Figure 6-19 and reviewed against the relevant trigger level values (Appendix G).

ATC Williams (2023) undertook a review of the relevant surface monitoring data from 2010 to present. The median pH in local creeks has a tendency to trend towards neutral to slightly alkaline levels (Appendix G). Monitoring results for additional water quality parameters including EC and TSS are discussed in Appendix G.

Based on the water quality data presented in Appendix G, ATC Williams (2023) considered that the Mt Arthur Coal Mine has had no discernible impact on the water quality of adjacent watercourses, including the Hunter River.

Surface Water Compliance and Management

Hunter River Salinity Trading Scheme

The Hunter River Salinity Trading Scheme (HRSTS) is managed by the EPA under the *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002*.

The HRSTS prohibits the release of saline water during periods of low flow in the Hunter River, rather, allows for controlled releases of saline water during periods of high flow such that specific salinity targets at various points in the river are not exceeded (Appendix G).

The amount of saline water that may be discharged from a given discharge licence holder is determined by reference to the salinity of the discharge waters, the river flow, the number of credits held and any overriding limit that may be applied as a condition of an EPL (Appendix G).

HVEC currently holds 20 HRSTS discharge credits (Appendix G). As required, controlled release of water from the Environmental Dam to the Hunter River is undertaken in accordance with the HRSTS and EPL 11457 (Appendix G).

Surface Water Management System

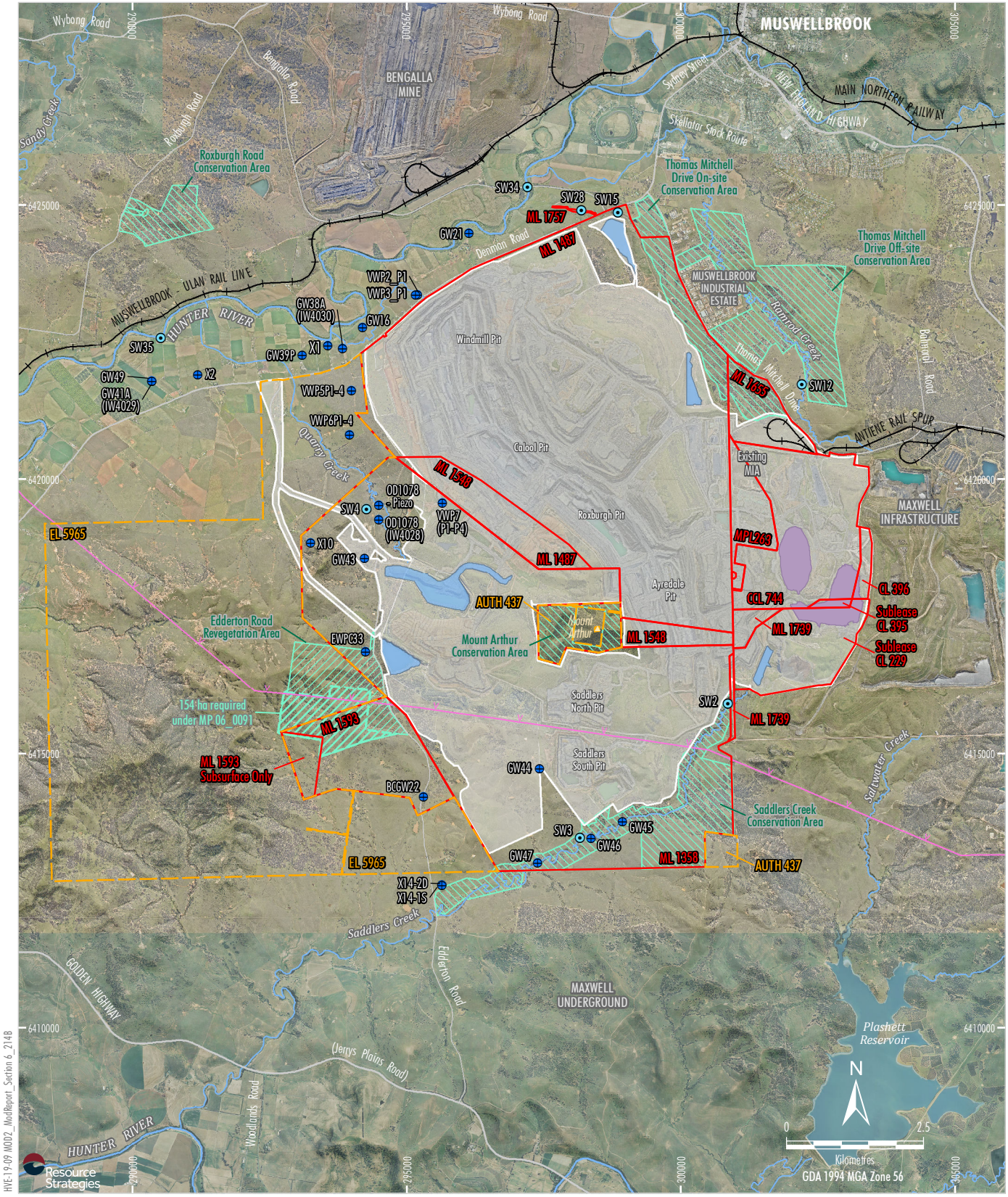
Surface water management at the Mt Arthur Coal Mine is undertaken in accordance with the WMP. A description of the existing site water management system is provided in Section 3.4 and presented on Figure 6-20.

The existing WMP includes a response plan which details protocols in the event that water monitoring results are identified as being unacceptable or exceed the relevant criteria (BHP, 2023d).

Modification 1 Site Water Balance

Gilbert & Associates (2013) developed a site water balance model as part of the Surface Water Assessment for Modification 1. The site water balance model simulated all the inflows, outflows, transfers and changes in storage of water on-site on a daily continuous basis from 2012 to 2026.

The site water balance model found that a majority of the Mt Arthur Coal Mine water demand was able to be sourced from site catchment runoff, with supply reliability predicted to be greater than 95% for all components of the Mt Arthur Coal Mine open cut operations (Gilbert & Associates, 2013).



Source: BHP (2023); HVEC (2019); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing 500kV Electricity Transmission Line
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approximate Extent of Existing/Approved Surface Development
- Tailings Storage Facility
- Water Storage

Monitoring Types

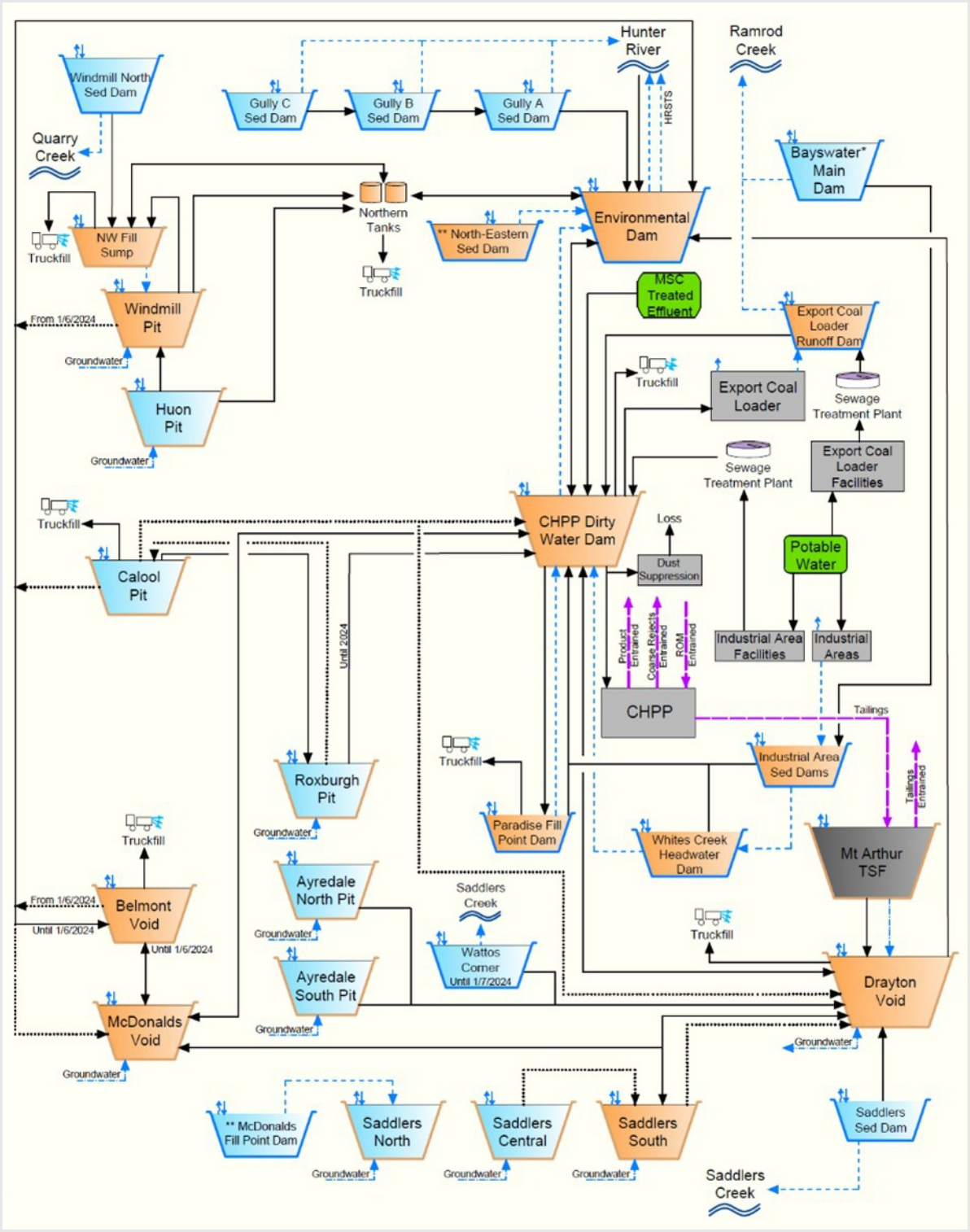
- Surface Water Monitoring Site
- Groundwater Monitoring Site

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Surface Water and Groundwater Monitoring Sites

Figure 6-19



* Includes North Cut TSF (decommissioned) and Wetland System
** Not explicitly modelled

Source: ATC Williams (2023)

LEGEND

- Dam Storage
- Excavated Storage
- Tailings Storage
- New Water Storage
- Mixed Water Storage
- Infrastructure
- Watercourse
- Future Pumped Flow
- Pumped Flow
- Gravity Flow
- Seepage Flow
- Material Flow
- Evaporation
- Rainfall/Runoff

Resource Strategies

HVE-19-09 MOD2_ModReport_Section 6_007A

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Mt Arthur Coal Mine
Water Management Schematic

Figure 6-20

Water demand required to be extracted from the Hunter River was predicted to be within the limits of licensed volumes for the majority of time, with the exception of extreme drought years (Gilbert & Associates, 2013).

In addition, the assessment showed that the Mt Arthur Coal Mine would be able to operate within the rules of the HRSTS (Gilbert & Associates, 2013).

6.11.2 Potential Impacts

Potential impacts on local and regional surface water resources associated with the Modification include (Appendix G):

- changes to flows in local creeks due to the proposed minor expansion of the open cut pit and subsequent capture and use of drainage from mine area catchments;
- potential for export of contaminants (principally sediments and soluble salts) in mine area runoff and accidental spills from contaminant storages (principally sediments, soluble salts, oils and greases), causing degradation of local and regional watercourses; and
- short-term increases in salinity in the Hunter River during periods of licensed controlled release under the HRSTS.

The above potential impacts in the Hunter River associated with the Modification are summarised below.

Flow Regime in Local Creeks

The Modification would comprise a net decrease in approved disturbance. As such, the total catchment area reporting to the mine water management system over the life of the Modification would be less than that currently approved (Appendix G). The effect of the Modification on the yield of local watercourses would therefore be less than that currently approved (Appendix G).

Post-mining, the final landforms would be rehabilitated, with most of the runoff from the former mining areas being restored to local creek catchments, with the exception of the voids. Because of the runoff being directed to the voids, the area to be excised from the Hunter River catchment post-closure is estimated at 25.7 km^2 (Appendix G).

As the total catchment area of the Hunter River at Denman is 4,530 km^2, the reduction equates to approximately 0.6% of the total catchment area of the Hunter River at Denman. The estimated resulting reduction in flow represents a small impact to flow in the Hunter River at Denman (Appendix G).

Surface Water Quality Impacts

Local Watercourses

Mine water and disturbed area runoff would continue to be directed to on-site storages for reuse. Controlled release would be undertaken from the Environmental Dam in accordance with the HRSTS and EPL 11457 (Appendix G).

Sediment laden runoff that is suitable for off-site release following treatment would be directed to sediment dams (Appendix G).

The site water balance predicted that overflows from the sediment dams are forecast to occur during wet weather when there is likely to be significant flow downstream (in the Hunter River and Saddlers Creek) (Appendix G). It is expected that overflow from the sediment dams would be highly diluted, and the impact of the sediment dam overflows on downstream water quality is likely to be negligible (Appendix G).

Hunter River

Controlled release from the Environmental Dam via 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 (Appendix G). An average annual licensed release volume of 432 megalitres is forecast according to the site water balance undertaken by ATC Williams (2023).

The controlled release from the Environmental Dam is estimated to result in a less than 1% increase in the EC of the Hunter River. Since the Environmental Dam typically contains low concentrations of environmentally significant metals, it is therefore considered that licensed release of water from the Environmental Dam is unlikely to result in significant impacts to the Hunter River (Appendix G).

Site Water Balance

ATC Williams (2023) updated the site water balance model for the Mt Arthur Coal Mine to reflect the Modification. The updated model simulates the volume of water held in and pumped between all simulated water storages. The updated water management schematic is shown on Figure 6-20.

The model operates on a maximum eight hourly time-step and simulates mining period up to the end of planned operations in June 2030 (Appendix G).

The updated site water balance model found that the majority of the Mt Arthur Coal Mine water demand was able to be sourced from site catchment runoff, with average volumetric supply reliability predicted to be greater than 99% for all components of the Mt Arthur Coal Mine (Appendix G).

The updated site water balance model showed that the Modification would result in a less reliance on extraction from the Hunter River when compared to that required for the currently approved operations (Appendix G).

Final Void

The final landform is proposed to comprise two remnant final voids: Northern Open Cut Void and McDonalds Void.

Post-mining inflows to the final void would comprise of direct rainfall, runoff, groundwater inflow and spoil seepage. Water would be lost from the final void through evaporation. Recovery of the regional groundwater levels was simulated as part of the Groundwater Assessment (Appendix H).

A final void water balance model was developed for the final void to predict the long-term behaviour of the final void water body. This modelling predicted that the final water level would be more than 130 m below the spill level at the Northern final void, and 24 m below the spill level at the McDonalds final void respectively. The salinity of void waters would slowly increase with time, as a result of ongoing slow migration of saline groundwater and flushing of residual salts from the overburden (Appendix G).

6.11.3 Mitigation and Management Measures

ATC Williams (2023) concluded that the current surface water monitoring program for the Mt Arthur Coal Mine is comprehensive and sufficient to enable potential surface water impacts associated with the Modification to be appropriately identified and managed (Appendix G).

The WMP would be reviewed, and if necessary, revised to incorporate the Modification.

6.12 GROUNDWATER

A Groundwater Assessment for the Modification has been prepared by SLR (2023) and is presented in Appendix H. The Groundwater Assessment has been peer reviewed by Brian Barnett (Jacobs) and the review report is also presented in Appendix H.

A description of the methodology of the groundwater assessment is provided in Section 6.12.1. Section 6.12.2 provides a description of the existing groundwater environment. The potential impacts of the Modification on groundwater resources are provided in Section 6.12.3, whilst the mitigation and management measures proposed are detailed in Section 6.12.4.

6.12.1 Methodology

The Groundwater Assessment (Appendix H) has been informed by the requirements of the following guidelines (but not limited):

- *Australian Groundwater Modelling Guidelines* (Barnett et al. 2012).
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council).
- *Groundwater Assessment Toolbox for Major Projects in NSW* (DPE, 2022f) and associated technical guidelines, including:
  - *Guidelines for Groundwater Documentation for SSD/SSI Projects*;
  - *Minimum Groundwater Modelling Requirements for SSD/SSI Projects*; and
  - *Cumulative Groundwater Impact Assessment Approaches*.
- *Information guidelines for proponents preparing coal seam gas and large coal mining development proposals* (IESC, 2018).
- *NSW Aquifer Interference Policy* (NSW Government, 2012) (AIP).

The Groundwater Assessment (Appendix H) has considered the requirements of relevant water sharing plans under the WM Act including:

- *Water Sharing Plan for the Hunter Regulated River Water Source 2016* (DPI, 2016a);
- *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (DPI, 2009); and
- *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016* (DPI, 2016b).

6.12.2 Existing Environment

Groundwater Management and Monitoring

Groundwater monitoring and management at the Mt Arthur Coal Mine is currently undertaken in accordance with the WMP.

The existing WMP includes a response plan which details protocols to be invoked in the event that water monitoring results are identified as being unacceptable or exceed the relevant criteria (BHP, 2023d).

Existing Hydrogeological Regime

A conceptual model of the groundwater regime has been developed by SLR based on review of the available hydrogeological data for the Mt Arthur Coal Mine and surrounds (Appendix H).

There are three main aquifers defined in the vicinity of the Mt Arthur Coal Mine (Appendix H):

- An unconfined aquifer associated with the unconsolidated alluvial and regolith deposits in the area surrounding the Hunter River and Saddlers Creek;
- A semi-confined to confined aquifer of low permeability associated with the Jurassic volcanics; and
- A semi-confined to confined aquifer associated with the Permian Coal Measures coal seams.

A summary of the local geology is provided below and presented on Figure 6-21. The geological cross-section A-A' is graphically presented on Figure 6-22.

Alluvial Aquifers

The Hunter River Alluvium is comprised of surficial silts and clays overlying basal sands and gravels. Groundwater flow within the Hunter River Alluvium generally follows the topography and Hunter River flow direction (west/south-westward past the northern Mt Arthur Coal Mine boundary) (Appendix H).

Recharge to the Hunter River Alluvium may occur from streamflow and direct rainfall infiltration. Discharge from the Hunter River Alluvium includes downwards leakage to the underlying Permian Coal Measures and via evapotranspiration when groundwater levels are recorded close to the surface (Appendix H). As described in Section 6.11.1, an alluvial cut off wall has been installed adjacent to the Windmill Pit.

Groundwater flow within the Saddlers Creek Alluvium also follows the topography, and the north-east to south-west flow direction in Saddlers Creek. Recharge to the alluvium may occur from discharges from the Saddlers Creek, direct infiltration of rainfall and via potential upward leakage from the underlying Coal Measures (Appendix H).

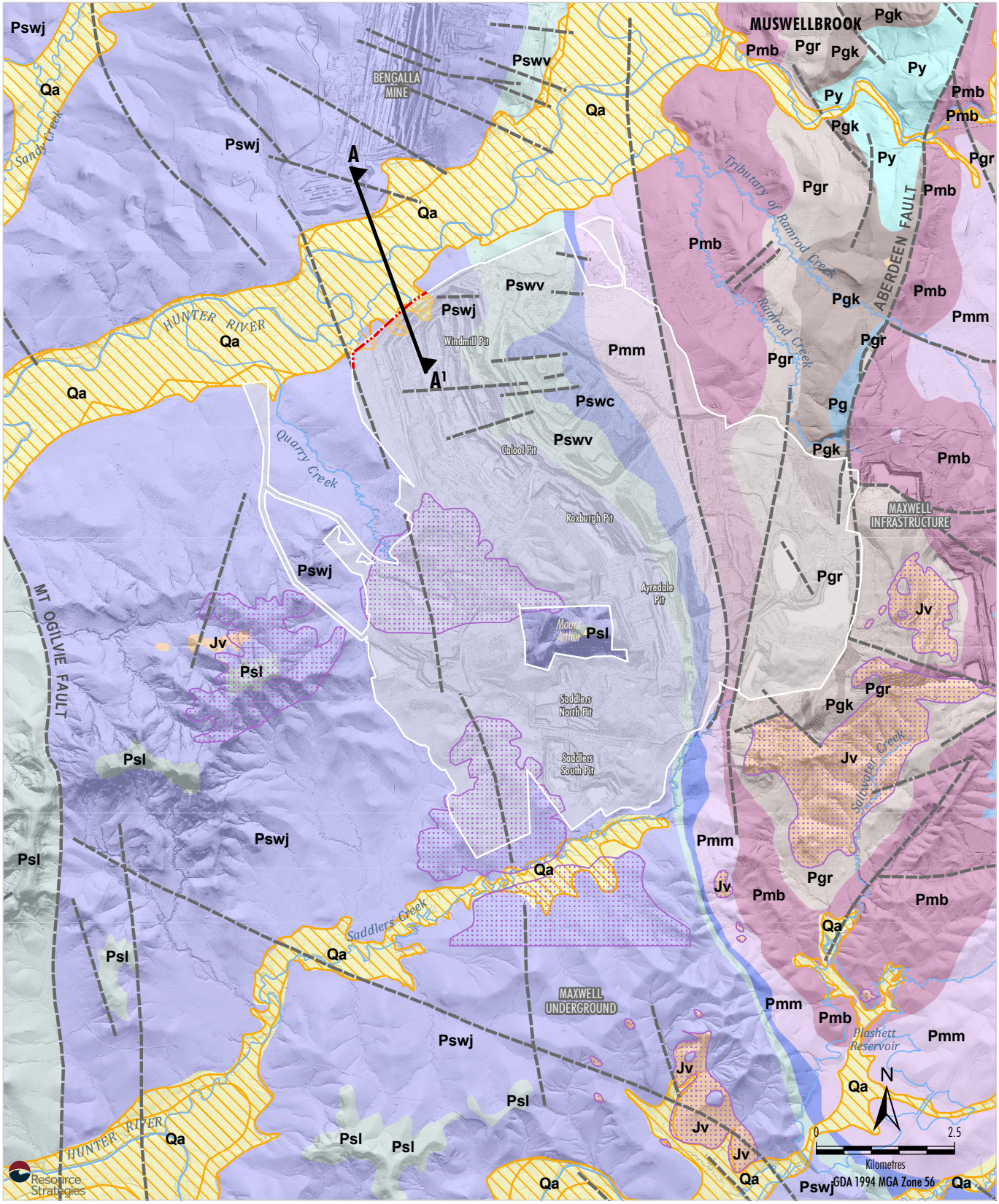
Regolith

The regolith (weathered shallow Permian bedrock) consists of sandy or silty-clayey lithology where coal seams outcrop or sub-crop, and a sandier lithology where the interburden units outcrop.

Permian Coal Measures

The Wittingham Coal Measures occurring at the Mt Arthur Coal Mine are comprised of interbedded sequences of sandstone, siltstone and coal. The coal seams are the main groundwater bearing units within the Permian sequences, with the lower permeability interburden generally confining the individual seams (Appendix H).

Regionally, groundwater within the Permian Coal Measures flows in a southerly direction, and locally groundwater flow patterns are modified by the influence of mining activities. The Permian Coal Measures are recharged from rainfall, downward seepage, and site water storage. Groundwater discharge is via mining inflows, private abstraction and, in localised areas outside of the extent of mine influence, potential upward seepage where hydraulic gradients enable this (Appendix H).



Source: BHP (2023); SLR (2023); NSW Spatial Services (2023)
Terrain: BHP (2022-2020)

LEGEND

- Approximate Extent of Existing/Approved Surface Development
- Existing Groundwater Cut-off Wall
- Sills Extent
- Alluvium Locally Mapped Extent
- Conceptual Model Cross-section

Refer to Figue 6-22 for cross-section.

Surface Geology

Qa	Quaternary Alluvium
Jv	Jurassic/Triassic Volcanics
Psl	Wollombi Coal Measures
Pswj	Jerrys Plains Subgroup
Pswv	Archerfield Ss., Vane Subgroup
Pswc	Saltwater Creek Formation
Pmm	Mulbring Siltstone
Pmb	Braxton Formation
Pgr	Greta Coal Measures (Skeletar)
Pgk	Greta Coal Measures (Sleletar)
Pg	Greta Coal Measures
Py	Gyarran Volcanics

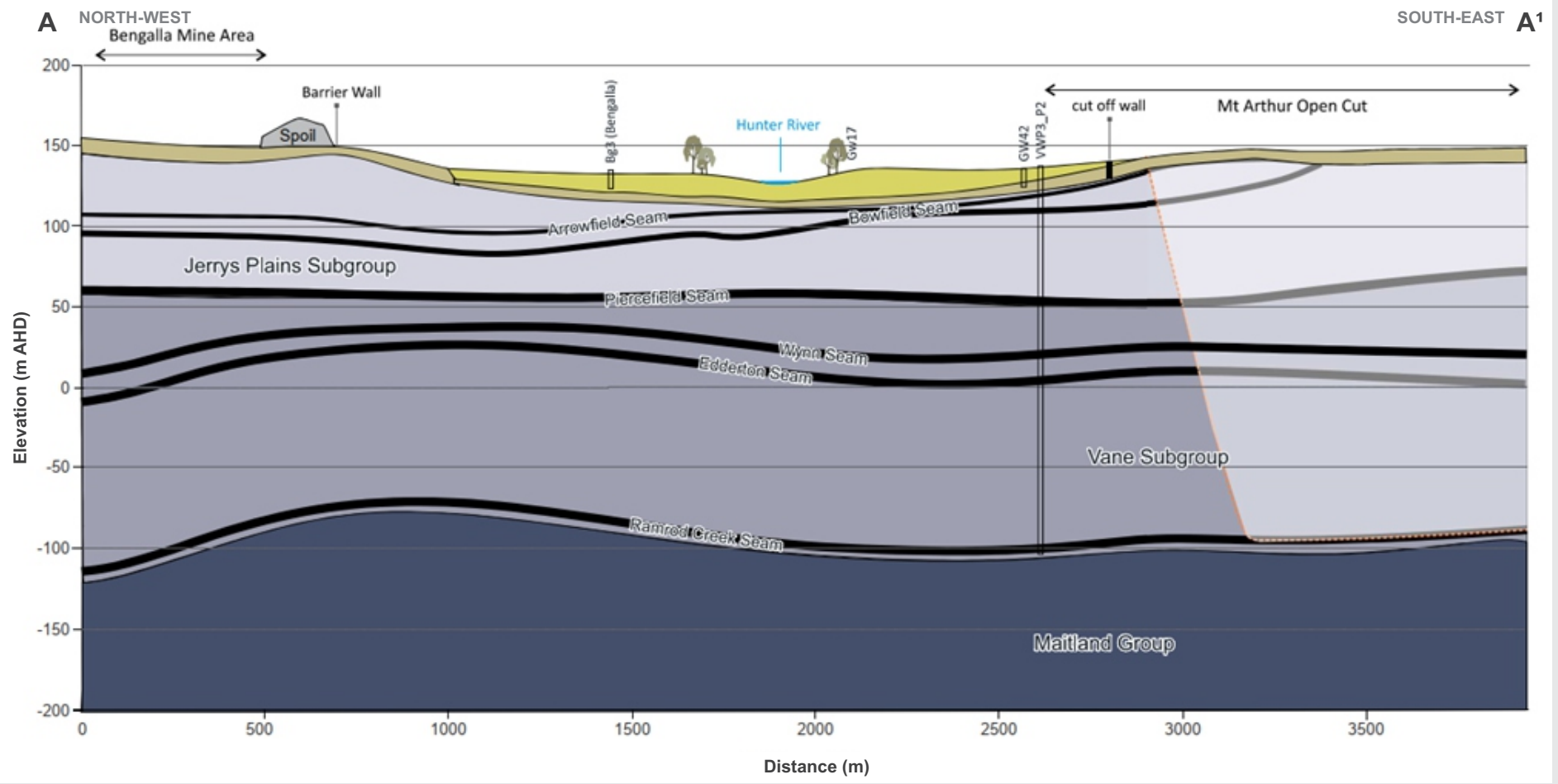
Fault

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Regional Geology at the Mt Arthur Coal Mine

Figure 6-21



Source: SLR (2023)

Resource Strategies

HVE-19-09 MOD2_ModReport_Section 6_008A

LEGEND
- Quaternary Alluvium
- Regolith
- Jerrys Plains Subgroup
- Vane Subgroup
- Maitland Group
- Coal
- Mine Area

Refer Figure 6-21 for cross-section location.

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Geological Cross-section A-A1
(Showing the Cut-off Wall between the Hunter River Alluvium and Existing Mt Arthur Coal Mine)

Figure 6-22

Groundwater Quality

An analysis of groundwater quality attributes at the Mt Arthur Coal Mine and surrounds is provided in Appendix H and includes analysis of the following attributes by SLR (2023):

- physico-chemical indicators – pH and salinity (as total dissolved solids [TDS]);
- major ions – calcium, sodium, magnesium, potassium, sulphate, chloride, carbonate and bicarbonate, and
- metal and metalloid concentrations.

The Mt Arthur Coal Mine groundwater monitoring network including bores installed in the Hunter River Alluvium, Saddlers Creek Alluvium and Wittingham Coal Measures are shown on Figure 6-19.

Salinity is a key constraint to water management and groundwater use. Baseline groundwater salinity is analysed in Appendix H and summarised below:

- groundwater salinity within the Hunter River Alluvium/Shallow Permian Coal Measures is of a fresh to moderately saline quality;
- the Saddlers Creek Alluvium and regolith near Saddlers Creek are generally moderately saline where saturated; and
- within the deeper Permian Coal Measures, most water samples show waters of a moderately saline nature.

Currently Approved Impacts

Australasian Groundwater & Environmental Consultants (AGE) (2009; 2013) developed a three-dimensional transient, groundwater flow model for the Mt Arthur Coal Mine in order to assess the potential cumulative impacts of the Mt Arthur Coal Mine and surrounding mining operations.

The numerical groundwater model incorporated the Mt Arthur Coal Mine (including the Mt Arthur Underground Mine) and the Bengalla Mine.

Pit inflows were predicted to average approximately 2.5 megalitres per day in 2026 (AGE, 2013).

AGE (2013) also predicted that three bores on HVEC-owned land in Permian aquifers would observe drawdowns in excess of 2 m. No private bores in alluvium were predicted to be impacted.

6.12.3 Potential Impacts

Groundwater Model

Numerical modelling was undertaken in support of the Groundwater Assessment for the Modification to evaluate the potential impacts of the Modification on the local groundwater regime (Appendix H).

The numerical groundwater model was developed based on the conceptual groundwater model using a Geographic Information System in conjunction with MODFLOW-USG.

Calibration of the model was carried out with the objective being to replicate the groundwater levels measured in the Bengalla, Mount Pleasant, Maxwell, Spur Hill and the Mt Arthur Coal monitoring networks, and available government and privately-owned bores, in accordance with *Australian Groundwater Modelling Guidelines* (Barnett et al., 2012) (Appendix H).

Transient predictive modelling was undertaken to simulate both the proposed mining at the Modification and surrounding mines.

Groundwater Inflows

The groundwater modelling shows that inflows for the Modification are predicted to peak in 2028 and 2029 to approximately 547.2 megalitres per year (ML/yr), and reducing until the proposed revised end of mining in 2030 (Appendix H).

Predicted Maximum Drawdown

The process of mining reduces water levels in surrounding groundwater units due to interception of groundwater in the mined geology, which is referred to as drawdown (Appendix H). Drawdown is greatest at the working coal-face, and generally, gradually decreases with distance from the mining operations (Appendix H).

Maximum drawdown due to the Modification is obtained by comparing the difference in groundwater levels for different aquifers in the approved mine model run and the Modification model run, and is referred to as incremental drawdown (Appendix H).

No incremental drawdown impacts are predicted for the alluvium or regolith as a result of the Modification (Appendix H).

The coal seams are the primary groundwater bearing units intercepted, and would experience drawdown as a direct result of mining within the Modification Area. The Ramrod Creek Seam is the deepest seam targeted by open cut mining operations at the Mt Arthur Coal Mine and therefore shows the greatest extent of drawdown (Appendix H).

Figure 6-23 shows the maximum predicted incremental drawdown associated with the Modification for the Ramrod Creek Seam. The extent of maximum predicted incremental drawdown in the Ramrod Creek Seam extends approximately 700 m west from the existing Mt Arthur Coal Mine boundary near Windmill Pit, and approximately 1 km west of the Roxburgh Pit (Appendix H). There are no private bores within the incremental drawdown area.

Incidental Water Impacts

A cut-off wall has been constructed to minimise the movement of groundwater from the Hunter River alluvium into the active Mt Arthur Coal mining areas. The model predicted that there is no predicted loss of water from the alluvium as a result of the Modification during operations (Appendix H).

The model also predicted that there is no change in net flow in the Hunter River, Goulburn River, Saddlers Creek, Ramrod Creek, Whites Gully or other minor creeks due to the Modification during operations (Appendix H).

Groundwater Quality

As the mining operations progress, the significant inward hydraulic flow gradients from the out-of-pit waste rock emplacement areas to the active open cut void would inhibit any outwards seepage to surrounding groundwater environment, including to the alluvium and regolith, and any seepage originating from the in-pit waste rock emplacement areas would be captured within the pit voids and managed under the existing mine water management system under the WMP (Appendix H).

Following the cessation of mining operations at the Mt Arthur Coal Mine (June 2030), water within the Northern Open Cut Void and McDonalds Void would evaporate and draw in groundwater from the surrounding strata and runoff from the final landform catchment areas, which would overtime concentrate salts in the water bodies (Appendix H).

Post-mining water quality modelling undertaken by SLR (2023) indicated that the gradual increase in salinity of the residual void water bodies would not pose a risk to the surrounding groundwater regime as both the Northern Open Cut Void and the McDonalds Void would remain as groundwater hydraulic sinks in perpetuity (Appendix H).

Post-Mining – Final Voids

Post-mining groundwater impacts at the Mt Arthur Coal Mine were investigated by SLR (2023) with a numerical groundwater recovery model developed for the proposed final landform (Appendix H).

There are periods of variable groundwater inflows predicted by the groundwater model in the first 50 years post-mining when groundwater levels remain suppressed. The groundwater inflows to the voids are predicted to stabilise between 200 to 600 years post closure (Appendix H).

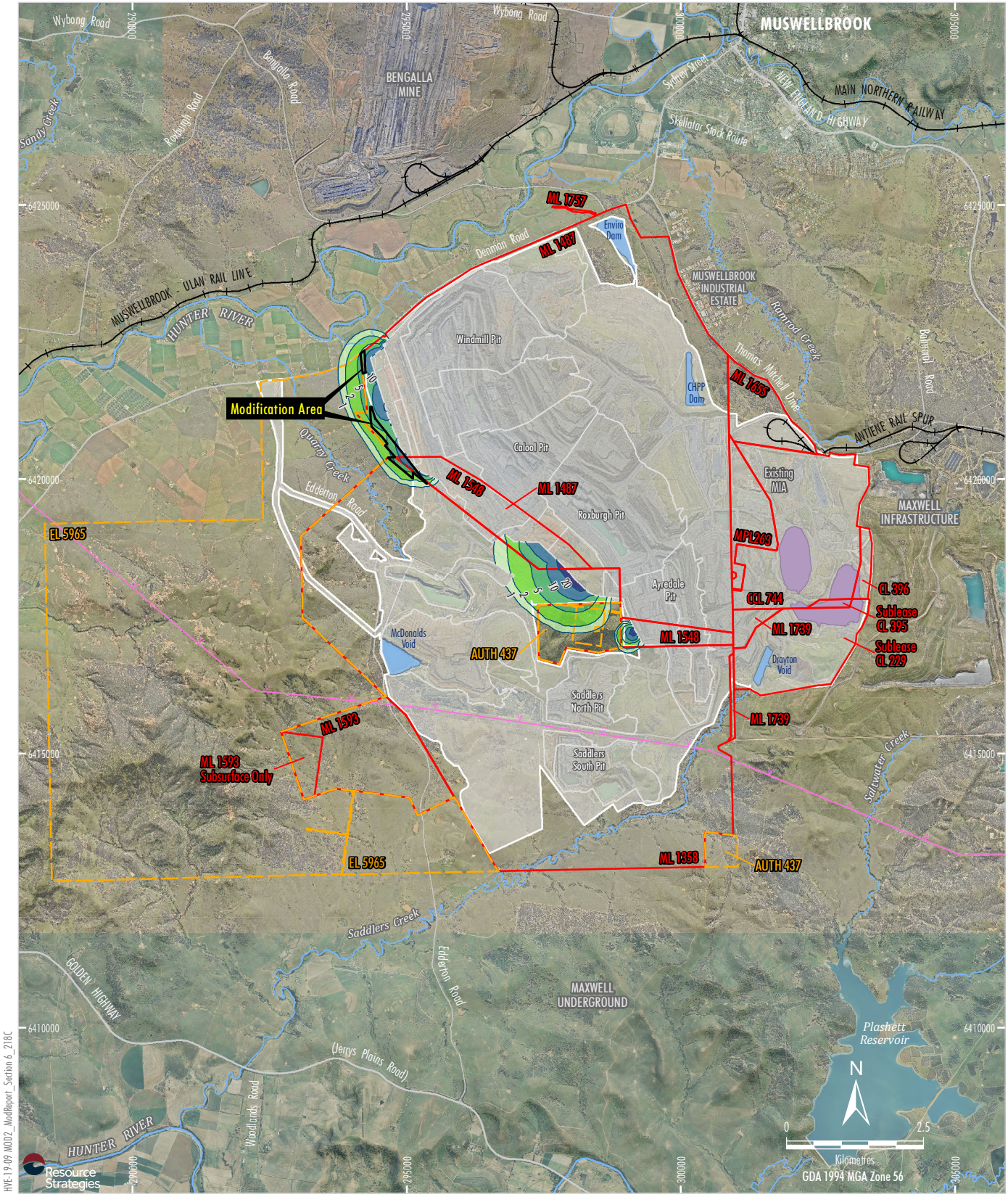
The model also showed the final void water levels would recover to a level well below the maximum storage elevation level (Appendix H).

A final void water balance model was also developed as part of the Surface Water Assessment and is described in Section 6.11.3.

Groundwater Dependent Ecosystems

As described above, the main productive aquifer in the area is the Hunter alluvium, however SLR (2023) predicts no incremental drawdown impacts for the alluvium. The extent of maximum predicted incremental drawdown in the lower Permian aquifer extends only approximately 700 m to 1 km west of open cut pit (SLR, 2023).

SLR has also assembled desktop GDE mapping from various sources. The limited extent of predicted maximum incremental drawdown in the lower Permian aquifer does not show any areas of potential GDEs which are expected to experience drawdowns as a result of the Modification (SLR, 2023).



HVE-19-09 MOD2_ModReport_Section 6_218C

Source: BHP (2023); SLR (2023); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Existing 500kV Electricity Transmission Line
- Approximate Extent of Existing/Approved Surface Development
- Tailings Storage Facility
- Water Storage
- Modification Area
- Incremental Drawdown Contour (m)
  - 0 - 1 m Drawdown
  - 1 - 2 m Drawdown
  - 2 - 5 m Drawdown
  - 5 - 10 m Drawdown
  - 10 - 20 m Drawdown

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Predicted Maximum Incremental Drawdown in Ramrod Creek Seam due to the Modification

Figure 6-23

Aquifer Interference Policy Minimal Impact Considerations

The AIP establishes minimal impact considerations for "highly productive groundwater" and "less productive groundwater".

The main highly productive groundwater source in the vicinity of the Modification is the Hunter Regulated River Alluvial Water Source (upstream Glennies Creek Management Zone). The Modification has been compared against the Level 1 minimal impact considerations defined in the AIP as follows (Appendix H):

- There is no incremental drawdown in the alluvial aquifers of greater than 2 m.
- There is minimal predicted take from this water source.
- The Modification does not result in any new or increased mechanism for water quality impacts relative to the approved Mt Arthur Coal Mine.

6.12.4 Mitigation and Management Measures

Groundwater Licensing

HVEC currently holds adequate licences to account for the potential incremental increase in take of water associated with the Modification (during operations) (Appendix H). Prior to the end of mining in 2030, HVEC would use the updated groundwater model to calculate the post-mining take of water from the Mt Arthur Coal Mine.

Water Management Plan

The existing WMP, including the Groundwater Monitoring Program and response plan, would be revised to reflect the Modification and the requirements of any associated water licences (subject to the conditions of MP 09_0062).

Groundwater Monitoring

Groundwater monitoring is conducted at the Mt Arthur Coal Mine in accordance with the Groundwater Monitoring Program. The Groundwater Monitoring Program would continue throughout the life of the Modification.

Groundwater quality sampling of existing monitoring bores would continue in order to detect any changes in groundwater quality during mining (Appendix H).

Alluvial Cut-Off Wall

A bentonite cut-off wall was installed at the Mt Arthur Coal Mine in 2013 and 2014 to provide a sub-surface physical barrier between Mt Arthur Coal operations and the Hunter River Alluvium to the immediate north (Appendix H). In 2021, the cut off wall was extended further to the west past the extent of proposed future mining, to minimise the movement of groundwater from the Hunter River alluvium into the active mining pit (Figure 3-3 and Figure 6-21) (Appendix H).

Both groundwater monitoring results and the predictive modelling demonstrated the effectiveness of the cut-off wall throughout the life of the Modification and in the long-term post cessation of mining (Appendix H). Accordingly, SLR (2023) concluded that no additional mitigation measures are warranted for the alluvium.

6.13 ROAD TRANSPORT

A Road Transport Assessment for the Modification has been undertaken by TTPP and is presented in Appendix I.

Section 6.13.1 provides a description of the methodology used for the Road Transport Assessment. A description of the existing road network and traffic environment in the vicinity of the Mt Arthur Coal Mine is provided in Section 6.13.2.

Section 6.13.3 provides an assessment of the potential impacts of the Modification on the existing Mt Arthur Coal Mine road network, while Section 6.13.4 outlines the applicable mitigation and management measures, where relevant.

6.13.1 Methodology

The Road Transport Assessment (Appendix I) was conducted in accordance with the *Guide to Traffic Management* (Austroads, 2020). Reference is also made to applicable Australian Standards and other Austroads guidelines, where relevant.

To quantify existing traffic conditions on roads of relevance to the Modification, a program of traffic surveys was conducted during June 2021 (prior to the introduction of COVID-19 related travel restrictions in NSW).

The survey program included automatic tube counts over seven days at the following locations (Figure 6-24) (Appendix I):

- Mt Arthur Coal Mine Main Access Road;
- Mt Arthur Coal Mine Bayswater Access Road;
- Mt Arthur Coal Mine Stage 2 Access Road;
- Denman Road north of Thomas Mitchell Drive;
- Edderton Road south of Denman Road;
- Thomas Mitchell Drive near Industrial Area; and
- Thomas Mitchell Drive west of Mt Arthur Access.

The survey conducted in 2021 is considered by TTPP (2023) to continue to be representative of road conditions to 2023.

Surveys of intersections were also undertaken under the survey program at the intersections of (Appendix I):

- Mt Arthur Coal Mine Main Access Road and Thomas Mitchell Drive;
- Mt Arthur Coal Mine Bayswater Access Road and Thomas Mitchell Drive;
- Thomas Mitchell Drive and Denman Road;
- Edderton Road and Mt Arthur Coal Mine Stage 2 Access Road; and
- Denman Road and Edderton Road.

The survey locations and the existing road network (as discussed below) are presented in Figure 6-24.

6.13.2 Existing Environment

Road Network

The following key roads are of relevance to the Mt Arthur Coal Mine (Figure 6-24) (Appendix I):

- New England Highway is the main north-south link through the Hunter Region and connects Muswellbrook and Newcastle as part of its route between Hexham and the Queensland Border.
- Golden Highway provides a link between New England Highway and Newell Highway at Dubbo.
- Denman Road forms the primary connection between the townships of Denman and Muswellbrook and provides a link between Golden Highway and New England Highway.
- Thomas Mitchell Drive provides a link between Denman Road and New England Highway to the south of Muswellbrook township, thus providing a bypass of Muswellbrook for some traffic and is signposted as an alternative route to Singleton from Denman Road.
- Edderton Road runs in a generally north-south alignment and provides a road connection between Golden Highway in the south and Denman Road in the north.

Existing Mine Access Roads

HVEC employs a total of approximately 2,200 FTE positions, who access the Mt Arthur Coal Mine from the following existing mine access routes (Figure 6-24) (Appendix I):

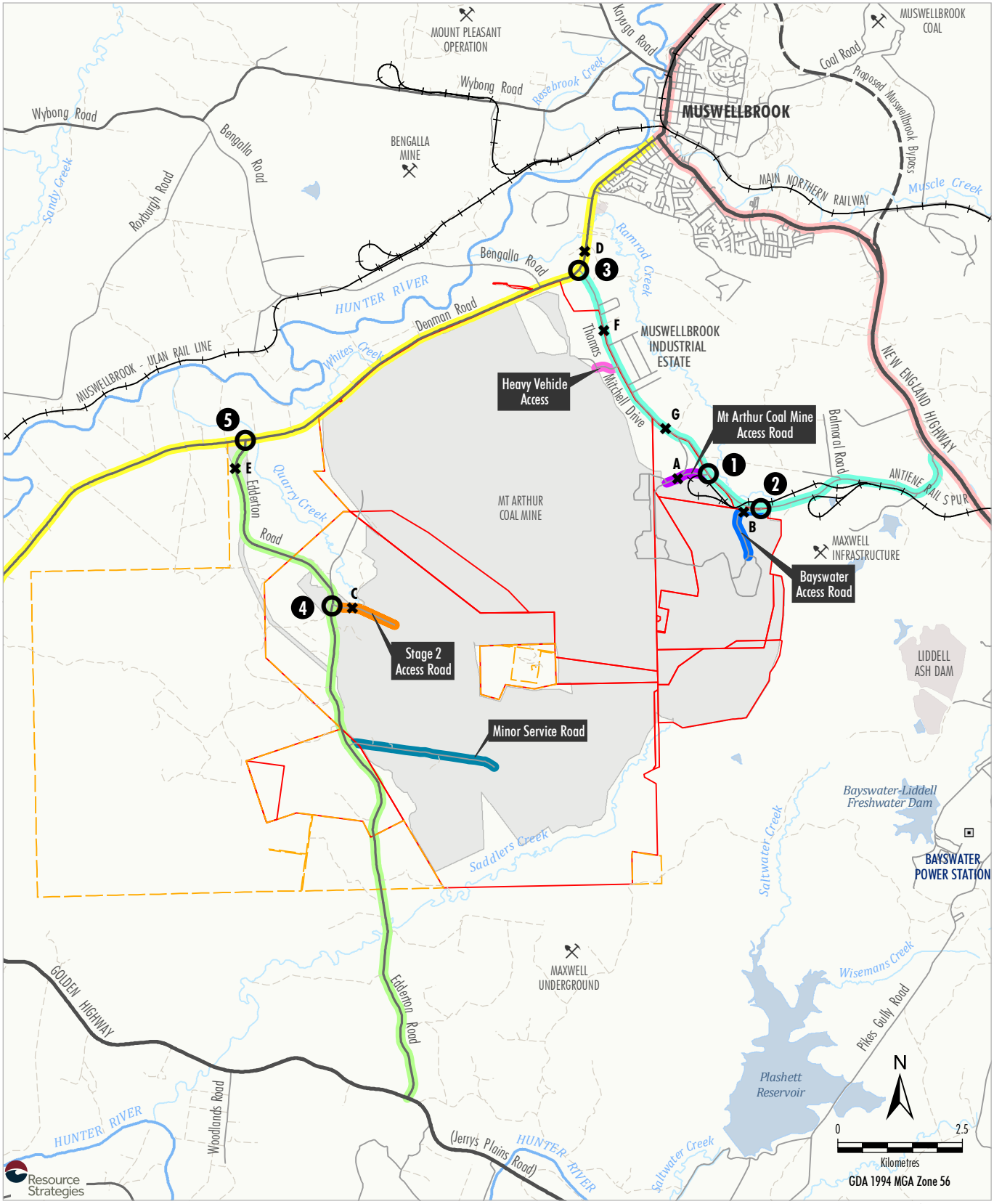
- Mt Arthur Coal Main Access Road, off Thomas Mitchell Drive approximately 5 km from Denman Road.
- Bayswater No. 2 Access Road off Thomas Mitchell Drive approximately 4.5 km from New England Highway.
- Stage 2 Access Road off Edderton Road south of the former Edderton Road.

In addition, two further site accesses exist for heavy or service vehicles (Appendix I):

- Heavy Vehicle Access Road off Thomas Mitchell Drive approximately 2 km from Denman Road.
- Minor Service Road off Edderton Road approximately 3 km south of the Stage 2 Access Road.

Access is provided to the summit of Mount Arthur on the Mt Arthur Coal Minor Service Road for emergency services and legitimate users in accordance with condition 47(f) of MP 09_0062.

All coal produced by the Mt Arthur Coal Mine is railed to the Port of Newcastle using the Antiene Rail Spur and Main Northern Railway.



Source: BHP (2023); TTPP (2023); NSW Spatial Services (2023); Transport for NSW (2020)

LEGEND

- Mining Operation
- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Approximate Extent of Existing/Approved Surface Development
- Railway
- Highway
- Arterial Road
- Sub-arterial Road
- Local Road
- Track

Key Roads

- New England Highway
- Denman Road
- Thomas Mitchell Drive
- Edderton Road
- MAC Main Access Road
- MAC Bayswater Access Road
- MAC Stage 2 Access Road
- MAC Heavy Vehicle Access
- MAC Minor Service Road

Proposed Traffic Survey Locations

- Intersection Survey Location
- Midblock Tube Count

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Survey Locations and Existing Road Network

Figure 6-24

HVE-19-09 MOD2_ModReport_Section 6_213B

Existing Traffic Volumes and Roadmap Capacity

Traffic survey locations are shown on Figure 6-24 and surveyed traffic volumes for key site accesses are summarised in Table 6-22.

A more detailed description of the generated traffic volumes from the existing Mt Arthur Coal Mine is provided in Appendix I.

Intersection Turning Movements

To examine the existing performance of key intersections of relevance to the Mt Arthur Coal Mine, vehicle turning movements were recorded on 22 June 2021 between 5:00 am and 7:00 pm at the intersections of (Appendix I):

- Mt Arthur Coal Mine Main Access Road and Thomas Mitchell Drive;
- Mt Arthur Coal Mine Bayswater Access Road and Thomas Mitchell Drive;
- Thomas Mitchell Drive and Denman Road;
- Edderton Road and Mt Arthur Coal Mine Stage 2 Access Road; and
- Denman Road and Edderton Road.

The locations of the intersection turning surveys are shown on Figure 6-24.

Road Safety

A review of TfNSW road crash data of the key roads for the five-year period from 1 January 2017 to 31 December 2021 was undertaken by TTPP (2023) as a component of the Road Transport Assessment.

Section 6.13.3 provides further detail on the outcomes of the road crash data.

6.13.3 Potential Impacts

Potential impacts of the Modification (inclusive of the four-year mine life extension) on traffic generation, roadway capacity and safety are assessed in Appendix I and summarised below.

Traffic Generation

The assessment scenario has adopted the maximum operating characteristics of the Modification, that is, the assessment assumes that in 2030 the Mt Arthur Coal Mine would (Appendix I):

- employ a workforce of 2,200 FTE positions;
- extract and process 25 Mt of open cut ROM coal; and
- transport 20 Mt of product coal by rail.

TTPP (2023) concluded that all light vehicle trips generated by the Mt Arthur Coal Mine during the 2021 traffic surveys were generated by the workforce of approximately 2,200 FTE positions travelling to and from the Mt Arthur Coal Mine each day. The Modification scenario assumes that this workforce level would continue through the life of the Modification, therefore no change to light vehicle trip generation would occur compared with that surveyed in 2021 (Table 6-23).

Similarly, as the ROM coal production is expected to increase from 21 Mtpa at the time of the traffic surveys to a peak of 25 Mtpa (open cut) with the Modification (i.e. by 19%), the surveyed heavy vehicle trip generation is conservatively assumed to also increase by 19% (Appendix I).

Table 6-22
Surveyed Average Weekday Mt Arthur Coal Mine Traffic Generation in 2021

	Light Vehicles	Rigid Heavy Vehicles	Articulated Heavy Vehicles	Total Vehicles
Daily Total (vehicles per day)				
Mt Arthur Coal Mine Main Access	1,641	384	44	2,069
Mt Arthur Coal Mine Bayswater Access	936	102	22	1,060
Mt Arthur Coal Mine Stage 2 Access	95	37	22	154
Total	2,672	523	88	3,283

Source: Appendix I.

Table 6-23
Increase in Average Weekday Mt Arthur Coal Mine Traffic Generation from 2021 to 2030

	Light Vehicles	Rigid Heavy Vehicles	Articulated Heavy Vehicles	Total Vehicles
Daily Total (vehicles per day)				
Mt Arthur Coal Mine Main Access	0	76	10	86
Mt Arthur Coal Mine Bayswater Access	0	22	5	27
Mt Arthur Coal Mine Stage 2 Access	0	9	5	14
Total	0	107	20	127

Source: Appendix I

Cumulative Traffic Sources

There are a number of traffic sources (i.e. existing mining operations) in the vicinity of the Mt Arthur Coal Mine that may contribute to existing and/or future traffic volumes that have been considered in the Road Transport Assessment (Appendix I).

Reasonably foreseeable changes in traffic volumes associated with surrounding mining operations were accounted for in the baseline level for traffic in Appendix I (i.e. the level of traffic expected regardless of the Modification).

Future Traffic Volumes

The impacts of the traffic changes associated with the various mining operations surrounding the Mt Arthur Coal Mine, background traffic growth and the Modification were included in the surveyed traffic conditions during the Mt Arthur Coal Mine peak hours and average weekday daily conditions in Appendix I.

The cumulative future traffic volume predictions and associated midblock Level of Service assessment focused on key surveyed access roads surrounding the Mt Arthur Coal Mine, being Thomas Mitchell Drive, Edderton Road and Denman Road.

The Austroads (2020) *Guide to Traffic Management* provides guidelines for the capacity and performance of two lane, two-way rural roads. Austroads (2020) define Levels of Service as a qualitative measure describing the operational conditions within a traffic stream (in terms of speed, travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety) as perceived by drivers and/or passengers.

Level of Service A provides the best traffic conditions, with no restrictions on desired travel speed or overtaking. Levels of Service B to D describe progressively worse traffic conditions, with Level of Service E for traffic conditions that are at or close to capacity, with virtually no freedom to select desired speeds or manoeuvre in the traffic stream (Austroads, 2020).

Appendix I details the existing and predicted peak hour midblock Levels of Service on Thomas Mitchell Drive, Edderton Road and Denman Road.

TTPP (2023) concluded peak hour midblock Levels of Service on key surveyed access roads would remain acceptable with the Modification, when considered cumulatively with background growth and impacts from other developments in the region.

Based on the analysis and discussions presented in Appendix I, it is concluded that the existing road network would satisfactorily accommodate the future traffic demands of the Mt Arthur Coal Mine with the Modification.

Operation of Intersections

Future intersection operating conditions were concluded by TTPP (2023) to be satisfactory and does not raise any concerns regarding the capacity, future performance and safety of the intersections with the cumulative future traffic demands, including the Modification.

Road Safety Review

The review of the road safety history found that there were no significant clustering of crashes on Thomas Mitchell Drive or Edderton Road that might suggest there is an inherent safety concern with the design of the principal access roads and intersections used by the Mt Arthur Coal Mine generated traffic (Appendix I).

The reported crashes on both Thomas Mitchell Drive and Edderton Road involved light vehicles only (Appendix I). This suggests that there are no inherent safety concerns regarding the use of these roads by heavy vehicles.

The potential addition of heavy vehicles associated with the Modification is therefore not expected to result in adverse impacts on road safety along the principal access roads (Appendix I).

6.13.4 Mitigation and Management Measures

No specific management or mitigation measures are considered to be warranted by the future operations of the Mt Arthur Coal Mine with the Modification and other mining operations in the region (Appendix I).

6.14 ECONOMIC

An Economic Assessment for the Modification was undertaken by AnalytEcon (2023) (Dr Stephen Beare) and is presented in Appendix J.

A description of the methodology undertaken for the Economic Assessment is provided in Section 6.14.1. A summary of the existing regional economies is provided in Section 6.14.2. The potential impacts of the Modification on the regional and NSW economies are described in Section 6.14.3, while mitigation measures are provided in Section 6.14.4.

6.14.1 Methodology

The Economic Assessment was prepared in accordance with the *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (NSW Government, 2015) (the EA Guidelines) and the *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (NSW Government, 2018b).

The Economic Assessment also had regard to the *NSW Government Guide to Cost-Benefit Analysis* (NSW Treasury, 2023).

The Economic Assessment is primarily concerned with the 'net benefits' of the Modification for the local region and NSW in terms of specific indicators, such as employment and income.

The local region assessment was conducted at two different scales (Appendix J):

- the Upper Hunter Statistical Area Level 3 region (the SA3 Region); and
- the Muswellbrook, Singleton, Cessnock, Upper Hunter and Maitland LGAs (the Mt Arthur Coal Region).

The SA3 Region was selected in accordance with the EA Guidelines. The Mt Arthur Coal Region was also adopted to better capture the local employment and income impacts of the Modification.

AnalytEcon (2023) conducted a cost-benefit analysis to evaluate the potential net benefits of the Modification to NSW (Appendix J).

The assessment of flow-on effects in the local region and NSW is based on input-output modelling developed by AnalytEcon (2023).

6.14.2 Existing Environment

Mining; agriculture, forestry and fishing; health care and social assistance; and retail trade are the largest sectors from an employment perspective in the SA3 Region and Mt Arthur Coal Region (cumulatively 45% of total employment) (Australian Bureau of Statistics [ABS], 2022).

The mining sector is of greater relative importance to the Upper Hunter SA3 regional economy than to the NSW economy (16.7% proportion of total employment in the region compared to 0.9% for NSW), as a number of operational mines are located within and proximal to the region (ABS, 2022).

Approximately 34% of the existing Mt Arthur Coal Mine employee workforce (which would continue to be employed if the Modification is approved) live in the Upper Hunter SA3 Region, and approximately 86% of the Mt Arthur Coal Mine workforce live in the Mt Arthur Coal Mine Region (Appendix J).

6.14.3 Potential Impacts

Net Benefits for NSW

The Modification would result in a total net benefit to the NSW economy of $1,033 million in NPV terms, inclusive of estimated costs for environmental externalities (including cost estimates for greenhouse gas emissions) and internalisation of environmental management costs by HVEC. The estimated net benefit of the Modification consists of (Appendix J):

- $483 million in NPV terms of incremental royalty payments;
- $16 million in NPV terms of incremental land taxes and local government rates;
- incremental disposable income payments to the workforce of $210 million in NPV terms;
- incremental company income tax payments attributable to NSW if $144 million in NPV terms; and
- an incremental net producer surplus of $181 million in NPV terms that is attributable to NSW shareholders of BHP.

Sensitivity analysis undertaken shows that the net benefits accruing to the NSW community remain positive in all the scenarios modelled (Appendix J).

Employment and Income

If approved, the Modification would generate (Appendix J):

- on average 569 FTE jobs in the SA3 Region or 1,438 FTE jobs in the Mt Arthur Coal Mine Region (898 FTE jobs and 2,316 FTE jobs in the SA3 Region and Mt Arthur Coal Mine Region, respectively, if flow-on effects are included); and
- additional aggregate net disposable income of $157 million in NPV terms in the SA3 Region or $396 million in NPV terms in the Mt Arthur Coal Mine Region ($364 million in NPV terms and $946 million in NPV terms in the SA3 Region and Mt Arthur Coal Mine Region, respectively, if flow-on effects are included).

Value Added

For NSW as a whole, the additional value added (or contribution to gross state product) generated by the Modification is estimated at approximately $1.1 billion in NPV terms, which would generate wider value added economic flow-on effects for the State of NSW of an estimated $219 million in NPV terms (Appendix J). The disposable income flow-on effects for NSW are estimated at $311 million in NPV terms, while the employment flow-on effects for the State are estimated to be 1,070 FTE workers per annum (Appendix J).

6.14.4 Mitigation and Management Measures

The Modification would allow for continued investment into community businesses and support to economic, social and environmental activities within the region.

Through the Local Buying Program, HVEC continues to engage and support small eligible local businesses through procuring goods and services across the Muswellbrook, Upper Hunter and Singleton Shires (BHP, 2021a). The Modification would facilitate the continuation of these types of benefits for a further four years.

Closure planning for the Mt Arthur Coal Mine would include consideration of amelioration of potential adverse socio-economic effects due to the cessation of the operational workforce at the Mt Arthur Coal Mine in 2030. In this regard, alternate mine land re-use is currently being explored by HVEC with the objective of considering closure opportunities that can contribute to generate social and economic benefits for the region (Attachment 2). Any alternate future uses would be subject to separate approval and do not form part of this Modification.

6.15 OTHER ENVIRONMENTAL ASPECTS

6.15.1 Non-Aboriginal Heritage

A Non-Indigenous Cultural Heritage Assessment was undertaken for Modification 1 by RPS Australia East Pty Ltd (RPS) (2013). A search of the Muswellbrook LEP was undertaken by RPS (2013) within a 10 km radius of the Modification 1 proposed development area. There were no items listed in the Muswellbrook LEP in the Modification 1 development area.

Following RPS (2013), a review of relevant environmental heritage items within and surrounding the Mt Arthur Coal Mine and a review of the Mt Arthur Coal Mine Historic Heritage Management Plan (BHP, 2022b) was undertaken for the Modification. There are no State or local heritage items located within the Modification Area and therefore no historic items would be directly impacted by the Modification.

The below details known historic heritage items and places within the wider vicinity of the Modification Area and potential indirect impacts that could result from the Modification.

State Heritage Items

The Mt Arthur Coal Mine Historic Heritage Management Plan (BHP, 2022b), Muswellbrook LEP and NSW State Heritage Inventory lists the Edinglassie Homestead and Rous Lench Homestead, both located on Denman Road.

The Edinglassie and Rous Lench homesteads are located approximately 0.5 km north of the Mt Arthur Coal Mine. BHP owns both the Edinglassie and Rous Lench properties and have a separate approved Conservation Management Plan and Heritage Management Program in place to monitor and manage any potential impacts from the existing Mt Arthur Coal Mine (BHP, 2022b).

Local Heritage Items

The below heritage sites are listed in the Muswellbrook LEP and the Historic Heritage Management Plan (BHP, 2022b) as local significance and are located on BHP-owned land within approved HVEC-held MLs and ELs (i.e. previously managed) and are outside of the Modification Area:

- ‘Ruins Site’ – low significance;
- Mills Cottage – low significance;
- Hospital Building – high significance;
- Farm and Farmhouse – low significance;
- Windmill, tank stand and trough – low significance;
- Fence and Yard Site – low significance;
- Beer Homestead (slab hut) – moderate significance;
- Edderton Homestead Complex – moderate significance;
- Belmont Homestead Complex – moderate significance; and
- Edderton Catena Heritage Site – low significance.

Balmoral Homestead is listed as high local significance in the Muswellbrook LEP and the Historic Heritage Management Plan. The homestead is located on BHP-owned land (outside of HVEC-held MLs and ELs).

Potential Impacts

Direct Impacts

As there are no known historic heritage sites located within the Modification Area, there would be no direct disturbance as a result of the Modification.

Indirect Impacts

Visual Amenity

Appendix F considered potential visual impacts on relevant sensitive viewpoints, including potential visual impacts from historic heritage sites including the Edinglassie, Rous-Lench and Balmoral Homesteads.

Existing vegetative screening and bunds employed by HVEC reduces potential views of existing operations from the Edinglassie, Rous-Lench and Balmoral Homesteads, including for the life of the Modification (albeit views of existing overburden emplacements are available where vegetation and bunding permits). Potential views of the Mt Arthur Coal Mine would be unchanged as a result of the Modification (Section 6.10).

Blasting Vibration

The Noise and Blasting Assessment undertaken by RWDI (2023) includes a blasting impact assessment for historic sites in the vicinity of the Mt Arthur Coal Mine.

As per the Historic Heritage Management Plan (BHP, 2022b), the Edinglassie, Rous Lench and Balmoral Homesteads were assessed by Wilkinson Murray (2013) for Modification 1 to have the potential to be impacted by the existing Mt Arthur Coal Mine.

Monitoring site BP08 (mine-owned Edinglassie Homestead) is designated for internal use only to provide indicative measure of blasting impacts for management of nearby historic heritage sites (BHP, 2021c).

The blasting analysis conducted for the Consolidation Project established two Blast Control Areas within which HVEC is required to manage blasts to achieve compliance with the relevant blasting impact assessment criteria. The Blast Control Areas were extended as part of the Noise and Blasting Assessment conducted for Modification 1 (Wilkinson Murray, 2013) to include an additional surface development area to the north-west of the site.

As the Modification includes a minor extension of the Windmill Pit, RWDI (2023) has recommended that the western Blast Control Area be extended to satisfy relevant blasting criteria, as shown on Figure 6-8.

Appendix A provides further detail on the blasting impact assessment criteria for heritage structures.

7 JUSTIFICATION OF THE MODIFICATION

This section provides a justification of the Modification and conclusion for the Modification Report.

7.1 STRATEGIC CONSIDERATIONS

BHP has undertaken a structural review of lower grade metallurgical and thermal coal assets. At the culmination of this review, BHP announced the Mt Arthur Coal Pathway to Closure in June 2022, whereby the mine continues to operate to 2030 to allow time for planning of the closure phase.

Consistent with this, HVEC is proposing to modify MP 09_0062 for the Mt Arthur Coal Mine to allow for the extension of mining operations until 30 June 2030.

The decision by BHP to retain the Mt Arthur Coal Mine within its portfolio of assets provides the opportunity to proceed with a managed process to cease mining in June 2030 with associated socio-economic benefits for the existing workforce, contractors and suppliers to the Mt Arthur Coal Mine arising from the additional four years of mining operations sought via the Modification.

BHP has commenced the Transition and Mine Closure Project in parallel to the Modification to ensure an orderly and just transition to closure. Whilst the Transition and Mine Closure Project is not part of the Modification, in its absence, closure would commence in 2026 rather than in 2030.

In order to assist with the Transition and Mine Closure Project, the Modification incorporates some flexibility to relocate existing and proposed offset areas (including rehabilitation areas), however does not seek to reduce the substantial biodiversity benefits that the approved landform will deliver.

Given operations would continue for a further four years, the Modification would result in $1,033 million in NPV terms in net benefits to NSW, comprising $483 million in NPV terms in royalties to NSW (Appendix J).

7.2 STATUTORY REQUIREMENTS

The Modification is considered to be substantially the same as the approved Mt Arthur Coal Mine and generally consistent with the objects of the EP&A Act. In evaluating the Modification, under section 4.15(1) of the EP&A Act, the consent authority is required to take into consideration a range of matters as they are of relevance to the subject of the application. Table 7-1 describes how these matters have been considered.

7.3 STAKEHOLDER ENGAGEMENT OVERVIEW

HVEC has consulted with a number of stakeholders during the development of this Modification Report, including;

- key State Government agencies;
- local council;
- the local community;
- Aboriginal stakeholders;
- non-government organisations;
- the Mt Arthur Coal CCC; and
- neighbouring mine operators.

Key comments and issues raised during consultation have been considered and addressed in preparation of this Modification Report.

The view of many stakeholders was that the decision by BHP to retain the Mt Arthur Coal Mine is positive in that it provides the opportunity to proceed with a managed process to cease mining in June 2030. The Modification would allow time for the orderly planning for closure while providing ongoing socio-economic benefits to the region.

Summary of Assessment of Impacts

HVEC has undertaken a review of the potential environmental impacts of the Modification and the key potential environmental impacts.

A summary of these potential environmental impacts, the government policies under which they are assessed in this Modification Report, and the key existing environmental management plans is provided in Table 7-2.

7.4 CONCLUSION

The assessment of the Modification has been undertaken against the backdrop of BHP's decision to proceed with a managed process to cease mining in June 2030.

The Modification would involve a range of positive socio-economic effects, but also environmental impacts which have been assessed to be largely a continuation of the existing impacts, which can continue to occur in accordance with existing conditions, management measures and consistent with current guidelines and policies.

The feedback from the majority of stakeholders was for BHP to appropriately plan for closure, which the Modification would in-part assist by providing the Transition and Mine Closure Project an additional four years of continued operations.

The additional time would allow the Transition and Mine Closure Project to evaluate opportunities to provide for beneficial alternate mine land re-uses for the site, ideally ongoing uses that generate continued significant economic activity. Any such alternate mine land re-uses would be subject to separate approval processes (by BHP or another applicant).

In weighing up the main environmental impacts (costs and benefits) associated with the proposal, as assessed and described in this Modification Report, the Modification, on balance, is considered to have merit and be in the public interest.

Table 7-1
Section 4.15(1) of the EP&A Act Matters for Consideration – General

Matter	Indication of How the Matter is Addressed
(a) the provisions of — *(i) any environmental planning instrument, and* *(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and* *(iii) any development control plan, and* *(iii) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and* *(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph),* *…* *that apply to the land to which the development application relates,*	• Consideration of the requirements of relevant environmental planning instruments is provided in Section 4.3. • Clause 2.10 of the *State Environmental Planning Policy (Planning Systems) 2021* states that development control plans do not apply to State Significant Developments (such as MP 09_0062). • The existing Voluntary Planning Agreement with Muswellbrook Shire Council under MP 09_0062 would continue to apply to the modified Mt Arthur Coal Mine. • This Modification Report has been prepared in consideration of the relevant provisions of the EP&A Regulation.
(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,	A description of the existing environment, an assessment of the potential environmental impacts associated with the Modification, and a description of the potential measures to avoid, mitigate, rehabilitate, remediate, monitor and/or offset the potential impacts of the Modification are described in Section 6 and Appendices A to J.
(c) the suitability of the site for the development,	The suitability of the site for the development has been assessed previously, in the context of MP 09_0062. The suitability and assessment of the final landform proposed by the Modification has been considered in Section 3.
(d) any submissions made in accordance with this Act or the regulation,	Following exhibition of the Modification Report, HVEC will prepare a Submissions Report addressing submissions received regarding the Modification.
(e) the public interest.	Consideration of whether, on evaluation, the Modification is considered to be in the public interest is provided in this section.

Table 7-2
Key Environmental Assessment Findings

Aspect	Key Policies Considered	Key Outcomes	Existing Key Management Plans*
Noise and Blasting	*Noise Policy for Industry* (EPA, 2017)	• No new noise and/or blasting exceedances at privately owned dwellings that are not subject to existing acquisition or mitigation-upon-request conditions.	NMP and BMP
Air Quality and Greenhouse Gas Emissions	*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2022) *National Greenhouse Accounts Factors* (NGA Factors) (DCCEEW, 2023a)	• No new air quality exceedances at privately owned dwellings that are not subject to acquisition-upon-request conditions. • Scope 1 and 2 emissions estimated to be approximately 0.13% of Australian greenhouse gas emissions. • Management of greenhouse gas emissions under the Safeguard Mechanism.	AQMP
Social	*Social Impact Assessment Guideline for State Significant Projects* (DPE, 2023b)	• Response from community – the Modification provides the opportunity to plan and prepare for cessation of mining and commencement of closure process. • The Modification would allow for continued socio-economic benefits including an additional four years of employment for the existing workforce.	N/A
Biodiversity	*Biodiversity Assessment Method 2020* (DPIE, 2020a)	• Avoidance considered and implemented. Decrease in disturbance (412 ha), net decrease of 387 ha. • 25 ha of vegetation clearance (minor compared to the existing Mt Arthur Coal Mine disturbance), which would be offset by HVEC. • Vegetation clearance limited to the greatest extent possible whilst providing optimised mining opportunities to 2030.	Mt Arthur Coal Biodiversity Management Plan (BHP, 2019b)
Aboriginal Cultural Heritage	*Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010a)	• Comprehensive assessment and engagement with registered Aboriginal stakeholders. • Direct disturbance to three Aboriginal cultural heritage sites of low archaeological significance, which would be subject to management under the AHMP.	AHMP
Visual Amenity	N/A	• Landforms (northern overburden emplacement areas) lower than approved height. • The Modification would result in a minor change in visual impact at the Mt Arthur Coal Mine.	Mt Arthur Coal Visual Impacts Management Report (AECOM, 2015).
Surface Water	N/A	• Minor changes to the site water management system. • No material changes to on and off-site surface water impacts from the Modification (compared to MP 09_0062).	WMP
Groundwater	*NSW Aquifer Interference Policy* (NSW Government, 2012)	• Limited incremental groundwater drawdown compared to MP 09_0062.	

Table 7-2 (continued)
Key Environmental Assessment Findings

Aspect	Key Policies Considered	Key Outcomes	Existing Key Management Plans*
Road Transport	*Guide to Traffic Generating Developments* (NSW Roads and Traffic Authority, 2002)	• Existing road network accommodates future traffic demands associated with the Modification.	N/A
Economics	*Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (NSW Government, 2015)	• Approximately $483 million in NPV terms in royalties to NSW. • Approximately $210 million in NPV terms disposable income payments to the Mt Arthur Coal Mine workforce. • Overall net benefit of approximately $1,033 million in NPV terms to NSW.	N/A

* All Mt Arthur Coal management plans would be reviewed and revised for the Modification.

8 REFERENCES

Adapt NSW (2023). *Climate Change in the Hunter.*

AnalytEcon (2023). *Mt Arthur Coal Mine Modification 2 Economic Assessment.*

ATC Williams (2017). *Mt Arthur Coal Tailings Facility Intermediate (Annual) Surveillance Report 2017.*

ATC Williams (2022). *MAC TSF Closure Planning.*

ATC Williams (2023). *Mt Arthur Coal Mine Modification 2 Surface Water Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd.

AECOM Australia (2015). *Mt Arthur Coal Mine - Open Cut Modification Project Visual Impacts Management Report.*

Australia International Council on Monuments and Sites (2013). *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance.*

Australian Bureau of Statistics (2022). *Time Series Profile Muswellbrook (LGA15650)*.

Australian and New Zealand Environment Council (1990). *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration.*

Australian Explosives Industry and Safety Group Inc. (2011). *Code of Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting.*

Austroads (2020). *Guide to Traffic Management.*

Australasian Groundwater & Environmental Consultants (2009). *Mt Arthur Coal Consolidation Project Groundwater Impact Assessment.* Prepared for Hansen Bailey Pty Ltd.

Australasian Groundwater & Environmental Consultants (2013). *Mt Arthur Coal Mine Open Cut Modification Groundwater Impact Assessment.*

Barnett et al. (2012). *Australian Groundwater Modelling Guidelines.*

BHP (2019a). *Mt Arthur Coal Air Quality Management Plan.*

BHP (2019b). *Mt Arthur Coal Biodiversity Management Plan.*

BHP (2020). *Mt Arthur Coal Mine Aboriginal Heritage Management Plan*.

BHP (2021a). *Mt Arthur Coal Annual Review FY21.*

BHP (2021b). *Mt Arthur Coal Rehabilitation Management Plan.*

BHP (2021c). *Mt Arthur Coal Blast Management Plan.*

BHP (2021d). *Climate Transition Action Plan 2021.*

BHP (2022a). *Mt Arthur Coal Annual Review FY22*.

BHP (2022b). Mt Arthur Coal Historic Heritage Management Plan.

BHP (2023a). *Mt Arthur Coal Mine Rehabilitation Strategy.*

BHP (2023b). *Mt Arthur Final Voids - 2030 Mine Closure Geotechnical Review Memo-v12.1.*

BHP (2023c) *Mt Arthur Coal Noise Management Plan.*

BHP (2023d). *Mt Arthur Coal Water Management Plan.*

Bolwarra Environmental Services (2023). *Mt Arthur Coal Modification 2 Threatened Flora Survey Report*.

Bureau of Meteorology (2020). *Groundwater Dependent Ecosystems Atlas.*

Bureau of Meteorology (2023) *Climate Data Online*. Website: http://www.bom.gov.au/climate/data/

Clean Energy Regulator (2021). *Guideline – Manner and Form Sections 19 22G and 22X reports.*

Coal Operations Australia Limited (2000). *Mount Arthur North Coal Project Environmental Impact Statement.*

Dames and Moore (2000). *Mt Arthur Coal Geochemical Characterisation of Overburden and Reject Coal.* Mt Arthur North Coal Project.

Department of Climate Change, Energy, the Environment and Water (2023a). *Safeguard Mechanism Reforms*. May 2023

Department of Climate Change, Energy, the Environment and Water (2023b). *National Greenhouse Account Factors.*

Department of Climate Change, Energy, the Environment and Water (2023c). *Explanatory Document Exposure draft of the National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Production Variables Update) Rules 2023.*

Department of Climate Change, Energy, the Environment and Water (2023d). *Australian National Greenhouse Accounts* – Paris Agreement inventory.

Department of Climate Change, Energy, the Environment and Water (2023e). *State and territory greenhouse gas inventories: 2020 emissions.*

Department of Climate Change, Energy, the Environment and Water (2023f). *Water Policy and Resources.*

Department of Environment, Climate Change and Water (2010a). *Aboriginal cultural heritage consultation requirements for proponents 2010.*

Department of Environment, Climate Change and Water (2010b). *NSW Wetlands*. Bioregional Assessment Source Dataset.

Department of Environment, Climate Change and Water (2010c). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.*

Department of Environment, Climate Change and Water (2011). *NSW Road Noise Policy.*

Department of Planning and Environment (2022a). *State Significant Development Guidelines.*

Department of Planning and Environment (2022b). *State Significant Development Guidelines – Preparing a Modification Report.*

Department of Planning and Environment (2022c). *Cumulative Impact Assessment Guidelines for State Significant Development Projects.*

Department of Planning and Environment (2022d). *Undertaking Engagement Guidelines for State Significant Projects.*

Department of Planning and Environment (2022e). *Cumulative Impact Assessment Guidelines for State Significant Projects.*

Department of Planning and Environment (2022f). *Groundwater Assessment Toolbox for Major Projects in NSW.*

Department of Planning and Environment (2023a). *Net Zero Emissions Dashboard*.

Department of Planning and Environment (2023b). *Social Impact Assessment Guideline for State Significant Projects.*

Department of Planning and Environment (2023c). *Technical Supplement – Social Impact Assessment for State Significant Projects.*

Department of Planning, Industry and Environment (2020a). *Biodiversity Assessment Method.*

Department of Planning, Industry and Environment (2020b). *Soil Landscapes of Central and Eastern NSW.*

Department of Planning, Industry and Environment (2020c). *Net Zero Plan Stage 1: 2020 – 2030.*

Department of Primary Industries (2009). *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009.*

Department of Primary Industries (2016a). *Water Sharing Plan for the Hunter Regulated River Water Source 2016.*

Department of Primary Industries (2016b). *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.*

Environment Protection Authority (2013). *Rail Infrastructure Noise Guideline.*

Environment Protection Authority (2017). *Noise Policy for Industry.*

Environment Protection Authority (2022). *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.*

Environment Protection Authority (2023). *Climate Change Action Plan 2023-26.*

European Union (2020). *Submission by Germany and the European Commission on behalf of the European Union and its Member States.*

Future Ecology (2023). *Mt Arthur Coal Mine Modification 2 Baseline Fauna Survey Report.* Prepared for Hunter Valley Energy Coal Pty Ltd.

Geo-Environmental Management Pty Ltd (2012). *Mt Arthur Coal Open Cut Modification Geochemistry Assessment of Overburden and Interburden.*

Gilbert & Associates Pty. Ltd. (2009). *Mt Arthur Coal Consolidation Project Surface Water Assessment.* Prepared for Hansen Bailey.

Gilbert & Associates Pty. Ltd. (2013). *Mt Arthur Coal Open Cut Modification Surface Water Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd.

Government of India (2022). *Climate Change Tracker – India.*

Government of Japan (2022). *Japan's Nationally Determined Contribution (NDC).*

Government of Korea (2021). *Submission under the Paris Agreement. The Republic of Korea's Enhanced Update of its First Nationally Determined Contribution.*

Government of Singapore (2022). *Singapore's Second Update of its First Nationally Determined Contribution (NDC) and Accompanying Information.*

GSS Environmental (2012). *Mt Arthur Coal Open Cut Modification Soil and Land Resource Assessment.*

Hunter Eco (2023). *Mt Arthur Coal Mine Modification 2 Baseline Flora Survey Report.* Prepared for Hunter Valley Energy Coal Pty Ltd.

Hunter Valley Energy Coal Pty Ltd (2009). *Mt Arthur Coal Consolidation Project Environmental Assessment.*

Hunter Valley Energy Coal Pty Ltd (2013a). *Mt Arthur Coal Open Cut Modification Environmental Assessment*

Hunter Valley Energy Coal Pty Ltd (2013b). *Mt Arthur Coal Open Cut Modification Agricultural Impact Statement*

Independent Expert Scientific Committee on Coal Seam Gas and Large Scale Coal Mining Development (2018). *Information Guidelines for the Independent Expert Scientific Committee advice on coal seam gas and large coal mining development proposals.*

Independent Expert Scientific Committee on Coal Seam Gas and Large Scale Coal Mining Development (2023). *Draft National Minimum Groundwater Monitoring Guidelines.*

Integral Landscape Architecture & Visual Planning (2009). *Mt Arthur Coal Consolidation Project Visual Impact Assessment Study – Volume 1.*

Malabar Resources Limited (2023). *Antiene Rail Spur Life Extension Modification – Modification Report.*

Mining Exploration and Geoscience (2023). *Practical guide Post mining land use.*

Minister for Climate Change and Energy (2023). *National Greenhouse and Energy Reporting (Safeguard Mechanism) Amendment (Production Variables Update) Rules 2023.*

Minister for the Environment and Water (2023). *Statement of reasons for reconsideration decision under the Environment Protection and Biodiversity Conservation Act 1999 for Mount Pleasant Optimisation Project.*

Muswellbrook Shire Council (2009). *Muswellbrook Development Control Plan 2009*.

New South Wales Department of Environment and Conservation (2006). *Assessing Vibration: a technical guideline.*

New South Wales Government (2012). *NSW Aquifer Interference Policy.*

New South Wales Government (2015). *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals.*

New South Wales Government (2018a). *Voluntary Land Acquisition and Mitigation Policy.*

New South Wales Government (2018b). *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals.*

New South Wales Government (2020). *Strategic Statement on Coal Exploration and Mining in NSW.*

New South Wales Minerals Council (2010). *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects.*

New South Wales Office of Environment and Heritage (2011). *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW.*

New South Wales Office of Environment and Heritage (2016). *NSW Climate Change Policy Framework.*

New South Wales Treasury (2023). *NSW Government Guide to Cost-Benefit Analysis.*

Niche Environment and Heritage Pty Ltd (2023). *Mt Arthur Coal Mine Modification 2 Aboriginal Cultural Heritage Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd.

PAEHolmes Environmental Consultants (2009). *Mt Arthur Coal Consolidation Project Air Quality Impact Assessment.* Prepared for Hansen Bailey.

PAEHolmes Environmental Consultants (2013). *Mt Arthur Coal Open Cut Modification Air Quality and Greenhouse Gas Assessment*. Prepared for Hunter Valley Energy Coal Pty Ltd.

Rawlings et al (2010) *State and Transition Model.* In *A Guide to Managing Box Gum Grassy Woodlands.*

Resource Strategies (2023). *Mt Arthur Coal Mine Modification 2 Biodiversity Development Assessment Report.* Prepared for Hunter Valley Energy Coal Pty Ltd.

Republic of China (Taiwan) (2015). *Submission by Republic of China (Taiwan) Intended Nationally Determined Contribution.*

Republic of Indonesia (2022). *Enhanced Nationally Determined Contribution Republic of Indonesia.*

RWDI Consulting Engineers and Scientists (2023). *Mt Arthur Coal Mine Modification 2 Noise and Blasting Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd.

RPS Australia East Pty Ltd (2013). *Mt Arthur Coal Open Cut Modification Aboriginal & Non-Indigenous Cultural Heritage Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd.

SLR Consulting Australia Pty Ltd (2023). *Mt Arthur Coal Modification 2 Groundwater Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd.

Square Peg Social Performance Pty Ltd (2023). *Mt Arthur Coal Mine Modification 2 Social Impact Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd

The Threatened Species Scientific Committee (2020). *Notice of and Reason for the Final Determination: 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.* NSW Department of Planning and the Environment, Sydney, NSW.

The Transport Planning Partnership (2023). *Mt Arthur Coal Mine Modification 2 Road Transport Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd.

Todoroski Air Sciences (2023). *Mt Arthur Coal Mine Modification 2 Air Quality and Greenhouse Gas Assessment*. Prepared for Hunter Valley Energy Coal Pty Ltd.

Truescape (2023). *Mt Arthur Coal Mine Modification 2 Landscape and Visual Impact Assessment Visualisations.*

Umwelt Australia Pty Limited (2007). *Mt Arthur Coal Mine South Pit Extension Project Environmental Assessment Report.*

United Nations Framework Convention on Climate Change (2022). *Paris Agreement.*

Urbis Pty Ltd (2013). *Mt Arthur Coal Open Cut Modification Landscape and Visual Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd.

Wilkinson Murray Pty Limited (2013). *Mt Arthur Coal Open Cut Modification Noise & Blasting Assessment.* Prepared for Hunter Valley Energy Coal Pty Ltd.

Wilkinson Murray Pty Limited (2019). *Maxwell Project Noise Impact Assessment.* Prepared for Malabar Coal Limited

World Business Council for Sustainable Development and World Resources Institute (2020). *Greenhouse Gas Protocol.*