BHP

MT ARTHUR COAL MINE
MODIFICATION 2

Modification Report

Appendix F

Landscape and Visual Impact Assessment

Resource Strategies

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Mt Arthur Coal Mine Modification 2 Modification Report

Appendix F – Landscape and Visual Impact Assessment

September 2023

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1 INTRODUCTION

1.1 BACKGROUND

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

MAC is owned and operated by Hunter Valley Energy Coal Pty Ltd (HVEC), a wholly owned subsidiary of BHP. Mining operations at MAC are currently approved until 30 June 2026 in accordance with Project Approval MP 09_0062 (the Project Approval). Open cut mining operations at MAC are approved to extract at rates of 32 Million tonnes per annum (Mtpa). The approved MAC general arrangement is shown on Figure 2.

1.2 OVERVIEW OF THE MODIFICATION

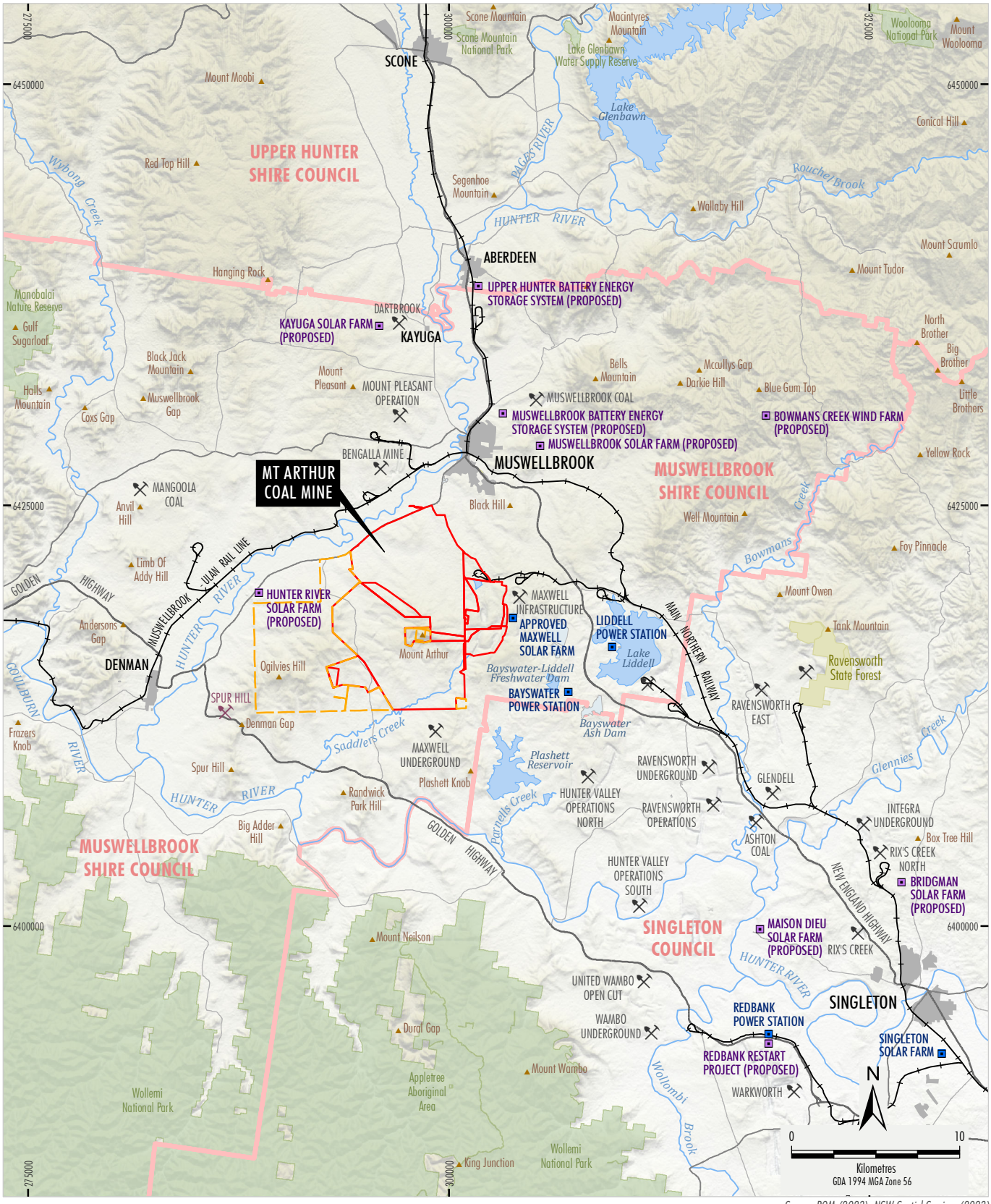
In June 2022, HVEC announced a decision to cease mining at MAC in 2030, as part of a plan to provide a pathway to closure of the operation. Accordingly, HVEC is planning to pursue a modification to the Project Approval to approve a four-year extension of mining operations at MAC until 30 June 2030 and other associated changes (the Modification).

Key aspects of the Modification would include:

- a four-year extension of mining activities to 30 June 2030;
- a reduction in the approved open cut mining rate from 32 Mtpa of run-of-mine (ROM) coal to a maximum of 25 Mtpa ROM coal (similar to current actual ROM coal production);
- a reduction in the cumulative open cut and underground ROM coal handling rate from 36 Mtpa to 29 Mtpa.
- a 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;
- a minor extension of the approved disturbance area in the north-west corner of the operation predominantly to allow for access and ancillary infrastructure (hereafter referred to as the 'Modification New Disturbance Area');
- an overall reduction (387 hectares [ha]) in approved disturbance, as some previously approved disturbance areas are no longer intended to be disturbed (referred to as 'Impact Minimisation Area'); and
- a 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).

This Landscape and Visual Impact Assessment forms part of a Modification Report which has been prepared to accompany a modification application made for the Modification in accordance with section 4.55(2) of the *Environmental Planning & Assessment Act 1979* (EP&A Act).

A more detailed description of the Modification is provided in Section 4.



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

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MT ARTHUR COAL MINE MODIFICATION 2

Regional Location

Figure 1

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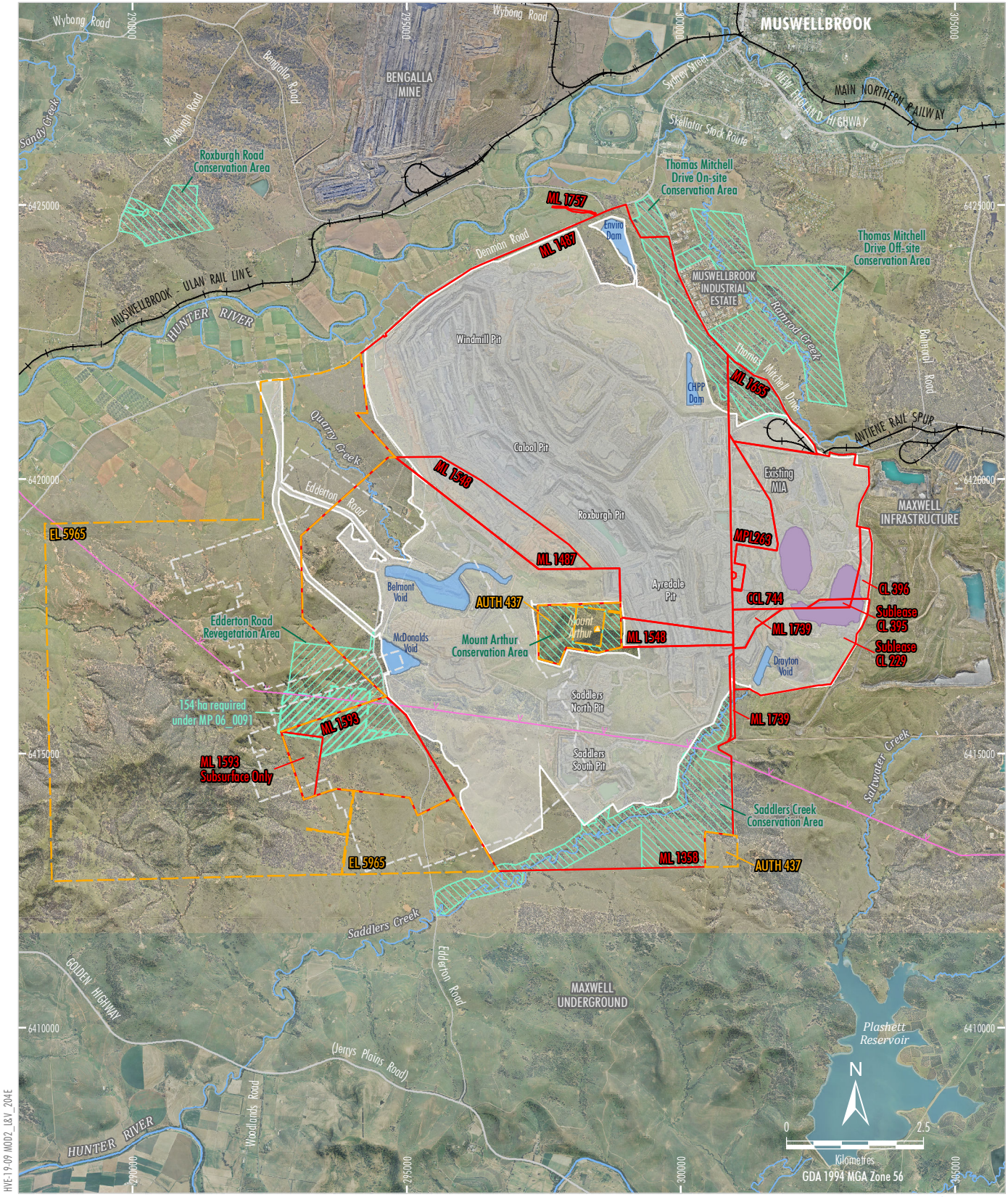

HVE-19-09 MOD2_L&V_204E

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

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MT ARTHUR COAL MINE MODIFICATION 2

Approved Mt Arthur Coal Mine

Figure 2

1.3 VISUAL ASSESSMENT OBJECTIVES

This Landscape and Visual Impact Assessment provides a visual assessment of the Modification through the analysis of the visual setting and the assessment of potential visual impacts from aspects of the Modification (Section 4.2). In order to analyse the potential impacts on the surrounding landscape, the assessment is structured into a series of study components, as follows:

Section 2 Describes the landscape character and scenic quality in the regional, sub-regional and local setting.

Section 3 Provides a review of previous visual assessments undertaken for MAC.

Section 4 Provides a description of the Modification and potential implications from a visual impact perspective.

Section 5 Outlines the methodology for assessing the visual sensitivity and visual magnitude at selected viewpoints.

Section 6 Provides an assessment of potential visual impacts at a regional, sub-regional and local scale.

Section 7 Proposes mitigation and management measures to limit potential visual impacts.

Section 8 Summarises and concludes the visual impact assessments findings.

Section 9 Lists the documents referenced.

As part of this Landscape and Visual Impact Assessment, an analysis was undertaken to identify sensitive viewpoints in the vicinity of MAC. Six viewpoints were originally identified and assessed by Integral (2009) for the Mt Arthur Consolidation Project, and were similarly assessed by Urbis (2013) as part of the Mt Arthur Modification 1. The same six viewpoints were assessed within this Landscape and Visual Impact Assessment to allow for consistency and comparative purposes. The six viewpoints selected are located on public roads or in locations where there was believed to be increased viewer sensitivity and/or visual magnitude.

This assessment considers potential direct night-lighting and indirect night-lighting as a result of the Modification (Section 6.3). Potential cumulative visual impacts in the locality, including with the approved MAC are also assessed in Section 6.4.

This Landscape and Visual Impact Assessment was prepared with the assistance of Truescape Australia Pty Ltd (Truescape), who provided technical input, including visual simulation images (Section 6.2).

2 EXISTING LANDSCAPE AND VISUAL SETTING

2.1 LANDSCAPE CHARACTER AND SCENIC QUALITY

Consideration of the landscape character aids in determining the overall impact of a development on the surrounding character and sense of place (Transport for NSW [TfNSW], 2023).

The level of visual impact is primarily determined by the contrasting difference between the existing landscape and any changes to this landscape as a result of a development observed within different settings and from various viewpoint locations (TfNSW, 2023). Therefore, it is imperative to the landscape and visual impact assessment process to have a thorough understanding of the existing landscape and land use.

Visual settings are based on distance from the existing MAC, including the Modification New Disturbance Area. In this assessment the visual settings will be defined as the following (Figure 3):

- Regional Setting – land use and key landscape features located greater than approximately 5 km from the existing surface disturbance extent (incorporating the Modification New Disturbance Area) of MAC (further detailed in Section 2.1.1).
- Sub-regional Setting – land use and key landscape features located 1 to 5 km from the existing surface disturbance extent (incorporating the Modification New Disturbance Area) of MAC (further detailed in Section 2.1.2).
- Local Setting – land use and key landscape features located less than 1 km from existing surface disturbance extent (incorporating the Modification New Disturbance Area) of MAC (further detailed in Section 2.1.3).

2.1.1 Regional Setting (> 5 km)

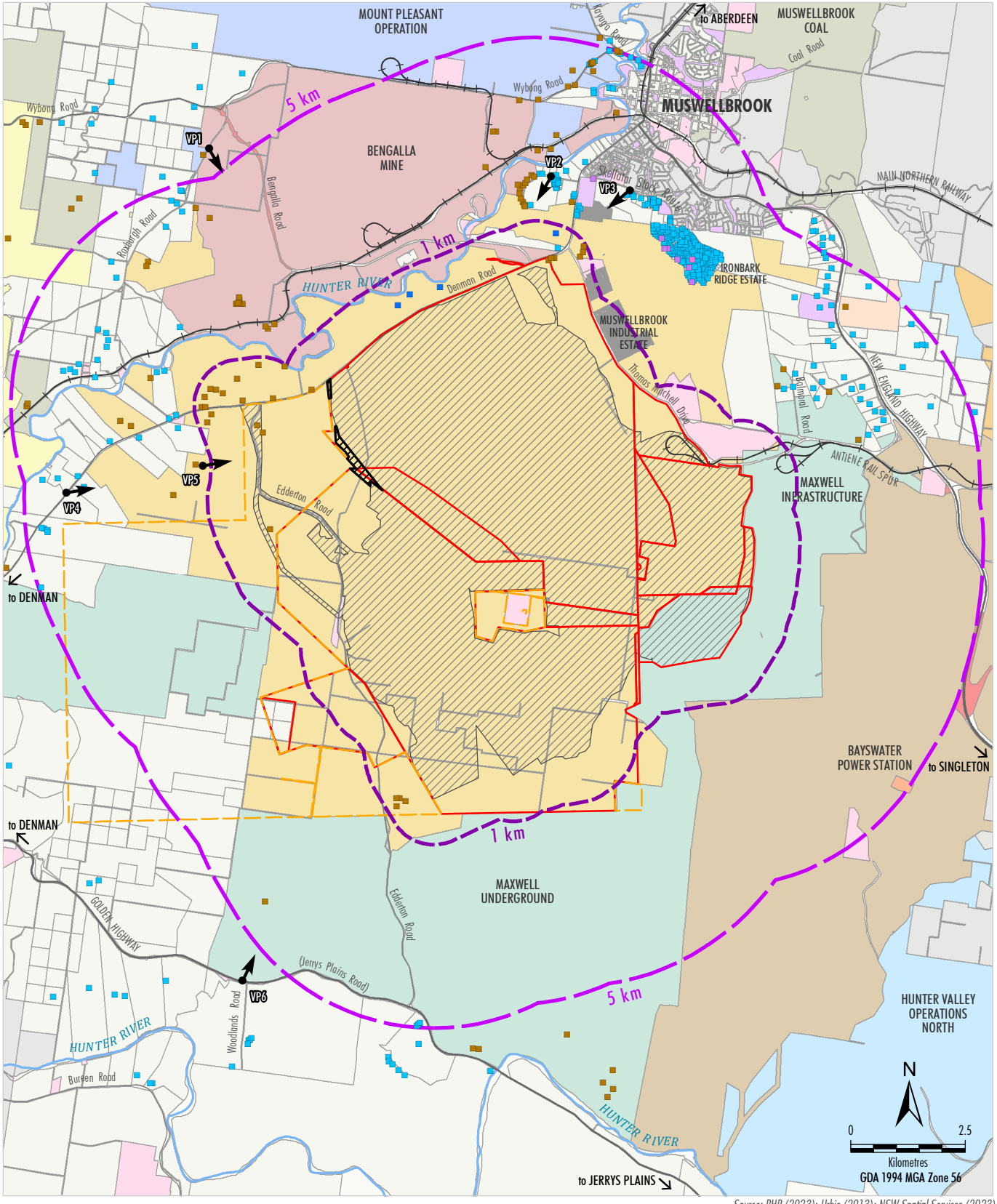
The regional setting predominantly consists of a broad scale of agriculture (i.e. grazing and crop production) and mining land uses. MAC is regionally situated in the NSW Hunter Coalfields which is known for large scale thermal coal production.

The Mangoola Open Cut operation is located in the region of MAC (approximately 10 km north-west). Other existing mining operations and power stations located in the region of MAC include Liddell and Bayswater Power Stations, Ravensworth Operations, Mount Thorley Warkworth Coal Complex and Hunter Valley Operations, and portions of the Mount Pleasant Operation, all of which are part of an existing mining precinct in the Hunter and Upper Hunter Valley surrounding MAC.

The town of Muswellbrook (overlapping both the regional and sub-regional setting) is the largest and nearest township located approximately 5 km from MAC, which has expanded to the south-east and includes the South Muswellbrook residential area (Urbis, 2013). This expansion has led to an increase in residential dwellings and a rise in the number of sensitive viewpoints. In addition, privately-owned residences located to the west in Denman and to the north in Aberdeen also contribute to the residential landscape character of the regional setting surrounding MAC (Urbis, 2013).

The regional landscape consists of several elevated ranges with intervening areas of grassland suitable for agricultural purposes (i.e. grazing). The topography to the south consists of mountain ranges bordering the alluvial lands of the Hunter River. The north comprises of rolling hills that limit the extent of views in the direction of MAC (Integral, 2009). The exception to this is along the Hunter River Floodplain, where more open views are possible, where adjoining foothills allow.

The regional setting possesses attributes of moderate to high scenic quality as it consists of several significant topographic features including mountain ranges and hills. However, due to the presence of existing mining operations and cleared agricultural areas, the regional setting also has attributes of low scenic quality.



Source: BHP (2023); Urbis (2013); NSW Spatial Services (2023)

LEGEND

- Exploration Licence Boundary (EL, AUTH)
- Mining and Coal Lease Boundary (ML, MPL, CL, CCL)
- Approximate Extent of Existing/Approved Surface Development
- Modification New Disturbance Area
- 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

Assessment Areas

- Local Setting (< 1 km)
- Sub-regional Setting (1 - 5 km)
- Viewpoint

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Land Ownership Overview

Figure 3

2.1.2 Sub-regional Setting (1 to 5 km)

Within the sub-regional setting, land uses are primarily associated with the Hunter River Floodplains and comprise a range of mixed cropping, small orchards and vineyards, grazing land, and horse studs. South Muswellbrook is also located within the sub-regional setting contributing to the residential character of the locality.

The Bengalla Mine, Maxwell Infrastructure and Underground and southern extents of the Mount Pleasant Operation are encompassed within the sub-regional setting of MAC contributing to the existing mining precinct in the Upper Hunter Valley.

The dominant vegetation communities within this setting are broadly affiliated with key topographic features and historic land uses. Pasture areas characterise the gentler undulating slopes to the west of MAC.

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. The sub-regional setting also possesses attributes of high scenic quality encompassing the mountain ridges and the Hunter River Floodplain.

2.1.3 Local Setting (< 1 km)

Land use within the local setting consists of rural agricultural land and industrial areas (predominately the Muswellbrook Industrial Estate to the east) (Figure 3). Within the specified radius of this setting (less than 1 km), 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 in the centre of MAC directly north of Saddlers North Pit, characterised by steep slopes comprising remnant woodland and forest landscapes (Integral, 2009). The summit of Mount Arthur is elevated above the surrounding landscape and is the dominant topographic feature within the local and sub-regional vicinity of MAC.

The local setting has a generally low scenic quality due to the limited key aesthetic features, and as the area is restricted to cleared grasslands, with the exception of the remnant woodland associated with the summit of Mount Arthur which possess relatively high scenic quality.

2.2 LANDSCAPE CHARACTER SIGNIFICANCE

A review of relevant environmental heritage items within the regional, sub-regional and local setting of MAC was undertaken and is detailed below.

2.2.1 State Heritage Items

The MAC Historic Heritage Management Plan (BHP, 2022), *Muswellbrook Local Environmental Plan 2009* (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 in the local setting, approximately 0.5 km north of MAC. 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 MAC.

There would be no disturbance of the Edinglassie Homestead and Rous Lench Homestead, and existing vegetative screening and bunds employed by BHP reduces potential views of existing operations, including for the life of the Modification (albeit views of existing overburden emplacements are available where vegetation and bunding permits).

2.2.2 Local Heritage Items

The below heritage sites are listed in the Muswellbrook LEP and the MAC Historic Heritage Management Plan (BHP, 2022) as local significance and are located on BHP-owned land within the approved MAC Mining Leases (ML) and Exploration Licences (EL) (i.e. previously managed) and are outside of the Modification New Disturbance 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 MAC Historic Heritage Management Plan (BHP, 2022). The homestead is located on BHP-owned land (outside of MAC MLs and ELs).

The above listed heritage items are managed under the approved Historic Heritage Management Plan (BHP, 2022), are located outside of the Modification New Disturbance Area, and would therefore not be impacted by the Modification. Potential views of MAC from these heritage items would be unchanged as a result of the Modification.

3 REVIEW OF PREVIOUS VISUAL ASSESSMENT

Previous visual impact assessments have been undertaken for the approved MAC, including detailed assessments for the Mt Arthur Consolidation Project Environmental Assessment (EA) (Integral, 2009) and the Mt Arthur Coal Open Cut Modification 1 EA (Urbis, 2013). Both assessments considered the impacts of MAC on the visual amenity and sensitivity of relevant viewpoints.

This Landscape and Visual Impact Assessment has considered the previously identified key issues in terms of landscape and visual impacts of MAC, as well as previously recommended mitigation measures. The key impacts identified for the existing MAC operations (as modified) would not be to the same extent and magnitude for the Modification due to the minor increase in open cut area, reduction in average overburden emplacement height by approximately 20 metres (m) Australian Height Datum (AHD), and a net reduction in disturbance.

3.1 MT ARTHUR CONSOLIDATION PROJECT – VISUAL IMPACT ASSESSMENT

As set out in Section 4 of the Modification Report, the consent authority must be satisfied that this Modification is 'substantially the same' development as the development last modified under section 75W of the EP&A Act (i.e. Modification 1 determined in 2014). The Landscape and Visual Impact Assessment undertaken for Modification 1 (Urbis, 2013) undertook an analysis by reference to the previous Visual Impact Assessment (Integral, 2009) undertaken in 2009. Therefore, the analysis of the Visual Impact Assessment (Integral, 2009) below is provided to contextualise the Landscape and Visual Impact Assessment undertaken by Urbis (2013).

Integral (2009) assessed the visual impact of the Mt Arthur Consolidation Project from six viewpoints representative of worst-case views of MAC. These same viewpoints were assessed in the 2013 Visual Impact Assessment, and again by this Landscape and Visual Impact Assessment to allow for a consistent comparison of impacts.

Integral (2009) determined that the Consolidation Project would increase the extent of visible mining landforms due to the raised elevation of the overburden emplacement areas, however these additional views were not typically in sensitive locations. The major viewpoint locations were found to be mostly unchanged from previously approved mining operations.

Integral (2009) concluded that the Consolidation Project would result in increased visual impacts compared with those previously experienced from approved operations at the time. Nevertheless, these impacts would decline during the life of mine for the Consolidation Project (due to progressive rehabilitation) and impacts would occur during the same timeframe of previous approvals.

The Consolidation Project proposed final landform would have created a revised landscape that was in character with its existing setting.

Mitigation measures recommended by Integral (2009) for the Consolidation Project included on-site treatments such as progressive ecological plantings on overburden dumps, minimising exposure of work areas to sensitive receivers, and preparation of an internal landscape plan for rehabilitation areas. Off-site treatments included screening and plantings for affected properties as well as adjacent areas such as the Roxburgh Vineyard and along Denman Road. Lighting mitigation measures were recommended for the Consolidation Project including limiting night works (where possible) that are exposed to direct views such as Denman Road.

3.2 MT ARTHUR COAL OPEN CUT MODIFICATION 1 – LANDSCAPE AND VISUAL IMPACT ASSESSMENT

Urbis (2013) concluded, from a visual impact perspective, that there was no material difference in disturbance associated with Modification 1 compared to the approved operations. The visual components of Modification 1 were consistent with the approved operations in terms of form, colour and texture, and were perceived visually as minor extensions of the existing mine's appearance (i.e. no material visual impacts).

The extension of the northern open cut proposed for Modification 1 was generally not visible from surrounding areas due to the lack of accessible elevated viewpoints (Urbis, 2013). The most sensitive viewpoint (a residence on Roxburgh Road) allows views over the Modification 1 area, however the only visible change from what was approved was a minor westward extension of the open cut pit, which was assessed as having low visual impact (Urbis, 2013).

Overall, for all six viewpoints, visual impact associated with the Modification 1 was assessed as very low, or no impact.

Mitigation measures recommended by Urbis (2013) were consistent with those for the Consolidation Project, and included progressive rehabilitation, vegetated screening, and relevant night-lighting measures (i.e. directional lighting and light shields).

4 MODIFICATION DESCRIPTION

4.1 OVERVIEW

MAC is currently approved to operate until 30 June 2026 in accordance with the Project Approval. BHP is proposing to retain MAC, and seek approval to mine beyond the current consent life as part of a process to cease mining in 2030 and provide a pathway to closure of the operation.

The Modification would ultimately extend the life of the currently approved operations at MAC by four years (until 2030). HVEC is also seeking to change the landform to reflect mining to 2030, see Section 4.2.

Table 1 details the primary differences between the approved MAC and the Modification.

Table 1
Overview of the Approved MAC and the 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 MAC 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 MAC would be approximately 6,323 ha.

Table 1 (continued)
Overview of the Approved MAC and the Modification

Component	Approved Mt Arthur Coal Mine MP 09_0062	Proposed Modification
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 up to 280 m AHD. Disposal of coarse reject 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 MAC. Maximum of 20 rail movements (or 10 laden train departures) per day.
Employment	Total workforce of approximately 2,600 full-time equivalent (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.
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 MAC Rehabilitation Management Plan (BHP, 2021) and Rehabilitation Strategy (BHP, 2023).	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 MAC Rehabilitation Management Plan (BHP, 2021) and Rehabilitation Strategy (BHP, 2023).	**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.

Table 1 (continued)
Overview of the Approved MAC and the Modification

Component	Approved Mt Arthur Coal Mine MP 09_0062	Proposed Modification
	Tailings: Tailings dam dewatering and capping undertaken consistent with the MAC Rehabilitation Management Plan (BHP, 2021), Rehabilitation Strategy (BHP, 2023) 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 the Project Approval).	**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.

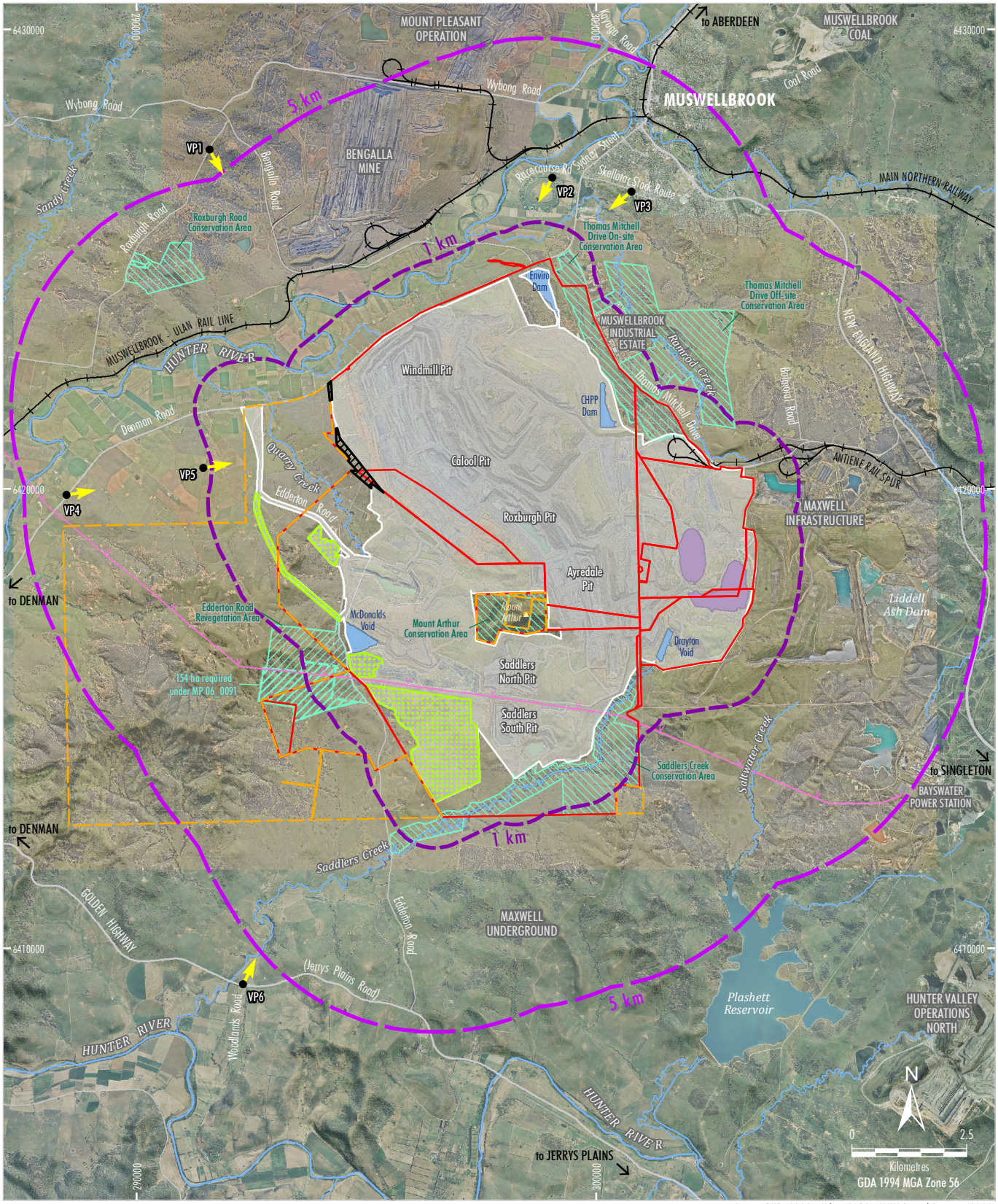
4.2 KEY COMPONENTS OF THE MODIFICATION

Through this Modification, HVEC is seeking to change the landform of MAC to reflect additional mining until 2030.

Table 2 describes the key proposed changes as part of the Modification, and the implications of these changes from a visual impact perspective.

Table 2
Implications of the Modification from a Visual Impact Perspective

Modification Aspect	Nature of Potential Visual Impact(s)
Four-year mine life extension from 2026 to 2030	MAC landforms are part of the existing viewshed, which would remain for closure in 2026 (as approved), however as a result of the Modification would be closed in 2030. Delay in cessation of night-lighting. Delay in the completion of rehabilitation activities.
Modification New Disturbance Area	Minor increase in disturbance (0.3% of MAC approved disturbance areas) of land previously disturbed for agricultural purposes, predominantly for ancillary infrastructure (Figure 4). Lighting visible at additional locations as additional light sources within the Modification New Disturbance Area, though minimal compared to approved operations.
Final Landform	**Emplacements:** reduction in final height from average of 360 m AHD to average of 340 m AHD. **Voids (including highwalls):** Change in final void configuration to reflect mining to 2030. Reduction in the approved number of voids (from three to two). Sections of highwall retained, similar to the scenario which would occur for the previously assessed 2026 final void configuration (Figure 5). **Land use(s):** No change to land use(s) comprising woodland, pasture (grazing), void water bodies and minor retained infrastructure. 2030 final landform to satisfy previous commitments regarding total area of woodland (at least 2,642 ha). Change in final position of land use areas due to change in final landform (Figure 5).
Impact Minimisation Area	Improved visual impact as no requirement to disturb some areas already approved for surface disturbance and no requirement to develop the southern out-of-pit emplacement area.



HVE-19-09 MOD2_L&V_2026

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 New Disturbance Area
- Impact Minimisation Area
- Viewpoint

Assessment Areas

- Local Setting (< 1 km)
- Sub-regional Setting (1 - 5 km)

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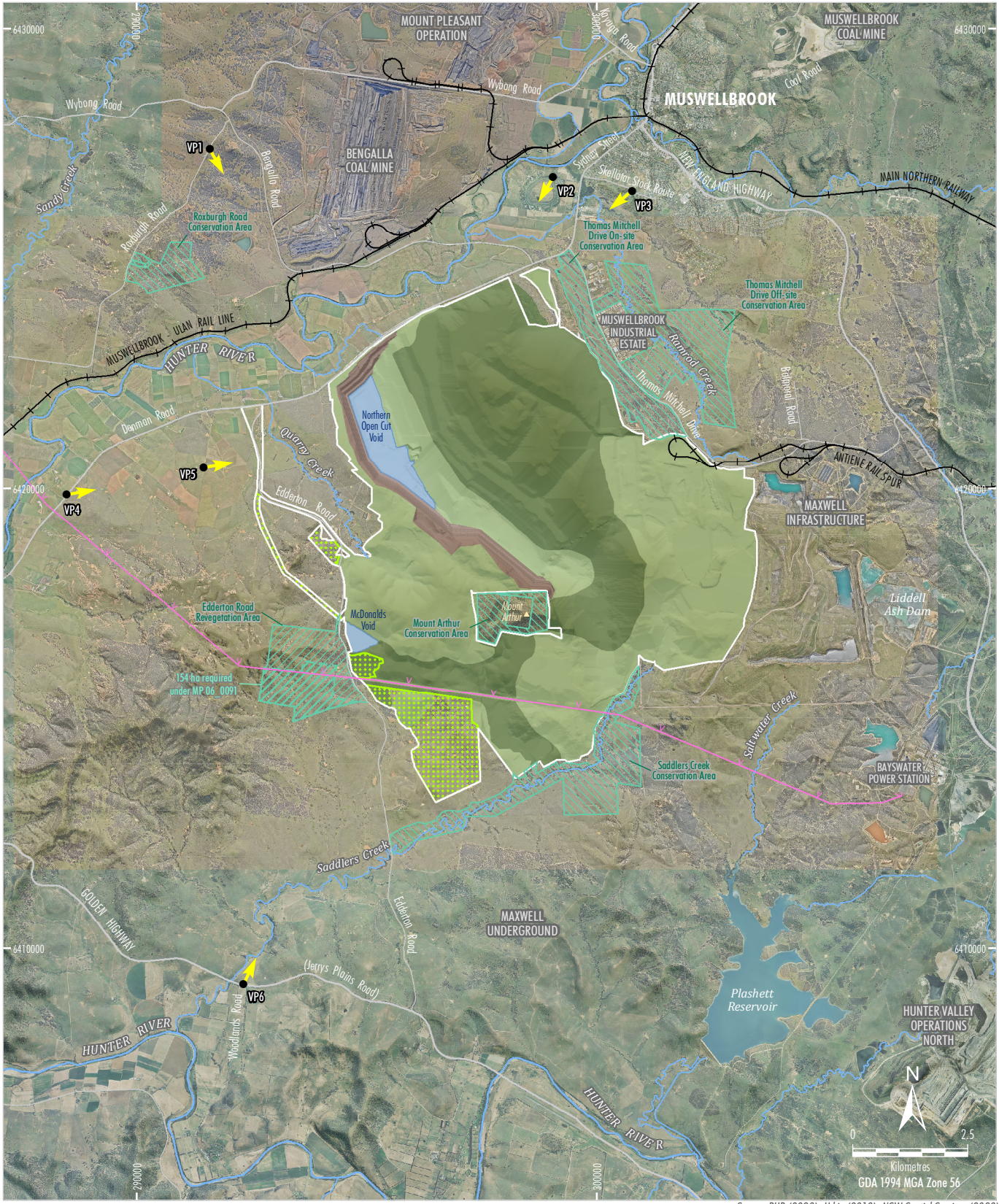
MT ARTHUR COAL MINE MODIFICATION 2

Modification General Arrangement

Figure 4



HVE-19-09 MOD2_L&V_206f

Source: BHP (2023); Urbis (2013); NSW Spatial Services (2023)
Orthophoto Mosaic: BHP (2022-2020)

LEGEND

- Existing 500kV Electricity Transmission Line
- Existing Conservation/Offset Area
- Edderton Road Revegetation Area
- Approximate Extent of Modified Surface Development Area
- Impact Minimisation Area
- Woodland Corridor
- Pasture Area
- Remnant Highwall
- Water Storage
- Viewpoint

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Conceptual Final Landform

Figure 5

4.2.1 Landforms

The rehabilitation of overburden emplacements would be undertaken on a progressive basis once an area is no longer being actively used for mining operations, to improve integration of the Modification landforms with the existing environment and to mitigate potential visual impacts. The appearance of overburden emplacements would vary over time from soil material and waste rock to rehabilitated vegetation cover. Further, geomorphic design principles, such as Geofluv, would be applied to selected external facing emplacement areas to create a natural landform design. Therefore, potential visual impact of these landforms would gradually decrease as vegetation is established and matures. Section 6 illustrates the gradual reduction of visual impact of approved operations over time. The existing Visual Impacts Management Report (AECOM, 2015) would continue to be implemented as part of the Modification.

4.2.2 Rehabilitation

Figure 5 displays the conceptual final landform, incorporating the proposed post-mining land use distribution. The conceptual final landform has assisted in informing the visual simulation images prepared by Truescape illustrated in Section 6.

4.2.3 Final Voids

The Modification is proposing to retain two final voids (being a reduction in total approved number of three final voids) with a revised configuration. Of potential primary relevance from a visual impact perspective, the Northern Open Cut Void would be re-positioned further north towards Denman Road (Figure 5) in areas approved to be backfilled, and retained as a groundwater sink to provide an option for its potential future use as water storage.

5 VISUAL ASSESSMENT METHODOLOGY

Visual sensitivity and visual magnitude, as described below, has been assessed consistent with the *Guideline for landscape character and visual impact assessment* (TfNSW, 2023). The purpose of this guideline is to provide direction on the preparation of landscape character and visual impact assessments for development proposals and inform environmental approval processes defined by the EP&A Act. This guideline details terminology and a methodology for assessment using levels of visual sensitivity and magnitude, which are generally consistent with the Visual Management System (United States Department of Agriculture [USDA] Forest Service, 1974) methodology, employed by Urbis (2013) in their Visual Impact Assessment.

The potential visual impacts were assessed by evaluating the visual magnitude of the Modification in the context of the visual sensitivity of relevant surrounding land use areas (i.e. those areas from which MAC may be visible). Levels of visual impact resulting from visual magnitude and sensitivity are illustrated in Table 3.

Table 3
Visual Impact Matrix

Visual Sensitivity \ Visual Magnitude	H	M	L	N
H	High Visual Impact	High-Moderate Impact	Moderate Impact	Negligible Impact
M	High-Moderate Impact	Moderate Impact	Moderate – Low Impact	Negligible Impact
L	Moderate Impact	Moderate- Low Impact	Low Impact	Negligible Impact
N	Negligible Impact	Negligible Impact	Negligible Impact	Negligible Impact

Source: TfNSW (2023)

The level of visual impact of a development tends to decrease as the distance to the disturbance area from various viewpoints increases. The level of impacts is defined as (TfNSW, 2023):

- Negligible – where the subject area is distant and results in a minute level of impact that is indiscernible to societies day-to-day activities.
- Low – visual impacts resulting from the subject area that is noticeable however does not cause significant adverse impacts and does not markedly contrast with the existing modified landscape.
- Moderate – where a component of the subject area is visible and contrasts from the surrounding landscape whilst possessing some integration at the same time. Surrounding topography, vegetation or the existing modified landscape can provide this level of integration.
- High – where the major components of a project can be clearly seen from public viewpoints and contrasts significantly with the surrounding landscape.

5.1 VISUAL SENSITIVITY

Visual (viewer) sensitivity is a measure to which a land use area is susceptible to the proposed change. This factor also takes into consideration the type of viewer and number of viewers (TfNSW, 2023). Different viewer activities are considered to have varying levels of sensitivity. For example, pristine natural environments (such as National Parks) that rely solely on the landscape and view for aesthetic appeal would be more sensitive to change than areas such as main/local roads and highways.

Sensitivity levels relevant to various viewpoints are as follows:

- High sensitivity – includes private residences (including rural residences), National Parks and reserves and/or buildings of cultural or historical significance.
- Moderate sensitivity – includes private rural landholdings (without residence), recreational or scenic sites and/or tourist accommodation.
- Low sensitivity – includes local and main roads, state highways and freeways and state or interstate passenger rail lines.

5.2 VISUAL MAGNITUDE

Visual magnitude refers to the measurement of the scale, size and character of a proposed development when compared to the existing environment. In terms of visual and landscape assessments, visual magnitude also relates to how far the proposal is from the viewer. Combined with sensitivity, visual magnitude provides a measurement of impact (TfNSW, 2023). The visual magnitude of a project can vary depending on a number of factors, including the extent of the view affected, the size and scale of the change and the level of contrast and compatibility with the surrounding landscape (Australian Institute of Landscape Architects [AILA], 2018).

5.3 IDENTIFICATION OF SENSITIVE VISUAL SETTINGS AND REPRESENTATIVE VIEWPOINTS

Views of the approved MAC may be available from several locations including:

- north of MAC – portions of Roxburgh Road, Racecourse Road and South Muswellbrook;
- west of MAC – along Denman Road and from the Roxburgh Vineyard; and
- south of MAC – portions of the Golden Highway.

Six viewpoints were selected (consistent with Integral [2009] and Urbis [2013]), to highlight the key features and broader characteristics of the location. Whilst these viewpoints provide an insight into potential views of MAC through the use of visual simulation images (Section 6), it is important to note that they may not fully represent the entire location or all possible areas which may experience potential views. However, the selected viewpoints provide a useful framework for understanding the visual character and landscape of the location surrounding MAC. Accordingly, this Landscape and Visual Impact Assessment assesses potential visual impacts from these selected viewpoints, taking into consideration the broader area they encompass.

Table 4 summarises the location of each viewpoint with respect to MAC.

Table 4
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 MAC)	Distant views of MAC are available from portions of Roxburgh Road (due to its higher elevation than surrounding areas). Vegetative plantings have been implemented along Roxburgh Road by HVEC to screen potential views of MAC, where practicable.
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 MAC)	Partial views of MAC are available along Racecourse Road, however existing rehabilitation present reduces the visual impact of MAC 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 MAC)	Distant views of MAC 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 MAC)	Portions of MAC can be distantly seen when travelling east along Denman Road, where topography and vegetation allows. Existing bunds located along Denman Road inhibit views of MAC, however partial views are available of MAC northern emplacement areas when travelling directly north of MAC 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 MAC)	Distant views of MAC 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 MAC are obscured by existing vegetation located along portions of the Golden Highway. Partial vegetative plantings have been implemented along the Golden Highway by HVEC to screen potential views of MAC.

* Based on distance from the viewpoints to the closest approved surface disturbance extent of MAC.

6 ASSESMENT OF POTENTIAL VISUAL IMPACTS

6.1 VISUAL SIMULATIONS

Visual simulation images have been prepared by Truescape to visually demonstrate the potential visual impact of the Modification from the selected six viewpoints (Figures 6a to 10e). The simulated images present potential views of existing operations from each viewpoint, where visual components would most likely contrast the existing setting. 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.

Dashed elevation lines are presented on the final landform simulated images, which represent the approximate approved maximum emplacement dump heights (i.e. 375 m AHD). Whilst the existing MAC operations would not exceed an average of 360 m AHD, for the purposes of comparison between approved and proposed emplacement heights, 375 m AHD has been applied to the simulated images as the greatest potential for visual impact, as approved.

6.2 VISUAL IMPACT ASSESSMENT

Table 5 provides a summary of the visual impact assessment for the Modification as well as previous assessments and is further described in Sections 6.2.1 and 6.2.2. Each viewpoint has been assessed in terms of visual sensitivity and visual magnitude as per Table 3.

For the purposes of this assessment, each viewpoint has been qualitatively assessed as per the regional and sub-regional setting of MAC, cross-referencing the relevant visual simulation images to provide justification of the visual impact assessment for the Modification.

Table 5
Summary of Visual Impacts for MAC

	Previous Assessment (Modification 1)		This Modification		
Viewpoint	**Visual Sensitivity (Urbis, 2013)**	**Visual Impact (Urbis, 2013)**	**Visual Sensitivity**	**Visual Magnitude***	**Visual Impact**
Roxburgh Road (VP1)	Low	Moderate	Low	Negligible	Negligible
Racecourse Road (VP2)	Low	Low	Low	Negligible	Negligible
South Muswellbrook (VP3)	Low	Moderate	High[1]	Negligible	Negligible
Denman Road (VP4)	Very Low	Very Low	Low	Negligible	Negligible
Roxburgh Vineyard (VP5)	Very Low	Low	Moderate[#]	Negligible	Negligible
Golden Highway (VP6)	Low	Very Low	Low	Negligible	Negligible

* Visual Magnitude is assessed as the change in visual magnitude of MAC resulting from the Modification.

[#] The change in visual sensitivity for the Modification compared to Urbis (2013) is consistent with the sensitivity methodology within TfNSW (2023).

Source: Urbis (2013); TfNSW (2023)

6.2.1 Regional Setting (> 5 km)

Viewpoint 1 – Roxburgh Road

Viewpoint VP1 (Roxburgh Road) is representative of potential impacts for people travelling on Roxburgh Road in the regional setting.

Private residences are located along Roxburgh Road to the south extending into the sub-regional setting of MAC. Potential views of MAC landforms are available (where existing vegetation permits) from these residences due to their elevated position. Potential views from private residences along Roxburgh Road are considered in the impact assessment below.

Visual Sensitivity

Consistent with Urbis (2013) (Table 4) and the *Guideline for landscape character and visual impact assessment* (TfNSW, 2023), the visual sensitivity of main and local roads (e.g. Roxburgh Road [VP1]), particularly at a great distance from MAC, is considered to be low as public road networks are not reliant on the surrounding environment for aesthetic value and are therefore less susceptible to change in landscapes (Section 5.1). However, private residences located along Roxburgh Road are considered to have an increased visual sensitivity.

Visual Magnitude

As previously assessed, distant views of the approved MAC landforms are available from Roxburgh Road, however established vegetation such as small trees and shrubs located along Roxburgh Road partially screen views of these landforms (Figure 6a).

Progressive rehabilitation would gradually reduce the visual contrast in colour and texture and would improve visual integration in landscape character with the surrounding landscape thereby reducing visual impact, as shown in Figures 6b to 6d. However, as the Modification involves a four-year extension in mine life, there would be a delay in completion of rehabilitation activities as well as a delay in the cessation of night-lighting.

The Modification would involve improvements (relative to what is currently approved) to the final landform design, whereby geomorphic design principles would be applied to selected external-facing emplacement areas to create a natural landform design. Geomorphic design principles, such as GeoFluv application, is considered a highly beneficial landform rehabilitation design technique to achieve long-term erosional stability, reduce maintenance and increase biodiversity and aesthetic value on rehabilitated landforms. In addition, other benefits of the revised landform would include:

- Net decrease in overall disturbance areas of approximately 387 ha (via the Impact Minimisation Area).
- Decrease in maximum overburden emplacement height by approximately 20 m AHD.

As per Table 2, the Modification would involve a reduction in final emplacement heights from the approved maximum height of 375 m AHD (average of 360 m AHD) to an average of 340 m AHD, thereby reducing the currently approved visual magnitude of MAC from Roxburgh Road and relevant residences (Figure 6d). Further, as there is no intention to disturb some of the areas approved for surface disturbance or develop the southern out-of-pit emplacement area, the visual magnitude of MAC would reduce compared to what is currently approved. Views of the proposed void position and the Modification New Disturbance Area would not be available from Roxburgh Road and surrounding residences due to its distance and intervening MAC landforms.

The proposed changes as part of the Modification would not increase the visual magnitude of MAC, therefore changes to the visual magnitude of MAC resulting from the Modification from Roxburgh Road and surrounding residences would be negligible.

Visual Impact of the Modification

The low level of visual sensitivity and negligible level of visual magnitude in represented areas of Roxburgh Road (VP1) indicates a negligible level of visual impact for the Modification, whereby there would be no change in visual impact directly as a result of the Modification (Table 3).

HVE-19-09 MOD2_Visual_001A

Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Roxburgh Road (VP1)
Visual Simulation

Figure 6

Viewpoint 6 – Golden Highway

Viewpoint 6 (VP6) is representative of potential views for people travelling along the Golden Highway south to south-west of MAC.

Visual Sensitivity

As per Table 4 and TfNSW (2023), the visual sensitivity of the Golden Highway is considered to be low as it is a main road located greater than 5 km from MAC and would not be reliant on the surrounding environment for aesthetic value.

Visual Magnitude

Views of the existing MAC are not possible from portions of the Golden Highway (as shown on Figure 7a) due to the significant intervening vegetation obstructing potential views as well as the distance from MAC. Similarly, views of the proposed void position and the Modification New Disturbance Area would not be available for those travelling along the Golden Highway.

Whilst the Modification would result in a delay to the cessation of night lighting, direct views of night-lighting sources would not be available from the Golden Highway due to intermitting vegetation, as shown on Figures 7a to 7d.

Therefore, the proposed changes as part of the Modification would not increase the visual magnitude of the approved MAC, resulting in a negligible change in visual magnitude from the Golden Highway.

Visual Impact of the Modification

The low level of visual sensitivity and negligible level of visual magnitude for people travelling along the Golden Highway (VP6) indicates a negligible level of visual impact for the Modification (Table 3).

6.2.2 Sub-regional Setting (1 km to 5 km)

Viewpoint 2 – Racecourse Road

Viewpoint 2 (VP2) is representative of potential views for people travelling along Racecourse Road, users of the Racecourse precinct as well as private residences located adjacent the Racecourse to the east.

Visual Sensitivity

Consistent with Urbis (2013) (Table 4) and TfNSW (2023), the visual sensitivity of main and local roads (e.g. Racecourse Road [VP2]) as well as private recreation areas and sporting fields, are considered to be low.

Visual Magnitude

Whilst distant views of MAC are possible from Racecourse Road and surrounding residences, rehabilitation activities have commenced and are visible from this location leading to minimal contrast between MAC and the surrounding landscape (Figure 8a). The Modification would involve improvements (relative to what is currently approved) to the final landform design, whereby geomorphic design principles would be applied to selected external-facing emplacement areas, and reduction in approved disturbance areas, improving visual amenity.

Due to the intervening partially rehabilitated MAC landform, the Modification would not increase the visual magnitude of MAC, resulting in a negligible change in visual magnitude of MAC from Racecourse Road and surrounding residences. Figures 8b to 8d illustrate the progression of rehabilitation (albeit slightly delayed due to the mine life extension) of MAC therefore supporting the negligible magnitude the Modification would have from Racecourse Road.

Visual Impact of the Modification

The low level of visual sensitivity and negligible level of visual magnitude for people travelling along Racecourse Road and adjacent residences indicates a negligible level of visual impact of with the Modification (Table 3).

HVE-19-09 MOD2_Visual_002A

Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Golden Highway (VP6)
Visual Simulation

Figure 7

HVE-19-09 MOD2_Visual_003A

Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Racecourse Road (VP2)
Visual Simulation

Figure 8

Viewpoint 3 – South Muswellbrook

Viewpoint 3 (VP3) is representative of potential visual impacts from private residences in South Muswellbrook.

As views of the existing MAC landforms from South Muswellbrook would remain unchanged over the life of MAC, simulated images were not prepared for South Muswellbrook (VP3), however visual impacts for private residences in South Muswellbrook were still assessed as below.

Visual Sensitivity

Consistent with TfNSW (2023), the visual sensitivity of private dwellings located on the residential margin of South Muswellbrook is considered to be high due to the association of the amenity of the surrounding visual landscape (Section 5.1).

Visual Magnitude

Distant views of MAC landforms can be seen, where vegetation and occasional intervening topography permit. As rehabilitation activities progress, the visual magnitude of approved operations would subsequently reduce, whereby an improved final landform design (through geomorphic design principles) would result in an overall positive impact of the Modification from a visual perspective.

As per Table 2, the Modification would involve a reduction in final emplacement heights from the approved maximum height of 375 m AHD (average of 360 m AHD) to an average of 340 m AHD, thereby reducing the current visual magnitude of MAC from residences in South Muswellbrook. Due to the intervening landforms, views of the proposed void position and the Modification New Disturbance Area would not be available from South Muswellbrook and surrounding residences.

The proposed changes as part of the Modification would not increase the visual magnitude of MAC, therefore the Modification would result in a negligible change to the visual magnitude of MAC from South Muswellbrook and surrounding residences.

Visual Impact of the Modification

Whilst the visual sensitivity for residences in South Muswellbrook is considered high, the negligible level of visual magnitude indicates a negligible level of visual impact of the Modification for residents in South Muswellbrook (Table 3).

Viewpoint 4 – Denman Road

Viewpoint 4 (VP4) is representative of potential views for people travelling east along Denman Road (i.e. west of MAC), as well as private residential properties surrounding VP4.

Denman Road extends along the western and northern extents of MAC, both in the regional, sub-regional and local setting. Visual bunds and vegetation employed by HVEC are located along Denman Road directly north of MAC which inhibit direct views of emplacement areas and other landforms. VP4 is located on a portion of Denman Road where potential distant views of MAC are available from the west, however for people travelling closer towards MAC either from the west or east, views are more prominent, particularly in the local vicinity directly north and north-west of MAC.

Visual Sensitivity

Consistent with Urbis (2013) (Table 4) and TfNSW (2023), the visual sensitivity of Denman Road (VP4) is considered to be low (Table 4) as local and main roads in the regional vicinity are less susceptible to change in the surrounding landscape.

Visual Magnitude

As presented on Figure 9a, distant views of MAC landforms from VP4 can partially be seen behind intermitting topography and vegetation. The visual magnitude of MAC would decrease progressively as rehabilitation is established and matures consistent with the proposed final position of land use(s) (Figures 9b-9d).

Whilst the Modification involves the extension of mining activities for an additional four years, MAC landforms are part of the existing viewshed, which would remain for cessation of mining in 2026 (as approved), and for the Modification cessation of mining in 2030, thereby not increasing the visual magnitude of existing operations.

The Modification would also involve a reduction in final emplacement heights from the approved maximum height of 375 m AHD (average of 360 m AHD) to an average of 340 m AHD, reducing the current visual magnitude of MAC from portions of Denman Road and surrounding residences (Figure 9d). The Modification would improve (relative to what is currently approved) the final landform design, whereby a natural landform design would be applied to selected external-facing emplacement areas resulting in an overall positive impact from a visual perspective.

Due to the intervening landforms as well as existing visual bunds and vegetative screening, views of the proposed void position and the Modification New Disturbance Area would not be available from portions of Denman Road and surrounding residences in the sub-regional vicinity.

Further, as Denman Road moves south, potential views of MAC decrease due to distance. The Impact Minimisation Area (areas previously approved for disturbance that are no longer intended to be disturbed which may have been visible from the southern portion of Denman Road) serves as a positive impact as part of the Modification from a visual perspective.

As Denman Road moves closer towards MAC within the local surrounds, potential views of sections of highwall would be available along elevated portions of Denman Road, where vegetative screening and visual bunds permits. As part of the Modification, sections of highwall would be retained, similar to the scenario which would occur for the previously assessed 2026 final void configuration.

Therefore, the proposed changes as part of the Modification would not increase the visual magnitude of the approved MAC, resulting in a negligible visual magnitude from Denman Road.

Visual Impact of the Modification

The low visual sensitivity combined with a negligible visual magnitude, would result in a negligible visual impact of the Modification for people travelling along Denman Road (Table 3).

Viewpoint 5 – Roxburgh Vineyard

Viewpoint 5 (VP5) is representative of potential views for users of the Roxburgh Vineyard in the sub-regional setting.

Visual Sensitivity

The visual sensitivity of Roxburgh Vineyard (VP5) is considered to be moderate due to its use as a ‘commercial’ tourist location, whereby the landscape setting is important to the vineyard to maintain aesthetic appeal and overall economic stability.

Visual Magnitude

Whilst distant views of MAC landforms are slightly visible from the vineyard (Figure 10a), the visual magnitude of MAC would decrease progressively as rehabilitation is established and matures consistent with the proposed final position of land use(s) (Figures 10b-10d). The Modification would involve improvements (relative to what is currently approved) to the final landform design, whereby geomorphic design principles would be applied to selected external-facing emplacement areas, resulting in an overall positive impact from a visual perspective.

Whilst the Modification involves the extension of mining activities for an additional four years, MAC landforms are part of the existing viewshed, which would remain for closure in 2026, as approved, and for the Modification with closure in 2030, thereby not increasing the visual magnitude of existing operations.

The Modification would also involve a reduction in final emplacement heights from the approved maximum height of 375 m AHD (average of 360 m AHD) to an average of 340 m AHD, thereby reducing the current visual magnitude of MAC from Roxburgh Vineyard (Figure 10d). Due to these intervening landforms, views of the proposed void position and the Modification New Disturbance Area would not be available from Roxburgh Vineyard.

HVE-19-09 MOD2_Visual_004A

Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Denman Road (VP4)
Visual Simulation

Figure 9

HVE-19-09 MOD2_Visual_005A

Source: Truescape (2023)

BHP

MT ARTHUR COAL MINE MODIFICATION 2

Roxburgh Vineyard (VP5)
Visual Simulation

Figure 10

Therefore, the proposed changes as part of the Modification would not increase the visual magnitude of the approved MAC, resulting in a negligible visual magnitude from Roxburgh Vineyard.

Visual Impact of the Modification

Although Roxburgh Vineyard is considered to have a moderate visual sensitivity, the negligible level of visual magnitude indicates a negligible level of visual impact if the Modification is approved, compared to what is currently approved (Table 3).

Other public roads

Other public roads, such as Bengalla Road, located in the sub-region of MAC would have potential views of sections of highwall, where vegetative screening and visual bunds permits. As part of the Modification, sections of highwall would be retained, similar to the scenario which would occur for the previously assessed 2026 final void configuration.

6.2.3 Local Setting (< 1 km)

Public Roads

Thomas Mitchell Drive and Edderton Road are the only public roads in the local setting of MAC (with the exception of Denman Road as assessed above). Consistent with the assessed viewpoint locations as discussed in Sections 6.2.1 and 6.2.2, the Modification would not result in an increased visual magnitude from these public roads and therefore the visual impact of the Modification would be negligible.

Natural Area – Recreation

There are no publicly accessible recreation areas within the local setting of MAC. On this basis, visual impacts on recreation and natural areas within the local setting are not assessed further.

Rural Residences and Landholdings

One private residence is located within the local vicinity (Figure 3). On the basis that this property is located on Denman Road (which has been assessed in Section 6.2.2), and is under acquisition upon request as per the Project Approval, visual impacts on rural residences and landholdings within the local setting are not assessed further.

6.2.4 Summary of Visual Impacts of the Modification

As detailed in Sections 6.2.1 and 6.2.2, the Modification has a negligible visual magnitude (compared to the visual impacts resulting from MAC as currently approved) from all six viewpoints and representative locations primarily due to the relatively minor extension in disturbance area and similarity of the proposed landform to the approved landform.

As previously discussed, the Modification also involves the continuation of mining for an additional four years (until 2030), leading to a continuation of available views of the approved MAC, which has been previously assessed by 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. Table 6 summarises the visual impact of the Modification in consideration of the above assessment.

Table 6
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

6.3 OTHER VISUAL IMPACT CONSIDERATIONS

Direct Night-Lighting

Night-lighting is currently emitted from the following key sources at MAC (Urbis, 2013):

- overhead lighting of the mine infrastructure area, including product, feed bins and rail facilities;
- mobile lighting plants (floodlights) used on the emplacements and the open cut; and
- mobile vehicle-mounted lights (e.g. haul trucks, loaders, coal trucks, and other heavy and light vehicles in various locations within the ML).

Night-lighting would primarily be concentrated in infrastructures areas, access roads and within the Modification New Disturbance Area due to the truck and shovel nature of the operations. Truck movements at night with associated headlight and warning lights have the potential to cause visual impacts as the light source may be flashing or moving. Other light sources from the Modification could include stations work lights, fixed-permanent lights and vehicle-mounted lights.

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 inhibiting these views. However, the Modification would result in a delay to the cessation of night-lighting due to the four-year mine life extension.

Measures to mitigate potential impacts from direct night-lighting are discussed in Section 7.3.

Indirect Night-Lighting

The glow of the sky on overcast nights, commonly referred to as sky glow, is a common element in the night environment at coal mines, including the approved MAC. 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.

Lighting of night-time works is essential for the safety of personnel operating at MAC. The intensity, nature and degree of night-lighting for the Modification would be similar to the existing night-lighting at the approved MAC, as well as other surrounding mining operations. However the Modification would result in a delay in the cessation of indirect night-lighting due to the four-year mine life extension.

Existing control measures and lighting requirements are in place at the approved MAC in accordance with condition 52 of the Project Approval, and would be applied to the Modification to manage any potential sky glow as a result of operations.

Siding Springs Observatory

MAC including the Modification New Disturbance Area lies outside of the Dark Sky Region and therefore does not need to be assessed under the *Dark Sky Planning Guideline* (DPE, 2016).

6.4 CUMULATIVE IMPACTS

The Modification involves various aspects including a four-year mine life extension, a minor increase in disturbance of land predominantly for ancillary infrastructure, a change in landform to reflect mining to 2030 and a reduction in approved surface disturbance extent. These aspects are all modifications to a currently approved large-scale mining operation, which includes significant existing surface infrastructure and disturbance areas. MAC, as proposed to be modified by the Modification, is located in an existing mining precinct. Therefore, the Modification locality has already been subject to considerable modification due to these existing mining operations, as per below.

Surrounding MAC, views of the following existing mining and power generation operations are available:

- Maxwell Underground and Maxwell Solar;
- Bowmans Creek Wind Farm;
- Dartbrook Mine;
- Spur Hill Underground;
- Liddell Battery and Bayswater Ancillary Works;
- Mangoola Open Cut operations;
- Bengalla Mine; and
- Mount Pleasant Operation.

The existing mining and power generation operations as above would remain visually dominant if the Modification were to proceed. As the visual impacts of the Modification are considered to be negligible, there would be negligible increase in cumulative visual impacts from the Modification.

7 MITIGATION

The mitigation and management measures that would be implemented for the maintenance of visual amenity at MAC would be largely consistent with the measures currently in place at MAC, and are described below.

7.1 PROGRESSIVE REHABILITATION

Rehabilitation has progressively been established at MAC once mining areas are no longer active. Progressive rehabilitation activities would continue to be undertaken over the life of the Modification (i.e. until 2030) and in subsequent years, whereby rehabilitation and landform shaping would be conducted to create the proposed land use areas (Figure 5). The final landform would reduce the contrast between MAC landforms and the surrounding environment. The final voids would be generally screened from public view by the existing MAC landforms and surrounding visual bunding and screen plantings. Rehabilitation and landform shaping would be conducted consistent with existing operations and MAC Rehabilitation Management Plan (BHP, 2021), Rehabilitation Strategy (BHP, 2023) and Annual Forward Program.

7.2 VEGETATIVE SCREENING

Existing vegetative screening along main and local roads surrounding MAC aids in reducing any potential views of MAC.

Existing vegetative screening employed by BHP is located along portions of main and local roads in the vicinity of MAC (i.e. Thomas Mitchell Drive, Edderton Road and Denman Road) partially screening views of MAC. 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).

7.3 NIGHT-LIGHTING

Measures that would be employed to mitigate potential impacts from night-lighting would include one or more of the following, consistent with existing operations (as per condition 52 of the Project Approval) and the Visual Impacts Management Report (AECOM, 2015), where relevant:

- 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.

8 CONCLUSION

Six viewpoints were selected as representative of sensitive visual settings which may experience potential views of MAC. Potential impacts at these viewpoints were assessed in consideration of the sensitivity of the viewpoint and visual magnitude of the Modification.

MAC (incorporating the Modification) is located in an existing mining precinct, therefore MAC locality has already been subject to considerable modification of visual characteristics due to these existing mining operations.

As MAC landforms are part of the existing viewshed, which would remain for cessation of mining in 2026 (as approved) as well as cessation of mining in 2030 for the Modification (albeit changes in landform), the proposed Modification would not increase the visual magnitude of current operations. Overall, the Modification is expected to result in negligible levels of visual impact at relevant sensitive receivers and would not incrementally increase cumulative visual impacts.

Mitigation and management measures implemented for the existing MAC would also be implemented for the Modification, including progressive rehabilitation and night-lighting controls (where practical and without compromising operational safety).

9 REFERENCES

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