

# **MACH**Energy

**Mount Pleasant Operation**

A JOINT VENTURE WITH  
**JODA**  
Japan Coal Development Australia

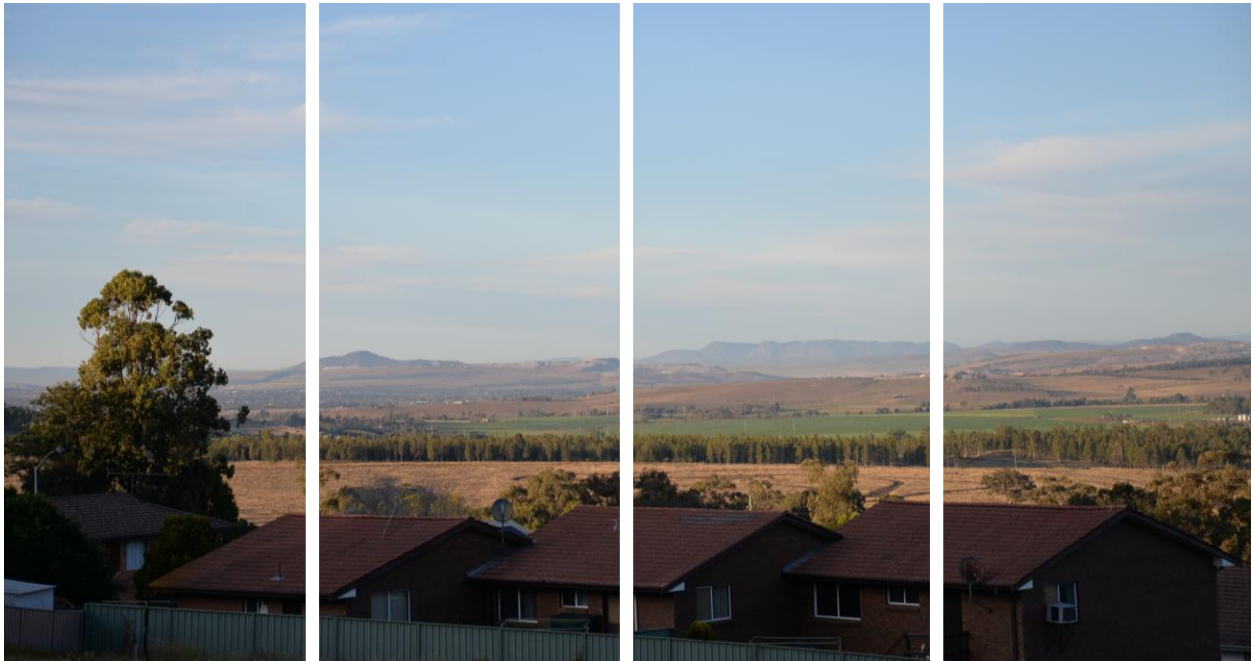


## **Appendix M**

Visual and Landscape Assessment

# Mount Pleasant Optimisation Project

## Visual and Landscape Assessment



A report prepared by:

**VPA** Visual Planning & Assessment





# Mount Pleasant Optimisation Project

## Visual and Landscape Assessment

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## GLOSSARY AND ABBREVIATIONS

Contrast	The degree to which a development element differs visually from its landscape setting.
CHPP	Coal Handling and Preparation Plant.
Integration	The degree to which a development element blends into the existing landscape without necessarily being screened from view.
Photomontage	Photomontage is the process and result of making a composite photograph by cutting and joining a number of other photographs or graphic images for illustrative effect. The composite picture or image aims to give a visualisation of a projected visual effect.
Focal View Area (FVA)	This zone is the central most critical part of a view that is seen with the greatest clarity. It is that part of a view that is within a horizontal arc of 30° either side of the centre line of a view and a vertical arc of 30° m above the horizontal.
Primary Visual Catchment (PVC)	The primary visual catchment includes the most significant parts of the total visual catchment from which the Project potentially could be seen. This is the area containing the most critical locations with potential views to the Project, which would be the focus of visual impact assessment.
Scenic amenity	This term encapsulates people's aesthetic experience of the environment; their appreciation and value of a physical environment whether it be an urban, coastal, bushland, rural or industrial setting. Aesthetic appeal is often associated with the reinforcement of cultural or social values and identity.
Screen	The degree to which a development element cannot be seen due to intervening landscape elements such as topography or vegetation.
State Significant Development (SSD)	Some types of development are deemed to have State significance due to the size, economic value or potential impacts that a development may have. Development that is State Significant Development (SSD) is identified in the State and Regional Development SEPP.
Visual Character Unit (VCU)	Visual Character Unit. Areas of landscape that have similar topographic, vegetation and land use features that create areas of similar visual character.
Visual Effect	A measure of the visual interaction between the Project and the landscape setting within which it is located.
Visual Impact	A measure of a joint consideration of both visual sensitivity and visual effect that considered together determine the visual impact of a development.
Visual Sensitivity	The degree to which a change to the landscape would be perceived in an adverse way.

# 1 INTRODUCTION

## 1.1 General

MACH Energy Australia Pty Limited has engaged Van Pelt Allen Visual Planning and Assessment (VPA) to complete a visual impact assessment for the Mount Pleasant Optimisation Project (herein referred to as the Project).

The purpose of the assessment is to support a State Significant Development (SSD) Application for the Project (SSD -10418) under Part 4 of the *Environmental Planning and Assessment Act, 1979* (EP&A Act).

This assessment will:

- provide an overview of the Project;
- provide a detailed assessment of the visual character and visual effects of the Project and the resulting changes to the visual landscape;
- assess the expanded landform design and the Project components and their visual effects against the existing/approved Mount Pleasant Operation;
- assess potential visual impacts on private landowners in surrounding areas as well as key vantage points in the public domain, including night-lighting impacts;
- evaluate and assess the potential dynamic landscape impacts associated with the Project; and
- provide a detailed description of the measures that would be implemented to minimise visual impacts of the Project.

## 1.2 Overview of the Mount Pleasant Operation

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

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

MACH Mount Pleasant Operations Pty Ltd manages the Mount Pleasant Operation as agent for and on behalf of the unincorporated Mount Pleasant Joint Venture between MACH Energy (95% owner) and J.C.D. Australia Pty Ltd (5% owner)<sup>1</sup>.

The approved Mount Pleasant Operation includes the construction and operation of an open cut coal mine and associated rail spur and product coal loading infrastructure located approximately three kilometres (km) north-west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW) (Figure 1.1).

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

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

### 1.3 Overview of the Project

The Project would include the following development:

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

### 1.4 Background

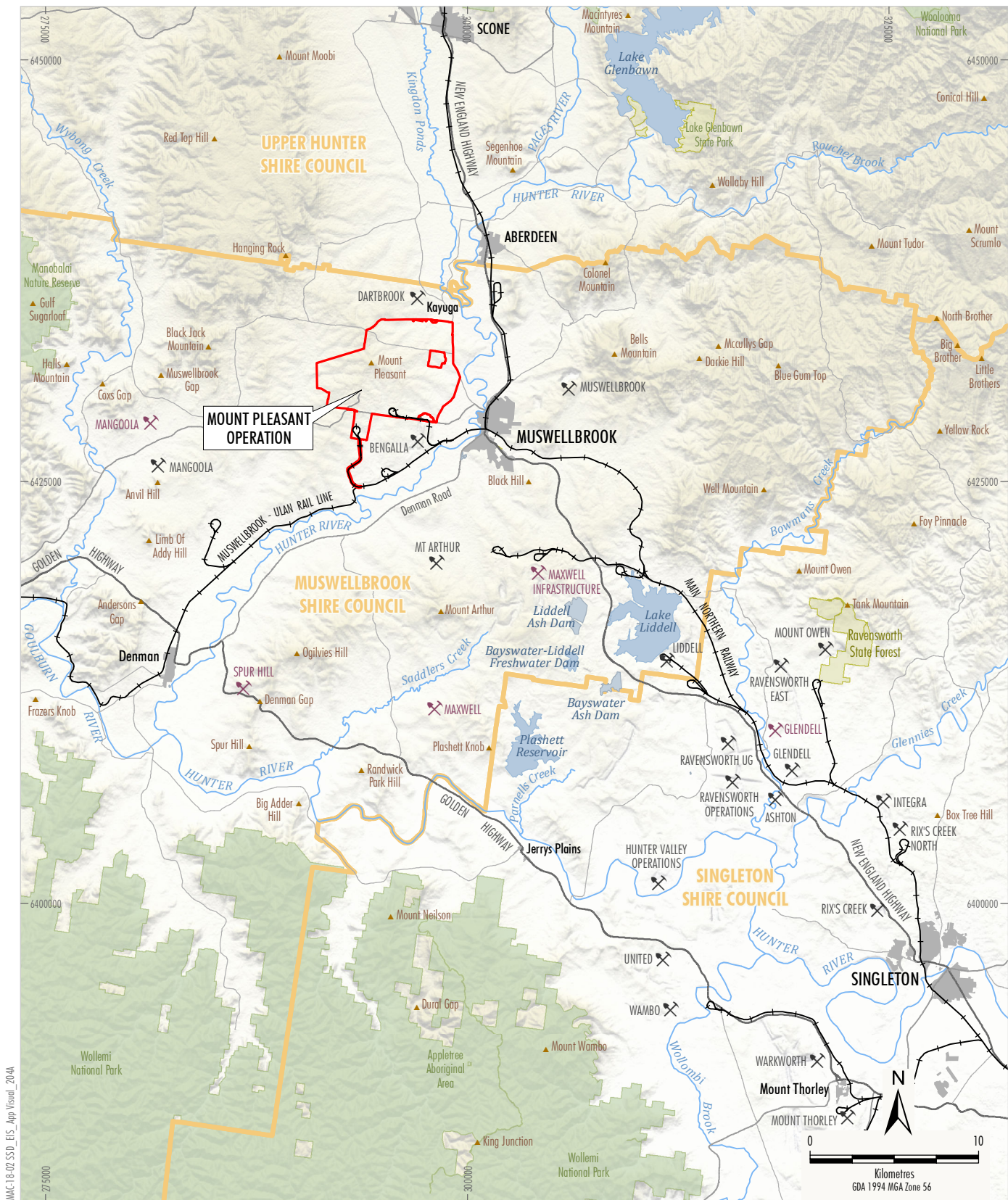
A visual assessment was prepared for the Mount Pleasant Environmental Impact Statement Visual Assessment (1997) and described the visual impacts of the Mount Pleasant Operation in the context of the sensitivity of surrounding viewpoints. Key potential viewpoints included a number of private dwellings, local roads and main travel routes (New England Highway and Main Northern Railway).

Since the original visual assessment was prepared, a number of changes to the visual catchment have occurred, including the development of the Bengalla Mine, the continued expansion of Muswellbrook, the acquisition of a number of private landholdings by resource companies and significantly, the approval and commencement of the original Mount Pleasant Operation and subsequent approved modifications as follows:

- Modification 1 – Modification of siting for mine infrastructure and optional conveyor/service corridor.
- Modification 2 - South Pit Haul Road Modification.
- Modification 3 – Mine Life Optimisation.
- Modification 4 – Rail Modification.

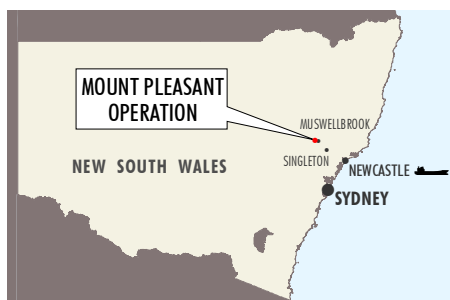
The assessment of the Project has been conducted in consideration of the approved Mount Pleasant Operation, such that the approved Mount Pleasant Operation (inclusive of approved modifications) is the basis for the impact assessment. It should be noted that components of the mining operation that are already approved have not been individually assessed but are considered in the assessment of the overall Project to provide a robust and comprehensive assessment.





IMC18-02 SSD\_EIS\_App Visual\_204A

Source: NSW Spatial Services (2020)



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

**Figure 1.1**  
**Mount Pleasant Optimisation Project - Regional Context**

## 2 ASSESSMENT METHODOLOGY

The level of visual impact of a development is determined based on:

- the appearance of the existing landscape (existing landscape settings); and
- changes to this landscape as a result of a development from various viewing locations.

In this way, the visual character of the landscape and the visual sensitivity of the various viewing locations are considered.

The visual effect of a development is determined by considering the visual characteristics of the development in the context of the landscape within which it is seen.

A combined consideration of both visual sensitivity and visual effect determines the visual impacts and the degree of impact guides the level of mitigation required. The overall method of visual assessment of the existing landscape and the development in the context of the landscape is outlined in Figure 2.1. The evaluation of the existing visual environment involves assessing the appearance of the existing landscape from key viewing locations.

### **2.1.1 Landscape Setting**

The landscape setting can be defined in terms of topography, vegetation, and hydrological and land use features. These elements define the existing visual character of the landscape adjacent to the development. Within any landscape there are areas of similar visual features that are defined as a Visual Character Unit (VCU). Defining the landscape in terms of these units assists in understanding the visual character of the landscape as a whole.

### **2.1.2 Viewing Locations**

The viewing locations are those areas where people are likely to obtain a view of the development. These viewing locations have different sensitivity based on numerous factors, collectively evaluated through land use and distance.

## **2.2 Analysis of a Development and its Setting**

The interaction between the existing visual environment and a development is analysed to provide the basis for determining impacts and potential mitigation strategies. By defining the visual effect of the development and testing the visual sensitivity from key viewing locations, the overall visual impact can be determined.

### **2.2.1 Visual Effect**

Visual effect is a measure of the level of visual contrast and integration of a development with the existing landscape and the proportion of the view that is occupied by the development.

#### ***Contrast and Integration***

The form, pattern and colour of the development components would contrast to varying degrees with the surrounding landscape, and the comparative scale of the development would define a level of integration with the environment.

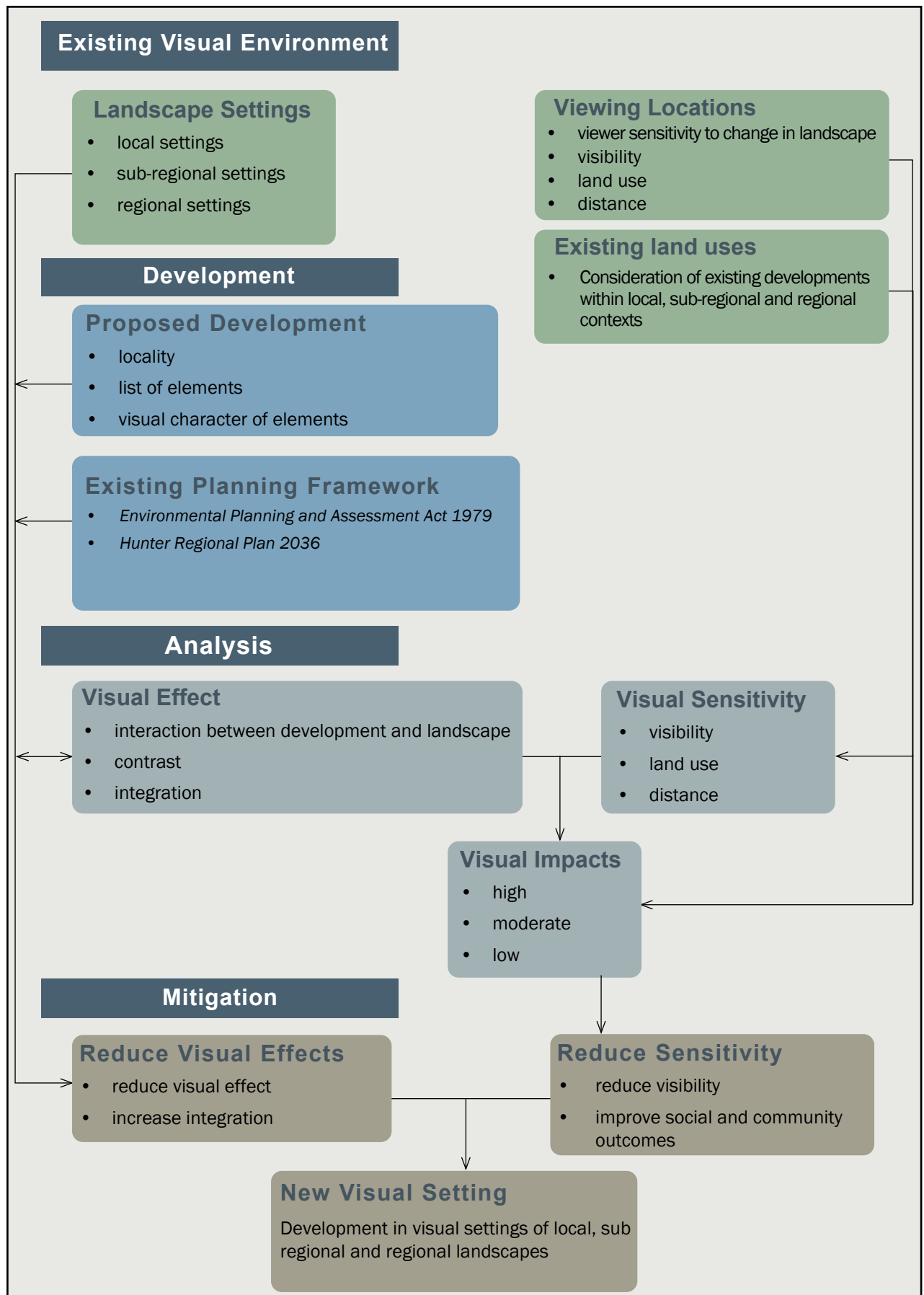


Figure 2.1



The degree to which the visual characteristics of a development contrast with the existing landscape determines the level of visual effect. A greenfield site (i.e. new development) would generally have a higher visual effect due to strong contrast with the existing environment, in comparison to an extension of an existing mine. In a similar way, high visual integration is achieved when a development is of a small scale compared to the surrounding landscape. A successfully rehabilitated development would integrate with the existing landscape through use of similar visual characteristics (forms, patterns, lines, colours and textures) that minimise the contrast with the surroundings and mitigate the visual impact of the development (see Table 2-1).

Over time the level of visual effects can be reduced to very low or unperceivable following appropriate, effective well managed rehabilitation, achieving unnoticeable variations to the landscape to someone unfamiliar with the pre-mining landscape. Those familiar with that same landscape would experience very low visual effects within a new landscape setting.

### ***Project Occupancy of the View***

For any given level of contrast and integration, the lower the proportion of the view that is occupied by the development, the lower the level of visual effect. This is determined by defining the proportion of the total field of view occupied by the development, or more appropriately determined by defining what percentage of the Focal View Area (FVA) it occupies, see Figure 2.2.

The FVA is the most critical and central part of a view. It is not the total view, but the most important part. It is that area that is occupied by an arc created by sight lines from the eye radiating out vertically and horizontally at angles of 30° around a centre view line.

Measuring the percentage of the FVA occupied by a development would provide a more critical measure than a measure of the development in the context of the whole view zone which would include both primary and secondary view areas, representing a view arc of 120 degrees (°) – 150°, instead of a view arc of 60° represented by the FVA only.

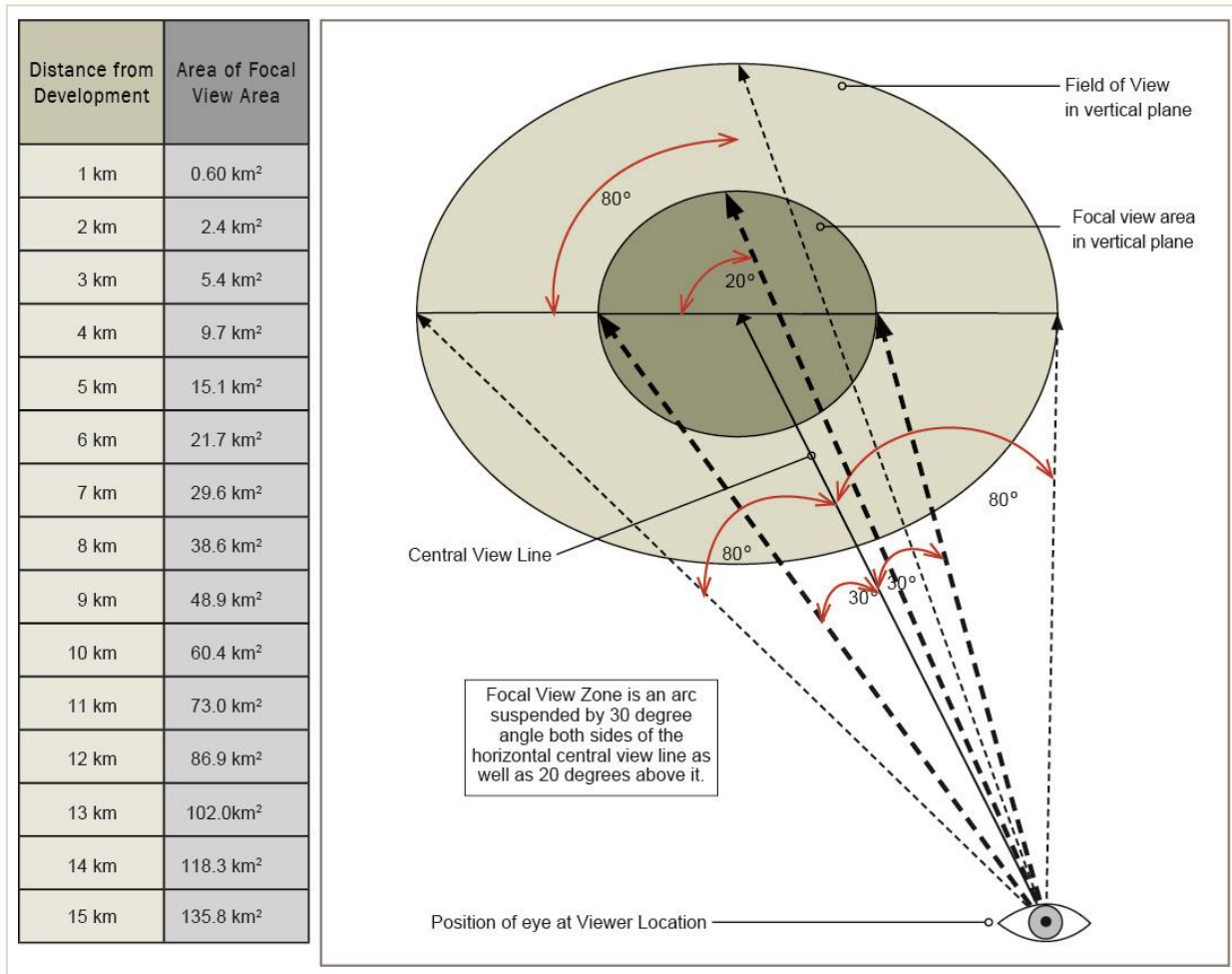
Generally, a low or very low visual effect level would occur if there is minimal contrast between the visible area of the development and the existing landscape setting and/or the area occupied by the Project are only small parts of a total view.

Conversely, a high visual effect level would result if a visible area of the development has a high visual contrast and low integration to the surrounding landscape.

The consideration of the level of visual effect and the percentage of the FVA that the development occupies, as well as the visual sensitivity would determine the overall impact. For example, a development that is determined as Level 1 (i.e. high visual effect) when considering level of contrast and integration but occupies 1% or less of the primary view has a low visual effect (Table 2-1).

**Table 2-1 Visual Effect**

Visual Properties		Visual Effect Levels	Visual Effect Levels		
Contrast Levels with elements in primary view zone	Visual Integration with elements in primary view zone		High Visual Effect	Moderate Visual Effect	Low Visual Effect
<b>High</b> Development elements do not borrow form, shape, line, colour or texture or scale from existing features of the visual setting and contrast levels with existing landscape are high.	<b>Low</b> The development lacks integration with visual setting because of scale totally dominating the ability of site or surrounding features, vegetation and/or topographic features to integrate with the development.	<b>Level 1</b>	It occupies more than 2.5% of the primary view shed	It occupies between 2.5 - 1% of the primary view shed	It occupies less than 1% of the primary view shed
<b>Moderate</b> Development elements borrow from some features of the visual setting in terms of form, shape, line, pattern, colour and scale, reducing visual contrast with existing setting.	<b>Moderate</b> The development has some degree of visual integration with setting due to other features, vegetation and /or topography, achieving some level of integration.	<b>Level 2</b>	It occupies more than 20% of the primary view shed, generally when in a foreground location	It occupies between 20-10% of the primary view shed	It occupies less than 10% of the primary view shed
<b>Low</b> Development elements borrow extensively from features in visual setting in terms of form, shape, line, pattern, colour and scale, minimizing contrast with the existing setting.	<b>High</b> Visual integration is high due to other landscape features, such as vegetation and/or topography, achieving dominance, screening or filtering.	<b>Level 3</b>	The development occupies more than 40% of the primary view shed	The development occupies 40-30% of the primary view shed	The development occupies less than 30% of the primary view shed
			Very Low Visual Effect.		
Contrast between existing landscape and project development or restoration is unperceivable in terms of landform, vegetation and or land use elements, as perceived/seen by an impartial viewer not familiar with any development.	Integration level of any project development is at a maximum with development elements integrating with existing form, pattern, shape, line, colour and texture of the landscape setting within which it occurs.	<b>Level 4</b>	Reflecting unperceivable contrast and very high visual integration levels of development and/ or its landscape restoration.		



**Figure 2.2** Area of Focal View Area at various distances from the development

### 2.2.2 Visual Sensitivity

Visual sensitivity is a measure of how critically a change to the existing landscape may be when viewed by different land use areas and other stakeholders from varying distances.

In this regard, residential, tourist and / or recreation areas generally have a higher visual sensitivity than other land use areas including industrial, agricultural or transport corridors. This due to land uses, such as residential, use the scenic amenity values of the surrounding landscape, often over extended viewing periods. Table 2-2 indicates the levels of visual sensitivity associated with the development.

However, the visual sensitivity of individual receptors may range from high to low, depending on the following additional factors:

- Screening effects of any intervening topography, buildings or vegetation. Receptors with well screened views of the development would have a lower visual sensitivity than those with open views.
- Viewing distance from the receptors, to visible areas of the development. The longer the viewing distances, the lower the visual sensitivity.
- General orientation of receptors to landscape areas affected by the development. Receptors with strong visual orientation towards the development would have a higher visual sensitivity than those not orientated towards the development.

**Table 2-2 Visual Sensitivity**

Land Use		Visibility	Visibility of Project			
			High			
			Nearest visible Project elements less than 2.5 km away	Nearest visible Project elements between 2.5 - 7.5 km away	Nearest visible Project elements between 7.5 - 12.5 km away	Nearest visible Project elements more than 12.5 km away
Sensitivity of Land Use	High	Urban and private rural houses including Heritage listed properties	High Sensitivity	High/Moderate Sensitivity	Moderate Sensitivity	Low Sensitivity
		Tourist destination of visually sensitive land uses e.g. racecourse, horse studs, vineyards etc.	High Sensitivity	High/ Moderate Sensitivity	Moderate/Low Sensitivity	Low Sensitivity
		Designated tourist & main roads - New England Highway, Denman Road	High Sensitivity	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
		Other roads - Kayuga Road, Dartbrook Road, Nandowra Road	Moderate Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
		Minor local roads in rural zone	Moderate/ Low Sensitivity	Low Sensitivity	Very Low Sensitivity	Very Low Sensitivity
		Broad acre rural lands	Low Sensitivity	Low Sensitivity	Very Low Sensitivity	Very Low Sensitivity

### 2.2.3 Visual Impact

The level of visual impact of a project is determined by combined consideration of the visual effect and the visual sensitivity. This combined consideration is illustrated in Table 2-3.

**Table 2-3 Visual Impact**

		Visual Sensitivity			
		High	Moderate	Low	Very Low
Visual Effect	High	High Visual Impact	High/Moderate Visual Impact	Moderate/Low Visual Impact	Moderate/Low Visual Impact
	Moderate	High /Moderate Visual Impact	Moderate Visual Impact	Moderate/Low Visual Impact	Low Visual Impact
	Low	Moderate/Low Visual Impact	Moderate/Low Visual Impact	Low Visual Impact	Very Low Visual Impact
	Very Low	Low Visual Impact	Very Low Visual Impact	Very Low Visual Impact	Very Low Visual Impact

### 2.2.4 Cumulative Impacts

An appropriate radius of analysis is required to include all relevant existing developments that the development would potentially interact with on a visual level. The cumulative impacts should also consider potential future actions that could affect the landscape and account for future generations of viewers.

Cumulative visual impacts are the combined impacts of the development with other past, present, or likely future developments which would have potential material visual interactions.

Cumulative visual impacts can occur:

- Where multiple facilities are seen within the same view without the viewer turning his/her head (the facilities may be juxtaposed so that one is seen “through” the other);
- Where multiple facilities can be seen successively if the viewer turns his/her head; or
- Where multiple facilities are viewed in succession as the viewer moves through the landscape (e.g., driving on highways, hiking trails, or boating on rivers). In this case, multiple facilities can impact the viewing experience for moving viewers even if the facilities are not visible from a single common viewpoint.

Cumulative visual impacts are particularly important where large-scale changes occur to the landscape over long distances, which increases the chances that multiple projects are in view at the same time or in succession for moving viewers. As the Project is an open cut mine with expansion to both surface infrastructure and surface disturbance, it would involve additional changes to the landscape within an area of considerable existing modification from mining. This landscape and visual impact assessment has included consideration of potential cumulative impacts and dynamic landscape impact assessment.

## 2.3 Visual Impact Mitigation

Visual impact mitigation strategies address on-site and off-site viewers, visual effects and sensitivity factors over time.

### 2.3.1 Reduce Visual Effects

The Project has been designed to reduce the potential for visual effects by:

- the development of an integrated waste rock emplacement landform that incorporates geomorphic drainage design principles for hydrological stability, and varying topographic relief to be more natural in exterior appearance;
- prioritising construction and early rehabilitation of the lower batters of the waste rock emplacements to final landform profile to progressively minimise the visual contrast with the broader landscape, thus reducing the visual impacts at Muswellbrook and other receivers to the east;
- development of lighting mitigation strategies;
- maximising the topographic shielding of the evening and night-time mining operations by the Eastern Out-of-Pit Emplacement; and
- the use of compatible tones for building and cladding colours (such colours would include tonal variations of existing colours in the surrounding landscape).

It should be noted that MACH has accelerated the progressive rehabilitation at the approved Mount Pleasant Operation to address concerns raised by key stakeholders, which has significantly reduced the existing visual effects. The status of progressive rehabilitation at the approved Mount Pleasant Operation, as of October 2020, is shown in Section 3.

### 2.3.2 Reduce Visual Sensitivity

Reducing visual sensitivity is achieved by carrying out treatments to minimise visibility of the Project. Such screening treatments can be used to enhance the landscape view and reframe views towards areas not affected by mining activities. The incorporation of geomorphic drainage design principles and varying topographic relief into the final landform also reduces the visual sensitivity as the landform would appear more natural and therefore is not visually perceived as an engineered or man-made structure.

### 2.3.3 New Visual Setting

On completion of mining operations and following rehabilitation, a new local landscape would be created. This new landscape would reflect post-mining landforms.

## 2.4 Dynamic Landscape Assessment

Kaymaz (2012) defines 'landscape' as:

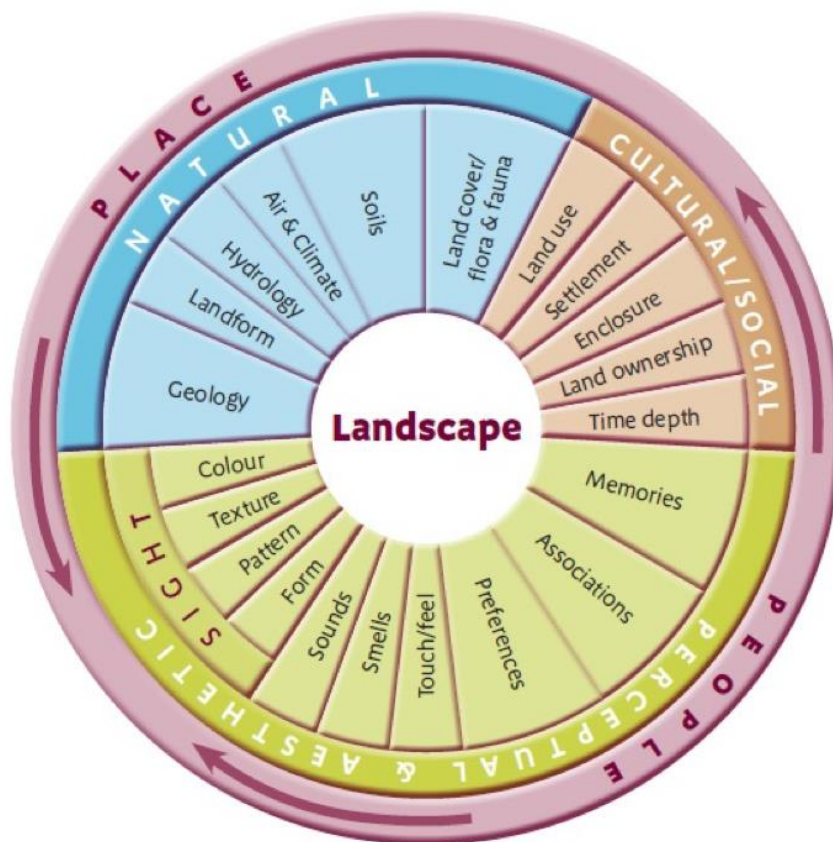
*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.*

Human factors are expressed through a wide range of rural and urban land uses. In the Hunter Region this includes, farming, horse studs, vineyards and mining. Other manifestations include towns and villages as well as roads of various scales and character and other infrastructure such as power lines, railway lines and major power generation facilities.

Landscape assessment seeks to identify and describe variation in the character of the landscape, with reference to the elements and features of the landscape both natural and cultural, as perceived by human perception (Figure 2.3). It differs from visual assessment in that it considers all sensory perception of the landscape.

Dynamic landscape assessment refers to the collective evaluation of these values at a regional and sub-regional level in addition to local area assessment. It reflects people's perceptions as they move through the landscape.

Individual characteristics of the viewer affect the perception of contrast and the ability to discern objects in the landscape.



**Figure 2.3 Landscape Characteristics**

Source: Natural England (2014)

## 2.5 Implementation of Assessment Methodology

### 2.5.1 Desktop Review

Evaluation of the various components of the Project was based on the Project description and associated technical drawings provided by MACH. Topographic mapping and aerial photography provided the basis for the establishment of landscape and visual character. Review of aerial photography and local topography mapping also assisted in evaluating the visibility, sensitive receptor locations and potential extent of views to the Project. Project description information (including mine plans, rehabilitation and final landform profiles) was used to define the potential visual effects of the Project.

### 2.5.2 Field Assessment

A field assessment was undertaken on 11 to 12 September 2019 in areas surrounding the Project. The field assessment included visits to locations within the Primary Visual Catchment (PVC) including New England Highway, Kayuga Road, Denman Road and Wybong Road, publicly accessible views near privately-owned rural properties on the Hunter River flood plain and key vantage points within Muswellbrook and Aberdeen. Some locations involved a review of previously assessed viewpoints, while expanded field assessment captured additional viewpoints in the context of the Project.

The field assessment also included the inspection of horse studs from publicly accessible locations within the vicinity of the Project, that may have potential for views. It is expected that there would be generally no views from these horse studs due to the distance to the Project, except for those along the Hunter River flood plain near Muswellbrook that would already have significant views of existing mining operations.

The field assessment provided an indication of the likely visibility of the Project from each area (e.g. identified foreground screening, vegetation, open views, etc.), the experience of different Landscape Character Units, and how these are seen together, to consider existing and potential cumulative effects.

### 2.5.3 Photomontage Analysis

Photomontages are images that synthesise terrain modelling (topographic mapping) and technical drawings of the Project components to simulate the existing landscape with the Project at a given location at various points in time. Photomontages for eight locations were developed to illustrate likely visual effects of the Project seen from various nearby locations (Section 6).

To conservatively assess the potential impacts of the Project, the photographs captured during the field assessment used a consistent focal length of between 75 millimetres (mm) to 78 mm that was used for the photomontage analysis. It is understood that a focal length of 78 mm is the nearest to an actual, unaided eye view.

## 2.6 Previous Assessments

Where relevant, this assessment has adopted a similar visual impact assessment methodology adopted for the *Mount Pleasant Mine Environmental Impact Statement* (ERM Mitchell McCotter, 1997), *Mount Pleasant Operation – Mine Optimisation Modification Environmental Assessment* (MACH, 2017a) and *Mount Pleasant Operation – Rail Modification Environmental Assessment* (MACH, 2017b) with updates to reflect contemporary best practice. This included:

- Establishing the visual character and visual effect created by the Project;
- Review of the approved mine plans and modifications associated with the Project within the context of the existing visual settings created by various landscapes in and around Mount Pleasant Operation;
- Consideration of the visibility of the Project from sensitive receivers using photomontage/visualisations;

- Identification of the likely visual impacts of the Project (including both short term and long term) with regard to visual effect and sensitivity;
- Consideration of cumulative visual impacts in the locality; and
- A review of the mitigation strategies to ameliorate adverse visual impacts to determine additional requirements to those in existing Mount Pleasant Operation Visual Impact Management Plan.

In addition to this methodology an appraisal of dynamic visual impacts is also conducted.

## 2.7 Applicable Policy and Legislation

The Environmental Impact Statement (EIS) for the development must comply with the requirements of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*, which requires the potential environmental effects of a proposal to be properly assessed and considered in the decision-making process.

The Secretary's Environmental Assessment Requirements (SEARs) issued for the Project (SSD-10418) includes the following requirements relevant to this visual and landscape assessment:

*Visual – including a detailed assessment of the likely visual impacts of the development (during and post-mining) on private landowners in the vicinity of the development and key vantage points in the public domain (including views from public roads), paying particular attention to any new or modified landforms, and to minimising lighting impacts;*

The SEARs issued for the Project also include the following requirements relevant to the assessment of land resources, in particular:

*Land Resources - including:*

...

- *an assessment of the compatibility of the development with other land uses in the vicinity of the development, in accordance with the requirements of Clause 12 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, paying particular attention to any potential impacts on Critical Industry Clusters;*

MACH provided a letter to the Department of Planning, Industry and Environment on 26 June 2020 to clarify the approach to address the SEARs and confirm the EIS would include:

- *Consideration of potential indirect impacts on CICs in the vicinity of the Project arising from continuing air quality emissions, operational noise and blasting, groundwater and surface water extraction, and **visual impacts associated with the mine.***

Therefore, this assessment has conservatively included assessment on the surrounding equine and viticulture critical industry clusters (CICs).

The *Hunter Regional Plan 2036* (NSW Government, 2016) provides an overarching framework to guide subsequent and more detailed land use plans, development proposals and infrastructure funding decisions. It identifies a series of priority actions for each council to coincide with medium-term and long-term population growth and economic change. These include:

- Conduct an assessment of land use compatibility.
- Undertake a land use assessment of the viticulture CICs to align planning controls to achieve a balance between scenic amenity and ongoing growth in tourism.
- Support diversification of the energy and agricultural sectors.
- Protect the equine CICs and allow for expansion of the industry.

Consideration has also been given to the *Strategic Regional Land Use Plan - Upper Hunter Valley* (NSW Government, 2012) and *Hunter Regional Plan 2036*.

This visual and landscape assessment has been prepared in consideration of the requirements in the SEARs and other policy and guideline documents.



## 3 EXISTING ENVIRONMENT

### 3.1 Introduction

The existing visual environment has previously been described in the following:

- Mount Pleasant Mine Environmental Impact Statement (ERM Mitchell McCotter, 1997).
- Mount Pleasant Operation Modification 1 Environmental Assessment (EMM, 2010).
- Continuation of Bengalla Mine Visual Impact Assessment (JVP Visual Planning and Design, 2013).
- Bengalla Mine Development Consent Optimisation Project – Statement of Environmental Effects (VPA Visual Assessment and Planning, 2016).
- *Mount Pleasant Operation Mine Optimisation Modification Environmental Assessment* (MACH, 2017a).
- *Mount Pleasant Operation Rail Modification Environmental Assessment* (MACH, 2017b).

This visual and landscape assessment builds upon these previous studies, reiterating findings regarding the visual character of the landscape. In particular, the Existing Mining, Power Generation and Industrial VCU has been included within the existing setting due to the number of mining, power generation and industrial operations within the vicinity of the Project.

As shown in Figure 3.1, the existing environment surrounding the Project comprises a range of different landscapes and features. This variety is based on differences in topography, vegetation cover and land use patterns.

### 3.2 Primary Visual Catchment

The Project is located west of Muswellbrook in the Upper Hunter Valley of NSW. The PVC represents the area that contains the majority of critical viewpoints relevant to the Project. The PVC is defined by the topography and includes the Project area, adjacent foothills to the south-west through to the north-west, the surrounding ranges and foothills directly north and north-east of Aberdeen, the ranges running north-south to the east of the New England Highway and the altered topography of Bengalla Mine to the south of the Mount Pleasant Operation.

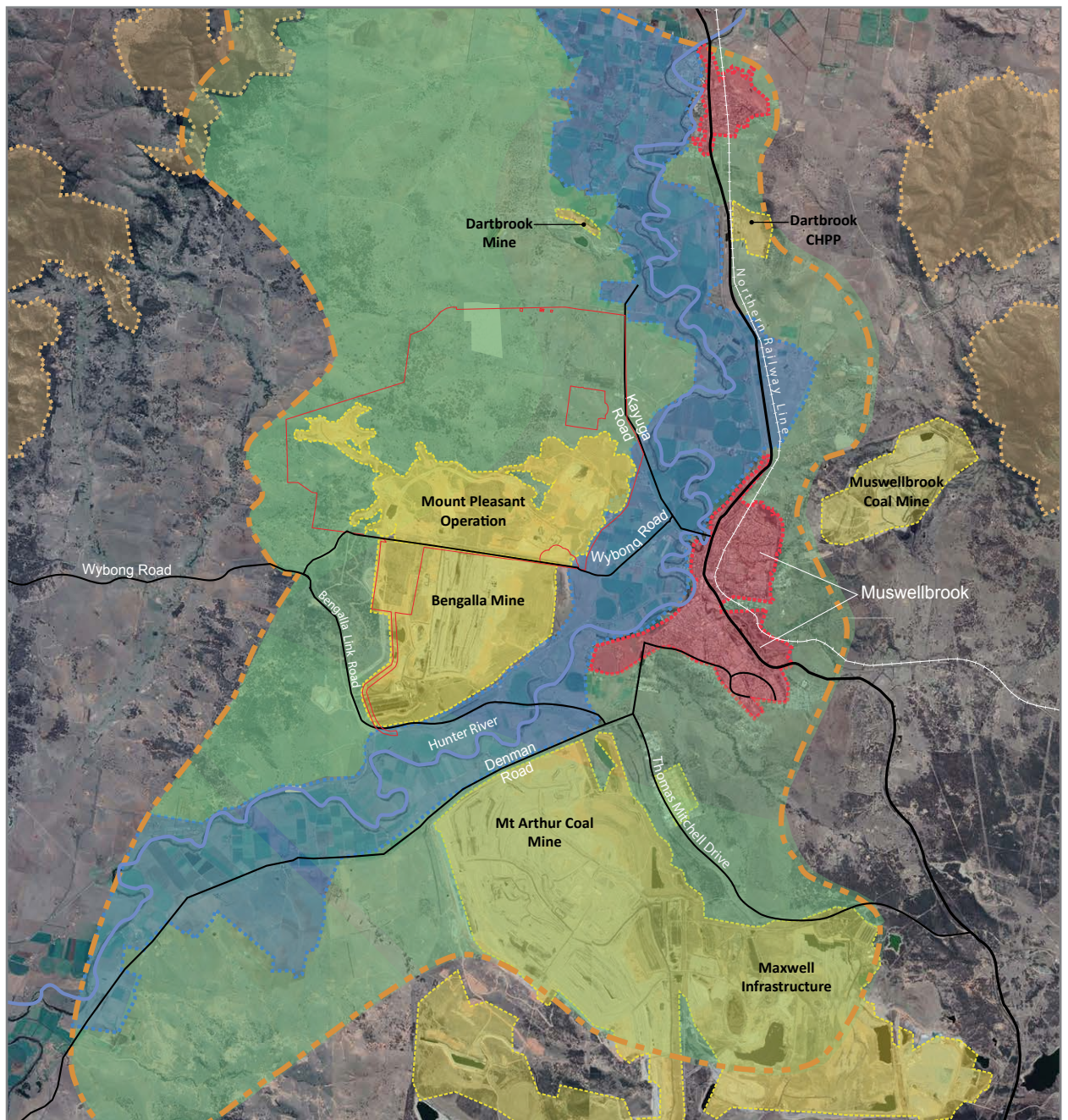
The PVC is further defined by Muswellbrook and adjacent hills to the east and by the existing Mt Arthur Coal Mine to the south. The small ridge located in the centre of the Mt Arthur Coal Mine marks the south-eastern corner of the PVC (Figure 3.1).

### 3.3 Land Ownership

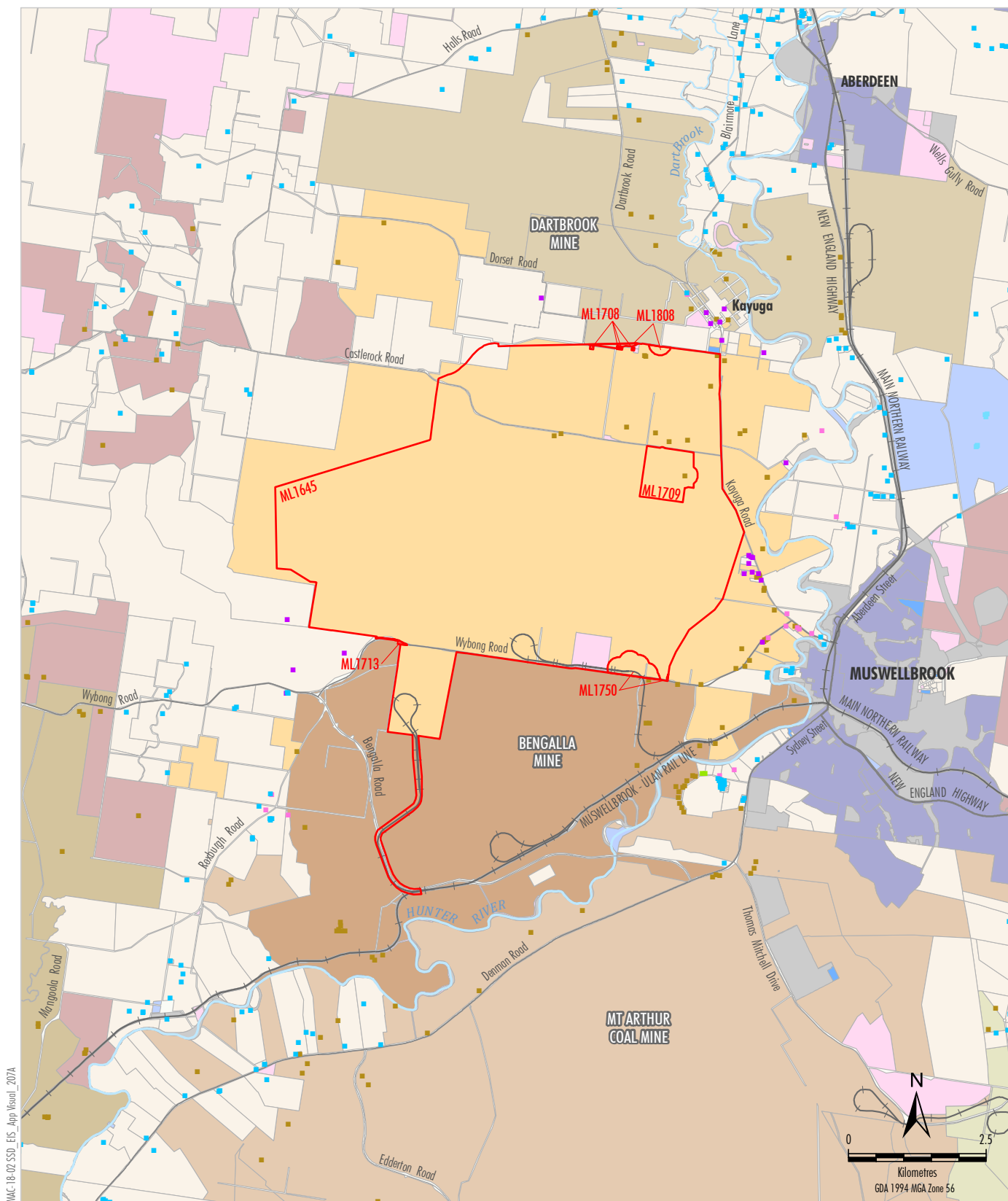
The land ownership around the Project is dominated by various mining companies (Figure 3.2). To the immediate south, land is primarily owned by Bengalla Mine. Beyond that, land ownership is dominated by Mt Arthur Coal Mine. To the west, outside the PVC, is land owned by Mangoola Coal and in the north-west by Muswellbrook Coal. To the north, adjacent Kayuga, is the Dartbrook Mine. The eastern boundary of Muswellbrook is also adjoined by Muswellbrook Coal landholdings.

Private lands are mainly located to the east and west. To the east, Muswellbrook represents an area of high visual sensitivity. To the west there are a number of small-scale rural holdings and rural residences and some rural/tourist destinations that are also sensitive to the potential visual impacts of the Project.

Aberdeen to the north also has a number of sensitive viewing locations but is located at a greater distance from the Project than Muswellbrook which influences visual sensitivity (Section 5).



**Figure 3.1** Primary visual catchment and visual character units



**Figure 3.2**  
**Land Ownership Overview**

### 3.4 Visual Character of the Landscape

The regional visual landscape surrounding the Project is strongly defined by the Hunter River flood plain and contains strongly modified landscapes characterised by existing mining activities and supporting infrastructure (including the approved Mount Pleasant Operation) surrounded by agricultural and pastoral land uses and remnant woodland along the Hunter River flood plain and surrounding foothills.

The Mount Pleasant Operation is in the early operational phase, with the development of an integrated waste rock emplacement landform and an open cut, therefore altering the visual character of the eastern Project area from pastoral grazing to mining.

The majority of the VCUs have been described in previous assessments. The field assessment for this report reviewed existing conditions to identify any significant changes to the visual character of individual units.

The revised visual character of the surrounding visual catchment is defined by several separate VCUs, which include:

- Town areas VCU (Figure 3.3);
- Hunter River flood plain VCU (Figure 3.4);
- Horse Studs VCU (Figure 3.5);
- Foothills VCU (Figure 3.6);
- Surrounding ranges VCU (Figure 3.7); and
- Existing Mining, Power Generation and Industrial VCU (Figure 3.8).

Within each VCU there may be a range of visual receivers. These receivers have varying sensitivity to landscape changes due to the Project. Relevant potentially sensitive visual receivers include:

Towns, villages and localities:

- Aberdeen;
- Muswellbrook; and
- Kayuga.

Tourism and Recreation areas:

- Muswellbrook Racecourse;
- Rossgole Lookout; and
- Pukara Estate.

Rural Areas:

- Horse studs and stables;
- Rural houses on flood plain and in foothills; and
- Heritage listed houses.





**Figure 3.3** *Town areas visual character unit*

Town areas have differing densities to support various functions; the variety of landscapes also reflects this.

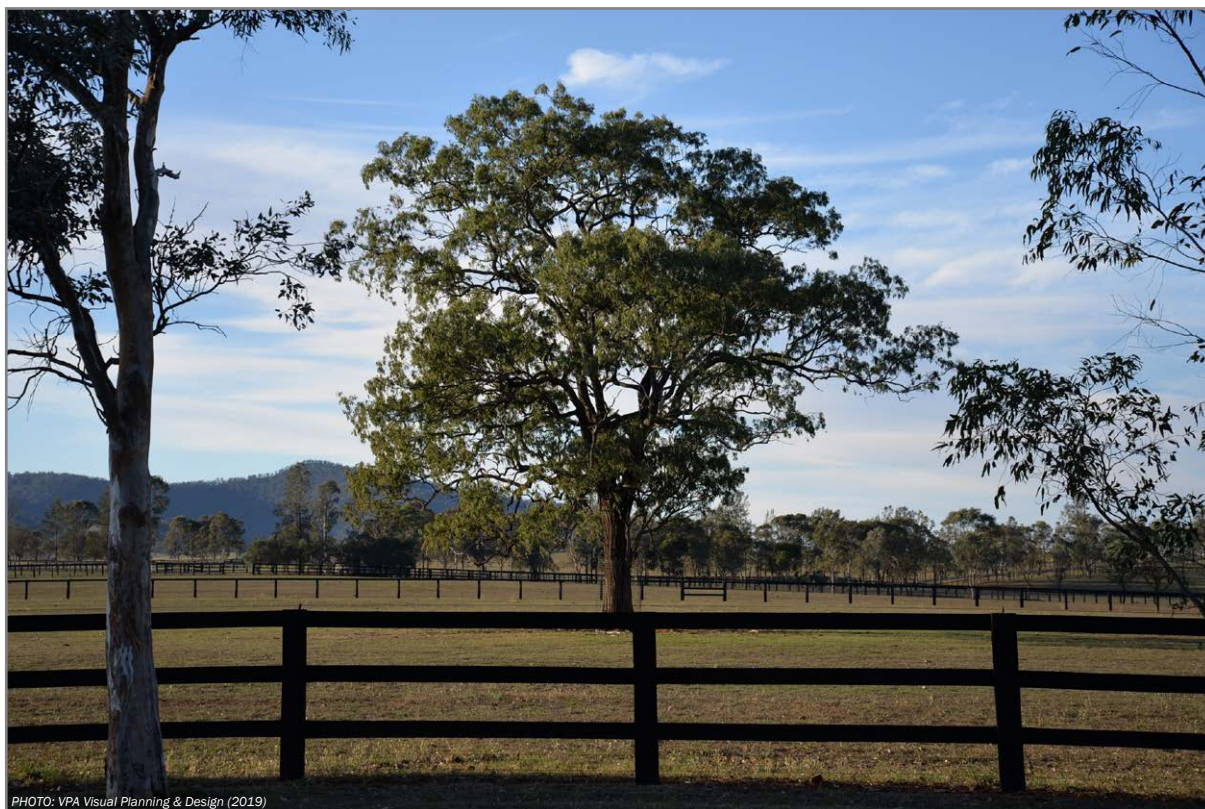




**Figure 3.4** *Hunter River flood plain visual character unit*

Cropland and grassland dominate this VCU, forming strong rectilinear patterns in an open landscape





**Figure 3.5 Horse studs within the Hunter River floodplain**

Horse studs within the flood plain areas present as views of high visual amenity due to owner investment in quality fencing and entry finishes and the irrigated pastures.





PHOTO: JVP Visual Planning & Design (2014)



PHOTO: VPA Visual Planning & Design (2019)

**Figure 3.6** *Foothills visual character unit*

The foothills generally are low elevation with a landscape mix of grassland, scattered trees and open forest. Foothills have generally been cleared for grazing purposes. Within this VCU, openwoodland areas (bottom) contrast with the adjacent cleared irrigated agricultural lands or mine areas.





**Figure 3.7** *Surrounding ranges visual character unit*

The surrounding ranges have higher elevations and steeper slopes than those of the foothills, and are often more densely forested. The surrounding ranges are often the backdrop to views across and within the valley.



**Figure 3.8 Existing mining, power generation and industrial uses visual character unit**

Active mine operations within Mount Pleasant Operation (top) with infrastructure and coal handling plant. Surrounding areas contain many views of existing open cut pits such as Mt Arthur Mine (middle) to the south and the industrial estate on Thomas Mitchell Drive (bottom).

### 3.4.1 Horse Studs

Within the Hunter River flood plain VCU is a sub-unit comprised of several horse studs and their associated rural residential land uses. The horse studs create a specific visual character due to the prestige of the equine racing and horse breeding enterprises both locally and regionally. The horse studs are visually distinctive due to well-constructed fences, property identification and highly verdant irrigated paddocks (Figure 3.5).

The horse studs located within the PVC are in proximity of the local racecourse on Denman Road, south-east of the Project:

- Edinglassie Thoroughbred Stud;
- Abbey Thoroughbreds; and
- Balmoral Horse Stud.

Outside the PVC are:

- on Rouchel Road - Kelvinside (Godolphin) Stud; Newgate Stud Farm and Segenhoe Stud;
- Monarch Stud;
- Yarraman Park Stud;
- Sledmere Stud;
- Godolophin Woodlands Stud – Jerrys Plains; and
- Coolmore Stud – Jerrys Plains.

Those more distant horse studs are outside of the PVC due to local topographic features that obscure potential views (Section 5).

### 3.4.2 Existing Mining, Power Generation and Industrial VCU

The Existing Mining, Power Generation and Industrial VCU consists of the existing approved Mount Pleasant Operation, Bengalla Mine, Dartbrook Mine to the north, the larger Mt Arthur Coal Mine to the south, Muswellbrook Coal Mine to the east (outside the PVC), and the Thomas Mitchell Drive Industrial Estate (Figure 3.8).

Mt Arthur Coal Mine, Bengalla Mine and Mount Pleasant Operation contribute to the local 'mine' visual character in this section of the foothills (i.e. within the PVC). Other mines in the vicinity of the PVC, contribute to the sub-regional and regional visual landscape character, including:

- Maxwell Infrastructure (former Drayton Mine).
- Maxwell Project.
- Muswellbrook Coal Mine.
- Mangoola Coal.
- Hunter Valley Operations.
- United Wambo.
- Greater Ravensworth Area Operations.
- Mt Thorley.
- Warkworth Complex.

The Thomas Mitchell Drive Industrial Estate occurs in the Southern Foothills VCU. Although the area would have views to the Project, the area is not visually sensitive or significant because of its industrial use.

### 3.4.3 Mount Pleasant Operation

MACH has established operations at the Mount Pleasant Operation with the development of an open cut, waste rock emplacement and other associated infrastructure. A visual bund has been developed along its southern boundary adjacent to Wybong Road. This bund is one of the visual mitigation strategies previously proposed in the Visual Impact Management Plan for the approved Mount Pleasant Operation. MACH had also planted tree screens on the visual bund during construction in 2018 and were observed during the field assessment in September 2019. Some of the planted tree screens would be removed as part of the construction of the Stage 2 rail infrastructure approved as part of Modification 4 and would be replanted following completion of the construction works, where necessary. Since the field assessment, MACH has also completed extensive additional planting and replanting of tree screens in various locations during 2019 and 2020.

The Mount Pleasant Operation consists of active mining areas and an associated out-of-pit waste rock emplacement. The waste rock emplacement is the most visually prominent Project component from off-site areas to the north, east and south. The CHPP and other infrastructure are visually evident only from a limited number of locations to the south and west (e.g. Wybong Road), where existing views of mining operations dominant the visual setting.

Table 3-1 describes the existing and approved visual impacts of the approved Mount Pleasant Operation on receptors in the vicinity of the Project, as assessed in previous assessments. Where assessment was not available for a specific receptor, an existing and approved visual impact has been assigned based on the expected visual impacts of the approved Mount Pleasant Operation.

The integrated waste rock emplacement landform associated with the Project would become part of the new visual setting. Alterations to the approved mining activities and infrastructure that would result in changes to the visual landscape as part of this Project are discussed in Section 4.

MACH has accelerated the progressive rehabilitation of the waste rock emplacements where possible minimising the potential extent and duration of visual effects of the approved Mount Pleasant Operation. The effectiveness of the progressive rehabilitation strategy is demonstrated in Figure 3.9 and Figure 3.10.



**Table 3-1 Visual Impacts of the Approved Mount Pleasant Operation**

Receptor	Visual Impacts of the Approved Mount Pleasant Operation
<b>Central Sector</b>	
Rural Residences on flood plain	High
Horse studs*	High
Muswellbrook Racecourse*	High
Sydney Road*	High/Moderate
Kayuga Road	High
Wybong Road	High/Moderate
Racecourse Road*	Moderate/Low
Rural Land	Low
<b>Northern Sector</b>	
Momberi-Scone Rural Landscape	Low
Aberdeen	High
Rural Residences on flood plain	High
Horse Studs	Nil
Rossgole Lookout*	Moderate/Low
New England Highway	High
Northern Railway Line	High
Local Minor Roads	Moderate/Low
Rural Land	Low
<b>Eastern Sector</b>	
Muswellbrook	High
Rural Residences on flood plain	High
New England Highway	High
Northern Railway Line	High
<b>Southern Sector</b>	
Heritage-listed Homesteads*	Moderate
Edinglassie Stud	Moderate
Other Horse Studs*	Nil
Tourist Features*	Nil
Muswellbrook-Jerrys Plains Landscape Conservation Area	Moderate
Rural Residences	Moderate
Denman Road*	High
Thomas Mitchell Drive*	Low
Rural Land	Low
<b>Western Sector</b>	
Rural Residences	Moderate
Wybong Road	High
Roxburgh Road	Moderate
Rural Land	Low

\* Receptors that were not assigned a visual impact as part of the previous visual assessments for the approved Mount Pleasant Operation, that have been assigned an approved visual impact for direct comparison with the Project.



Photo 1 - September 2019



Photo 2 - March 2020



Photo 3 - May 2020

**Figure 3.9** *Progressive rehabilitation - September 2019 to May 2020*





Photo 4 - June 2020



Photo 5 - August 2020



Photo 6 - October 2020

**Figure 3.10 Progressive rehabilitation - June 2020 to October 2020**

## 4 MOUNT PLEASANT OPTIMISATION PROJECT

The visual effects of the Mount Pleasant Operation have already been identified in previous studies by Mount Pleasant Environmental Impact Statement Visual Assessment (Geoffrey Britton and Associates, 1997), with additional visual assessments completed for the approved Mount Pleasant Operation Mine Optimisation Modification Environmental Assessment (MACH, 2017a) (Modification 3) and the Mount Pleasant Operation Rail Modification Environmental Assessment (MACH, 2017b) (Modification 4).

This section describes the components of the Project with the potential to cause visual effects additional to those identified for the existing approved Mount Pleasant Operation. These include:

- expansion of open cut and associated disturbance, including;
  - vegetation clearance and topsoil stripping;
  - drilling and blasting;
  - overburden and interburden material removal and handling; and
  - coal mining.
- development of the integrated waste rock emplacement landform, including higher elevations and changes to extents;
- relinquishment of MACH's existing approvals to construct the North West and South West Out-of-Pit Emplacements<sup>2</sup>;
- construction of new ancillary infrastructure and associated disturbance;
- upgrades to infrastructure and associated disturbance and potential night-lighting;
- progressive development of Fines Emplacement Area;
- Northern Link Road realignment and associated disturbance;
- rail movements and potential night-lighting; and
- extension of the durations of mining operations.

Throughout the life of the approved mining operations (including coal transportation), MACH would implement progressive rehabilitation and the visual mitigation strategies described in the approved Visual Impact Management Plan and any newly identified visual mitigation requirements resulting from this assessment. This is a significant consideration when determining potential visual effects and impacts of the Project on the surrounding landscape as the new waste rock emplacement landform design improves medium to long-term outcomes.

Figure 4.1 provides the proposed general arrangement of the above key Project elements. A detailed project description, including information showing the progression of mining for the Project, is provided in Section 3 of the Main Text of the EIS. Project components and visual properties are summarised in Table 4-1.

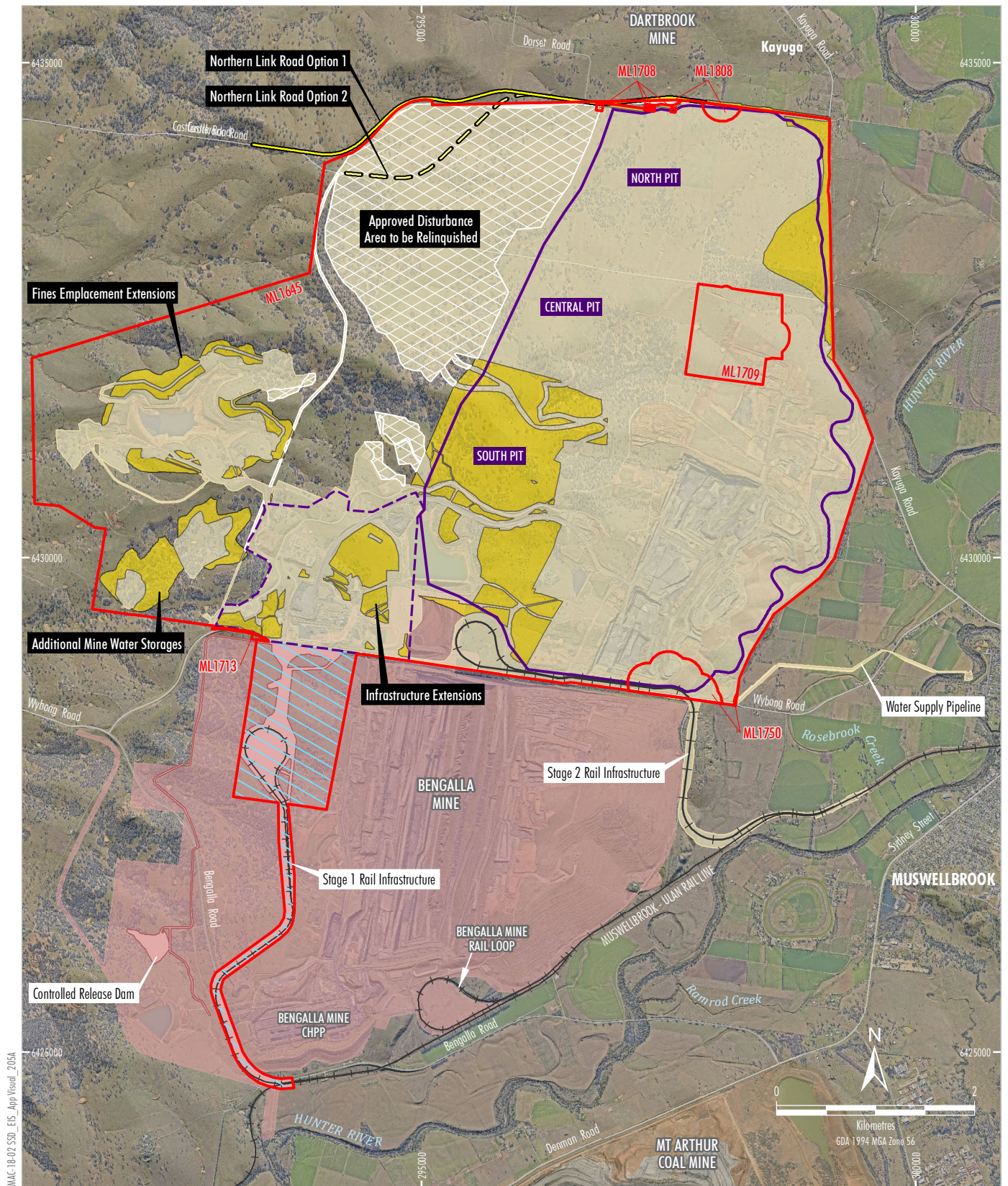
Figure 4.2 shows the location and extent of the existing and proposed mine infrastructure area components for the Project and Figure 4.3 provides the indicative cross-sections of the Fines Emplacement Area.

Figure 4.4 to Figure 4.8 provide examples of existing mining operations (including the approved Mount Pleasant Operation) within the vicinity of the Project and the visual characteristics of the mining operations components.

Appendix A contains general arrangement plans for the Project mine stage views included in this report.

<sup>2</sup> The North West and South West Out-of-Pit Emplacements were assessed in the Mount Pleasant Environmental Impact Statement Visual Assessment (1997).





#### LEGEND

##### Existing Mine Elements

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

##### Additional/Revised Project Elements

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

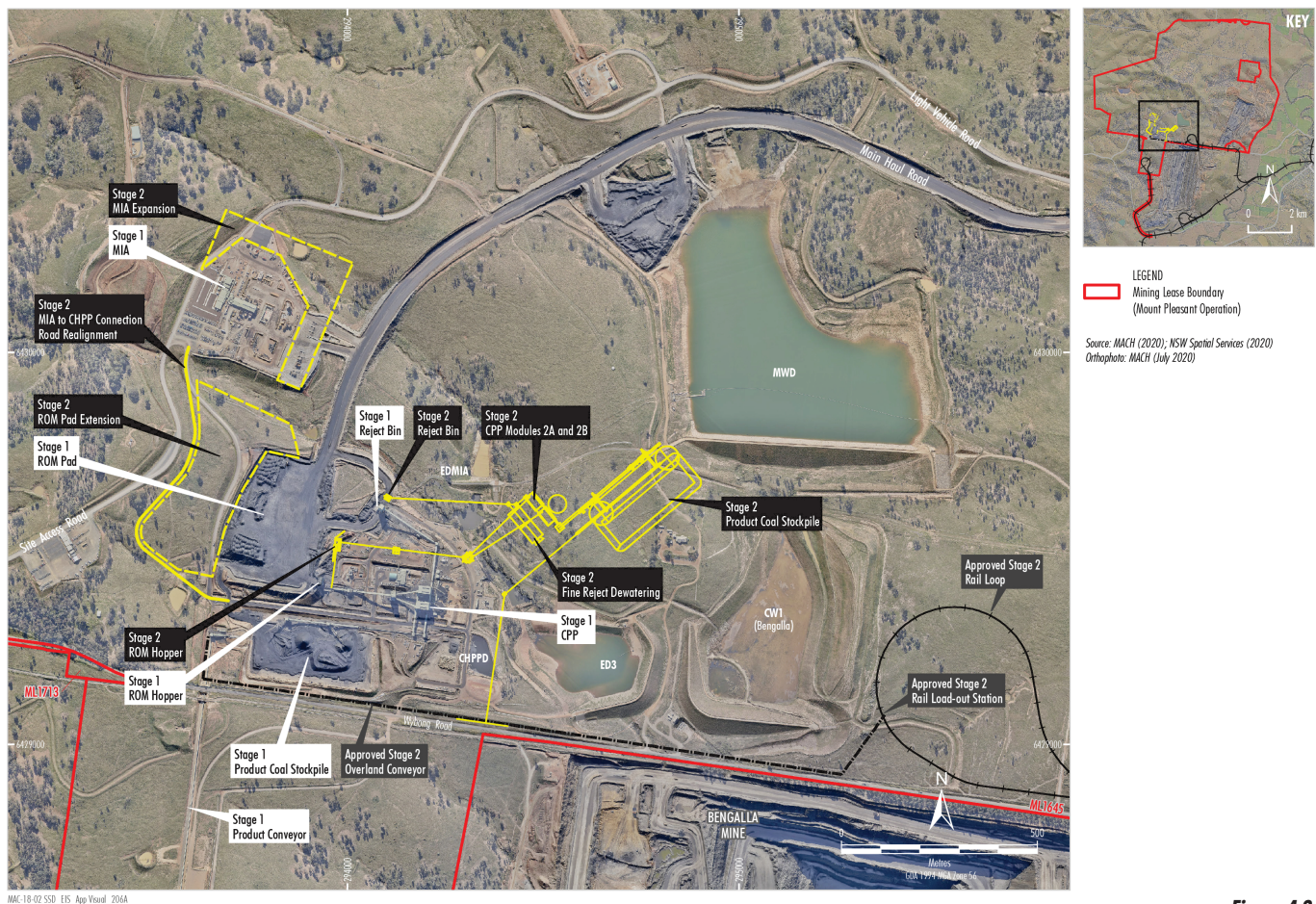
#### NOTES

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

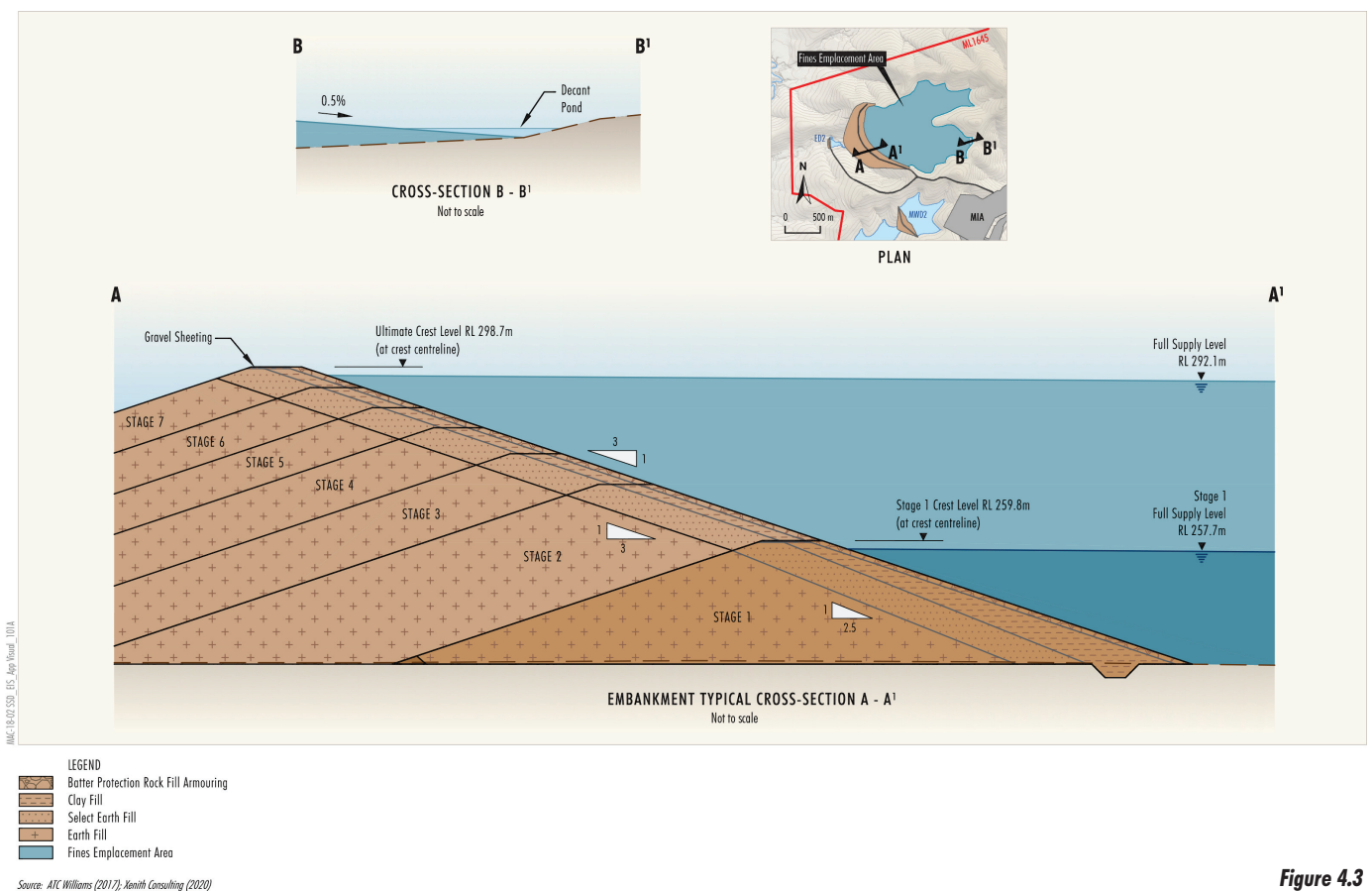
Source: MACH (2020); NSW Spatial Services (2020); Department of Planning and Environment (2016) Orthophoto: MACH (2020)

**Figure 4.1**  
**Mount Pleasant Optimisation Project - General Arrangement**





**Figure 4.2**  
**Existing and Proposed Mine Infrastructure Area Components**



**Figure 4.3**  
**Fines Emplacement Area Indicative Cross-sections**

**Table 4-1 Project Components and Visual Properties**

Project Component	Visual Properties		
	Construction	Operations (with final rehabilitation works)	Final Landform
<p><b>Expansion of Open Cut and Associated Disturbance</b></p> <p>The open cut arrangement would be modified with the South Pit extended west, and the North Pit does not extend as far west. The nomenclature also has been amended to refer to a Central Pit, however, all pits are effectively contiguous.</p> <p>A large area of the previous North Pit and associated out-of-pit waste rock emplacement would be relinquished west of the extent of the open cut and waste rock emplacement landform.</p> <p>The visual effect of each component for the expansion of open cut mining activities and associated disturbance have been summarised below for vegetation clearance, topsoil stripping, drilling and blasting, overburden and interburden material removal and handling and coal mining.</p>	-	-	-
<p><b>1 Vegetation Clearance and Topsoil Stripping</b></p> <p>Progressive vegetation clearance and soil clearing would be undertaken ahead of the advancing open cuts. While the Project would optimise the recovery of coal reserves, the total disturbance area would remain similar and this would be achieved in part by avoiding and minimising vegetation clearance by forgoing the clearance of some areas approved to be cleared (Figure 4.1).</p> <p>Soil stripping would continue to be undertaken progressively by mobile equipment and stripped topsoil would either be used directly in progressive rehabilitation or placed in stockpiles for later re-use.</p> <p>Soil stockpile locations and volumes would vary over the life of the Project. Indicative locations of temporary soil stockpiles that would be used and then rehabilitated during the life of the Project are provided in Section 3 of the Main Text of the EIS.</p> <p>During construction and operation, vegetation clearance and soil stripping would result in disturbed areas with low integration with the existing environment as colours and textures of cleared areas would highly contrast with the existing rural setting. In areas of existing modification, the levels of contrast would be lower. There would be minimal vegetation clearance during the final landform phase of the Project.</p>	Level 1	Level 1	-
<p><b>2 Drilling and Blasting</b></p> <p>Overburden and interburden material that cannot be efficiently ripped and excavated by mobile equipment would be drilled and blasted. With the implementation of the existing mitigation and management measures for blasting during construction and operation, it is not expected that this would cause a significant visual effect.</p>	Level 3	Level 3	-

Project Component	Visual Properties		
	Construction	Operations (with final rehabilitation works)	Final Landform
<b>3 Overburden and Interburden Material Removal and Handling</b> Overburden and interburden material would continue to be removed with excavators, with haul trucks used to haul the material to in-pit and the out-of-pit emplacement. Draglines may also be used in the place of excavators to remove overburden and interburden material if further Project engineering studies indicate it would be reasonable and feasible to do so.  During construction, operation and final landform shaping, handling and emplacement of overburden and interburden would result in low integration with the existing environment as colours and textures of waste rock emplacement areas would highly contrast with the existing rural setting. In areas of existing modification, the levels of contrast of the waste rock emplacements would be lower.	Level 1	Level 1	-
<b>4 Coal Mining</b> Mining of exposed coal seams at the approved Mount Pleasant Operation typically involves excavators or front-end loaders ripping and pushing coal and parting material, and loading ROM coal into haul trucks for haulage directly to the ROM dump hopper or ROM pad.  Haulage of Project ROM coal would continue to use internal haul roads.  During construction and operation, coal mining activities may be visible from elevated viewpoints (coal stockpiles, bench structures) and would have low integration with the existing environment as colours and textures of coal stockpiles and benches would highly contrast with the existing rural setting. In areas of existing modification, the levels of contrast of the coal stockpiles and benches would be lower. There would be no coal mining activities during the final landform phase of the Project.	Level 1	Level 1	-

Project Component	Visual Properties		
	Construction	Operations (with final rehabilitation works)	Final Landform
<p><b>Development of an Integrated Waste Rock Emplacement Landform</b></p> <p>Hauled overburden and interburden material, and coarse rejects from the CHPP, would continue to be strategically placed within mined out voids and the Eastern Out-of-Pit Emplacement to develop the final landform. Dewatered fine rejects would also be co-disposed as a component of the Project.</p> <p>Overburden material would also be placed along selected boundary areas of the open cuts (e.g. the northern boundary of North Pit) in advance of mining activities to act as a safety bund (i.e. to prevent accidental access), as well as assisting in reducing direct views of the open cut workings from publicly accessible locations and/or act as a noise bund.</p> <p>Landform profiling and rehabilitation of the Eastern Out-of-Pit Emplacement would continue to be undertaken progressively over the life of the Project (as evident at the existing Mount Pleasant Operation).</p> <p>Temporary rehabilitation would be undertaken where practical to stabilise landforms until further mining operations are carried out in the future and to minimise the potential for dust generation.</p> <p>The integrated waste rock emplacement landform incorporates geomorphic drainage design principles for hydrological stability and varying macro and micro-relief on the eastern face to be more natural in appearance particularly from viewpoints to the east, north-east and south-east (Figures 3.9 and 3.10 and Appendix A).</p> <p>The integrated waste rock emplacement landform would be vertically higher than the approved landform by approximately 40 m (approximately 360 m AHD at the highest point in comparison of a maximum approved height of up to 320 m AHD) but provides a more natural upper profile. The additional elevation provides both additional waste rock emplacement capacity and facilitates the objective to develop a more natural landform in both vertical and horizontal profile.</p>	Level 1	Level 1 - 2	Level 3 - 4



Project Component	Visual Properties		
	Construction	Operations (with final rehabilitation works)	Final Landform
<p><b>Construction of New Ancillary Infrastructure, Upgrades to Infrastructure and Associated Disturbance</b></p> <p>Upgrades to existing infrastructure at the approved Mount Pleasant Operation would require an increase in the extent of additional mine water storages and infrastructure areas.</p> <p>Existing approved infrastructure and facilities with minor physical changes to existing infrastructure and modified layout and expanded footprint for various components as follows (Figure 4.2):</p> <ul style="list-style-type: none"> <li>• Development of the Stage 2 CHPP and associated infrastructure (approximately 30 m high) adjacent to the Stage 1 CHPP.</li> <li>• Development of the Stage 2 product coal stockpile and associated infrastructure (approximately 20 m high, 280 m long and 40 m wide) adjacent to the existing mine water dam.</li> <li>• Development of the Stage 2 ROM pad and associated infrastructure adjacent to the Stage 1 ROM pad.</li> <li>• Expansion of the Stage 1 mine infrastructure area to include additional laydown areas for the Stage 2 mine infrastructure area.</li> </ul> <p>Various components and activities of an industrial scale and character consistent with approved Mount Pleasant Operation. The proposed upgrades to the infrastructure would be well integrated with the existing setting at the approved Mount Pleasant Operation during construction and operations, with limited contrast or change.</p> <p>Further, the upgraded infrastructure would be located adjacent to the existing mine infrastructure which is west of the integrated waste rock emplacement landform, which would shield potential views of the infrastructure from the north and east of the Project, as well as shield these viewpoints from potential night-lighting impacts of fixed and mobile equipment.</p>	Level 3	Level 3	-
<p><b>Progressive Development of Fines Emplacement Area</b></p> <p>Six embankment raises of the Fines Emplacement Area would be required over the life of the Project (Figure 4.3), which would result in an ultimate crest height of approximately 299 m AHD. At full capacity, the Fines Emplacement Area would have a total disturbance area of approximately 166 hectares (ha).</p> <p>The Fines Emplacement Area would be located well to the west of the integrated waste rock emplacement landform, which would shield potential views of the area from the north and east.</p>	Level 1	Level 1 - 2	Level 3 - 4

Project Component	Visual Properties		
	Construction	Operations (with final rehabilitation works)	Final Landform
<p><b>Northern Link Road Realignment and Associated Disturbance</b></p> <p>The Northern Link Road near the northern boundary of the ML 1645 would be realigned, with the development of a new connection between Castlerock, Dorset and Kayuga Roads.</p> <p>During construction, vegetation clearing and earthworks would create areas of contrasting colour and texture. In the short-term, views of the construction activities may be evident, but would be generally consistent with the existing environment. General topography would remain similar to the existing terrain along the existing Northern Link Road.</p> <p>Rehabilitation of the Northern Link Road disturbance activities would be completed early in the Project life and would generally be consistent with other public roads in the vicinity.</p>	Level 2	Level 4	Level 4
<p><b>Rail Movements and Associated Night-Lighting</b></p> <p>Rail movements would be intermittent elements with up to approximately 17 Mtpa of product coal transported via rail. As the mine operates 24 hours per day, train head lights would contribute to the visual factor, with some potential for headlight spill into Muswellbrook. The approved headlight screens and the low frequency of the train movements would limit the potential visual effects.</p>	The assessment of potential night-lighting impacts of the Project, as a result from additional rail movements is considered in Section 7.7.		
<p><b>Extension of Duration of Mining Operations</b></p> <p>Extension to the time limit on mining operations to 22 December 2048 (mining operations extended for 22 years).</p>	This Project component would not have associated visual properties, however it would increase the timeframe during which the visual effects may be observed. Notwithstanding, the extension of mining operations has been considered as part of the dynamic landscape assessment in Section 8.		





**Figure 4.4** *Examples of existing rehabilitation of overburden emplacement areas at Mt Arthur Coal Mine.*



**Figure 4.5** *Mangoola Coal - micro-topographic rehabilitation techniques.*





**Figure 4.6** Development of waste rock emplacement area as viewed from Wybong Road.



**Figure 4.7** CHPP components at the existing Mount Pleasant Operation - Wybong Road.



**Figure 4.8** Existing Mount Pleasant Operation from Wybong Road.

## 5 VISUAL SENSITIVITY

### 5.1 General

Visibility of the potential visual effects of the Project depend on factors such as topography and vegetation, distance, atmospheric conditions and screening effectiveness of approved components of the Mount Pleasant Operation including the approved visual impact mitigation measures (e.g. visual bunds and screen tree planting).

The sensitivity of viewing locations would depend on the land use of that location. Land uses that utilise the view (i.e. residences and recreation areas) would have a high sensitivity, whereas areas such as rural lots (without a residence) have a low sensitivity, as they do not gain value by utilising the view.

### 5.2 Primary Visual Catchment

The boundaries of the PVC for the Project and various view sectors are illustrated in Figure 5.1 and defined below:

- The Central sector that includes the rural foothills and Hunter River flood plain immediately to the east of the existing Mount Pleasant Operation open cut;
- The Northern sector that includes the foothills and ridgeline (including Rossgole Lookout) and the village of Aberdeen and Kayuga and the northern Hunter River flood plain;
- The Eastern sector that includes the town of Muswellbrook and adjoining foothills;
- The Southern sector that includes the foothills and mine areas south of the Project and southern Hunter River flood plain; and
- The Western sector that includes the ridgeline of the foothills in the vicinity of Wybong Road.

### 5.3 Viewing Locations – General

In the vicinity of the Project there are a number of potential viewing locations (see Table 5-1). These include:

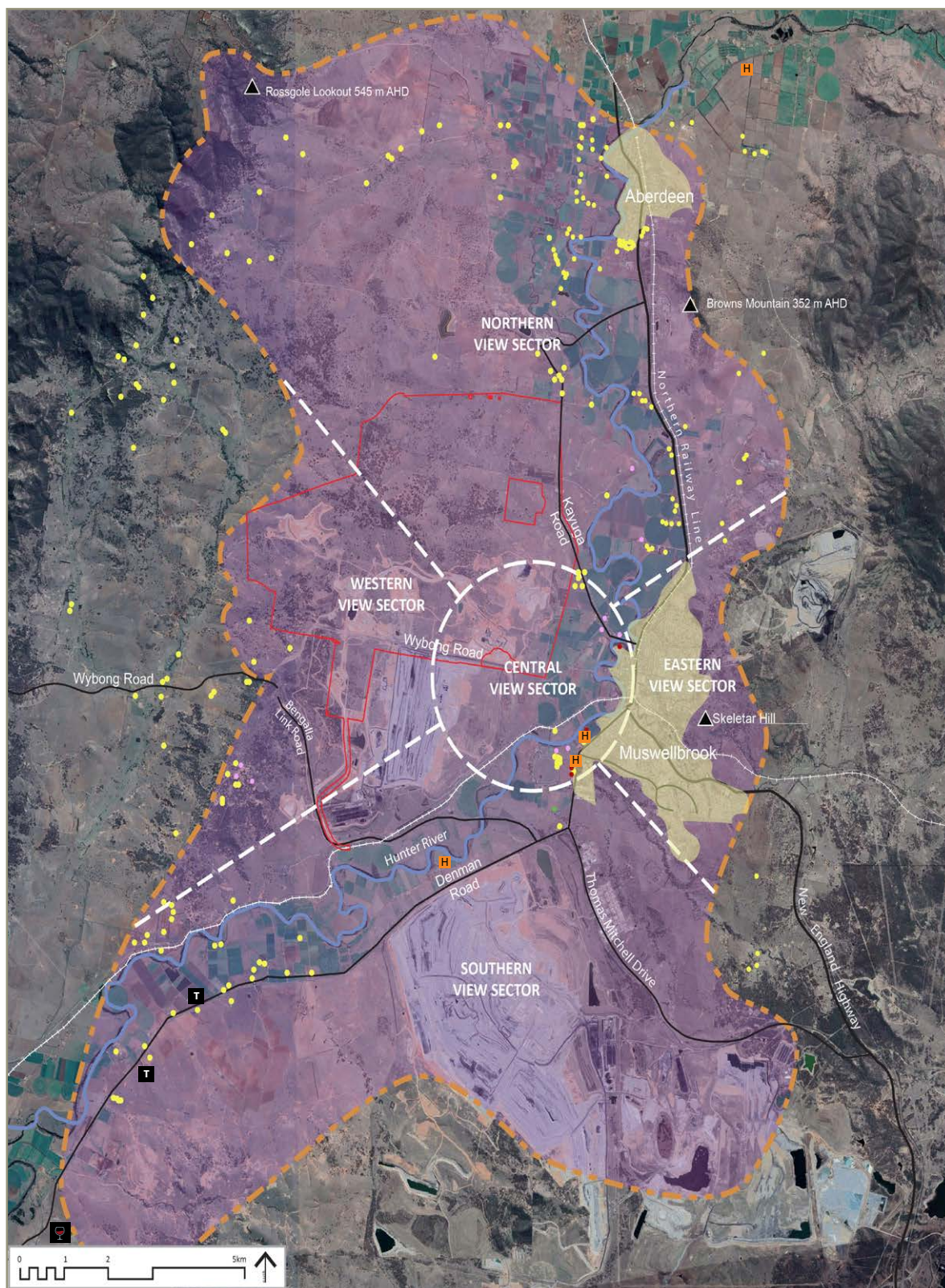
- Town of Muswellbrook - particularly elevated areas orientated west;
- Village of Aberdeen – particularly elevated areas oriented south;
- Rural residences and areas - properties are scattered throughout the region, and are sometimes elevated to take advantage of views across the Hunter River flood plain;
- Horse Studs – Abbey Thoroughbreds and Edinglassie Stud;
- Vineyards and wineries;
- Historic homesteads of ‘Overton’, ‘Overdene’, ‘Rous Lynch’, ‘Edinglassie’ and Kayuga Homestead (identified in previous ERM Mitchell McCotter 1997 - Heritage Report and listed in the Muswellbrook Local Environmental Plan<sup>3</sup>);
- Recreation areas and tourist facilities such as Muswellbrook Racecourse; and
- Roads - the major road through the PVC is the New England Highway. Regional roads include Denman Road and local roads include Wybong Road, Kayuga Road and Bengalla Link Road, in addition to minor local roads.

For the purposes of this assessment, computer generated photomontages have been developed from eight key sensitive viewing points within the PVC to illustrate the potential visual effect of the Project (Section 6).

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<sup>3</sup> It should be noted that, the Kayuga Homestead is outside the study area for the *Historic Heritage Assessment and Statement of Heritage Impact* prepared by Extent Heritage (2020). Notwithstanding, the potential visual impacts of the Project on the Kayuga Homestead have been considered.





Source: Aerial photography - Google Earth Pro (2017)



**Figure 5.1** Primary visual catchment, view sectors and sensitive receptors

## 5.4 Visibility Considerations

### 5.4.1 Significant Topographic Features

Some topographic features contribute to limiting the visibility of the Project area. The gently undulating hills between the flood plain and the surrounding ranges create local view sheds and changing view angles and glimpses dependent on location in relation to the Project area. The limited number of accessible high points restricts potential overviews.

The PVC created by surrounding ranges, ridgelines or existing mine-altered landforms, generally limits direct views from beyond the visual catchment in all directions. Though elevation range is small within the PVC, some accessible higher points provide broader views across the Hunter River and flood plains to undulating foothills and existing mining operations (Mt Arthur Coal Mine, Bengalla Mine and approved Mount Pleasant Operation).

Some of the higher points along the PVC perimeter such as Mount Arthur to the south (currently not publicly accessible), Skelletar Hill (Trig) east of the Project at 334 m AHD and publicly accessible Rossgole Lookout north-west of the Project at 545 m AHD would have longer views over the foothills within the PVC. Elevated views west from Coal Road and Acacia Road in South Muswellbrook, currently include views of large scale mine modified landscapes (Figure 5.2).

Local topographic features that limit views include the mine landforms of the Bengalla Mine with an existing elevation of 300 m AHD and rolling hills and ridges to the north and west of the Project (Figure 5.3). The topography of Muswellbrook provides for viewing opportunities from the many elevated vantage points with western outlooks. Most lower locations within the town are screened by adjoining buildings and/or vegetation. This screening effect can also be important in relation to individual rural residences where adjoining sheds, homestead gardens and/or trees can create foreground screens. This screening effect may be diminished when viewing locations are situated in more elevated locations.

### 5.4.2 Vegetation Screening and Foreground Elements

The influence of vegetation and tree cover at the point of viewing has the potential to screen views to the Project (Figure 5.4, Figure 5.5 and Figure 5.6).

Vegetation close to the Project along road corridors such as Kayuga Road and Dartbrook Road would also influence visibility due to viewing angles (Figure 5.5).

There is opportunity to further mitigate potential visibility, and therefore potential visual impacts, through the planting of additional tree screens.

Elements in the foreground or near middle ground (e.g. existing buildings or other structures) also can significantly reduce the visibility of the Project (Figure 5.6).

## 5.5 Land Use Sensitivity

Land use in the vicinity of the Project varies, which influences the sensitivity of receptors. Land use activities include agriculture businesses, rural residences, suburban residential areas, tourism and recreation locations, road and rail corridors, and equine enterprises, as well as mining and power generation industrial uses. These land use features contribute to the visual character of the landscape as well as influence visual sensitivity.

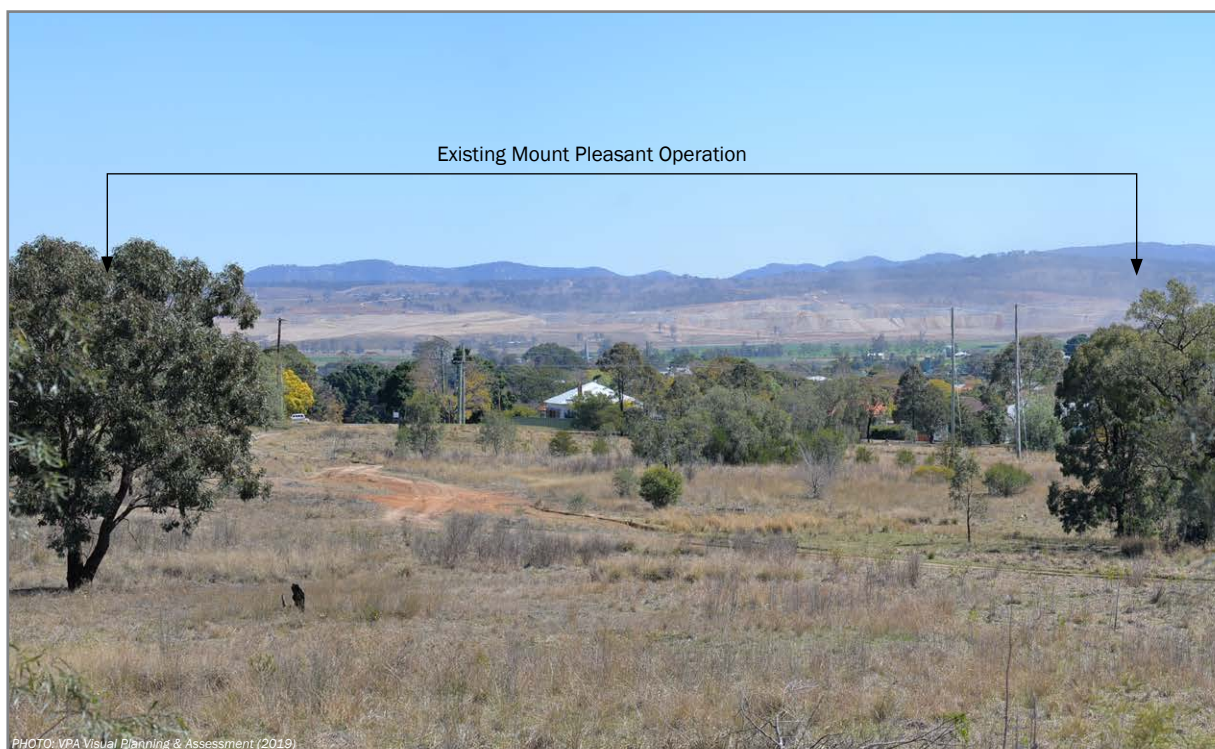
In this context, residential areas such as Muswellbrook, Aberdeen, Kayuga or rural residences would have sensitivity to larger scale changes to the landscape. As such, these have been assigned a high sensitivity up to 7.5 km away from any visible Project component with a moderate sensitivity resulting for locations further away.

Horse studs and viticulture enterprises located within the PVC are assigned high sensitivity up to 7.5 km away due to the high visual amenity cultural landscapes created by these industries and the associated properties. These landscapes reinforce the cultural and economic profile of the properties. Consequently, there are a number of sensitive receptors located in the equine Critical Industry Cluster (CICs) and viticulture CICs. The mapped equine and viticulture CICs within the vicinity of the Project are shown on Figure 5.7.





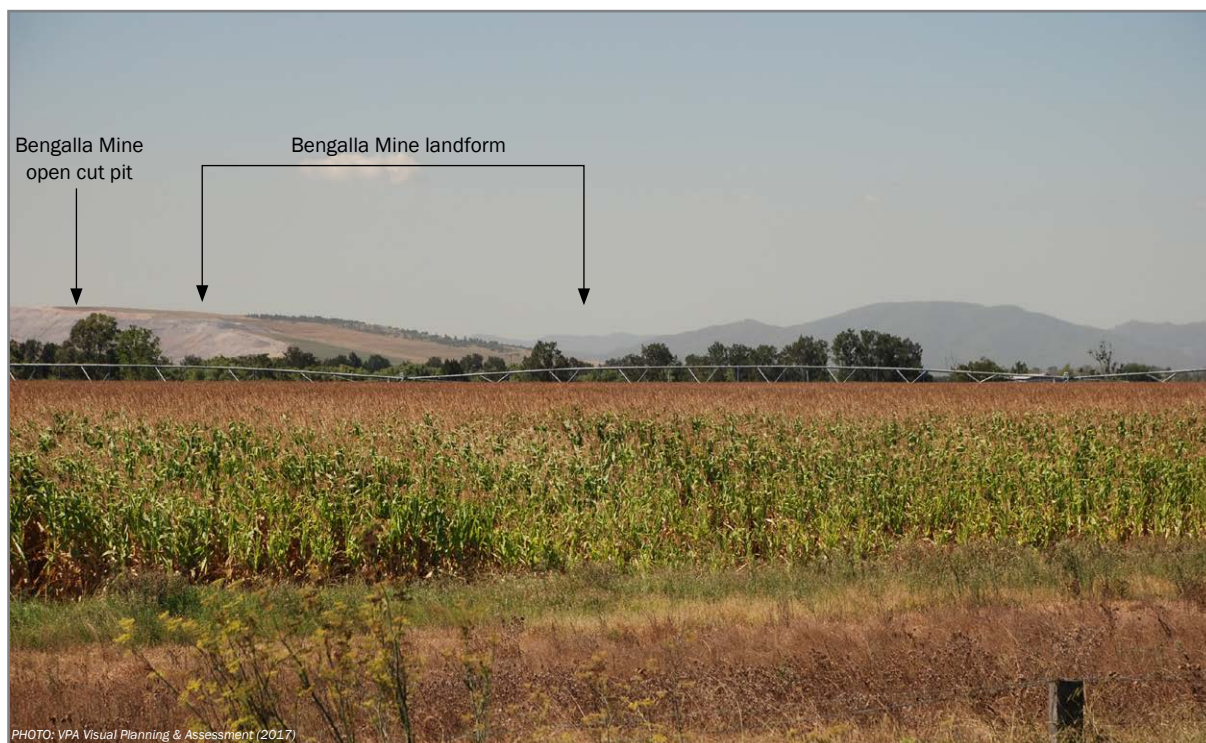
Elevated viewing locations bypass the effects of foreground screens of vegetation or other buildings to obtain views to distant components.



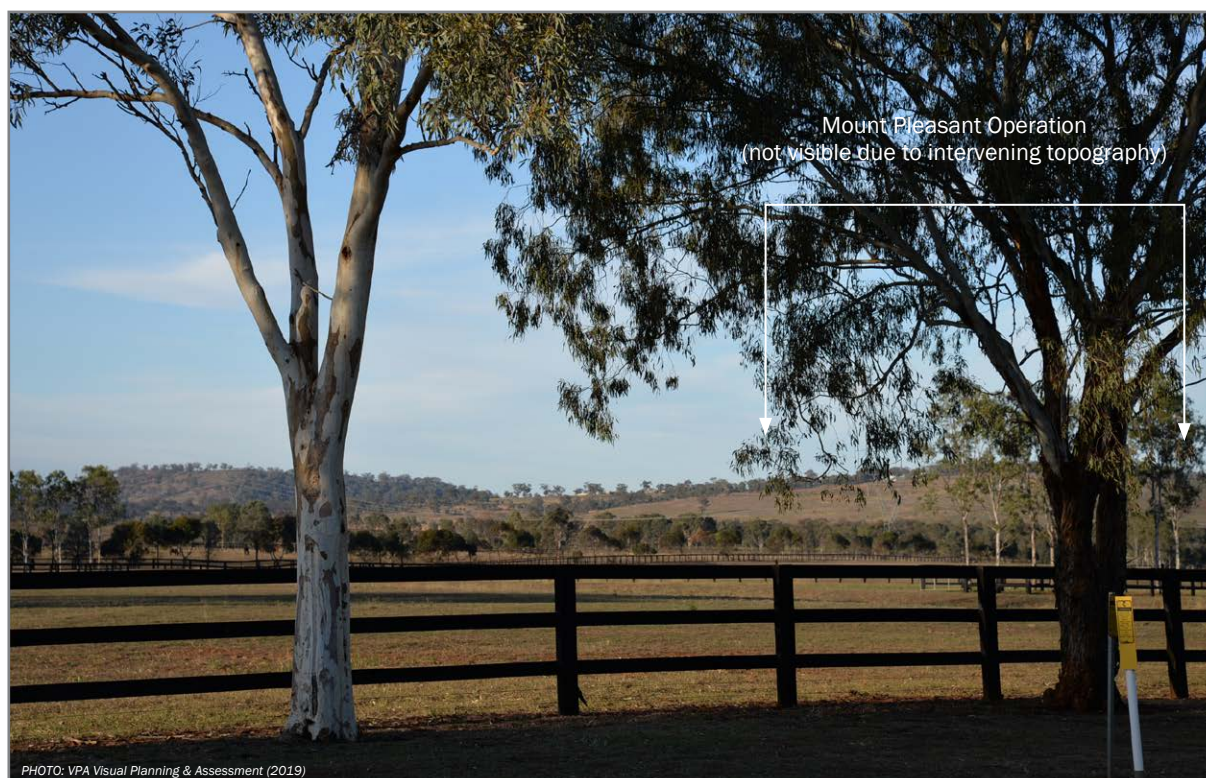
Views towards Mount Pleasant Operation from east Muswellbrook.

**Figure 5.2 Views from elevated locations**





From Denman Road in the south, Bengalla Mine landform screens Mount Pleasant Operation.



**Figure 5.3 Topographic features limit views**

Undulating foothills south of Rouchel Road create the visual edge to the PVC and limit views from horse studs to the north of Aberdeen.





**Figure 5.4 Tree cover at point of viewing**

Intervening foreground vegetation (off-site) can provide more effective screening/filtering to distant views. This view is of existing roadside vegetation on Skelletar Stock Route looking towards the approved Mount Pleasant Operation.



**Figure 5.5 Local vegetation screening on-site**

Existing established local screen planting (on-site) for Mount Pleasant Operation.





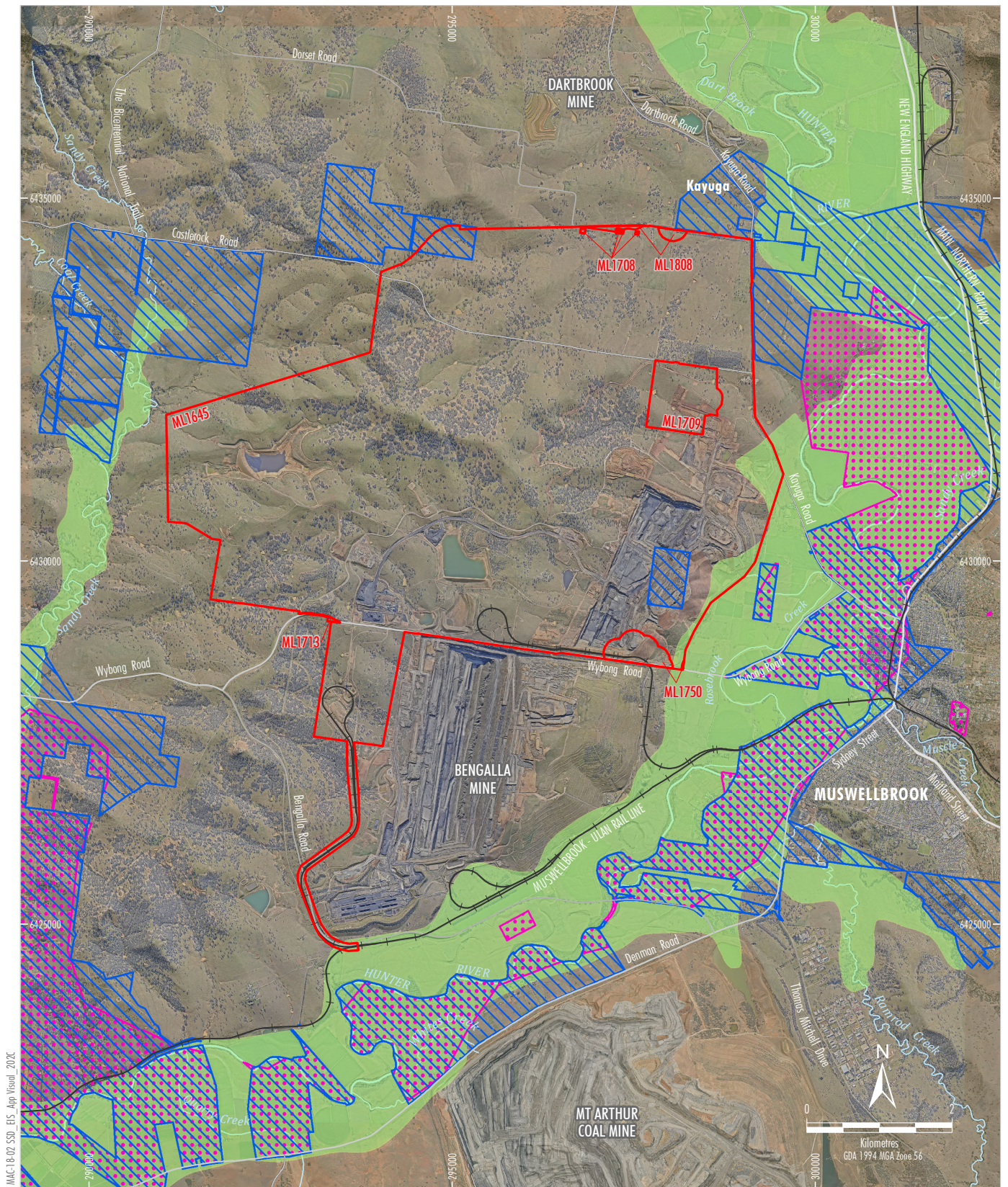
Sydney Road - Central sector



**Figure 5.6** *Effect of foreground elements*

Foreground vegetation and buildings off-site can filter or screen views to Project components.





**Figure 5.7** Regional Biophysical Strategic Agricultural Land and Critical Industry Cluster Mapping



The operations and activities associated with thoroughbred horse breeding are considered highly sensitive to mine operations due to the 'particular nature of, operations and requirements' of them as existing land uses and potential impacts on the sustainability of the equine CIC.

In the same way, recreation, tourist facilities and viticulture enterprises within the viticulture CICs (i.e. vineyards, cellar doors), as well as tourist roads and highways have been assigned a high sensitivity to up to 2.5 km away. Other significant roads have been assigned a moderate sensitivity up to 2.5 km with minor roads and rural production areas have been assigned a low sensitivity.

Incremental visual sensitivity to the Project would evolve as the mine components extend beyond existing and approved extents of the Mount Pleasant Operation.

The actual visual impact relates to the overlay of visual effect of the Project over time due to the approved rehabilitation regime and any additional visual mitigation responses incorporated as part of the Project (Section 6).

## 5.6 Rural Landscapes in the Register of the National Trust of Australia

The Momberoi-Scone Rural Landscape and Muswellbrook-Jerrys Plains Landscape Conservation Area are included in the Register of the National Trust of Australia (NSW) and are in the vicinity of the Project.

The registered rural landscapes are not recognised in the Muswellbrook Local Environmental Plan (LEP) and have no legislative effect and gives rise to no statutory obligations. However, consideration of the landscape and visual impacts on these areas has been conservatively considered as part of this assessment.

The Momberoi-Scone Rural Landscape is located to the north of the Project and comprises the valleys and streams which rise in the Liverpool Range between Mt. Tinagroo and Towarri Mountain and fall away to the south to join Dart Brook. The visual sensitivity of the Momberoi-Scone Rural Landscape is considered to be low.

The Muswellbrook-Jerrys Plains Landscape Conservation Area is located south of the site. Views remain consistent as per previous assessments for the approved Mount Pleasant Operation (i.e. views from most of this area of the Mount Pleasant Operation would be obscured by Bengalla Mine, Mt Arthur Coal Mine and other intervening topography). However, the approved Mount Pleasant Operation may be visible from the north-east corner of the Muswellbrook-Jerrys Plains rural landscape area (i.e. from Wybong Road). This represents a very small portion of the total Muswellbrook-Jerrys Plains Landscape Conservation Area and therefore visual sensitivity is considered to be moderate.

## 5.7 Central Sector

The Central sector includes a range of sensitive receivers that include:

- horse studs;
- rural residences;
- heritage listed properties;
- recreation areas;
- main roads (parts of Sydney Road and Denman Road);
- local minor and rural roads (Kayuga Road, Racecourse Road, Overton Road, Wybong Road and other minor roads off these roads); and
- rural lands.

Views to the Project would vary greatly dependent upon the location of the receptor within the view sector. Vegetation along the Hunter River often also provides significant visual screening from viewpoints at lower elevations.

### 5.7.1 Horse Studs

The Central sector contains two horse studs, Abbey Thoroughbreds and Balmoral Park Thoroughbred Horse Farm. Both are located adjacent to Sydney Road, at the lower elevations of the Hunter River flood plain. Existing vegetation along the Hunter River and the Bengalla Mine currently filter and screen views to the north-west towards the Project (Figure 5.8).

Existing views from these locations also include Bengalla Mine and Mt Arthur Coal Mine.

The waste rock emplacement areas at the approved Mount Pleasant Operation remain lower than the tree screening. Changes to the elevation of the integrated waste rock emplacement landform over time would change the filtering capacity of this vegetation, however the visual sensitivity of the horse studs in this sector would remain high.

### 5.7.2 Rural Residences

Rural residences on the Hunter River flood plain on Wybong Road, Kayuga Road, Racecourse Road, Sheppard Avenue, parts of Denman Road and Sydney Road would have a high to moderate/low sensitivity depending on the extent of visibility of the Project.

Residences experience views similar to the rest of the Hunter River flood plain with potential for long views over flat topography except where intervening vegetation provides filtering and screening of views.

Visibility of the Project from this view sector is variable. Residences in the vicinity of Wybong Road, Collins Lane and Kayuga Road are the closest to the integrated waste rock emplacement landform and other minor project components (within 2.5 km) (Figure 5.9). Depending on house orientation, these residences may have views of the eastern face of the integrated waste rock emplacement landform. Residences along Wybong Road, Collins Lane and Kayuga Road have views of the approved Mount Pleasant Operation and therefore a high visual sensitivity, but the presence of existing mining would reduce sensitivity to further change in the visual amenity of the local area.

The visual character and scale of the Project is consistent with the existing visual landscape (i.e. approved Mount Pleasant Operation, Bengalla Mine), thereby integrating components within the existing regional mining setting.

Residences in this location have been assigned high sensitivity. Views of the Project from privately-owned receptors on Racecourse Road would be minimal due to the presence of screening vegetation along the intervening Hunter River. Views of the Project from the racecourse are limited by intervening vegetation and topography. Changes to the elevation of the integrated waste rock emplacement landform over time would change the filtering capacity of this vegetation with higher elevations viewed above the vegetation.

The Project would also be visible from 'Overton' and 'Overdene' heritage listed homesteads on Overton Road, however both properties are mine-owned residences.

### 5.7.3 Recreation Areas

Muswellbrook Racecourse, located west of Muswellbrook off Denman Road, is operated by the Muswellbrook Race Club (Figure 5.10).

As well as the regular 18 race meetings per year, it is a popular local and regional venue for weddings and social events.

Views outwards from the racecourse currently include extensive areas of the Mt Arthur Coal Mine to the south and the Bengalla Mine. The approved Mount Pleasant Operation largely remains below the screening vegetation. Visibility of the eastern face of the integrated waste rock emplacement landform would change over time as the it develops.

The Muswellbrook Racecourse has experienced the development of the Bengalla Mine and Mt Arthur Coal Mine over a number of years. The Project would be within 2.5 km of the Muswellbrook Racecourse. Accordingly, it has been designated a high visual sensitivity. However, the presence of existing mining on two fronts would reduce sensitivity to further change in the visual amenity.



**Figure 5.8 Horse studs - Central sector**

Views towards Mount Pleasant Operation area are filtered by intervening riparian vegetation along the Hunter River.



**Figure 5.9 Views from rural residences - Central sector**

Views towards Mount Pleasant Operation area as viewed from rural residential areas and Kayuga Road.



**Figure 5.10 View from Muswellbrook Racecourse - Central sector**

#### 5.7.4 Roads

Parts of Sydney Road lie between approximately 2.5 km to 7.5 km from the south of the integrated waste rock emplacement. However, views to the approved waste rock emplacement are filtered in many locations along these roads by foreground roadside vegetation (Figure 5.11) and vegetation in the middle ground.

Where there are views to the Project components, the sensitivity would be moderate as these components are located greater than 2.5 km away (typically between 2.5 km and 3.5 km).

Minor roads, including Kayuga Road, Racecourse Road, Overton Road and other minor roads off these roads, would have moderate to low sensitivity in areas less than 2.5 km from the Project.

Parts of Wybong Road, Kayuga Road and Collins Lane would have some direct views of most of the Project elements including the integrated waste rock emplacement landform and expanded infrastructure and CHPP facilities. As these local roads occur within the context of existing significantly modified mining landscape (adjacent Bengalla Mine pit) and Mount Pleasant Operation facilities and mining operations, it has a moderate/low visual sensitivity (Figure 5.12).

### 5.8 Northern Sector

The Northern sector extends to approximately 12 km from the Central sector to its northern extent along the northern PVC perimeter. Generally, it comprises the Hunter River flood plain running north-south contained by the foothills and surrounding ranges to the east, north and west. A portion of the approved Mount Pleasant Operation is within the Northern sector.

This sector is dominated by rural cattle grazing land on rolling hills with cropping along the Hunter River flood plain.

The sensitive receivers include:

- village of Aberdeen;
- rural residences and land;
- New England Highway and Northern Railway Line;
- tourist features; and
- local and rural roads.
- Outside the northern sector and PVC are three horse studs Kelvinside and Segenhoe on Rouchel Road (north-east of Aberdeen) and Yarraman Park north of Aberdeen.

Views to the integrated waste rock emplacement landform from the Northern sector would vary. Elevation of any view location would have a significant influence on visibility of the Project as intervening vegetation and topography would limit views from lower elevations.

The approved Mount Pleasant Operation would change the existing landscape views in some parts of this view sector, reducing the proportion of background views and increasing the middle ground views due to the integrated waste rock emplacement landform.

Distance from the viewed components, together with varying atmospheric conditions such as fog, dust and haze would generally reduce potential visual effects.

Many view locations along the Hunter River flood plain have long extensive views, however vegetation and local topography provides screening in many locations.





**Figure 5.11 View from Sydney Road - Central sector**

Views towards Mount Pleasant Operation area are filtered by intervening vegetation along the Hunter River.



**Figure 5.12 Views from Wybong Road - Central sector**

Views east towards Muswellbrook include Mount Pleasant Operation and Bengalla Mine

### **5.8.1 Aberdeen**

Aberdeen is a small country village (population of approximately 1,900) in the Upper Hunter Shire local government area, 12 km north of Muswellbrook. It is bisected by the New England Highway and the main Northern Railway Line.

Topographically, it is situated on undulating foothills with a ridgeline on the north-eastern edge providing elevated views to the south and south-west towards the Project.

These views are typically from residential streets and homes (Figure 5.13 and Figure 5.14). Views from this location are approximately 6.5 km from the nearest visible Project component (the integrated waste rock emplacement landform). Accordingly, views from Aberdeen would have high/moderate potential visual sensitivity to the Project.

### **5.8.2 Rural Residences and Land**

The Northern sector supports a number of rural lots with improved pastures and cropping land, along with scattered rural residences along the New England Highway, Dartbrook Road, Invermein Road, Nandowra Road, Kayuga Road (including the mine-owned Kayuga Homestead) and other minor roads within the Hunter River flood plain between Aberdeen and Muswellbrook (refer Figure 3.2).

Most rural residences on the New England Highway would be screened by vegetation and localised topography.

The open nature of the Hunter River flood plain and associated rural lots in other areas at the southern extent of the sector on Dartbrook, Invermein, Nandowra and Kayuga Roads, means views are unobstructed by topographical features.

Private residences located less than 7.5 km from the nearest visible mine component would be assigned high visual sensitivity if it has views of the Project.

Existing mine operations within the view sector include the underground Dartbrook Mine Infrastructure located adjacent to the New England Highway, which is the most visible component of this mine.

Grazing and cropping lands along the Hunter River Valley would have long unobstructed views. Any rural land (i.e. without a residence) with views to the Project would have low visual sensitivity.





**Figure 5.13 View from elevated location in Aberdeen - Northern sector**

Views from Graeme Street in the Northern view sector include views towards the Optimisation Project.



**Figure 5.14 Aerial photo - Aberdeen - Northern sector**

Ridge lines (red) and high points to the north-east of Aberdeen defining the northern extent of the PVC. Photo location for Figure 5.13.

### 5.8.3 *New England Highway and Northern Railway Line*

Both the New England Highway and the Northern Railway Line travel approximately parallel in this view sector, through Aberdeen, heading south toward Muswellbrook.

Views from the New England Highway and Northern Railway Line within this view sector are generally limited by intervening hills and riverine vegetation. Views may be possible at the few elevated locations offering a west to south-west outlook (Figure 5.15). Glimpses of existing mining operations can be seen above a ridgeline from one location (Section 6). Views to the Project from the New England Highway and the Northern Railway Line are between 2.5 km and 7.5 km away. Accordingly, such views have been designated as having moderate sensitivity.

### *Local and Rural Roads*

There are several minor roads within the view sector including:

- Nandowra Road (Figure 5.16);
- Kayuga Road (Figure 5.17);
- Dartbrook Road (Figure 5.18);
- Dorset Road;
- Castlerock Road; and
- Invermein Road.

Views of the approved Mount Pleasant Operation from Nandowra Road are generally screened by local gently undulating topography (Figure 5.16). There are views to elevated components of existing approved mining operations south of the Project (e.g. Mt Arthur Coal Mine).

Invermein and Kayuga Roads have views to the approved Mount Pleasant Operation (Figure 5.17). Visual sensitivity on local roads increases from low to moderate when views are closer than 2.5 km.

The numerous rural roads within rural lands in this view sector, would have moderate to low visual sensitivity if there are views to the Project nearer than 2.5 km away. Between 2.5 to 7.5 km views would be designated as low sensitivity.

### 5.8.4 *Tourism Features*

#### *Rossgole Lookout*

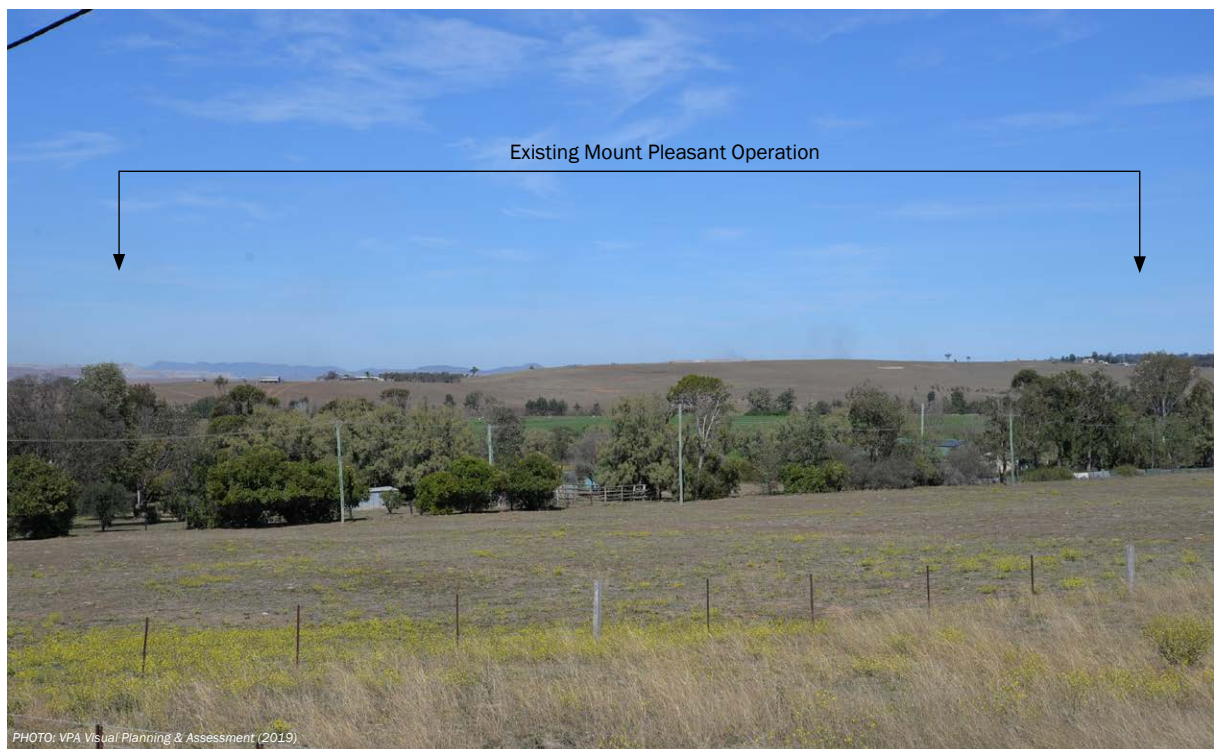
Located north-west of the Project, this elevated lookout (545 m AHD) is one of the highest accessible locations within the PVC. The lookout and view location afford panoramic views south across the Upper Hunter Valley, including Aberdeen and Muswellbrook to the southern extent of the PVC. With views approximately 10 km from the Project, the lookout would have moderate visual sensitivity.

#### *The Bicentennial National Trail*

The Bicentennial National Trail is Australia's long distance trekking route stretching from Cooktown to Healesville. The Aberdeen to Jenolan Caves section of the trail crosses the Hunter River flood plain before climbing into the foothills and ranges in the Northern sector in the vicinity of Dorset Road and Sandy Creek Road, joining Castlerock Road west of the Project.

Views to the Project from this tourist trail would have moderate to high visual sensitivity.





**Figure 5.15 View from the New England Highway - Northern sector**

Views towards existing Mount Pleasant Operation from an elevated section of the New England Highway.



**Figure 5.16 View from Nandowra Road and rural land - Northern sector**

Views towards Existing Mount Pleasant Operation from Nandowra Road further north in the view sector. View is adjacent 'Calderwood' rural property.



**Figure 5.17 View from Kayuga Road - Northern sector**  
Views from rural residences and Kayuga Road in the Northern sector.



**Figure 5.18 View east from Dartbrook Road - Northern sector**  
Views to Dartbrook CHPP facilities and rural areas in the Northern sector.



## 5.9 Eastern Sector

This sector contains the highest number of potentially sensitive receivers and is dominated by the town of Muswellbrook, and the tourist/main road function of the New England Highway. The rural lands adjoining the integrated waste rock emplacement landform support a number of rural residences along eastern end of Kayuga Road.

The sensitive receivers include:

- town of Muswellbrook;
- rural residences; and
- New England Highway, other roads and Northern Railway Line.

Visibility of extensive existing approved mining operations in the region is high due to the view sector's partially elevated topography and western orientation. The vegetation along the Hunter River provides significant screening for areas at lower elevation, but more elevated areas are only screened by local features, where present.

Visibility of the Project is significant. Previous visual assessments have identified the visual sensitivity and visual impact of the approved Mount Pleasant Operation from locations within Muswellbrook. The increase in elevation of the integrated waste rock emplacement landform would increase the number of locations from which views of the Mount Pleasant Operation are available in the sector.

The Project would change the existing landscape views in some parts of this view sector from those dominated by middle ground with minor background views of surrounding ranges to one still dominated by middle ground views with a reduced proportion of background views due to the intervening integrated waste rock emplacement landform and associated establishment woodland vegetation.

### 5.9.1 Muswellbrook

The approved visual impact and viewer sensitivity of receivers in Muswellbrook were previously determined to be high. However it should be noted that residents of Muswellbrook may have become more accustomed to significant modifications to the landscape due to the ongoing development of the Bengalla Mine, Mt Arthur Coal Mine and approved Mount Pleasant Operation. However, tourists visiting Muswellbrook may not be accustomed to views of mine operations.

Receptors within Muswellbrook would be within 7.5 km of the Project.

From within Muswellbrook, many of the internal residential streets in elevated locations or aligned east-west have existing views to the approved Mount Pleasant Operation. Elevated components of the Project which primarily include the integrated waste rock emplacement landform, would be more visible from other view locations within Muswellbrook (Figure 5.19 and Figure 5.20).

Accordingly, residences in Muswellbrook are generally assessed as having moderate to high sensitivity depending on the viewing distance to the Project.

The exceptions are parts of South Muswellbrook that have a southerly aspect and views in the vicinity of the Skellatar Stock Route and Calgaroo Avenue (Figure 5.21).

Density of town development (e.g. adjacent housing, gardens and streetscape) screens views from the majority of residences. Residences on the western and southern edges of South Muswellbrook and some elevated residences would be most sensitive to the Project. Where these houses are less than 7.5 km from the Project, sensitivity is high. Where there is adjacent screening, the sensitivity of these residences may decrease to moderate.

The Project would be visible for some elevated residences at the top of Acacia Drive, particularly the waste rock emplacement areas. These residences are less than 7.5 km from the Project. The elevation of this area also places viewing locations above topography and vegetation screening resulting in high sensitivity levels.

The Project would generally be visible to residences in the north of Muswellbrook and those in elevated locations in the south of Muswellbrook and therefore would have high sensitivity.



**Figure 5.19 View west from Muswellbrook - Eastern sector**  
Views towards Mount Pleasant Operation from Burgundy Street .



**Figure 5.20 View from the New England Highway - Eastern sector**  
Views of the existing Mount Pleasant Operation west from the New England Highway in Muswellbrook.





**Figure 5.21 View from Skelletar Stock Route - Eastern sector**

Views towards existing Mount Pleasant Operation from Skelletar Stock Route.



**Figure 5.22 View from Horse Stud - Southern sector**

Views towards existing Mount Pleasant Operation from Deman Road with Bengalla Mine landform screening views to the north in middleground.

### 5.9.2 Rural Residences

Rural or large lot rural residential residences are situated along parts of the New England Highway, Skellatar Stock Route and a short section of Kayuga Road near where it crosses the Hunter River.

Other isolated rural residences are those directly to the west and north of Muswellbrook. Those residences along Kayuga Road and to the west of the highway (privately-owned) have been designated a high sensitivity due to their proximity and orientation to the Project, and their sensitive land use type.

### 5.9.3 Roads and Northern Railway Line

Both the New England Highway and the Northern Railway Line travel approximately parallel in this view sector, through Muswellbrook and north towards Aberdeen.

There would be views to the Project from parts of the New England Highway. Travellers on the New England Highway would have high visual sensitivity as a result of views of integrated waste rock emplacement landform during construction and operation (Figure 5.20). Consistent with familiarity of residents to the local mining landscapes, this high sensitivity is more relevant to visitors to the area. Sensitivity to the Project would change with viewing distance.

Views of the Project from the New England Highway and Northern Railway Line within this view sector are available from less than 2.5 km. Those views have been designated as having high sensitivity.

Views from the New England Highway entering Muswellbrook from the south-east are further than 2.5 km resulting in moderate sensitivity.

## 5.10 Southern Sector

The Southern sector extends from between 6 km to 15 km south and south-west from the Central sector to the southern PVC perimeter. Generally, it comprises the Hunter River flood plain and is contained by southern foothills to the west, Bengalla Mine to the north and Mt Arthur Coal Mine forming the south-eastern perimeter.

The sensitive receivers include:

- heritage listed residences;
- rural residences and land;
- horse studs – Edinglassie Thoroughbred Stud inside the PVC and others outside the PVC (e.g. Monarch Stud, Coolmore Stud and Godolphin Woodlands Stud);
- vineyards and wineries;
- tourist features; and
- roads.

Views to the integrated waste rock emplacement landform from the Southern sector would vary. Elevation of any view location would have a significant influence on visibility of the Project as intervening vegetation and topography would limit views from lower elevations.

The most sensitive view locations include a small number of residences (approximately 2.5 km from the Project) on the northern edge of the view sector on Denman Road. These locations and similar areas with open views to the Project would have high sensitivity up to distances of 7.5 km. Views to the Project would be limited due to screening by vegetation and the mine landforms of the Bengalla Mine.

For locations at greater distances, receptors would have a moderate sensitivity to impacts from the Project.

### 5.10.1 Heritage Listed Homesteads

Denman Road, a northern section of Thomas Mitchell Drive, and the historic homesteads of 'Edinglassie' and 'Rous Lench' occur within this sector. These receptors are over 2.5 km to the south of the Project.

These homesteads are located on Denman Road approximately 5 km from the Project. These homesteads would have high/moderate visual sensitivity, however the Project would be partially screened by the mine landforms of the Bengalla Mine, local intervening topography and vegetation.

### 5.10.2 Rural Residences and Land

The private residential properties along Denman Road within this sector are approximately 2.5 km away from the Project.

Some properties are on the edge of the Hunter River flood plain where the landform is flat and open; the flood plain vegetation creates visual screening for these residences.

Properties further south along elevated sections of Denman Road have long views towards the Project. Properties oriented north and north-west have direct views of the Project. Some properties already have dense foreground vegetation around the residences which may limit views to the Project.

Sensitivity levels would therefore be high/moderate for properties less than 7.5 km away from visible Project components, depending on individual levels of screening that may limit visibility. Houses in this location are generally less than 4 km away from the southern extent of the Project.

Any rural land (i.e. without residences) within 7.5 km with views to the Project would have low visual sensitivity.

### 5.10.3 Horse Studs

Within the PVC, Edinglassie Thoroughbred is situated on the flats of Hunter River flood plain between the Hunter River and Denman Road. Views extend along the Hunter River flood plain to the north-east with the Bengalla Mine landform in the middleground screening the Project north of the ridgeline (Figure 5.22).

The Project is within 7.5 km of the Edinglassie Thoroughbred Stud. Any parts of the horse stud with views to the Project would have high/moderate visual sensitivity.

Outside the south-west perimeter of the PVC is Monarch Stud, Coolmore Stud and Godolphin Woodlands Stud. There would be no views of the Project due to intervening topography between the horse studs and the Project.

### 5.10.4 Vineyards and Wineries

Outside the south-west perimeter of the PVC and over 17.5 km from the Project is Small Forest Wines. It is located on Denman Road, near the intersection with the Golden Highway. There are no views of the Project due to intervening topography between the vineyard and the Project.

### 5.10.5 Tourist Features

*Pukara Estate Grove* café and tasting rooms are listed on the Hunter Valley regional gourmet food trail.

Located on Denman Road on the Hunter River flood plain in the south of the southern view sector. Bengalla Mine and intervening topography lies between Pukara Estate and the Project, screening potential views. As there are no direct views visual sensitivity at this location is low (Figure 5.23).

### 5.10.6 Roads

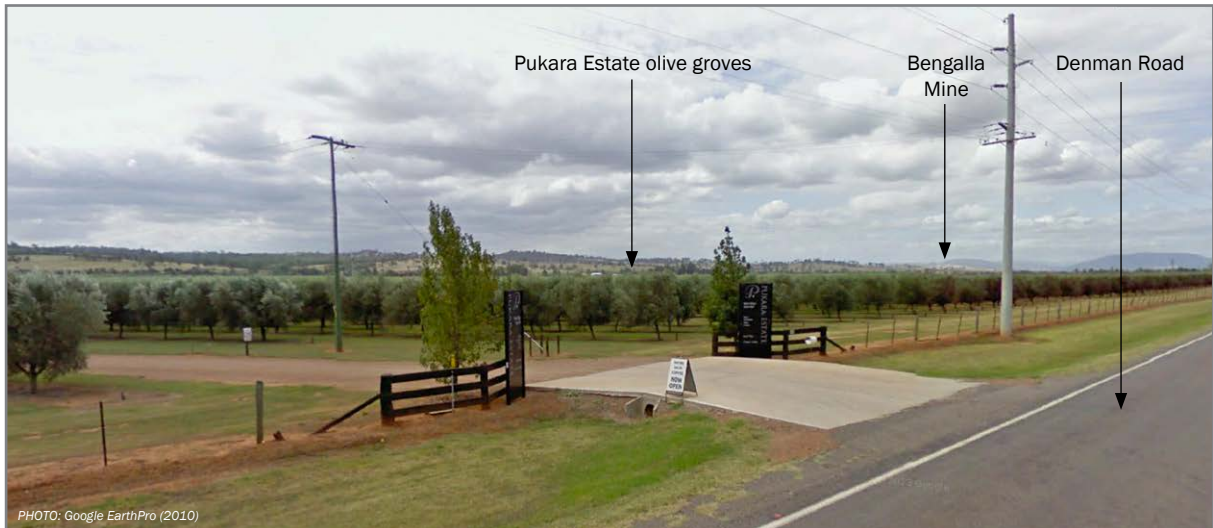
The main roads running through this sector are Denman Road and Thomas Mitchell Drive.

Driving north, the intersection of Thomas Mitchell Drive with Denman Road has roadside vegetation, which filters views towards the Project from the south-east at a distance of approximately 3 km, resulting in low visual sensitivity. Before reaching this intersection, an elevated rise on Thomas Mitchell Drive affords more open views of the approved Mount Pleasant Operation and other existing mining operations. Vegetation in the middle ground filters visibility of Project components.

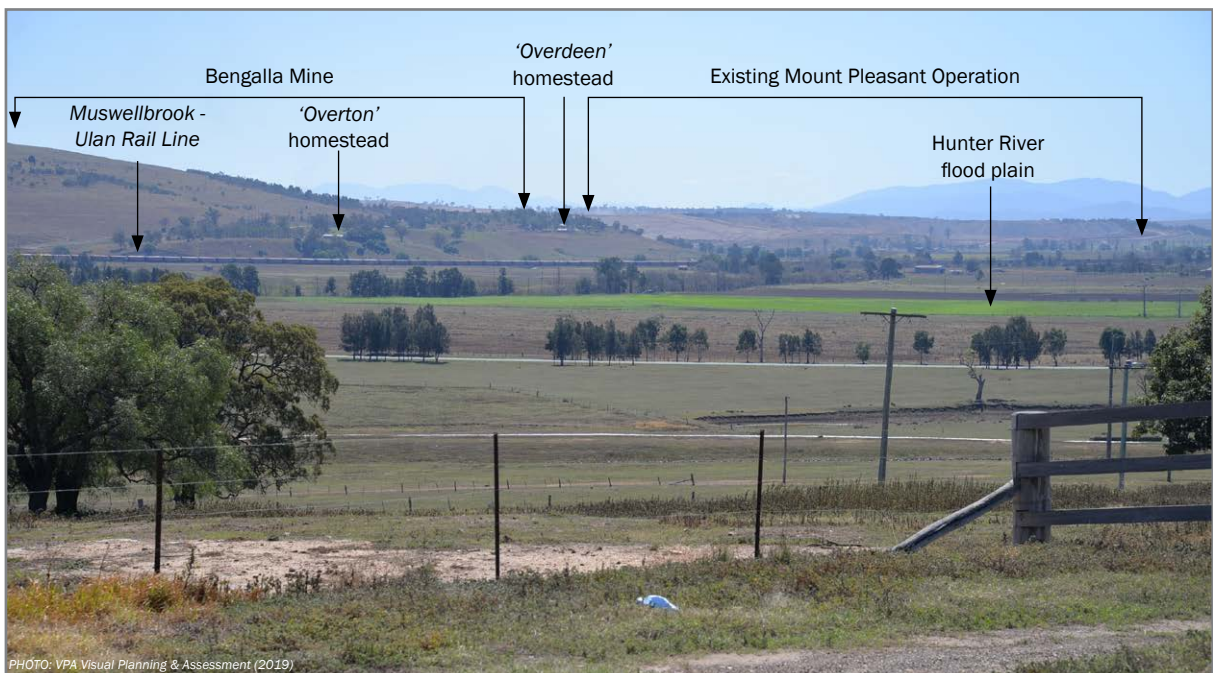
Denman Road would continue to have views to both the approved Mount Pleasant Operation and the Project resulting in moderate sensitivity (Figure 5.24).

Thomas Mitchell Drive is more than 2.5 km away from and orientated towards the Project; it therefore has a low sensitivity.





**Figure 5.23 View from Pukara Estate on Denman Road - Southern sector**  
Views are north-east towards Bengalla Mine and Muswellbrook.



**Figure 5.24 View from Denman Road - Southern sector**  
Views from Denman Road across flood plain towards existing Mount Pleasant Operation.

## 5.11 Western Sector

This view sector contains significant areas of existing and approved mining activity (Bengalla Mine and approved Mount Pleasant Operation). Outside mine owned areas are rural residences scattered across wooded foothills.

The sensitive receivers include:

- rural residences and land; and
- minor local roads.

### 5.11.1 Rural Residences and Land

There are fewer residences to the west and the majority of rural residences in this view sector would have high visual sensitivity to the Project, if visible through the intervening local topography.

There are residences on Roxburgh Road that may have views to the elevated sections of the Project. These receptors would be assigned a high visual sensitivity.

Rural lands (i.e. without residences) occupy the largest proportion of area outside mine-owned land in this view sector. The varying topography provides varying views of the Project, with intervening ridges and vegetation limiting views from many locations. Those areas within 7.5 km of the Project with views would have low visual sensitivity.

### 5.11.2 Roads

The few potential view locations within this sector are associated with Wybong Road and elevated sections of Roxburgh Road. All other roads in this view sector would be screened from the Project by existing topography.

Roxburgh Road and Wybong Road would have moderate sensitivity up to 2.5 km away from the Project and low sensitivity beyond that.

## 5.12 Summary of Viewpoint Sensitivity

Table 5-1 provides a summary of the sensitivity of various receptors in the vicinity of the Project.

**Table 5-1 Summary of Viewpoint Sensitivity where there are views**

Receptor	Sensitivity of Land Use	Visibility of the Project		Visual Sensitivity
		Distance to nearest Project component	Visibility category	
Central Sector				
Rural residences on Hunter River flood plain	High	Less than 2.5 km	High	High
Horse Studs	High	Less than 2.5 km	High	High
Muswellbrook Racecourse	High	Less than 2.5 km	High	High
Wybong Road	Low	Less than 2.5 km	High	Moderate / Low
Kayuga Road	Moderate	Less than 2.5 km	Moderate	Moderate
Sydney Road	Moderate	2.5 to 7.5 km	Moderate	Moderate
Racecourse Road	Moderate	Less than 2.5 km	High	Moderate/ Low
Rural Land	Low	Less than 2.5 km	High	Low

Receptor	Sensitivity of Land Use	Visibility of the Project		Visual Sensitivity
		Distance to nearest Project component	Visibility category	
Northern Sector				
Aberdeen	High	2.5 to 7.5 km	Moderate	High/Moderate
Momberi-Scone Rural Landscape	High	Greater than 12.5 km	Very low	Low
Horse Studs	High	7.5 to 12.5 km	Nil	Nil
Rural residences on Hunter River flood plain	High	Less than 2.5 km	High	High
New England Highway	Moderate	2.5 to 7.5 km	Moderate	Moderate
Northern Railway Line	Moderate	2.5 to 7.5 km	Moderate	Moderate
Rossgole Lookout	High	7.5 to 12.5 km	Moderate	Moderate
Rural Land	Low	Less than 2.5 km	Low	Low
Eastern Sector				
Muswellbrook	High	Less than 2.5 km	High	High
Rural residences on Hunter River flood plain	High	Less than 2.5 km	High	High
New England Highway	Moderate	Less than 2.5 km	High	High
Northern Railway Line	Moderate	Less than 2.5 km	High	High
Southern Sector				
Heritage-listed Homesteads	High	2.5 to 7.5 km	Moderate	High/Moderate
Rural Residences	High	2.5 to 7.5 km	Moderate	High/Moderate
Edinglassie Stud	High	2.5 to 7.5 km	Moderate	High/Moderate
Other Horse Studs*	High	2.5 to 7.5 km	Moderate	High/Moderate
Tourist Features	High	Not visible	Nil	Nil
Muswellbrook-Jerrys Plains Landscape Conservation Area	Moderate	2.5 to 7.5 km	Variable	Moderate
Denman Road	Moderate	2.5 to 7.5 km	Variable	Moderate
Thomas Mitchell Drive	Moderate	2.5 to 7.5 km	Low	Low
Rural Land	Low	2.5 to 7.5 km	Varies	Low
Western Sector				
Rural residences	High	Less than 2.5 km	High	High
Wybong Road	Low	Less than 2.5 km	High	Moderate/Low
Roxburgh Road	Low	Less than 2.5 km	Moderate	Moderate/Low
Rural Land	Low	Less than 2.5 km	Variable	Low



## 6 VISUAL EFFECT

### 6.1 Introduction

The visual effects of the Project would vary as seen from key locations in the vicinity of the Project. Potential visual effects on a number of potential viewing locations in the Central, Northern, Eastern, Southern and Western sectors have been assessed through the development of photomontages as seen from a range of viewpoints. These viewpoints are illustrative snapshots, representative of worst-case scenario views of the Project. Visual effects are determined using the methodology described in Section 2. As a mining operation progresses, visual effects can be reduced to very low or unperceivable (Level 4) following effective rehabilitation, achieving unnoticeable variations to the landscape to someone unfamiliar with the pre-mining landscape. Those familiar with that same landscape would experience very low visual effects within a new landscape setting. An additional time frame (incremental long-term effects) has been added to reflect this additional dimension in visual effects.

The Project would change some of the existing landscape views within the PVC from those dominated by middle ground with minor background views of surrounding ranges to one still dominated by middle ground views with a reduced proportion of background views.

Distance from the viewed components (e.g. between 2.5 km and 7.5 km), together with varying atmospheric conditions such as fog, dust and haze would reduce the visual effect.

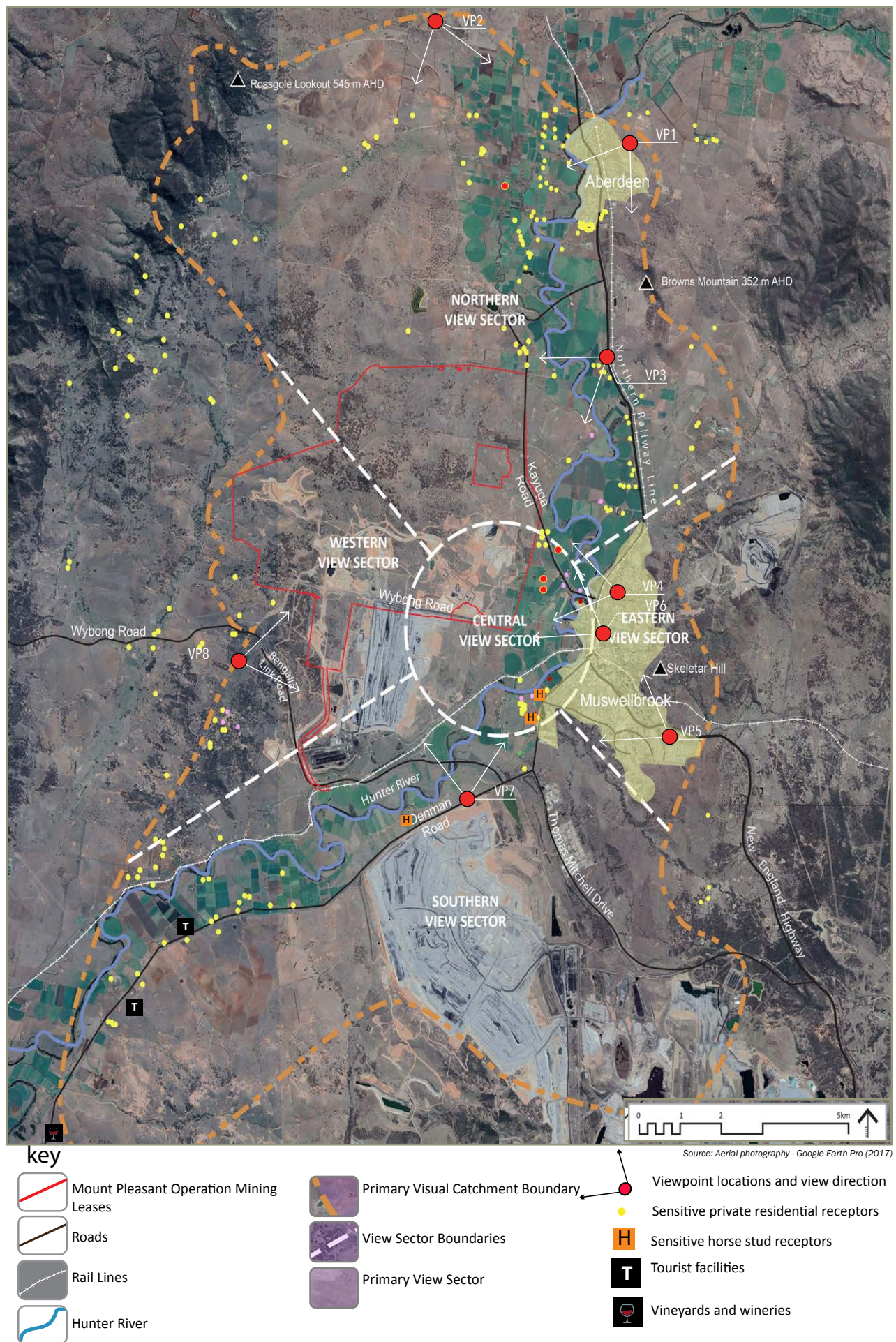
The viewpoints adopted for the assessment include:

- VP1 Aberdeen – Graeme Street (Northern Sector);
- VP2 Nandowra Road (Northern Sector);
- VP3 New England Highway – North (Northern Sector);
- VP4 Muswellbrook – St Heliers Street (Eastern Sector);
- VP5 New England Highway – East (Eastern Sector);
- VP6 Muswellbrook – Hill Street (Eastern Sector);
- VP7 Denman Road (Southern Sector); and
- VP8 Roxburgh Road (Western Sector).

The representative viewing locations used in this assessment are shown in Figure 6.1.

The photomontage locations were selected to illustrate a range of typical views and potential worst-case scenarios (i.e. during the phases of the Project where visual components would most likely contrast the existing setting) as seen from these locations. Each location was logged with GPS coordinates and views photographed to establish the base for the photomontages during the field assessment in September 2019.

The visual effects of the Project were evaluated by analysing photomontages using consistent criteria, with the eight viewpoint locations selected.



**Figure 6.1 View locations and view direction**

The following terms would be used to address worst-case visual effects in chronological progression at key mine stages:

- **Construction/Operation** - Includes any stage of mining operations that is in addition to the approved Mount Pleasant Operation. It may include additional clearing, excavation, removal and handling of overburden and interburden material, construction and upgrades of infrastructure, coal mining and progressive rehabilitation.
- **Final Landform** - Refers specifically to the phase following completion of waste rock emplacement and rehabilitation for the final landform.
- **Long-term** - Established rehabilitation, over a number of years matures into more natural vegetation patterns with tree and shrub layers maturing, creating patterns and textures more consistent with local areas undisturbed by mining. Any visual contrast becomes difficult to ascertain for someone unfamiliar with the landscape due to the high levels of integration with the visual setting.

## 6.2 Central Sector

The Central sector is dominated by the existing Mount Pleasant Operation and Bengalla Mine. The improved pasture and areas of irrigated cropping along the Hunter River flood plain contribute significantly to this visual setting. There are some rural residences scattered about the Hunter River flood plain.

The rural lands immediately adjacent to the Project support a number of rural residences along Wybong Road, Overton Road, Kayuga Road, Collins Lane and Logues Lane. Other potential viewpoints include residential properties along Racecourse Road, Sheppard Avenue and Sydney Road that are also in close proximity to some Project components.

Previous assessments determined that high visual impacts (with the implementation of mitigation measures) would occur at rural properties on the Hunter River flood plain from the approved Mount Pleasant Operation.

The Project would increase the percentage of focal view area occupied by the Project from the majority of view locations within this view sector. The visual effects associated with the development of the integrated waste rock emplacement landform and the open cut remain high due to the scale and visual contrast. This is due to the lack of visual integration of the working eastern face with the surrounding landscape in the early stages of emplacement, as bare exposed soils create high levels of colour contrast. The integrated waste rock emplacement landform would also increase in vertical elevation increasing the potential occupancy of views. Visual effect would reduce after post-construction rehabilitation of disturbed areas with vegetation improving visual integration.

There are no photomontage view locations in the Central view sector, however VP6 at Hill St in Muswellbrook and VP7 on Denman Road generally represent views from within the Central sector.



### 6.3 Northern Sector

The integrated waste rock emplacement landform would increase the percentage of the view occupied by the Project. Specifically, the increase in vertical elevation would result in increased numbers of view locations within the view sector that are able to see the Project as less topographical screening would occur.

Elevated locations within Aberdeen (VP1) and the more distant Rossgole Lookout to the north-west would have views that include the Project within the context of existing approved mines within the view.

The visual effect on the more eastern part of the Northern sector would be altered as the elevated profiles of the integrated waste rock emplacement landform would now be viewed above the intervening topography of ridges and vegetation on the Hunter River flood plain between view locations and the Project (VP3).

#### 6.3.1 Viewpoint 1– Aberdeen – Graeme Street

##### *Existing View*

This view location is from a ridgeline along a public road that runs behind elevated residential areas within east Aberdeen. The view is orientated south-west towards the approved Mount Pleasant Operation, with Bengalla Mine and Mt Arthur Coal Mine in the distance. This view includes Dartbrook CHPP infrastructure, a section of the New England Highway and the Northern Railway Line (Figure 6.2).

Active mine operations are part of the existing view in the distance, against a backdrop of surrounding ranges in centre view and Mount Arthur to the right. In the middle distance is the low undulating topography and irrigated croplands within the Hunter River flood plain. In the foreground are Aberdeen residences orientated towards the west and south-west.

##### *Year 2034*

In 2034, the views would include the developing integrated waste rock emplacement landform and some views into the Central and North Pits. The integrated waste rock emplacement landform would increase in height and would reduce views to the surrounding ranges and Mount Arthur to the south-west. The adjacent Bengalla Mine would also be less visible.

A portion of the open cut would be visible from this viewpoint from approximately 2026 to 2034, as the mine progressively moves north and west. The percentage of visible open cut would remain generally consistent over this period, occupying approximately 45% of the visible Project.

This open cut area would display high levels of visual contrast and low integration in landscape character and landform with the surrounding visual setting due to the exposed soils and excavations that would result in high levels of visual effect (Figure 6.3).

The progressive rehabilitation on the eastern face of the integrated waste rock emplacement landform would be more established reducing colour and texture contrast. This would improve integration with the landscape, thereby lowering visual effects for a proportion of the mining operations within the FVA.

The increased height of the integrated waste rock emplacement landform above the approved Mount Pleasant Operation level would have high levels of contrast in colour and texture during construction, however, would be a minor percentage of the total view above previous approved effects.

### Year 2041

In 2041, the integrated waste rock emplacement landform would have expanded to occupy more of the FVA creating a new middle ground ridgeline. The exposed pits would have progressed to the north-west (right of view). The total FVA occupied by the Project (including the integrated waste rock emplacement landform and the pits) would increase, however, a larger percentage of the visible Project (approximately 82%) would be occupied by the rehabilitated eastern face of the integrated waste rock emplacement landform. The pits visible to the north would have high levels of visual contrast in texture and colour and low integration with the surrounding landscape character, however, would occupy a smaller percentage of the visible Project (Figure 6.4).

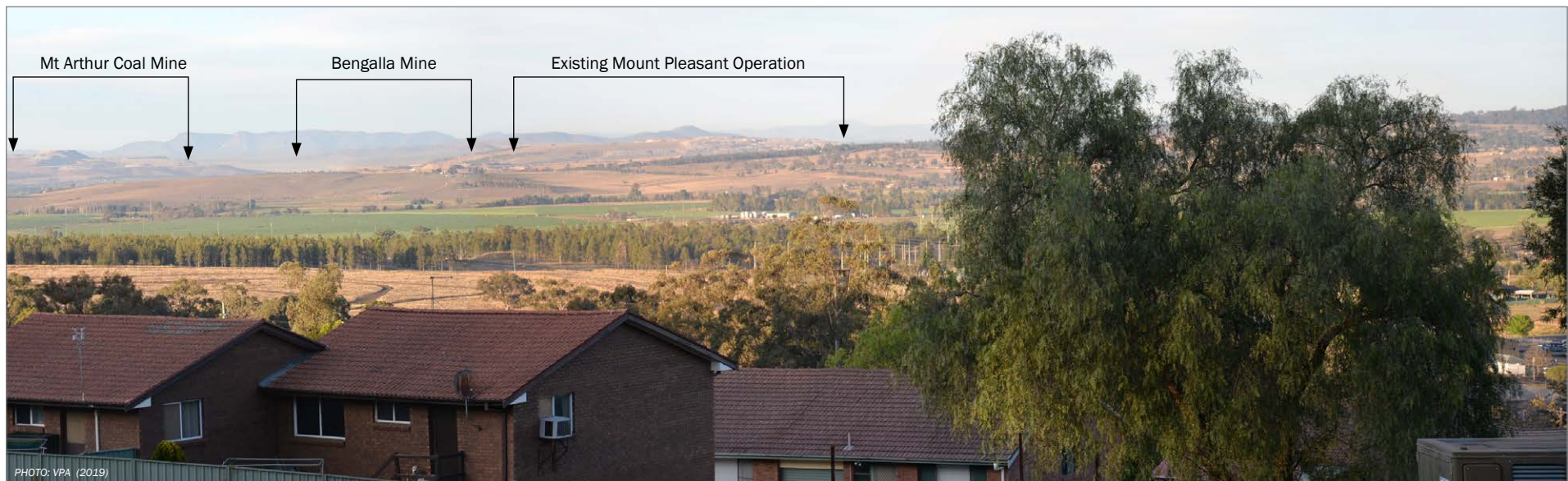
### Final Landform

The integrated waste rock emplacement landform with established rehabilitation would occupy the majority of the view in the middle distance and screen the active open cuts behind the northern edge of the bund. The modulated design of the landform would improve visual integration with the landscape character of the surrounding landscape setting (Figure 6.5).

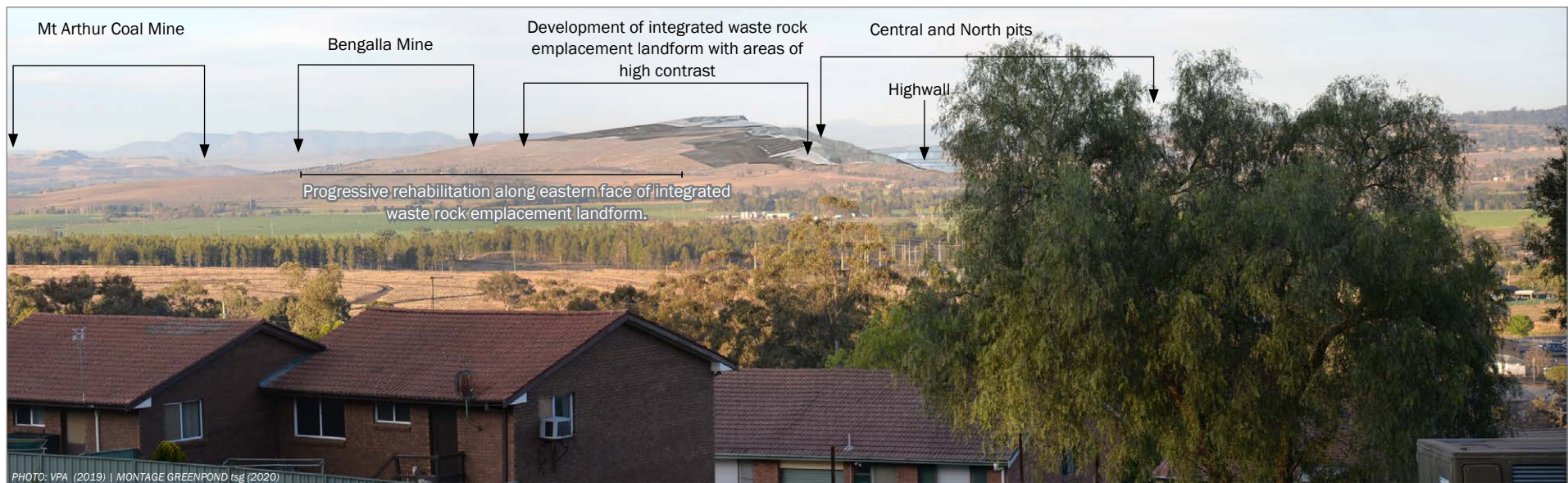
Established rehabilitation across all areas of the waste rock emplacement landform eastern and northern faces would reduce visual contrast in colour and texture, lowering the visual effect to low and to very low in the long-term.

**Table 6-1 Viewpoint 1 Visual Effect**

Project Stage	Percentage of FVA occupied by visible Project
Year 2034	1.6%
Year 2041	2%
Final Landform	2.1%
<b>Worst case visual effects:</b>	
Construction/Operation	Level 1- Moderate
Final Landform	Level 3 - Low
Long-term	Level 4 – Very Low

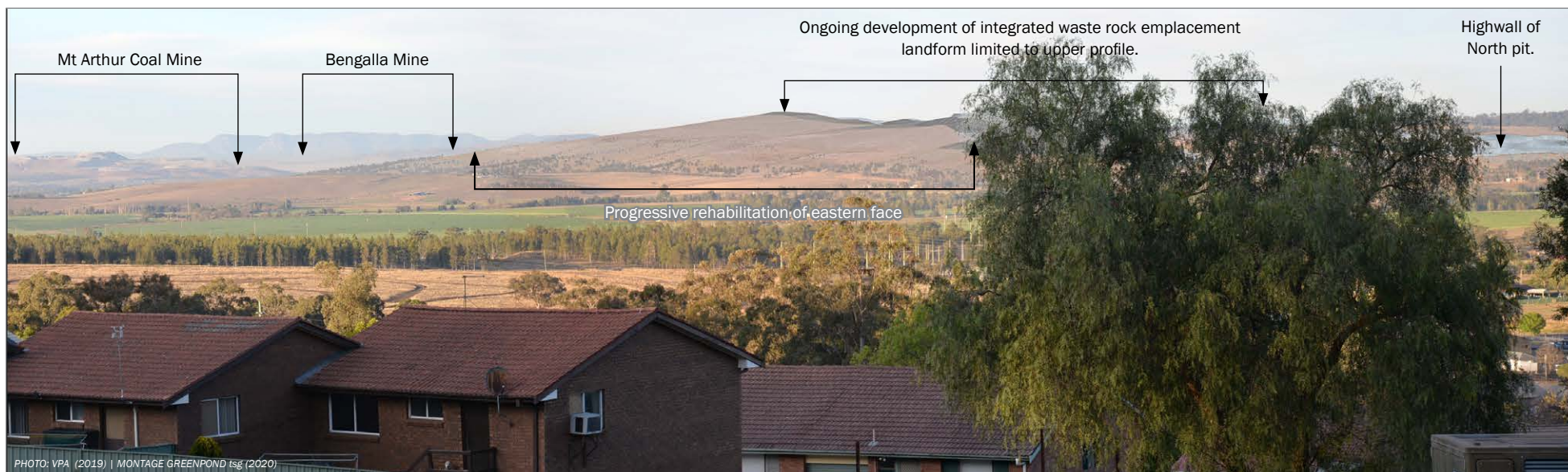


**Figure 6.2 Viewpoint 1 - Aberdeen - Graeme Street - Project - Existing Views**



**Figure 6.3 Viewpoint 1 - Aberdeen- Graeme Street - Project - 2034**





**Figure 6.4 Viewpoint 1 - Aberdeen - Graeme Street - Project - 2041**



**Figure 6.5 Viewpoint 1 - Aberdeen - Graeme Street - Project - Final Landform**

### 6.3.2 Viewpoint 2 – Nandowra Road

#### Existing View

This view location is taken from Nandowra Road servicing farms and the rural residential area west of the New England Highway between Muswellbrook and Aberdeen. The view location is on a small crest looking towards the Project, approximately 8 km to the north (Figure 6.6).

An existing power station can be seen mid-view in the distance with the prominent profile of Mount Arthur further west. The view also includes flat Hunter River flood plain grazing areas surrounded by open woodland scattered across the low ridgelines and foothills, and rural residential properties with farm outbuildings and ancillary features. It is a characteristic view from within this part of the PVC looking south. The low ridgeline in right mid-view limits views to the existing mine activities further south.

#### Year 2034

From this location the Project would be seen from a north-west angle with more extensive views onto the western working face of the integrated waste rock emplacement landform. Visual effect would be high due to high visual contrast and low visual integration of the exposed excavated areas (Figure 6.7).

The integrated waste rock emplacement landform would expand in elevation, however, the incremental change of the new integrated waste rock emplacement landform would occupy approximately 1% of the FVA with the eastern face of the integrated waste rock emplacement landform. Views to the surrounding ranges and Mount Arthur to the south are no longer in view.

#### Year 2041

The waste rock emplacement landform would expand in scale and elevation to occupy more of the FVA creating a new middle distance ridgeline. The total proportion of FVA that would be occupied by the Project (including the waste rock emplacement landform and active working faces) would increase, with a larger proportion occupied by active working face. The visual effect would be moderate due to high visual contrast and low visual integration of the exposed working faces and open cuts coupled with the Project occupying 1.1% of the FVA (Figure 6.8).

Progressive rehabilitation treatment would be evident along the upper areas and lower northern slopes of the integrated waste rock emplacement landform, reducing visual effect of those areas.

#### Final Landform

The integrated waste rock emplacement landform would be in the middle distance and would be slightly higher in elevation in comparison to the landform in 2041. The modulated design of the new landform and ridgeline improves visual integration with the surrounding landscape setting (Figure 6.9).

Established rehabilitation across all areas of the integrated waste rock emplacement landform would include the west facing slopes and northern extent that would reduce visual contrast in colour and texture effect and would improve visual integration in landscape character and landform with the surrounding landscape setting thereby reducing visual effect levels to low.

**Table 6-2 Viewpoint 2 Visual Effect**

Project Stage	Percentage of FVA occupied by visible Project
2034	1%
2041	1.1%
Final Landform	1.2%
<b>Worst case visual effects:</b>	
Construction/Operation	Level 1 – Moderate to Low
Final Landform	Level 3 - Low
Long-term	Level 3 - Low





**Figure 6.6 Viewpoint 2 - Nandowra Road - Existing Views**



**Figure 6.7 Viewpoint 2 - Nandowra Road - Project – 2034**





**Figure 6.8**      **Viewpoint 2 - Nandowra Road - Project – 2041**



**Figure 6.9**      **Viewpoint 2 - Nandowra Road - Project - Final Landform**

### 6.3.3 Viewpoint 3 – New England Highway - North

#### Existing View

This view location looking from the south-west to the west was taken along the New England Highway on a rise 3 km south of Aberdeen and approximately 2.5 km east of the approved Mount Pleasant Operation.

Undulating grazing lands across low ridgelines and wooded foothills hills are visible across the Hunter River in the near and middle distance. These ridgelines limit views to the Project in this view, though a minor portion of the waste rock emplacement landform can be seen in centre of view. There are no distant views (Figure 6.10).

#### Year 2034

In 2034, the Project would be viewed along its eastern face as the development of the integrated waste rock emplacement landform progresses. The early excavations for the North Pit would be visible from 2026 to the right of view. There would be a significant increase in the scale and elevation of the integrated waste rock emplacement landform with progressive rehabilitation on the lower slopes reducing visual contrast of the visible proportion of the Project, and would lower the visual effect. Upper slopes would have areas of higher visual contrast and lower visual integration (Figure 6.11).

There would also be an additional area of high visual contrast at the development of the integrated waste rock emplacement landform. Both areas would have higher visual contrast and lower visual integration with the adjacent rehabilitated waste rock emplacement landform face and surrounding landscape setting resulting in higher visual effects, however, would occupy a smaller visible proportion of the Project.

#### Year 2041

In 2041, the integrated waste rock emplacement landform would expand in extent and elevation to occupy more of the FVA and would create a new middle distance ridgeline. Upper profile for the integrated waste rock emplacement landform would almost be complete with modulation improving visual integration with natural landforms. Upper zones of integrated waste rock emplacement landform in the north would continue to have high visual contrast.

Established rehabilitation treatment covers the majority of the integrated waste rock emplacement landform, reducing visual effect. Early rehabilitation in the northern upper slopes displays a reduction of visual contrast and visual effects.

The extent of progressive rehabilitation across the eastern face would reduce visual contrast and improve visual integration with the surrounding landscape setting thereby lowering the visual effects (Figure 6.12).

The views to previous wooded hills landscapes to the west are now limited as the integrated waste rock emplacement landform would form a new ridgeline, further with improved visual integration.

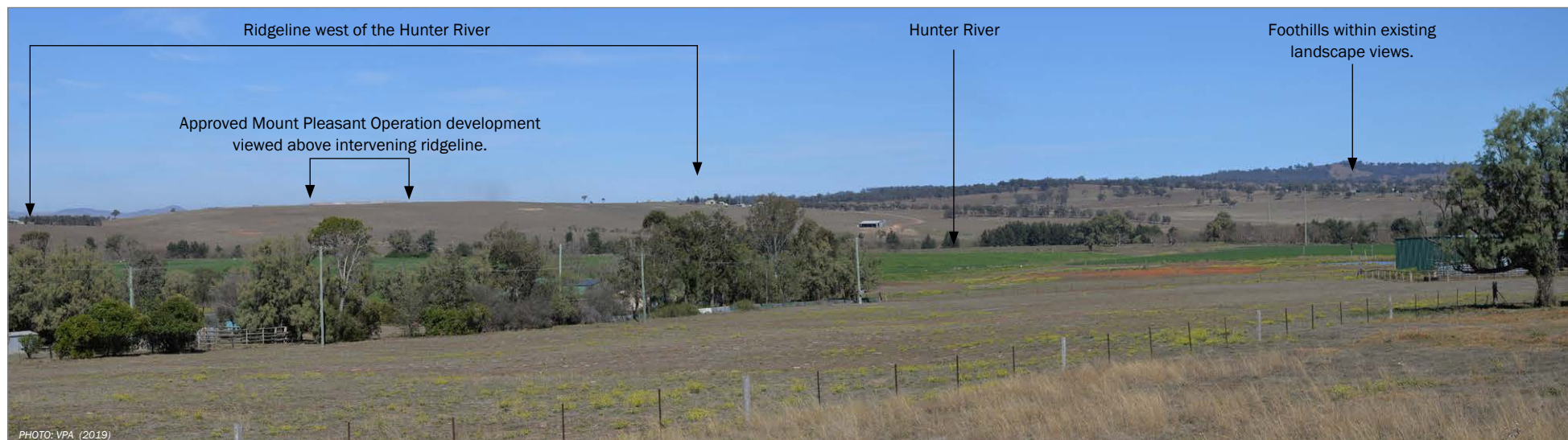
#### Final Landform

The rehabilitated integrated waste rock emplacement landform in the middle distance would be slightly higher in elevation in comparison to the landform in 2041. Visual contrast would be very low and the modulated design of the landform and ridgeline would improve visual integration with the surrounding landscape setting. Established rehabilitation on the eastern face would reduce visual effect to low (Figure 6.13) and overall effect would be one of a new well integrated view setting (i.e. very low in the long-term).

**Table 6-3 Viewpoint 3 Visual Effect**

Project Stage	Percentage of FVA occupied by visible Project
Year 2034	3.9%
Year 2041	4.3%
Final Landform	5.5%
<b>Worst case visual effect:</b>	
Construction/Operation	Level 1 – High
Final Landform	Level 3 – Low
Long-term	Level 4 – Very Low





**Figure 6.10 Viewpoint 3 - New England Highway - North – Project – Existing Views**



**Figure 6.11 Viewpoint 3 - New England Highway - North - Project – 2034**





**Figure 6.12 Viewpoint 3 - New England Highway - North – Project – 2041**



**Figure 6.13 Viewpoint 3 - New England Highway - North – Project - Final Landform**

## 6.4 Eastern Sector

This sector would have the most critical viewing locations and is representative of the greatest population. Therefore, three relevant photomontage view locations have been modelled to provide reference points for assessing sensitive views in many elevated areas within the Eastern sector.

The visual effect of the Project would have varying visibility from the east, as surrounding buildings and vegetation, particularly on lower elevations, screen some view locations.

### 6.4.1 Viewpoint 4 – St Heliers Street and Sowerby Street

#### *Existing View*

The existing view from this location was taken at the intersection of St Heliers Street and Sowerby Street at an elevated position in Muswellbrook. The view is representative of the channeled views available at similar east-west orientated roads dropping down to the New England Highway. It includes residential streetscape and heritage buildings on the New England Highway in the near distance and the irrigated areas adjacent the Hunter River flood plain in the middle distance, against a backdrop of the existing Mount Pleasant Operation and the surrounding ranges in the distance (Figure 6.14).

The views from Sowerby Street extend above the roofline of houses and include the existing Mount Pleasant Operation and the mine landforms of the Bengalla Mine. This view already has been previously reported as having high visual effects from the approved Mount Pleasant Operation on sensitive receptors within Muswellbrook. Established vegetation around houses filters some sections of the view towards the existing Mount Pleasant Operation.

#### *Year 2026*

In 2026, the Project would be viewed along its eastern face as the integrated waste rock emplacement landform as construction progresses. There would be a significant increase in the elevation of the integrated waste rock emplacement landform and there would be well-established rehabilitation to approximately 66% of the lower sections of integrated waste rock emplacement landform (Figure 6.15). Areas above the lower slopes would have progressive implementation of rehabilitation, and therefore, would have more visual contrast in colour and texture, increasing the visual effect.

The increase in elevation would create a new middle-distance ridgeline. It would occupy an increased percentage of the FVA however only a small proportion creates higher level visual effects.

The North Pit would be developed, however, from this viewpoint it would be screened by intervening vegetation and foreground elements. Open cuts and associated infrastructure to the west of the integrated waste rock emplacement landform would be screened, reducing the potential visual effect.

Views to the surrounding ranges and wooded foothills to the west of the integrated waste rock emplacement landform ridgeline would also be screened.

#### *Year 2034*

In 2034, the integrated waste rock emplacement landform would increase in extent and elevation to occupy more of the FVA. Progressive rehabilitation would cover the majority of the eastern face of the integrated waste rock emplacement landform, reducing visual effect in well-established areas (i.e. lower slopes). The remaining areas on the upper slopes (prior to rehabilitation cover crop) would have more visual contrast in colour and texture, increasing the visual effect (Figure 6.16).

Areas of high visual effect would be limited to sections along the uppermost ridgeline occupying minor percentages of the FVA and overall view of landscape.

### **Final Landform**

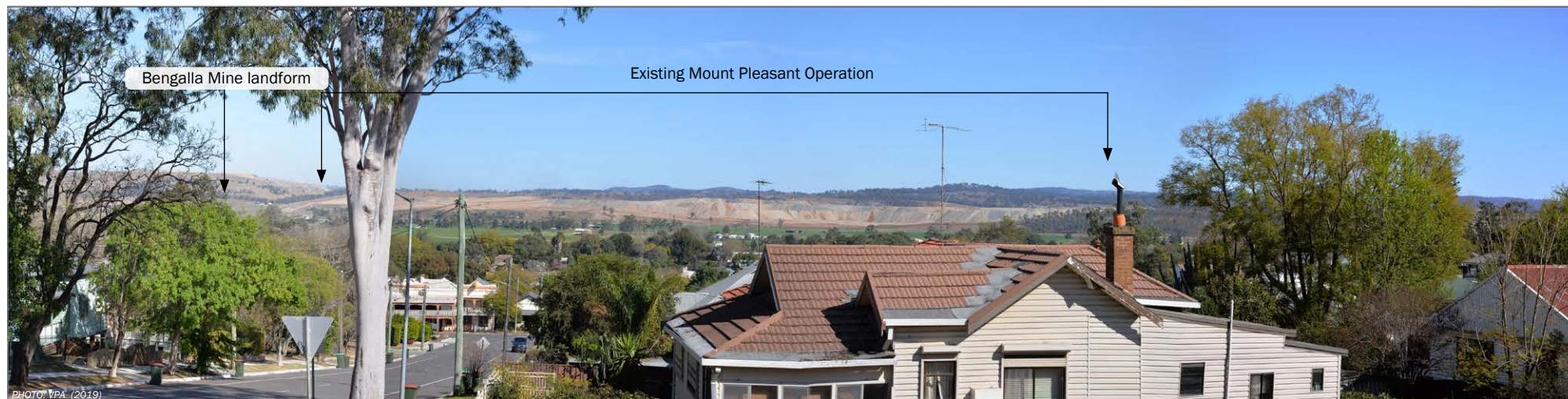
The rehabilitated integrated waste rock emplacement landform in the middle distance would be higher in elevation in comparison to the landform in 2034. Figure 6.17 also provides an indication of the existing horizon line to provide an indicative scale to the change in view setting. The modulated design of the landform and ridgeline would emulate the natural landforms improving visual integration with the surrounding landscape setting (Figure 6.17).

Established rehabilitation on the eastern face would reduce the visual effect to low, and to very low in the long-term. Planting densities are higher than existing views of the surrounding agricultural areas.

**Table 6-4 Viewpoint 4 Visual Effect**

Project Stage	Percentage of FVA occupied by visible Project
2026	5.5%
2034	10.9%
Final Landform	11.3%
<b>Worst case visual effect:</b>	
Construction/Operation	Level 1 - High
Final Landform	Level 3 - Low
Long-term	Level 4 - Very Low





**Figure 6.14 Viewpoint 4 - St Heliers Street and Sowerby Street - Existing Views**



**Figure 6.15 Viewpoint 4 - St Heliers Street and Sowerby Street - Project - 2026**





**Figure 6.16 Viewpoint 4 - St Heliers Street and Sowerby Street - Project - 2034**



**Figure 6.17 Viewpoint 4 - St Heliers Street and Sowerby Street - Project - Final Landform**

## 6.4.2 Viewpoint 5 – New England Highway – East

### Existing View

This view location is near an entry point into the PVC on the New England Highway east of Muswellbrook and approximately 5.8 km south-east of the Project. The view looks towards the west and includes the mine landforms of the Bengalla Mine to the left of view. The existing Mount Pleasant Operation can be seen to the right of the Bengalla Mine landform and extends across the middle-distance view against a backdrop of foothills with surrounding ranges in the distance. Distance of view location to these areas of active mine operations is approximately 6 km (Figure 6.18).

Low lying areas in Muswellbrook lie between this view and the existing Mount Pleasant Operation, with a glimpse of some areas to the left of view adjacent to the mine landforms of the Bengalla Mine.

### Year 2026

In 2026, the Project would be viewed along its eastern face as the development of the integrated waste rock emplacement landform progresses. There would be a moderate increase in the elevation of the integrated waste rock emplacement landform with areas of well-established progressive rehabilitation along the lower slopes. Areas along the upper slopes would have more visual contrast in colour and texture, increasing the visual effect (Figure 6.19).

Open cuts and associated infrastructure to the west of the integrated waste rock emplacement landform would be screened, reducing the potential visual effect.

### Year 2034

In 2034, the integrated waste rock emplacement landform would increase in extent and elevation to occupy more of the FVA, creating a new middle distance ridgeline screening views to the ranges to the west. Progressive rehabilitation treatment along the eastern face would reduce the visual effect in well-established areas on lower slopes (Figure 6.20). The rehabilitation would continue progressively following the development of the integrated waste rock emplacement landform.

### Final Landform

The rehabilitated integrated waste rock emplacement landform in the middle distance would increase in elevation in comparison to the landform in 2034. As the rehabilitation matures, the previous contrast with the surrounding rural setting would be lowered. The upper profile of the rehabilitated integrated waste rock emplacement landform and ridgeline would emulate the natural landforms improving visual integration with the surrounding landscape setting.

Established rehabilitation on the eastern face would further reduce visual contrast and improve visual integration, reducing effect to low (Figure 6.21). Planting densities are higher than existing views of the surrounding agricultural areas.

**Table 6-5 Viewpoint 5 Visual Effect**

Project Stage	Percentage of FVA occupied by visible Project
2026	1.5%
2034	2.9%
Final Landform	3%
<b>Worst case visual effect:</b>	
Construction/Operation	Level 1 - Moderate
Final Landform	Level 3 - Low
Long-term	Level 3 - Low





**Figure 6.18 Viewpoint 5 - New England Highway - East - Project - Existing Views**



**Figure 6.19 Viewpoint 5 - New England Highway - East - Project- 2026**



**Figure 6.20 Viewpoint 5 - New England Highway - East - Project - 2034**



**Figure 6.21 Viewpoint 5 - New England Highway - East - Project - Final Landform**



### 6.4.3 Viewpoint 6 – Hill Street

#### Existing View

This view location is consistent with a viewpoint from a previous visual assessment for Modification 3, taken in a sensitive viewing location adjacent to a local church, primary school and entrance to local shopping mall car park used by a broad sector of the community. The view looks west towards the existing Mount Pleasant Operation with active mine development visible as the area of colour contrast across the middle-distance; this is against a backdrop of foothills with surrounding ranges in the distance (Figure 6.22).

The Bengalla Mine landform is located to the left of the existing Mount Pleasant Operation. There are also views of the irrigated green of Hunter River flood plain agricultural land, rural residences and outbuildings between the existing Mount Pleasant Operation and the edge of Muswellbrook.

#### Year 2026

In 2026, the Project would be viewed along the eastern face of the integrated waste rock emplacement landform, that would increase in extent and elevation. There would be areas of well-established progressive rehabilitation along the lower slopes of the integrated waste rock emplacement landform. Areas along the upper slopes would have more visual contrast in colour and texture, increasing the visual effect (Figure 6.23).

Areas of open cut to the west would be screened by the integrated waste rock emplacement landform except for a small area to the far left of view at southern extent within the approved Mount Pleasant Operation. Previous views to the ranges and foothills to the west would no longer be visible.

#### Year 2034

The integrated waste rock emplacement landform would increase in extent and elevation above the approved Mount Pleasant Operation to occupy more of the FVA. This would create a new middle distance ridgeline, screening views to the surrounding ranges to the west.

The expansion of the integrated waste rock emplacement landform would result in greater areas of high visual effects north of the Mount Pleasant Operation. This would be limited to a small percentage of FVA occupied by the areas of high visual contrast along the upper profile (i.e. above the progressively rehabilitated landform).

Progressive rehabilitation treatment would be evident along the eastern face of the integrated waste rock emplacement landform, reducing visual effect where implemented (Figure 6.24). The rehabilitation would continue progressively following the development of the integrated waste rock emplacement landform.

#### Final Landform

The rehabilitated integrated waste rock emplacement landform in the middle distance would slightly increase in elevation in comparison to the landform in 2034 with additional rehabilitation. As the rehabilitation matures the previous contrast with the surrounding rural setting would be reduced, lowering the visual effect. The modulated design of the landform would also improve visual integration with the surrounding landscape setting.

The upper profile of the final landform and ridgeline would emulate the natural landforms improving visual integration with the surrounding landscape setting.

Established rehabilitation on the eastern face would further reduce visual contrast and improve visual integration thereby reducing effect to low (Figure 6.25). Planting densities are higher than existing views of the surrounding agricultural areas.

**Table 6-6 Viewpoint 6 Visual Effect**

Project Stage	Percentage of FVA occupied by visible Project
2026	5.8%
2034	11.7%
Final Landform	12.2%
<b>Worst case visual effects:</b>	
Construction/Operation	Level 1 - High
Final Landform	Level 3 - Low
Long-term	Level 3 - Low



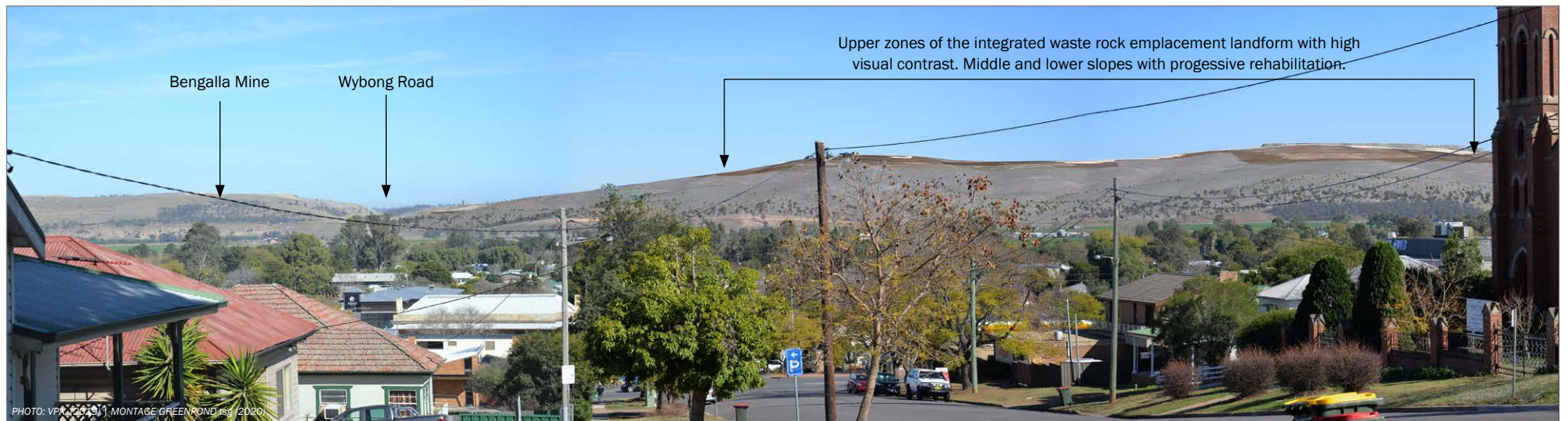


**Figure 6.22 Viewpoint 6 - Hill Street - Existing Views**



**Figure 6.23 Viewpoint 6 - Hill Street - Project - 2026**





**Figure 6.24 Viewpoint 6 - Hill Street - Project - 2034**



**Figure 6.25 Viewpoint 6 - Hill Street - Project - Final Landform**

## 6.5 Southern Sector

Visual effects on the Southern view sector would vary in extent depending on viewpoint location. In the eastern parts of the sector, the views are predominantly of the southern part of the approved Mount Pleasant Operation, where the Project would be seen from Sydney Road and Denman Road. Bengalla Mine screens views towards the Project from further south and south-west within this sector.

### 6.5.1 Viewpoint 7 – Denman Road

#### *Existing View*

This view location is along Denman Road south of the Project. Views are dominated by the broad Hunter River flood plain with the Bengalla Mine landforms to the left of view against a backdrop of distant ranges to the north-east. The existing Mount Pleasant Operation is seen as areas of colour and texture contrast in centre view (Figure 6.26).

Rural residential properties and associated ancillary buildings can be seen scattered across the Hunter River flood plain.

View also includes existing Muswellbrook – Ulan Rail Line and heritage listed Overdene and Overton homesteads adjacent to the Bengalla Mine landform. It is worth noting that the existing view does not include the approved Stage 2 rail associated with the approved Mount Pleasant Operation as it was yet to be constructed at the time of the field assessment in September 2019. The approved Stage 2 rail associated with the approved Mount Pleasant Operation has been included in the simulations for completeness. This view illustrates hazy atmospheric conditions on the day of recording, typical of conditions that may affect visibility and visual effects at this viewing distance from the Project.

Directly south of this location (behind viewer) is the northern perimeter of Mt Arthur Coal Mine and visual bund which runs alongside Denman Road.

#### *Year 2026*

In 2026, the Bengalla Mine landform would screen a portion of the Project located north of Wybong Road. There would be a significant increase in the elevation of the integrated waste rock emplacement landform in the middle-distance. The eastern face profile of the Mount Pleasant Operation landform would screen the expansion areas of the Project to the north.

The Project would result in a small percentage of high visual contrast and visual effects contributing to total FVA. These areas would be limited to the upper profile above the rehabilitation on the eastern face of the integrated waste rock emplacement landform and would be consistent in character with the visual effects of the existing Mount Pleasant Operation.

Progressive rehabilitation treatment would cover a large proportion of the lower slopes of the eastern face, reducing visual effect in well-established areas. The balance areas on the upper slopes (prior to rehabilitation cover crop) would have more visual contrast in colour and texture, increasing the visual effect (Figure 6.27).

The integrated waste rock emplacement landform would also screen views into the open cut areas from this viewpoint, reducing the proportion of the view occupied by high visual contrast.

#### *Year 2034*

In 2034, the integrated waste rock emplacement landform would increase in elevation, increasing the proportion of FVA occupied by the Project. There would be further reduction of views to distant surrounding ranges to the north and the integrated waste rock emplacement landform would create a new backdrop to the Hunter River flood plain in the middle-distance.

Areas of high visual effect would be limited to a small section along the uppermost landform that would occupy a minor percentage of the FVA and overall view of landscape (Figure 6.28), with progressive rehabilitation further reducing visual contrast on the lower slopes.



### **Final Landform**

The rehabilitated integrated waste rock emplacement landform in the middle distance would slightly increase in elevation in comparison to the landform in 2034. The modulated design of the landform eastern face would improve the visual integration with the surrounding landscape setting (Figure 6.29).

Established rehabilitation on the eastern face of the integrated waste rock emplacement landform would reduce the visual effect to low (very low in the long-term).

The approved Stage 2 rail associated with the approved Mount Pleasant Operation would also be decommissioned and removed in the final landform (if no alternative post-mining use is identified).

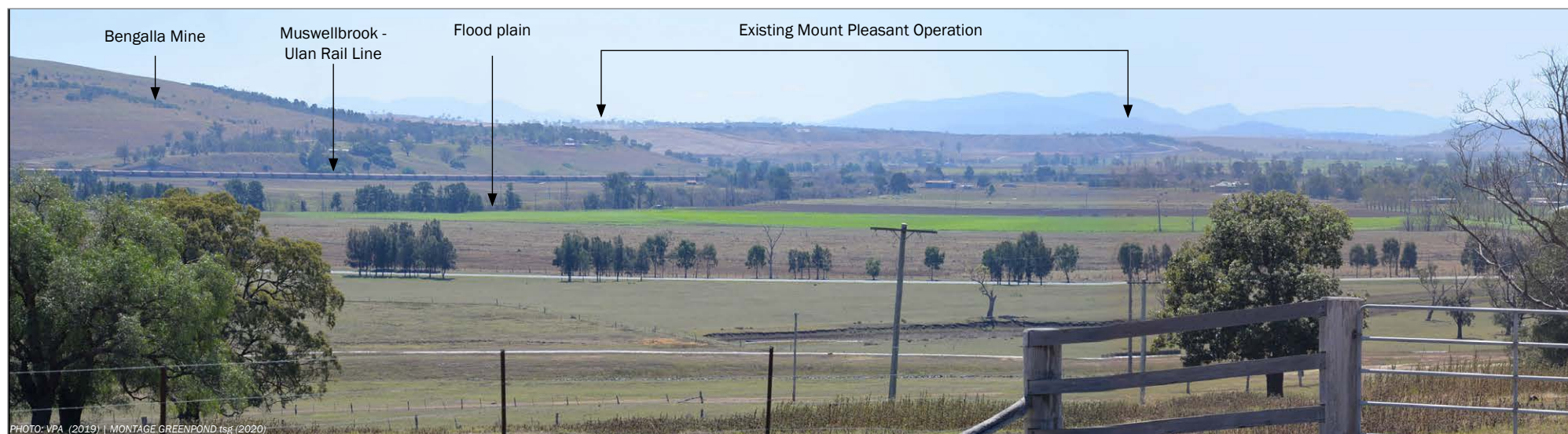
**Table 6-7 Viewpoint 7 Visual Effect**

Project Stage	Percentage of FVA occupied by visible Project
2026	0.9%
2034	2.1%
Final Landform	2.3%
<b>Worse case visual effect:</b>	
Construction/Operation	Level 2 - Low
Final Landform	Level 3 - Low
Long-term	Level 4 - Very Low

## **6.6 Western Sector**

The sector is also dominated by rural residences and land that support rural lifestyle blocks in the elevated parts west of the approved Mount Pleasant Operation.

Views to the Project would be limited as there would be a limited number of publicly accessible locations and the existing topography and existing Bengalla Mine landform would screen views. The views from the elevated ridge inside this view sector include an existing highly modified landscape with large scale disturbance to the rural setting of this region created by existing mining operations.

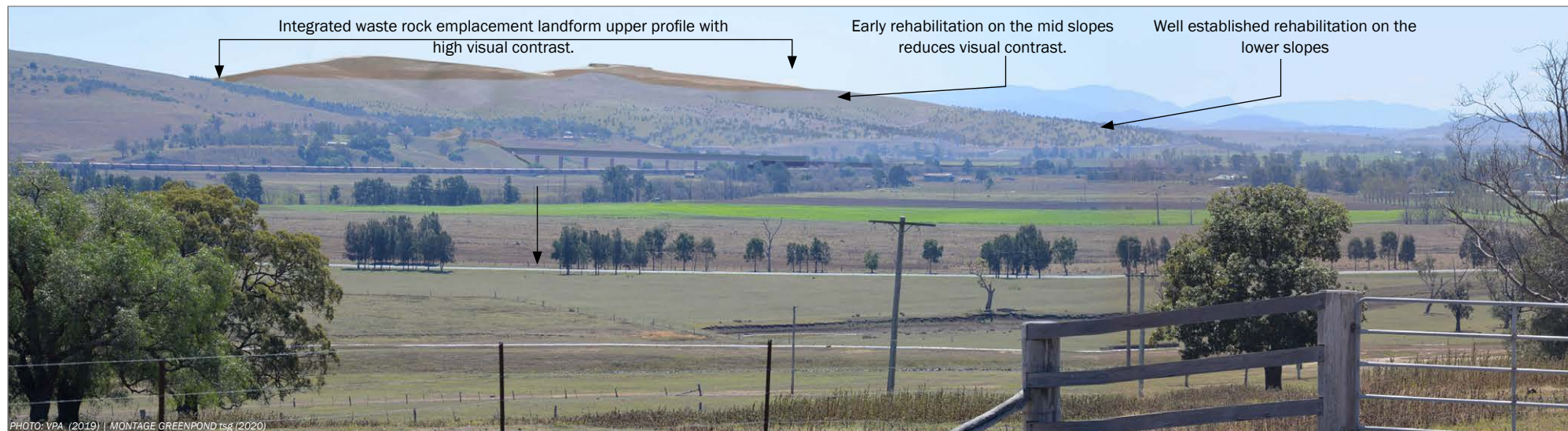


**Figure 6.26 Viewpoint 7 - Denman Road - Project - Existing Views**



**Figure 6.27 Viewpoint 7 - Denman Road - 2026**





**Figure 6.28 Viewpoint 7 - Denman Road - Project - 2034**



**Figure 6.29 Viewpoint 7 - Denman Road - Project - Final Landform**



### 6.6.1 Viewpoint 8 – Roxburgh Road

#### Existing View

This view location is from an elevated roadside location to the south-west of existing Mount Pleasant Operation and west of the Bengalla Mine looking towards the north-east. The view includes areas of woodland and an infrastructure easement west of Bengalla Mine open cut. Roadside vegetation screen planting along Wybong Road is visible adjacent to the extensive Bengalla Mine open cut in mid view to the south of the existing Mount Pleasant Operation. Areas of the Mount Pleasant Operation are visible beyond this against a backdrop of surrounding ranges north and east of the view location (Figure 6.30).

This view illustrates hazy atmospheric conditions on the day of recording affecting visibility at this viewing distance from the Project. It is also taken in a location of existing visual mitigation tree planting (in foreground) associated with Bengalla Mine. It is anticipated that this view would be filtered over time by the growth and establishment of this tree screen planting.

#### Year 2034

In 2034, the active mining operations for the Project (i.e. west of the integrated waste rock emplacement landform), would be visible from this viewpoint. The view would have the highest visual effect of the Project due to the high visual contrast in colour and texture and very low integration of landform, due to the structured benching of working face, within the rural setting. However, the landform would be consistent with the adjacent open cut of the existing Bengalla Mine (right of view) thereby integrating with the existing mining setting but contributing to the immediate cumulative effects at this view location (Figure 6.31). Therefore, the visual effects at this viewpoint would be high.

In addition, the increase in elevation of the integrated waste rock emplacement landform would reduce views to the surrounding ranges to the north-east. The peak of Bells Mountain remains visible above the integrated waste rock emplacement landform.

#### Year 2041

In 2041, the extent of active mine face would progress further west and an increase in the elevation of the integrated waste rock emplacement landform would increase the proportion of the FVA occupied by the Project. There would be further reduction of views to surrounding ranges with Bells Mountain just visible above the integrated waste rock emplacement landform.

Rehabilitation areas would be visible along the upper areas of the integrated waste rock emplacement landform, however, visual contrast would remain high resulting in a high visual effect (Figure 6.32).

#### Final Landform

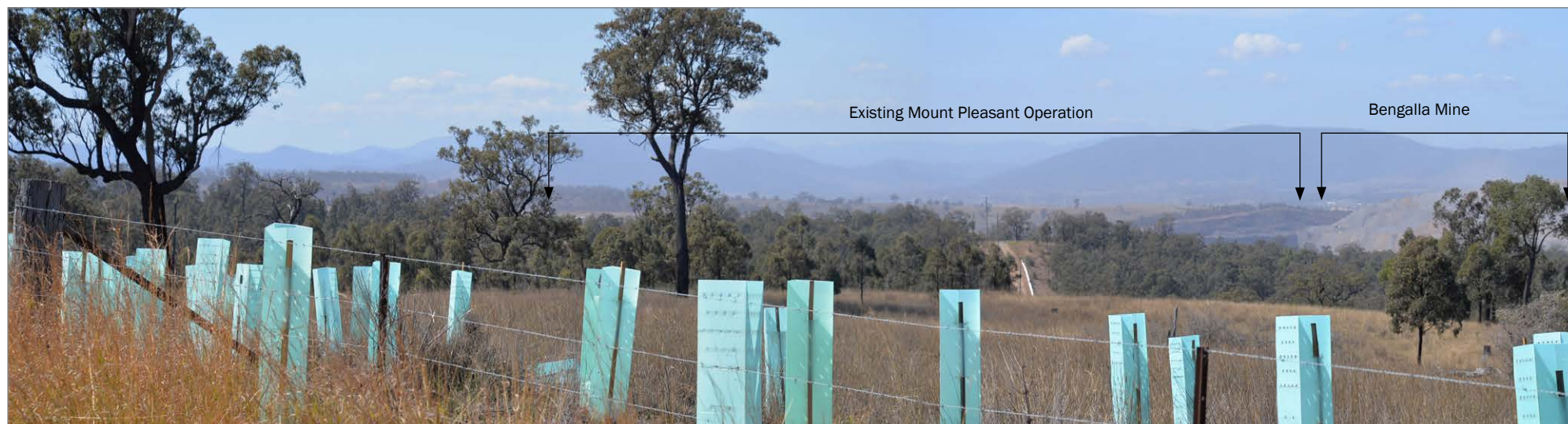
The rehabilitated waste rock emplacement landform in the middle distance would slightly increase in elevation in comparison to the landform in 2034. This would create a new ridgeline in the landscape. The modulated design of the landform and ridgeline would improve the visual integration with the surrounding landscape setting.

Established rehabilitation across all aspects of the waste rock emplacement landform would reduce the visual effect to low.

Views to the existing backdrop of surrounding ranges and foothills would be reduced (Figure 6.33).

**Table 6-8 Viewpoint 8 Visual Effect**

Project Stage	Percentage of FVA occupied by visible Project
2034	2.4%
2041	2.7%
Final Landform	4%
<b>Worst case visual effects:</b>	
Construction/Operation	Level 1 - High
Final Landform	Level 2 - Low
Long-term	Level 3 - Low



**Figure 6.30 Viewpoint 8 - Roxburgh Road - Existing Views**

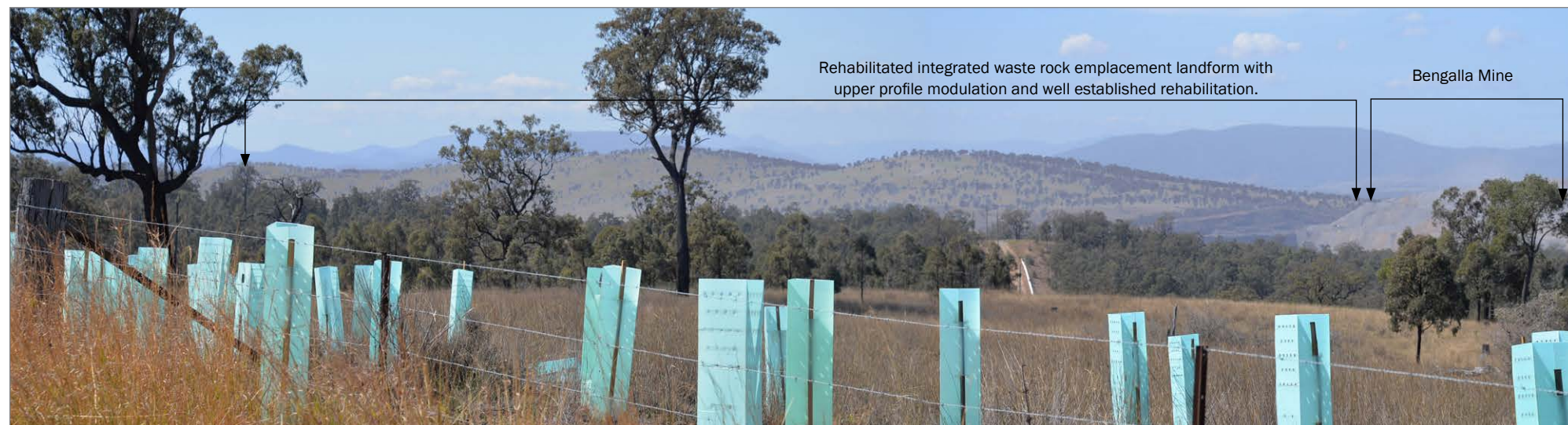


**Figure 6.31 Viewpoint 8 - Roxburgh Road - Project - 2034**





**Figure 6.32 Viewpoint 8 - Roxburgh Road - Project – 2034**



**Figure 6.33 Viewpoint 8 - Roxburgh Road - Project – Final Landform**



## 6.7 Visual Effect Summary

The visual effects of the Project vary from viewing locations. The Project components would create the highest visual effect when viewed from the east within the Central view sector, particularly from rural residential properties in the vicinity. These viewpoints also have the highest existing visual effect for the approved Mount Pleasant Operation.

Elevated locations within Muswellbrook would have an increase to FVA areas occupied by high visual effects during the development of the integrated waste rock emplacement landform for the Project. The character of these visual effects would be consistent with the approved Mount Pleasant Operation.

Visual effects in the Northern sector of the PVC would increase due to the increase in the integrated waste rock emplacement landform in extent and elevation. The character of these effects would be consistent with the approved Mount Pleasant Operation.

The design of the integrated waste rock emplacement landform would lower the visual effects in the long-term through the improvement of visual integration by creating a more natural looking landform within this rural setting.

The potential visual effects of the Project as described in this section are summarised in Table 6-9.

**Table 6-9** *Summary of visual effects from viewpoints*

Viewpoint	Distance from Nearest Visible Project Component	Maximum Proportion of the View Occupied by the Project	Visual Effect
VP1	Integrated waste rock emplacement landform - 6 km	2.1%	Construction/Operation: Level 1 – Moderate Final Landform: Level 3 – Low Long-term: Level 4 – Very Low
VP2	Integrated waste rock emplacement landform – 8.0 km	1.2%	Construction/Operation: Level 1 – Low Final Landform: Level 3 – Low Long-term: Level 3 – Low
VP3	Integrated waste rock emplacement landform – 4.0 km	5.5%	Construction/Operation: Level 1 – High Final Landform: Level 3 – Low Long-term: Level 4 – Very Low
VP4	Integrated waste rock emplacement landform – 2.7 km	11.3%	Construction/Operation: Level 1 – High Final Landform: Level 3 – Low Long-term: Level 4 – Very Low
VP5	Integrated waste rock emplacement landform – 5.8 km	3.0%	Construction/Operation: Level 1 – Moderate Final Landform: Level 3 – Low Long-term: Level 3 – Low
VP6	Integrated waste rock emplacement landform – 2.7 km	12.2%	Construction/Operation: Level 1 – High Final Landform: Level 3 – Low Long-term: Level 3 – Low
VP7	Integrated waste rock emplacement landform – 4.0 km	2.3%	Construction/Operation: Level 2 – Low Final Landform: Level 3 – Low Long-term: Level 4 – Very Low
VP8	Integrated waste rock emplacement landform – 4.0 km	4%	Construction/Operation: Level 1 – High Final Landform: Level 2 – Low Long-term: Level 3 – Low

## 7 VISUAL IMPACT

This section describes the potential visual impacts of the Project. The visual impact of the Project has been assessed in consideration of the visual impacts of the approved Mount Pleasant Operation, the visual sensitivity of the receptors (Section 5) and the visual effect at representative viewing locations (Section 6).

The potential visual impacts of the Project are summarised in Table 7-1 and discussed throughout this section.

**Table 7-1 Summary of the Visual Impacts of the Project**

Receptor	Visual Sensitivity	Visual Effect		Visual Impact		
		During Project	Long-term	Approved Mount Pleasant Operation	During Project	Long-term
Central Sector						
Rural Residences on flood plain	High	High	Low	High	High	Moderate/Low
Horse studs*	High	High	Low	High	High	Moderate/Low
Muswellbrook Racecourse	High	High	Low	High	High	Moderate/Low
Sydney Road*	Moderate	High	Low	High/Moderate	High/Moderate	Moderate/Low
Kayuga Road	Moderate	High	Low	High	High/Moderate	Moderate/Low
Wybong Road	Moderate/Low	High	Low	High/Moderate	Moderate	Low
Racecourse Road*	Moderate/Low	High	Low	Moderate/Low	Moderate	Low
Rural Land	Low	High	Low	Low	Moderate/Low	Low
Northern Sector						
Momberri-Scone Rural Landscape	Low	Moderate	Very Low	Low	Moderate/Low	Low/Very Low
Aberdeen	High/Moderate	Moderate	Very Low	High	High/Moderate	Low
Rural Residences on flood plain	High	High	Very Low	High	High	Low
Horse Studs	Nil	Nil	Nil	Nil	Nil	Nil
Rossgole Lookout*	Moderate	Low	Very Low	Moderate/Low	Moderate/Low	Very Low
New England Highway	Moderate	High	Very Low	High	High/Moderate	Very Low
Northern Railway Line	Moderate	High	Very Low	High	High/Moderate	Very Low
Rural Land	Low	Low	Very Low	Low	Low	Very Low
Eastern Sector						
Muswellbrook	High	High	Low	High	High	Moderate/Low
Rural Residences	High	High	Low	High	High	Moderate/Low
New England Highway	High	Moderate	Low	High	High/Moderate	Moderate/Low
Northern Railway Line	High	Low	Low	High	Moderate/Low	Moderate/Low

Receptor	Visual Sensitivity	Visual Effect		Visual Impact		
		During Project	Long-term	Approved Mount Pleasant Operation	During Project	Long-term
Southern Sector						
Heritage-listed Homesteads*	High/Moderate	Moderate	Very Low	Moderate	High/Moderate	Moderate/Low
Edinglassie Stud	High/Moderate	Low	Very Low	Moderate	Moderate/Low	Low
Other Horse Studs*	Nil	Nil	Nil	Nil	Nil	Nil
Tourist Features*	Nil	Nil	Nil	Nil	Nil	Nil
Muswellbrook-Jerrys Plains Landscape Conservation Area	Moderate	Moderate	Very Low	Moderate	Moderate	Very Low
Rural Residences	High/Moderate	Moderate	Very Low	Moderate	High/Moderate	Moderate/Low
Denman Road*	Moderate	Low	Very Low	Moderate	Moderate/Low	Low
Thomas Mitchell Drive*	Low	Low	Very Low	Low	Low	Low
Rural Land	Low	Moderate	Very Low	Low	Moderate/Low	Very Low
Western Sector						
Rural Residences	High	High	Low	Moderate	High	Low
Wybong Road	Moderate/Low	High	Low	Moderate	High/Moderate	Low
Roxburgh Road	Moderate/Low	High	Low	Low	Moderate	Low
Rural Land	Low	High	Low	Low	Moderate/Low	Very Low

\* Receptors that were not assigned a visual impact as part of the previous visual assessments for the approved Mount Pleasant Operation, that have been assigned a visual impact for direct comparison with the Project.

## 7.1 Visual Impacts in the Central Sector

### 7.1.1 Horse Studs

There are two horse studs within the Central sector, namely the Abbey Thoroughbreds and Balmoral Park Thoroughbred Studs.

The visual impacts of the approved Mount Pleasant Operation at these horse studs was determined to be high.

The visual impacts during the construction and operation of the Project would continue to be high and would reduce to moderate/low in the long-term following the rehabilitation of the final landform.

### 7.1.2 Tourist Locations/Recreation Areas

Muswellbrook Racecourse currently has three approved operating mines in close proximity and within view of the facility.

Previous assessments determined the approved Mount Pleasant Operation would have high visual impacts on the Muswellbrook Racecourse.

The visual impacts during the construction and operation of the Project on Muswellbrook Racecourse would continue to be high initially and would decrease over time to be moderate/low in the long-term following the rehabilitation of the final landform.



### **7.1.3 Rural Residences and Land**

Rural residences in this sector are located mainly on the lower elevation of the Hunter River flood plain along Wybong Road and Kayuga Road.

Previous assessments determined that high visual impacts would occur at rural properties on the Hunter River flood plain for the approved Mount Pleasant Operation.

There are varying levels of impact of the Project on rural residences in this sector as some Project components are screened from view, however, the visual impacts would continue to be high and the Project would increase the scale and elevation of the final landform.

The design of the integrated waste rock emplacement landform profile (i.e. incorporates geomorphic drainage design principles for hydrological stability and varying topographic relief to be more natural in exterior appearance) would also minimise the contrast with the surrounding setting reducing the visual impact of the Project to moderate/low at the rural residences in this sector in the long-term.

### **7.1.4 Roads**

The roads in this sector include Wybong Road, Overton Road, Logues Lane, part of Kayuga Road, Sydney Road and Racecourse Road. The visual impacts of the approved Mount Pleasant Operation on these roads would range from high to moderate.

Within the Central view sector, the Project occupies a significant percentage of the view and the Project would increase the scale and elevation of final landform, so visual impacts for users of these roads would continue to be high/moderate to high.

In the long-term, the visual impact on these roads would reduce to moderate/low to low.

## **7.2 Visual Impacts in the Northern Sector**

### **7.2.1 Momberoi–Scone Rural Landscape**

The Momberoi-Scone Rural Landscape is located to the north of the Project, outside the PVC, however it has been conservatively considered in this assessment. Previous assessments determined that the approved Mount Pleasant Operation would result in low visual impacts on the Momberoi-Scone Rural Landscape.

The increased elevation of the integrated waste rock emplacement landform would increase the level of visibility and the percentage of view occupied by the Project, with the visual impacts during the construction and operation of the Project on viewing locations within Momberoi-Scone Rural Landscape would be moderate/low.

The visual impacts of the Project would reduce to low/very low in the long-term following the rehabilitation of the final landform.

### **7.2.2 Aberdeen**

The approved Mount Pleasant Operation can be viewed from some elevated locations within Aberdeen such as from Graeme Street in the north-east.

Previous assessments determined that the approved Mount Pleasant Operation would result in high visual impacts on viewing locations within Aberdeen.

The increased elevation of the integrated waste rock emplacement landform would increase the level of visibility and the percentage of view occupied by the Project, however the visual impacts during the construction and operation of the Project on viewing locations within Aberdeen would continue to be high/moderate.

The design of the integrated waste rock emplacement landform profile would minimise the contrast with the surrounding setting reducing the visual impact of the Project to low in the long-term.

### **7.2.3 Rural Residences and Land**

Rural residences are located throughout the local setting mainly on the lower elevation of the Hunter River flood plain along Dartbrook Road, Blairmore Road, Nandowra Road and Kayuga Road, and would also include the heritage listed Kayuga Homestead.

Previous assessments determined that high visual impacts would occur at rural properties on the Hunter River flood plain due to the approved Mount Pleasant Operation.

Within the Northern sector, the Project would continue to have high visual impacts on rural residences (including to Kayuga Homestead) with views of the Project during construction and operation, which would reduce to low visual impacts in the long-term.

### **7.2.4 Rossgole Lookout**

The Rossgole Lookout has a broad sweeping overview of Aberdeen to Muswellbrook within the PVC. The approved Mount Pleasant Operation was expected to have moderate/low visual impacts at the Rossgole Lookout.

Atmospheric conditions would play an important part of visual impacts of the Project, however it is expected that during construction and operation the visual impacts would be moderate/low.

The visual impacts of the Project on the Rossgole Lookout would reduce to very low in the long-term following the rehabilitation of the final landform.

It should be noted that existing views from Rossgole Lookout include a number of mining operations and the increased proportion of the view occupied by the Project would be minor at the distance of the lookout.

### **7.2.5 New England Highway and Northern Railway Line**

The approved Mount Pleasant Operation is visible from a number of locations along the New England Highway and the Northern Railway Line and was determined to have high visual impacts.

Within the Northern sector, the visual impacts of the Project on the New England Highway and the Northern Railway Line during construction and operation would be high/moderate, and would reduce to very low visual impacts in the long-term.

### **7.2.6 Roads**

The approved Mount Pleasant Operation was determined to have high visual impacts on Kayuga Road and Castlerock Road in the Northern sector, with views from other minor roads limited by intervening topography and vegetation.

The visual impacts of the Project on these roads would continue to be high, reducing to low in the long-term following the rehabilitation of the final landform.

The Project would also involve the development of the revised Northern Link Road running adjacent to the north of the Project, that may alter potential viewing locations to the Project. However, it is expected that the visual impacts would be generally consistent with the approved Mount Pleasant Operation (noting that the proximity of the Northern Link Road to the approved North-west Out-of-Pit Emplacement suggests lesser impacts would occur as the Project would relinquish this area).

## 7.3 Visual Impacts in the Eastern Sector

### 7.3.1 Muswellbrook

Muswellbrook occupies most of the Eastern view sector and the approved Mount Pleasant Operation was previously determined to have high visual impacts in Muswellbrook.

Many elevated parts of Muswellbrook already have direct views onto the most visible components of the approved Mount Pleasant Operation. Areas that have views to the Project are typically already subject to high visual impacts from the approved Mount Pleasant Operation.

The development of the integrated waste rock emplacement landform and associated increase in scale and elevation may introduce additional viewpoints within Muswellbrook (e.g. along areas of lower elevation). However, it is expected that the visual impacts would remain high in Muswellbrook during construction and operation of the Project.

Progressive rehabilitation of the integrated waste rock emplacement landform and successful establishment of suitable vegetation cover would over time, reduce the visual impacts of the Project. The design of the integrated waste rock emplacement landform profile would also minimise the contrast with the surrounding setting, reducing the visual impact to moderate/low in the long-term.

### 7.3.2 Rural Residences

Rural or large lot rural residences are situated along parts of the New England Highway, Skellatar Stock Route and a short section of Kayuga Road near where it crosses the Hunter River.

These rural residences were previously determined to have high visual impacts for the approved Mount Pleasant Operation.

There are varying levels impact of the Project on rural residences in this sector as some of the components are screened from view, however, the visual impacts would continue to be high.

In the long-term, the visual impacts of the Project on the rural residences would reduce to moderate/low following the rehabilitation of the final landform.

### 7.3.3 Main Roads and Tourist Routes – New England Highway and Northern Rail Line

The approved Mount Pleasant Operation is visible from a number of locations along the New England Highway and the Northern Railway Line and was determined to have high visual impacts.

Within the Eastern sector, the visual impacts of the Project on the New England Highway and the Northern Railway Line during construction and operation would be high/moderate to moderate/low and would reduce to moderate/low visual impacts in the long-term.

The *New England Highway Muswellbrook Bypass Options Report* (Roads and Maritime Services, 2018) describes various options for the proposed Muswellbrook Bypass, with the most likely option to the east of Muswellbrook. Correspondence with Transport for NSW personnel described that the anticipated completion of the Muswellbrook Bypass would be 2027. It is anticipated that the visual impacts of the Project from along the Muswellbrook Bypass would be similar to visual impacts along the existing alignment of the New England Highway.



## 7.4 Visual Impacts in the Southern Sector

### 7.4.1 Heritage Listed Homesteads

This sector contains the historic homesteads of 'Edinglassie' and 'Rous Lench', with both homesteads owned by BHP. These historic homesteads were previously determined to have high visual impacts for the approved Mount Pleasant Operation.

The mine landforms of the Bengalla Mine partially intervene with views from the historic homesteads resulting in a reduction in the visual impacts of the Project to high/moderate during operations.

In the long-term, the visual impacts of the Project on the historic homesteads would reduce to moderate/low following the rehabilitation of the final landform.

### 7.4.2 Horse Studs

Edinglassie Stud was previously determined to have moderate visual impacts for the approved Mount Pleasant Operation. The mine landforms of the Bengalla Mine partially intervene with views of the Project from the Edinglassie Stud resulting in a reduction in the visual impacts of the Project to moderate/low.

In the long-term, the visual impacts of the Project on Edinglassie Stud would reduce to low following the rehabilitation of the final landform.

There would continue to be no views of the Project from Monarch Stud, Coolmore Stud and Godolphin Woodlands Stud, and therefore no visual impacts from the Project at these key horse stud facilities.

### 7.4.3 Tourist Features

There would continue to be no views of the Project from Pukara Estate, and therefore no visual impacts.

### 7.4.4 Rural Residences and Land

There are a number of rural properties scattered along Denman Road and within the Hunter River flood plain with moderate visual impacts from the approved Mount Pleasant Operation.

The rural residences in the Southern sector would be partially screened by the mine landforms of the Bengalla Mine and/or the intervening flood plain vegetation. However, the Project would have high visual impacts due to the increase in the scale and elevation of the integrated waste rock emplacement landform as viewed from these residences. In the long-term, the visual impacts at these rural residences would reduce to moderate/low.

### 7.4.5 Roads

The approved Mount Pleasant Operation was previously determined to have moderate to low visual impacts on Denman Road and Thomas Mitchell Drive in the Southern sector.

The visual impacts of the Project on these roads would continue to be moderate to low, reducing to low in the long-term following the rehabilitation of the final landform.

## 7.5 Visual Impacts in the Western Sector

### 7.5.1 Rural Residences and Land

There are a number of rural residences in the Western sector that were determined to have moderate visual impacts for the approved Mount Pleasant Operation, if views to the Project were not limited by topography and intervening vegetation.

The Project would have high visual impacts on these rural residences due to the increased scale and elevation, reducing to low visual impacts in the long-term.

### 7.5.2 Other Roads

Wybong Road and Roxburgh Road were determined to have moderate to low visual impacts from the approved Mount Pleasant Operation.

The visual impacts of the Project on these roads would increase to high/moderate and moderate for Wybong Road and Roxburgh Road, respectively.

## 7.6 Cumulative Visual Impacts

As described in Section 2.2.4, cumulative visual impacts are the combined impacts of the development with other past, present, or likely future developments that may have potential visual interactions. The Project is an expansion of an open cut mine with significant existing surface infrastructure, mine landforms and disturbance, in a region of considerable modification to the landscape due to various mining operations.

To consider the cumulative impact of the Project, it is necessary to consider the following:

- Visual effect in the context of other mine activity seen within the one view from sensitive receptors.
- Visual effect as part of a progression of different views as one moves through the landscape from one visual catchment to another.

In the vicinity of the Project, there are views of the following existing mining operations:

- the approved Mount Pleasant Operation;
- Bengalla Mine;
- Dartbrook Mine; and
- Mt Arthur Coal Mine.

It is expected that the cumulative impacts of the Project would be similar to cumulative impacts of the approved Mount Pleasant Operation, noting that the temporal exposure of these cumulative impacts would be increased due to the extended duration of Project mining operations. The approved and existing mining operations in the vicinity of the Project would continue to remain visually dominant as one moves through the landscape.

## 7.7 Lighting Impacts

### 7.7.1 Introduction

There are two types of lighting effects that could be experienced from the Project, direct light effects and diffuse light effects. Direct light effects result from when the light source is directly visible and would be experienced if there is a direct line of sight between the light source and viewpoint.

Diffuse light effects relate to the general night-glow (diffuse light) that results from light of sufficient strength being reflected into the atmosphere. Diffuse light effect would create a local focal point that would vary with distance and atmospheric conditions such as fog, low clouds and/or dust particles which all reflect light.

Both of these light effects are observed in the existing environment surrounding the Project (Figure 7.1) and are discussed in more detail below.



**Figure 7.1 Indicative lighting effects from mining operations**

Australian/New Zealand Standard (AS/NZS) 4282:2019 *Control of the obtrusive effects of outdoor lighting* outlines the potential influence of night-lighting impacts on the surrounding environment, in particular Section 2.3 of AS/NZS 4282:2019 states the obtrusive effects of the lighting system may be significantly influenced by the following factors:

- The use of the area abutting or in close proximity to the proposed development.
- The topography of the area surrounding the lighting installation. Residential developments at a lower level than that of the lighting installation are more likely to be subjected to a direct view of the luminaires.
- Physical features, such as adjacent buildings and trees, that may be effective in restricting light spill beyond the boundaries of the development.
- The existing ambient lighting characteristics relative to the proposed lighting.
- The location of the proposed development relative to:
  - areas of special significance, e.g. areas having cultural, environmental, historical or scientific importance;
  - harbours, airports, waterways, roads or railway systems where spill light from the proposed development may interfere with the visibility of signalling systems; or
  - community and scientific optical observatories where spill light from the proposed development may interfere with astronomical observations.

The visual effect of night-lighting would be influenced by the location of operations, any lighting mitigation measures, the elevation of the viewpoint and the presence of any barriers such as topographic features and/or vegetation.

### **7.7.2 Direct Light Effects**

Most operational areas would remain screened from direct views due to the Eastern Out-of-Pit Emplacement associated with the approved Mount Pleasant Operation and the mine landforms of the Bengalla Mine. Direct lighting effects from headlights of haul trucks and flashing safety lights of smaller vehicles are currently intermittently visible at night from elevated viewing locations where lines of sight are above the Eastern Out-of-Pit Emplacement.



The visual effect of direct lighting would extend further to the north with the Project. Vehicle headlights would be visible along the upper elevations of the integrated waste rock emplacement landform when mobile equipment is operating at night. The duration of such lighting effects would extend for an additional period until the completion of rehabilitation of the integrated waste rock emplacement landform.

The approved Mount Pleasant Operation currently implements measures to mitigate the potential for direct light effects through prioritising the construction and final shaping of the Eastern Out-of-Pit Emplacement during the day and using mine landform topography to largely shield evening and night-time mining operations. It would be expected that these direct lighting measures would continue to be undertaken for the Project.

Any potential impact associated with direct light effects of the Project would be similar to those assessed for the approved Mount Pleasant Operation. These potential impacts would be minimised as far as possible through the implementation of mitigation measures in consideration of AS/NZS 4282:2019, as described in Section 9.

### 7.7.3 Diffuse Light Effects

A number of mining operations, power stations, residences and agricultural activities in the vicinity of the Project already contribute to diffuse light effects into the night sky (sky glow). The influence of lighting associated with the surrounding mining operations and towns would reduce the potential visual sensitivity of diffuse light emanating from the Project.

The diffuse lighting effects would have lower but broader effects due to the prevalence of atmospheric moisture or background particulate matter such as dust. This would create a halo of light above the source of operational lighting.

Existing diffuse light levels at the approved Mount Pleasant Operation range between approximately  $0.15 \times 10^{-9}$  watts per square centimetre ( $\text{W}/\text{cm}^2$ ) to  $24 \times 10^{-9} \text{ W}/\text{cm}^2$ .<sup>4</sup> The existing levels of diffuse light within Muswellbrook and Scone reach a maximum of  $22 \times 10^{-9} \text{ W}/\text{cm}^2$  and  $14 \times 10^{-9} \text{ W}/\text{cm}^2$ , respectively. Other surrounding mining operations reach maximum existing diffuse light levels of  $20 \times 10^{-9} \text{ W}/\text{cm}^2$  to  $40 \times 10^{-9} \text{ W}/\text{cm}^2$  (Figure 7.2).

Project operational areas and machinery night-lighting would not be directly visible to most locations due to the positioning west of the approved waste rock emplacement landform and adjoining topography and vegetation. Rather, a diffuse effect of light and its interaction with atmospheric conditions may create a glow around approved Mount Pleasant Operation. It is expected that the potential diffuse light effects of the Project would extend further north in comparison to the existing levels creating more localised lighting visual impacts, however the nature of the diffuse light effects would be consistent with the approved effects of the approved Mount Pleasant Operation and the existing effects of other developments in the vicinity of the Project (e.g. Bengalla Mine, Mt Arthur Coal Mine).

The Siding Springs Observatory is located approximately 195 km to the north-west of the Project. As such, the Project is within the Dark Sky Region (i.e. within 200 km radius of the Siding Spring Observatory), as defined in the *Dark Sky Planning Guideline* (DP&E, 2016). There are a number of light sources between the Project and the Siding Springs Observatory, which may contribute to sky glow at the Siding Springs Observatory.

Any potential impact associated with diffuse light effects of the Project would be similar to those assessed for the approved Mount Pleasant Operation, and therefore there would be no material change at the Siding Springs Observatory. These potential impacts would be minimised as far as practicable through the implementation of mitigation measures in consideration of AS/NZS 4282:2019, as described in Section 9.

<sup>4</sup> Falchi, Fabio; Cinzano, Pierantonio; Duriscoe, Dan; Kyba, Christopher C. M.; Elvidge, Christopher D.; Baugh, Kimberly; Portnov, Boris; Rybnikova, Nataliya A.; Furgoni, Riccardo (2016) *The New World Atlas of Artificial Night Sky Brightness*.

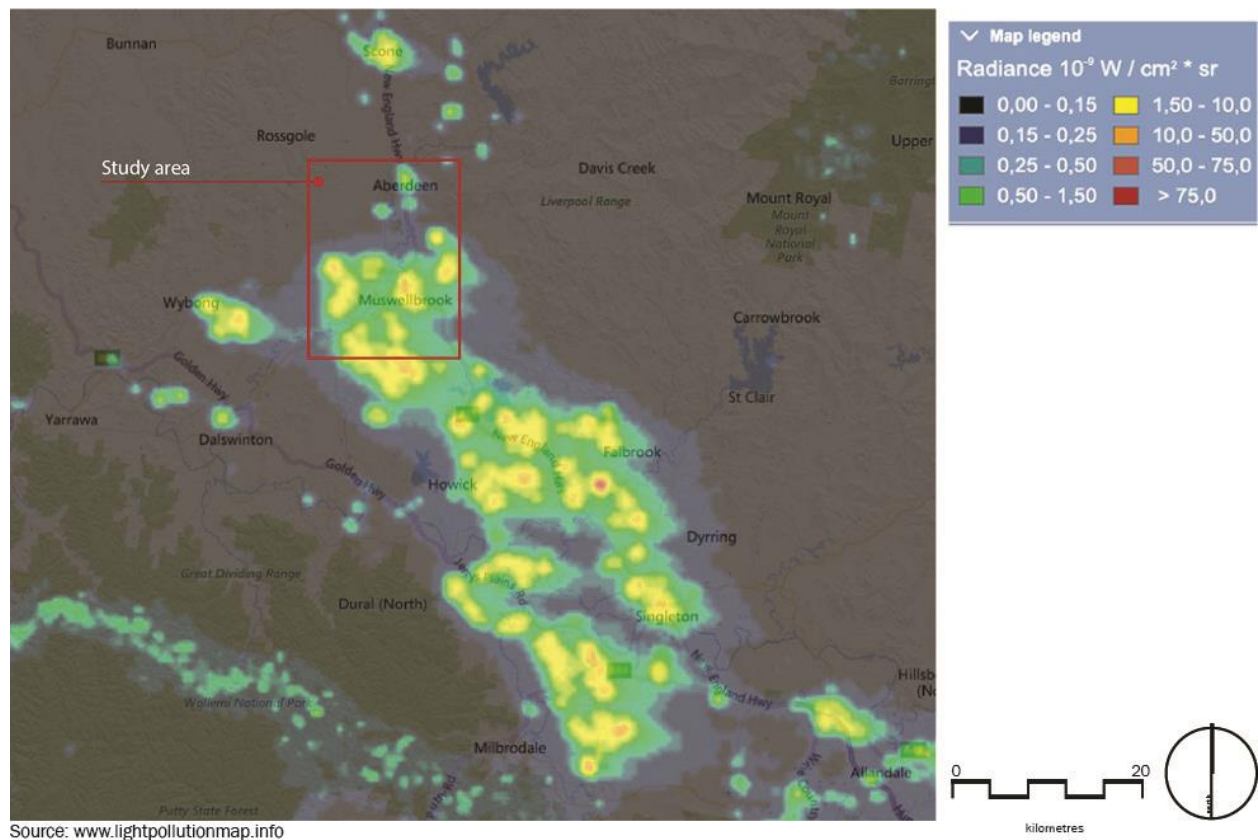


Figure 7.2 Existing regional diffuse lighting effects

## 8 DYNAMIC LANDSCAPE ASSESSMENT

The natural and cultural/social elements of the landscape and the potential impacts of the Project on these elements are assessed in detail by other relevant technical experts, including:

- Wilkinson Murray (noise and blasting assessment);
- Todoroski Air Sciences (TAS) (air quality assessment);
- AGE Consultants (groundwater assessment);
- Hydro Engineering & Consulting (surface water assessment);
- Hunter Eco (biodiversity assessment report);
- Bio-Analysis (aquatic ecology report);
- South East Archaeology (Aboriginal cultural heritage report);
- Extent Heritage (historical heritage assessment);
- GT Environmental (soil resources assessment);
- Just Add Lime (social impact assessment);
- The Transport Planning Partnership (road transport assessment);
- RGS Environmental (geochemistry assessment);
- JBS&G (land contamination assessment);
- AnalytEcon (economic assessment);
- Environmental Risk Sciences (EnRiskS) (human health risk assessment); and
- University of Newcastle and Golder (integrated waste rock emplacement landform stability).

Accordingly, this dynamic landscape assessment focuses on the perceptual and aesthetic characteristics of a landscape, including visual, sound, smell, touch/feel, preferences, associations and memories.

The latter elements of preferences, associations and memories are influenced by the receptors' existing understanding of the landscape (e.g. through exposure to media describing the landscape prior to a visitor's arrival). Whilst dynamic landscape assessment considers each of these inputs to a receptor's perception of the landscape, it is accepted that sight is the most dominant sensory input (Porteous, 1996; Kaymaz, 2012).

Table 8-1 outlines potential impact mechanisms considered as part of this assessment.



**Table 8-1     Dynamic Landscape Assessment of Impacts**

Landscape Characteristics	Potential Impact Mechanisms
Sight	<ul style="list-style-type: none"> <li>• Direct visual impacts (assessed separately in Sections 5,6 and 7).</li> <li>• Visual impacts from night-lighting (assessed separately in Section 7.7).</li> <li>• Visual impacts whilst travelling through sub-region and region (e.g. views from the public road network or views from planes/ helicopters).</li> <li>• Indirect visual impacts (e.g. additional mine-related vehicles on roads, mine staff wearing high visibility clothing in public places or visible dust and road entry signs to sites).</li> </ul>
Sounds	<ul style="list-style-type: none"> <li>• Noise/ vibration from construction, operation, road and or rail activities.</li> </ul>
Smells	<ul style="list-style-type: none"> <li>• Odour generated by the Project (e.g. from spontaneous combustion events).</li> </ul>
Touch/feel	<ul style="list-style-type: none"> <li>• Not applicable given public access to the Project site would be restricted, with minor exception potentially from dust events.</li> </ul>
Preferences, associates and memories	<ul style="list-style-type: none"> <li>• Viewing media related to the Project (including news articles and company statements).</li> <li>• Mapping and aerial photography (e.g. Google Earth).</li> <li>• Existing reports</li> <li>• Engaging with MACH representatives.</li> <li>• Memories of historical land uses and / or projects.</li> </ul>

Individual perception varies between individuals and can therefore be difficult to assess. The NSW Department of Planning and Environment's (now DPIE) (2017) *Social impact assessment guideline* states the following with respect to assessing perceptions of adverse impacts:

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

Accordingly, the assessment of perceptions in this dynamic landscape assessment draws, in part, on the assessment of potential adverse effects on amenity undertaken by other technical experts, where relevant (as listed above).

## 8.1 Sensitive Receptors

Receptors and local landscapes considered particularly sensitive to potential dynamic impacts include:

- Muswellbrook and Aberdeen;
- designated rural landscape areas (Muswellbrook – Jerrys Plains Landscape Conservation Area, and Momberoi - Scone Rural Landscape);
- locality of Kayuga;
- Muswellbrook Racecourse;
- Thoroughbred horse studs;
- Pukara Estate; and
- rural residences.

### ***Muswellbrook***

Muswellbrook (population approximately 12,000), has been part of the evolving landscape of the Upper Hunter Valley. This landscape is known for coal mining and horse breeding and more recently as a gourmet food and wine destination. The town has a relaxed character as the business and residential centre for the mines and surrounding rural area.

Muswellbrook is surrounded by existing mines in close proximity (the approved Mount Pleasant Operation, Mt Arthur Coal Mine, Bengalla Mine, Muswellbrook Coal, Maxwell Infrastructure [former Drayton Mine]). These mines form the landscape backdrop of Muswellbrook and can be viewed from many locations particularly from elevated viewpoints. Muswellbrook has experienced the development of Bengalla Mine and Mount Pleasant Operation directly west of the town so are familiar with the visual impacts of coal mining related changes to the landscape amenity. This town while considered sensitive to further change to visual amenity, is accustomed to a mining landscape and is considered less sensitive to dynamic landscape impacts associated with mining.

### ***Aberdeen***

Aberdeen is a small country town and service centre located on a south-west facing hill beside the Hunter River, between Muswellbrook and Scone. It is on the northern edge of the PVC and is surrounded by rich grazing pasturelands, horse studs and agriculture. The New England Highway passes through the town past several older buildings which give the town a pleasing rural character. The Segenhoe Inn built in 1837 is a well-established bed and breakfast destination for tourists.

This country town character is considered sensitive to potential dynamic landscape impacts associated with mining, nevertheless there are a number of existing mining operations in proximity to Aberdeen.

### ***Kayuga***

This small rural locality is immediately north of the approved Mount Pleasant Operation. It has previously experienced the adjacent development of mine landforms and structures associated with Dartbrook Mine, Bengalla Mine and the approved Mount Pleasant Operation. This location is considered sensitive to potential dynamic landscape impacts associated with the extension to the approved Mount Pleasant Operation due to its proximity to the active face of the development.

### ***Muswellbrook Race Club***

The Muswellbrook Racecourse has been bounded by active mine operations from Mt Arthur Coal Mine to the south and Bengalla Mine directly west, and the Mount Pleasant Operation adjacent to Bengalla Mine and further to the north.

This location is sensitive but is accustomed to existing mine development reducing its sensitivity to dynamic landscape impacts due to additional modifications to the landscape.

### ***Horse Studs***

The horse studs within the vicinity of the Project and wider region create an attractive rural landscape with high visual appeal that they consider fundamental to the success of their operations. Most of the horse studs are at lower elevation along the Hunter River flood plain. Some of the horse studs in the region (e.g. Edinglassie Stud, Abbey Thoroughbred Stud, Coolmore Stud) have existing views of mining operations including the Mt Arthur Coal Mine, Bengalla Mine and approved Mount Pleasant Operation.

The horse studs are considered sensitive to potential dynamic landscape impacts.

### ***Pukara Estate***

Pukara Estate on Denman Road in the Southern view sector is a commercial producer of olive oil and popular tourist attraction that operates a boutique retail outlet and café. Pukara Estate contains a landscape setting that adds to the visual quality of the region and locality. It is considered sensitive to potential dynamic landscape impacts.

## **Rural Residences**

There are a number of scattered rural residences within the PVC. The Social Impact Assessment for the Project, prepared by Just Add Lime (2020), has assessed the potential social impacts of the Project, including the potential impacts to rural communities.

Rural residences are considered sensitive to potential dynamic landscape impacts given the aesthetic of the landscape, is considered central to the rural way of life, however the extensive number of mining operations in the region (including the approved Mount Pleasant Operation) would reduce the sensitivity to further changes to the landscape.

## **8.2 Potential Dynamic Landscape Impacts**

Dynamic visual assessment takes into account human perceptions of the landscape (beyond sight) through sound (blasting and traffic), smell and touch (dust).

The natural and cultural/social elements of the landscape are assessed by other relevant technical experts. Accordingly, this dynamic landscape assessment is focused on three components:

- ephemeral effects;
- other visual effect experiences at regional and subregional scale; and
- educational inputs.

These are due to non-visual environmental elements such as noise, dust and smell which may be experienced by receptors (viewers) within the PVC. These ephemeral effects can be positive experiences (e.g. sound of a waterfall), or negative (e.g. smell of rubbish, sound of machinery). In this way, ephemeral effects of the Project, when significant, can lessen positive experiences of the landscape.

### **8.2.1 Sounds**

Wilkinson Murray (2020) has modelled the potential noise impacts associated with the Project and found that:

- Noise modelling has been conducted at more than 650 privately-owned residences, 100 mine-owned residences and 100 other receivers (e.g. aged care facilities, schools, commercial buildings).
- The noise levels associated with the Project may increase or decrease depending on the location of any individual receiver, however it is expected the Project would have similar effects to approved Mount Pleasant Operation, as:
  - There would be minimal exceedances of daytime noise criteria resulting from the Project, and any exceedances are expected to be in the negligible range.
  - The Project noise criteria for evening have increased in some locations, however the night time criteria have generally been reduced, and therefore the applicable noise criteria would reduce for a significant number of receivers in the sensitive night-time period.
  - The noise modelling results indicate the staged increase to the mining rate is effective in reducing impacts at sensitive receivers, and the total number of receivers that would receive mitigation or acquisition upon request rights due to noise is expected to be equivalent to or less than the approved Mount Pleasant Operation.

In consideration of mechanisms described above for sounds, it is expected that noise generated by the Project would be similar to those already experienced from the approved Mount Pleasant Operation. The impact on the perception of the landscape is not expected to change with the Project, however the Project would result in a continuation or extension of the existing noise impacts.

Any incidence of negative perception of sound at sensitive receptors may evoke temporary memories of adverse landscape impacts. In the context of the Project, the extensive number of mining operations in the region (including the approved Mount Pleasant Operation) and intervening topography, this adverse dynamic impact is considered not to be significant.



### 8.2.2 Smells

Spontaneous combustion at Mount Pleasant Operation would be managed during the Project through monitoring and the rehabilitation of the landform, which would reduce the potential for spontaneous combustion events. Given the design of the Project and the nature of the targeted coal seams, it is expected that potential odour generated from the Project would not be a frequent occurrence and therefore would not impact on the perception of the landscape.

In an unlikely occurrence of odour impacts off-site, there may be a temporary adverse dynamic landscape impact, however the impact would be of short duration.

## 8.3 Visual Effects of the Project Outside Seen Area

In addition to dynamic perceptions created by sound and smell, the effects on a viewers' perceptions, gained accumulatively from moving away from a particular location can affect dynamic impacts. Such views (memories) would become part of the visual diary of the Project as seen from anywhere around it, generally within the PVC.

Such viewing then forms part of that viewer's perceptions of the Project at local, sub-regional and regional levels.

Dynamic landscape assessment considers these perceptions from both outside the PVC and within it in areas that do not have views of the Project.

The existing visual landscape settings inform perceptions of current mining affected landscapes and possible changes to those settings. Those settings include:

- local setting (Muswellbrook, Kayuga, Hunter River flood plain and New England Highway);
- sub-regional setting (Aberdeen, Muswellbrook – Jerrys Plains Landscape Conservation Area, PVC); and
- regional setting (Upper Hunter Valley and Momberei-Scone Rural Landscape).

The landscape and visual impact assessment for the Project identifies that the visual impacts are generally limited to the visual effects created by views of the expanded waste rock emplacement landform in various stages of development, the extension of operations and additional disturbance outside of the approved Mount Pleasant Operation.

However, views of the Project from around the PVC more broadly, may contribute to the perceptions of the Project at those sensitive receptors (such as horse studs) in locations with no views. This would include passenger views from the air and from road travel along the New England Highway, Denman Road and Wybong Road and from outside the PVC.

It should be noted that the Project would also involve the relinquishment of MACH's existing approvals to construct the North-west and South-west Out-of-Pit Emplacements, thereby minimising the area of total disturbance.

### 8.3.1 Sub-regional Landscape

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

This is apparent from the presence of, and views into, existing mining operations within the sub-region. From the New England Highway north of Muswellbrook, there are more distant views into the approved Mount Pleasant Operation, Bengalla Mine and Mt Arthur Coal Mine and close proximity views of infrastructure at the Dartbrook Mine. The views from Denman Road generally include the existing Mt Arthur Coal Mine and Bengalla Mine.

This sub-regional landscape includes many additional areas of quarries, open cut mining, partially rehabilitated waste rock emplacement areas, infrastructure areas and associated administration areas, all of landscape character consistent with the Existing Mining, Power Generation and Industrial VCU as identified in the visual and landscape assessment.

As the approved Mount Pleasant Operation is already an approved component of the Existing Mining, Power Generation and Industrial VCU the Project would only result in an extension in the duration of the visual effect of the broader sub-regional Existing Mining, Power Generation and Industrial VCU that would be minor.

As defined in this visual and landscape assessment, various operations have different levels of visual effect, (e.g. underground mining usually with no visual effect, roads potentially having a level 2 or 3 visual effect, infrastructure areas and conveyors having a level 1 visual effect and open cut mines having a level 1 visual effect). The additional visual effect of these areas for the Project, when considered with all other existing mining areas within the sub-regional visual catchment, are modest in scale, with the implementation of progressive rehabilitation.

As seen from a journey along Thomas Mitchell Drive, Denman Road, Sydney Road and New England Highway coming from the south, views of the extent of the Project would increase in scale, linear travel and in duration over time. This view is seen in the larger context of existing 'seen' mining at the Mount Pleasant Operation, Bengalla Mine and Mt Arthur Coal Mine on the same journey.

The journey south from Aberdeen along the New England Highway includes distant views to existing Mount Pleasant Operation, Bengalla Mine and Mt Arthur Coal Mine. The views of the Project and the expanded disturbance areas of the integrated waste rock emplacement landform would be visible sooner and for a longer duration. This new view may be seen in the context of extending mining activity further north into the foothills and areas of higher visual amenity and Hunter River flood plain and the existing more distant 'seen' mining.

Journeys at this sub-regional scale would result in views of moderately expanded areas of disturbance (and the relinquishment of previously approved disturbance areas) and as a consequence, would have a moderate dynamic landscape impact. The incorporation of geomorphic design principles into the design of the integrated waste rock emplacement landform together with progressive rehabilitation, would result in a more well integrated landform thereby limiting some visual effects in sensitive view locations in the long-term.

### **8.3.2 Regional Landscape**

On a regional scale, the Project is experienced when arriving from the south-east via Singleton and Muswellbrook along the New England Highway, from the south via Denman Road or from the north via Scone and Aberdeen. These road journeys expand the current experience of regional open cut coal mines with Mount Pleasant Operation, Bengalla Mine, Mt Arthur Coal Mine, Dartbrook Mine, Greater Ravensworth Area Operations, Hunter Valley Operations, United Wambo, Mt. Thorley and Warkworth Complex all visible in varied degrees from the New England Highway, Denman Road and Putty Road.

This broader experience of existing mining areas reduces the significance of visible disturbance as a result of the Project on a regional scale (Figures 8.1, 8.2 and 8.3).

For people flying into the region (Scone Airport and Destiny Airport in Denman), there would be views of the Project, including open cuts, waste rock emplacements and infrastructure areas from the air. There would be a number of private runways and heli-pads within the region and sub-region. The visual effects would vary depending on elevation before and after take-off; increasing as viewing angles afford the aerial views then decreasing as planes or helicopters move away from the runway. These visual effects would be seen in the context of the broader mined landscape around the Project.

Aerial views (including via Google Earth) show the extensive landscape changes due to mining operations within the Hunter Valley that would be experienced from Broke to Muswellbrook (Figure 8.4). The extensive landscape changes in this regional view are significant. The addition of disturbed area from the Project to this overall view containing existing open cut mines would be minimal. Further to this, the Project would also involve the relinquishment of some previously approved disturbance areas in the north-west of the approved Mount Pleasant Operation, that would balance the additional disturbance areas required for the Project, while conserving high value vegetation in the north.



**Figure 8.1** *Mt Arthur Coal Mine viewed from Edderton Road*

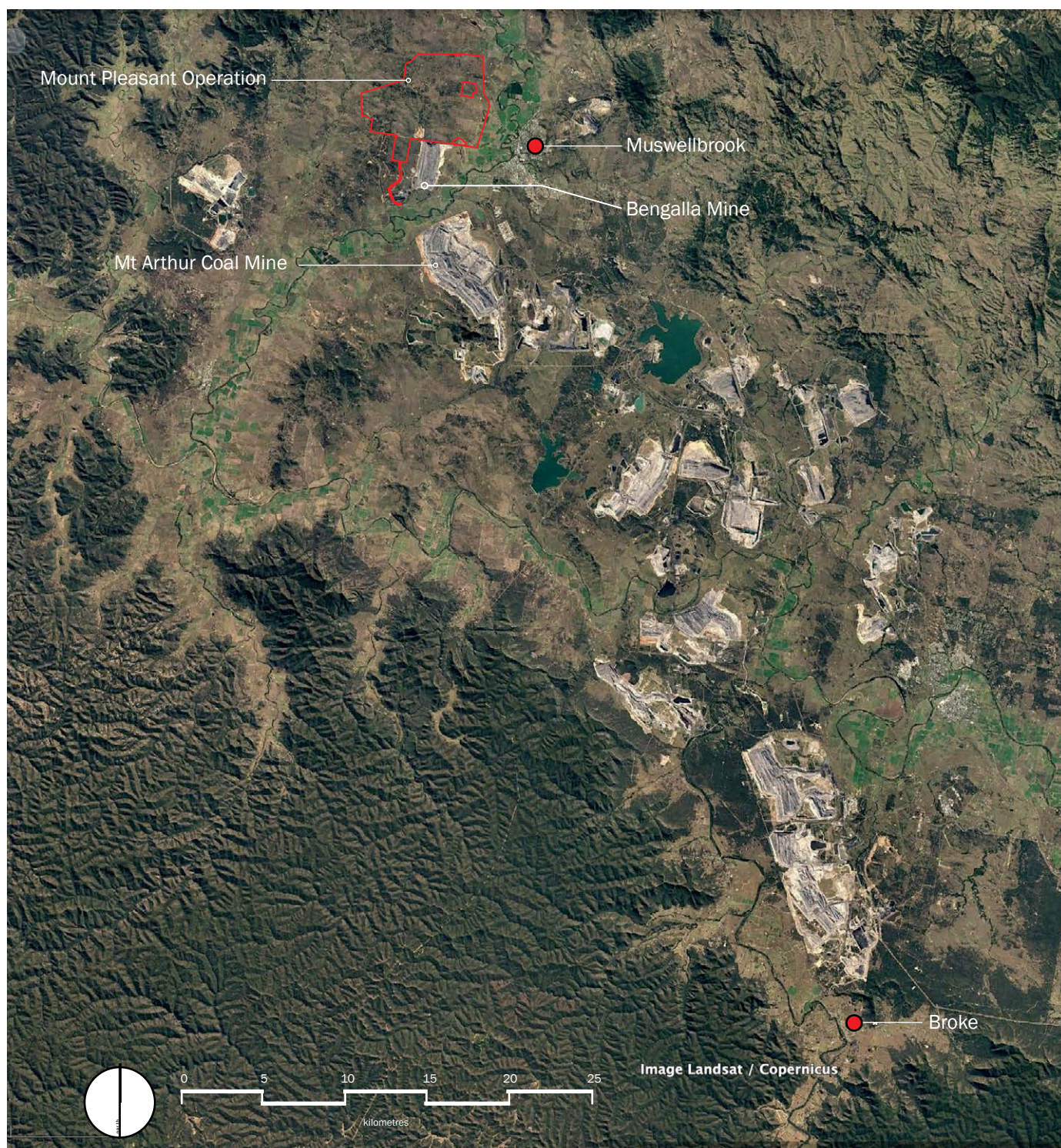


**Figure 8.2** *View from New England Highway between Muswellbrook and Singleton*



**Figure 8.3** *Views along Golden Highway include mine infrastructure and signs*





**Figure 8.4** Aerial views (via Google Earth 2016) shows the extensive landscape changes due to mining operations within the Hunter Valley



## 8.4 High Visibility Clothing

The NSW Planning Assessment Commission (now the Independent Planning Commission) has previously recognised the potential for mining to affect the tourism atmosphere of small towns and local sentiment against turning into 'high vis' mining towns (referencing the high visibility safety clothing required to be worn in operational areas of most mine sites).

Muswellbrook, Singleton and Aberdeen have an existing strong influence of mining in these towns and the approved Mount Pleasant Operation is already part of the character of the region.

It is acknowledged that the operational and construction workforce would increase over the life of the Project, however the nature of key towns where the workforce currently reside do not warrant any specific measures to minimise the occurrence of high visibility clothing.

## 8.5 Knowledge Based Perception

Perceptions on the basis of knowledge gained by reading, hearing and or seeing reports on previous, existing and proposed activities having an effect on personal perceptions. This perception input goes beyond any consideration of visual perception as it is based on all inputs that create a knowledge base of a landscape setting and the projects within it.

Such knowledge gained through public information would create an overarching awareness of this Project, including the existing Mount Pleasant Operation. However, it is not likely that the increased awareness of the Project would change the dynamic landscape impacts in the context of the existing, approved Mount Pleasant Operation.

### 8.5.1 Memories of Historical Land Uses and/or Projects

An initial application to develop a major open cut mine at Mount Pleasant was made by Coal & Allied Operations Pty Ltd in 1997 and granted in 1999. Following that initial approval, modifications to the approved Mount Pleasant Operation have been sought with the most recent being in 2017 for Modification 3, and Modification 4.

Modification 3 involved extensions of the time limits for mining operations to 2026 and to the South Pit Out-of-Pit emplacement to improve the final landform.

Modification 4 involved approval for duplication of the approved rail spur, rail loop, conveyor and rail load-out facility and associated services, and other associated minor infrastructure services.

Both of these Modifications are now being implemented, with construction of the new rail infrastructure commencing in the latter part of 2020.

The bilateral sharing of project status and liaison with the CCC and stakeholders provides a positive conduit for community concerns. Accordingly, legacy issues associated with Mount Pleasant Operation are not anticipated to materially affect a large number of receptors' perceptions of the Project, or the way it affects the landscape.

### 8.5.2 Viewing Media Related to the Project

Within the Mount Pleasant Operation (DA 92/97) Environmental Management Strategy (2019a) are mechanisms for accessing information regarding the Project. Section 5.3 - Information Dissemination identifies the establishment and operation of a Community Consultative Committee (CCC) in accordance with Condition 6, Schedule 5 of Development Consent DA 92/97.

The CCC comprises seven residents who have an interest in the approved Mount Pleasant Operation. They meet at least twice a year to discuss the project and ongoing developments. Minutes are published on the MACH website. The website promotes the existence of *“strong, positive relationships with the communities surrounding the Mount Pleasant Operation. Regular project updates will continue to be provided through a variety of channels including: the CCC, website updates, fact sheets, posters, our community newsletter and face-to-face discussions”*<sup>5</sup>.

The website also has an avenue for submission of community concerns or complaints.

To mitigate the potential for media to negatively affect perception of the Project and its effect on the landscape, MACH would continue to actively update the MACH website with information regarding all current statutory approvals for development and approved strategies, plans or programs, project monitoring results, minutes of CCC meetings, annual reviews and independent environmental audits, and complaints register.

As discussed earlier, aerial views of the Project (e.g. via Google Earth) would be consistent with other adjacent mines when viewed in the context of the existing landscape.

## 8.6 Stakeholder Engagement

Extensive community engagement has been undertaken as part of the Social Impact Assessment prepared by Just Add Lime (2020), in accordance with the *Social impact assessment guideline* (Department of Planning and Environment, 2017) (the SIA Guideline).<sup>6</sup>

The Social Impact Assessment concluded that whether the Project proceeds or not, there would be social impacts, with the extent of the impacts dependent upon the scenario and the management strategies applied, and in summary:

- The social impacts of the Project proceeding would represent a continuation or extension of the existing social impacts of the approved Mount Pleasant Operation. Impacts are dependent on:
  - location – the closer someone lives to the Project, the increased impact on the quality of their living environment due to environmental impacts, including visual impacts; and
  - relationship to the Project – people who benefit from the Project (employment or as a supplier) are more likely to express fewer negative impacts on the quality of their living environment.

In comparison, the social impacts of the Project not proceeding would be spread more broadly across the region and relate to loss of direct and indirect employment and economic benefits.

In addition to the consultation undertaken for the Social Impact Assessment, MACH Energy engages directly and regularly with a local CCC which encourages dialogue between the mine operators and the various community stakeholders including Muswellbrook Shire Council. MACH has a range of community investments and sponsorships in local social, educational and recreational activities and organisations.

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<sup>5</sup> MACH Energy Australia website – Communities

<sup>6</sup> MACH Energy Australia website - Communities



## 8.7 Dynamic Landscape Impacts

Individual perception varies between individuals and can therefore be difficult to assess. In this context it appears appropriate to consider the NSW Department of Planning and Environment's (2017) *Social impact assessment guideline*, which states the following with respect to assessing perceptions of adverse impacts:

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

Accordingly, it is considered that the impact of the Project on the landscape and the extended duration of those impacts over time in the context of existing land use patterns at the regional, subregional and local scales would create moderate dynamic landscape impact; there are those who have an existing adverse perception of mining activity no matter how low the impacts or how informative the educational inputs. This impact is not necessarily tied to one's experience of the actual landscape and can create an adverse perception in those who have not even experienced the area.

However, in the context of "...considering perceptions of adverse impacts on amenity, an evaluation must be made of the reasonableness of those perceptions", it is considered that the Project dynamic landscape impact would be moderate based on intensity and extent of visual and other perceptual experiences of the Project in the context of the extensive existing mining operations in the locality, sub-region and region (including the approved Mount Pleasant Operation).

## 9 MITIGATION

There are numerous visual mitigation measures incorporated into the design of the Project. These include:

- location of additional Project major infrastructure to the west of the integrated waste rock emplacement landform which significantly reduces the visibility of the mine infrastructure components from key public vantage points;
- development of the integrated waste rock emplacement to screen development of open cut, infrastructure and haul roads during early stages of the Project;
- the integrated waste rock emplacement landform incorporates geomorphic drainage design principles for hydrological stability, and varying topographic relief to be more natural in exterior appearance;
- progressive rehabilitation of the integrated waste rock emplacement landform; and
- use of compatible tones for building and cladding colours in forest tones (such colours would include tonal variations of existing colours) to assist in assimilating infrastructure components into the setting.

Mitigation measures to reduce visual impacts that may be adopted for the Project via adaptive management include:

- prioritisation of landform shaping activities on the eastern side of the integrated waste rock emplacement landform during the day where practicable;
- on-site treatments to reduce visual effects of the Project components by reducing visibility for sensitive receptors and reducing the level of contrast;
- off-site treatments at viewer locations to reduce visual sensitivity; and
- implementation of night-lighting mitigation measures in consideration of AS/NZS 4282:2019.

### 9.1 On-site Treatments

On-site treatments involve rehabilitation of landforms and land cover, while off-site treatments could involve a range of treatments to screen views, filter views and/or reorientate primary views, should this be necessary.

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

The proposed on-site treatments for the open cut mining areas would include:

- Protect and maintain existing trees and vegetation screening outside of the open cut mine clearing zone from mine machinery and damage by creating vehicle and machinery exclusion zones.
- Create on-site stockpiles for mulched vegetation and appropriate topsoil storage to maintain viability of soil for rehabilitation works.
- Provide additional reasonable and feasible tree screening at key on-site locations on an as-needed basis, in accordance with the Visual Impact Management Plan for the approved Mount Pleasant Operation (MACH, 2019b).

The proposed on-site treatments for the integrated waste rock emplacement landform would include (MACH, 2020):

- As the highest visual priority, complete progressive rehabilitation of the eastern face of the waste rock emplacement to provide a visual and landscape buffer to ongoing activity within the Project area as seen from residences to the north and east, most significantly Muswellbrook. This would be undertaken by:
  - seeding the rehabilitation area with a native seed mix including native grass, shrub and tree species and temporary cover crop species as soon as practicable after topsoil application, so that natural grassland colouring and texture can be achieved following landform establishment; and
  - planting tubestock (including ground, middle and upper stratum species of the target native vegetation communities when suitable climatic conditions prevail), with irregular densities and mosaic patterning to emulate the structure of surrounding vegetation communities and to avoid mass plantings of regular patterning.
- Maintaining plant establishment where necessary to achieve screening and revegetation outcomes in the long-term and install signage denoting the rehabilitation area to restrict access and minimise potential for disturbance to rehabilitation area.

## 9.2 Off-Site Treatments

Off-site treatments may include roadside and residential planting. Off-site treatments have been previously implemented for the approved Mount Pleasant Operation along Wybong Road, Kayuga Road and Dorset Road as described in the Visual Impact Management Plan for the approved Mount Pleasant Operation (MACH, 2019b).

Project off-site mitigation measures may include the development of additional roadside tree screens, and in consultation local private landholders may include reasonable and feasible treatments (e.g. planting of additional site-specific tree screens) at the most proximal privately-owned residences (i.e. within 1 km) of the Project (e.g. residences along Wybong Road, Kayuga Road and Collins Lane). It is not expected that other off-site tree screens would be required due to the existing views of the approved Mount Pleasant Operation and MACH's accelerated progressive rehabilitation program (Figure 3.9 and Figure 3.10) minimising the contrast with the surrounding setting.

### 9.2.1 Lighting Mitigation

Sky glow is a visual amenity problem that is less amenable to control, as it is caused by reflected light and direct light from the installations, restricting design illuminances to the minimum necessary for the application would provide additional mitigation.

All external lighting associated with the Project would be designed in consideration of AS/NZS 4282:2019, including the minimisation of light spill through the following:

- Adequate direction of lights (including consideration of mounting heights).
- Use of shielded fittings, where available and safe to do so.
- Where feasible, use of anti-reflective paint to light spill surfaces.
- Upward light spill would be minimised and lighting would generally be directed either downwards, or away from the potentially sensitive receptors (i.e. Muswellbrook).
- Night-lighting would be restricted to the minimum required for operational and safety requirements so as to avoid over-lighting.
- Energy efficient lighting would be used for any new fixed lighting installed, where available and safe to do so.
- Where floodlights are required, asymmetric beams would be used.
- Fixed lights would not be directed towards reflective surfaces.
- Lighting would potentially use warm white colours for fixed lighting, where available and if compliant with industrial lighting standards.



## 10 CONCLUSION

In terms of visual impact assessment, the key features of the Project that alters the impacts of the approved Mount Pleasant Operation are the expansion in elevation and scale of the waste rock emplacement landform and associated activities, lighting effects and the extension to duration of operations for an additional 22 years.

The expanded waste rock emplacement landform would generally result in similar visual impacts to the approved Mount Pleasant Operation, with high visual impacts that would initially move towards the north, before then moving west over the life of the Project.

The progressive early rehabilitation of the lower eastern batters of the waste rock emplacements and then moving up the batters to final landform profile would progressively minimise the extent and duration of high visual impacts at Muswellbrook and other viewpoints around the view catchment. The effectiveness of this progressive rehabilitation strategy is demonstrated in Figure 3.9 and Figure 3.10. As the ground cover crops and vegetation is established, the visual effects would be lowered; there would be moderate impacts over broader areas for longer duration until the rehabilitation is well established.

The rehabilitation strategies that emulate the vegetation patterns, landforms, lines and colours of the existing landscape (consistent with the approved Mount Pleasant Operation strategy) would also reduce the contrast with the surrounding landscape setting and would further lower visual impacts. The eastern face of the integrated waste rock emplacement landform under rehabilitation would be the visible landscape view for the longer duration over the life of the mine.

The final landform has been designed to achieve an upper profile and micro-topographic contouring that would emulate the natural landscape topography and is an example of best practice mine geomorphic rehabilitation. In the long term, this design feature of the Project improves visual integration within a rural landscape setting, particularly the surrounding rolling foothills to the north and west of the mine lease boundary.

Some of the components, including associated night-lighting effects, would be visible from locations predominantly to the east of the Project, particularly elevated locations within Muswellbrook and to the north in Aberdeen would be visible for longer duration due to the extension of the life of mine.

There would be moderate cumulative impacts due to the extension of duration of the mine operations that would be evident in the local and sub-regional area. There would also be a further reduction in views to surrounding hills and mountains on the horizon line from some view locations due to the increase in elevation of the integrated waste rock emplacement landform above the approved Mount Pleasant Operation.

The implementation of the suggested adaptive management strategies would further ameliorate visual impacts including:

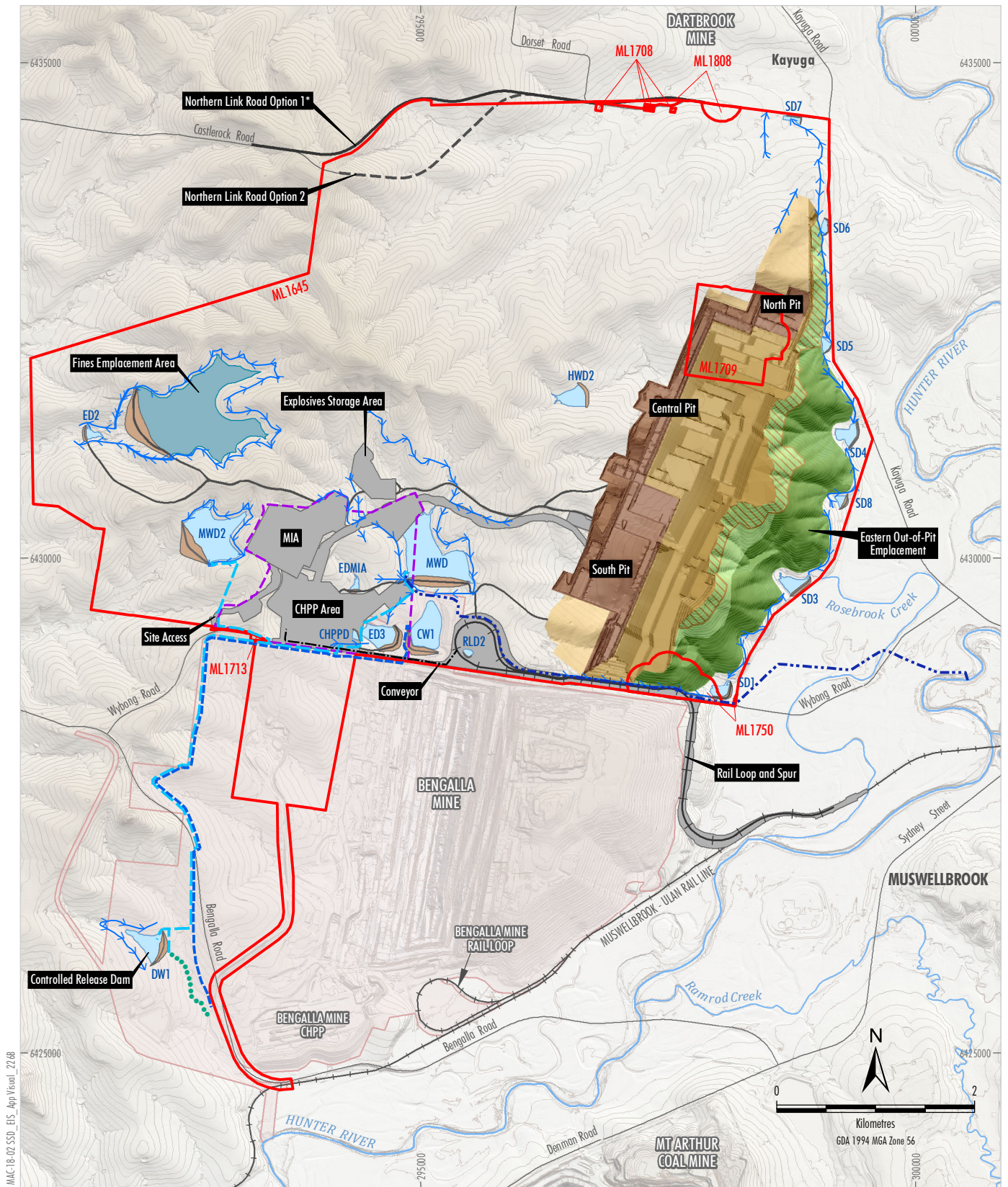
- progressive rehabilitation of the integrated waste rock emplacement landform;
- lighting mitigation strategies; and
- planting of tree screens consistent with the approved Visual Impact Management Plan and additional site-specific tree screens at the most proximal privately-owned residences (i.e. within 1 km) of the Project (e.g. residences along Wybong Road, Kayuga Road and Collins Lane).

# 11 BIBLIOGRAPHY

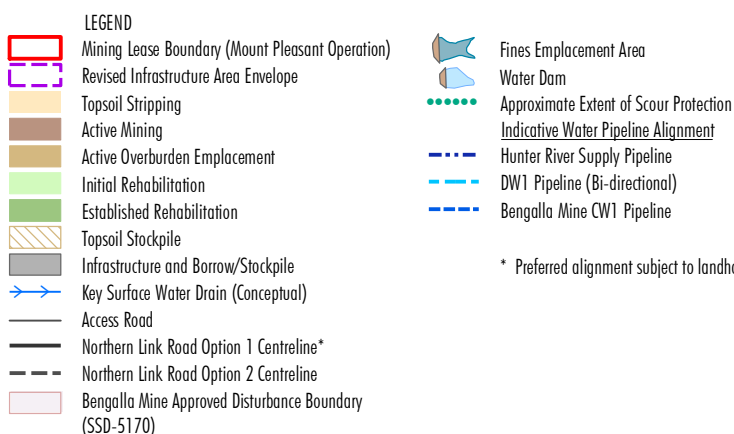
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# APPENDIX A





Source: MACH (2020); NSW Spatial Services (2020)

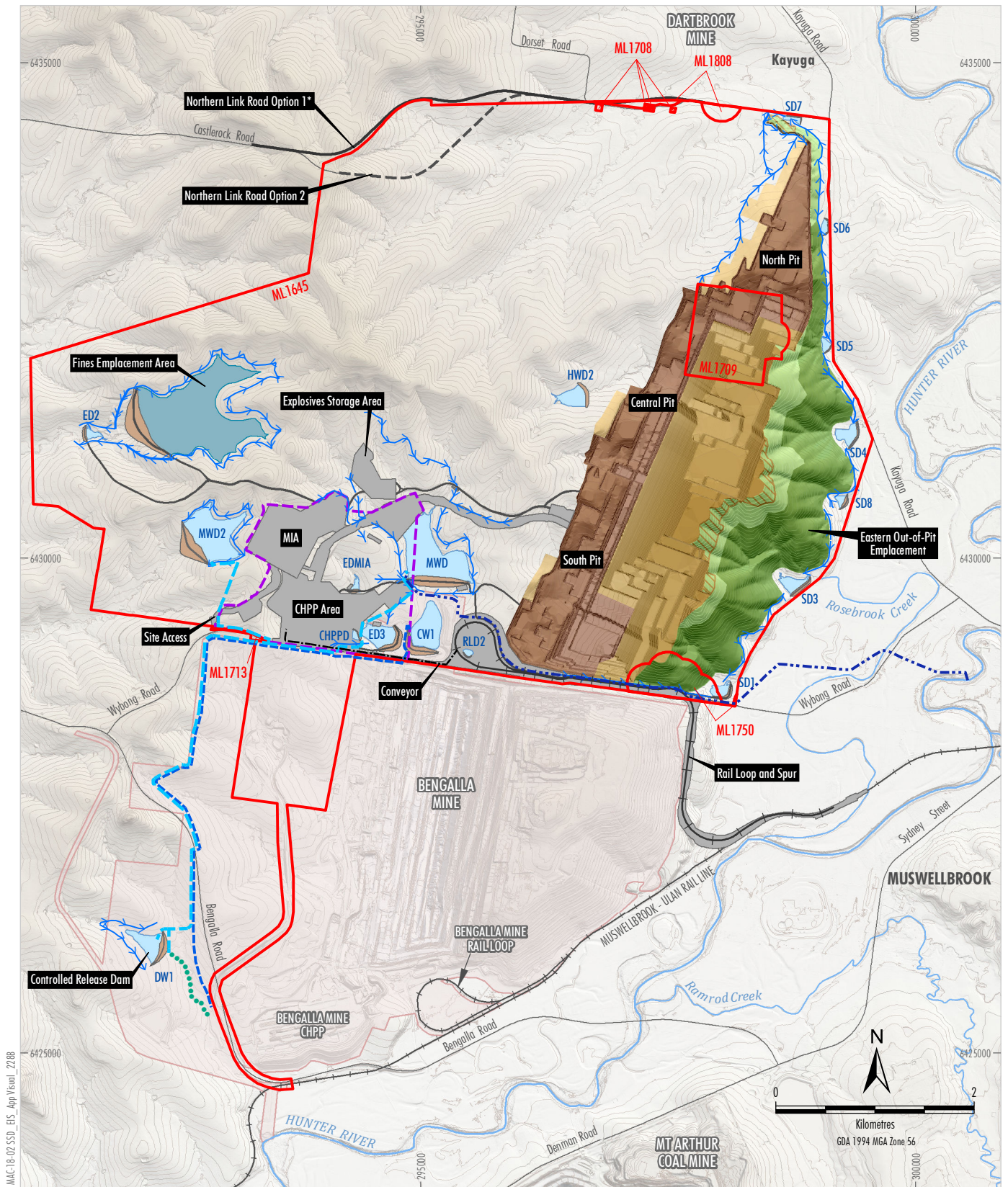


\* Preferred alignment subject to landholder access.

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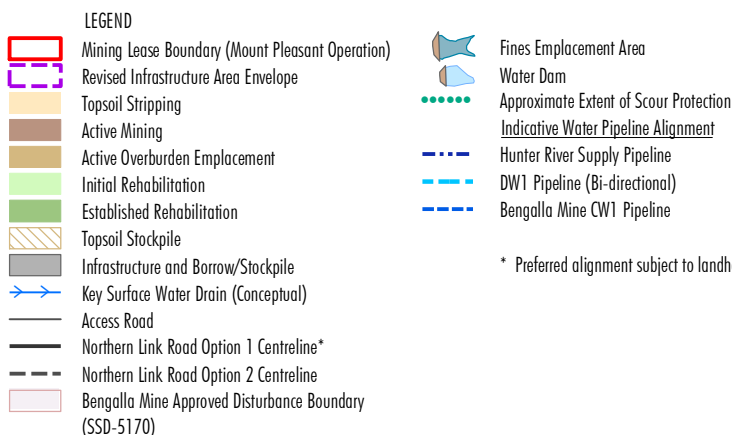
**Figure A-1**





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Source: MACH (2020); NSW Spatial Services (2020)

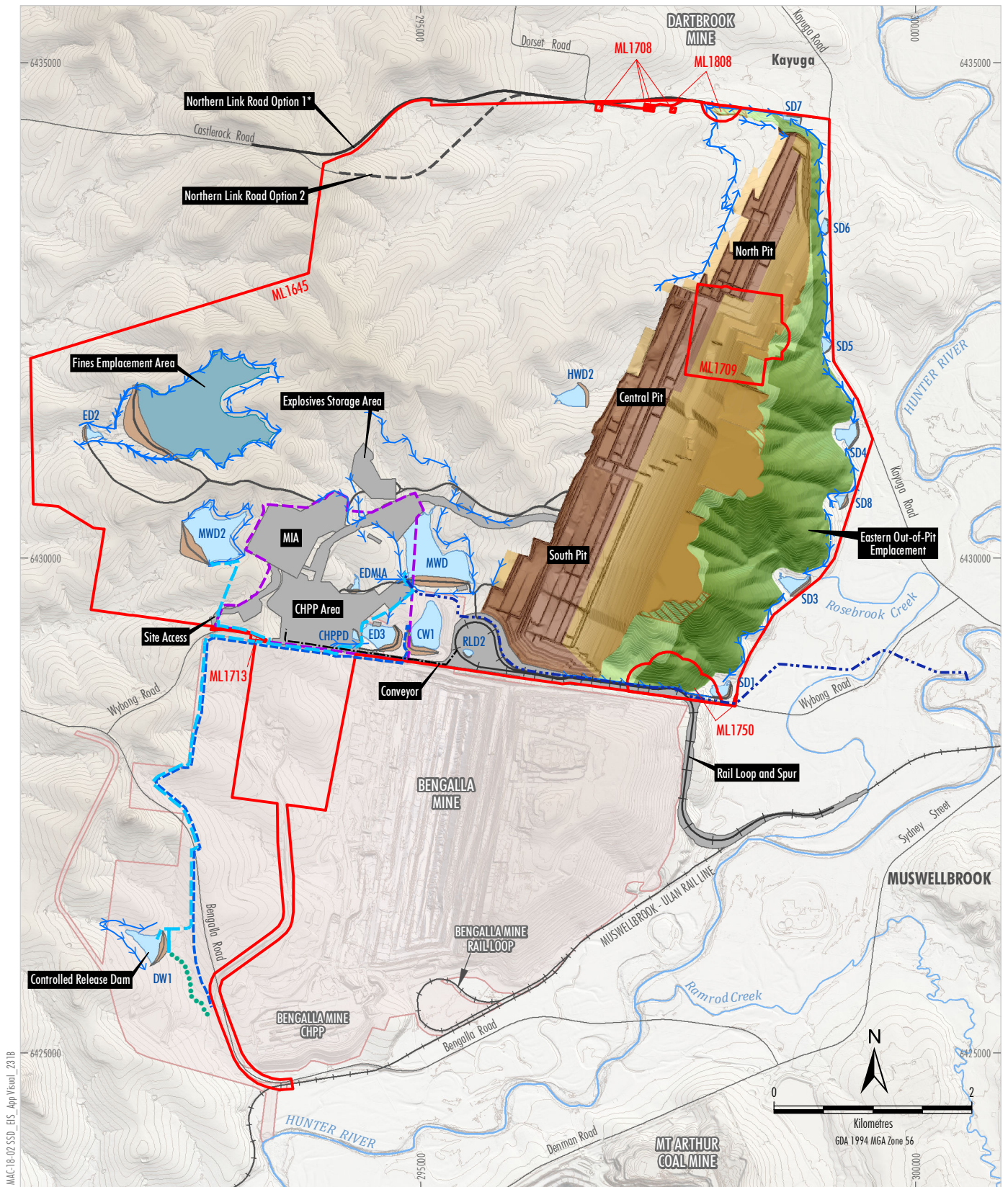


\* Preferred alignment subject to landholder access.

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Figure A-2





#### LEGEND

- |   |  |   |  |
|---|--|---|--|
| <span style="border: 2px solid red; padding: 2px;"> </span>                                 | Mining Lease Boundary (Mount Pleasant Operation)       | <span style="background-color: #e0f0ff; border: 1px solid blue; padding: 2px;"> </span>     | Fines Emplacement Area                 |
| <span style="border: 2px dashed purple; padding: 2px;"> </span>                             | Revised Infrastructure Area Envelope                   | <span style="background-color: #e0f0ff; border: 1px solid blue; padding: 2px;"> </span>     | Water Dam                              |
| <span style="background-color: #f0f0f0; border: 1px solid black; padding: 2px;"> </span>    | Topsoil Stripping                                      | <span style="border-bottom: 2px dotted green; width: 20px; display: inline-block;"> </span> | Approximate Extent of Scour Protection |
| <span style="background-color: #d0d0d0; border: 1px solid black; padding: 2px;"> </span>    | Active Mining  | <span style="border-bottom: 2px dashed blue; width: 20px; display: inline-block;"> </span>  | Indicative Water Pipeline Alignment    |
| <span style="background-color: #a0a0a0; border: 1px solid black; padding: 2px;"> </span>    | Active Overburden Emplacement                          | <span style="border-bottom: 2px dashed blue; width: 20px; display: inline-block;"> </span>  | Hunter River Supply Pipeline           |
| <span style="background-color: #808080; border: 1px solid black; padding: 2px;"> </span>    | Initial Rehabilitation                                 | <span style="border-bottom: 2px dashed blue; width: 20px; display: inline-block;"> </span>  | DW1 Pipeline (Bi-directional)          |
| <span style="background-color: #606060; border: 1px solid black; padding: 2px;"> </span>    | Established Rehabilitation                             | <span style="border-bottom: 2px dashed blue; width: 20px; display: inline-block;"> </span>  | Bengalla Mine CW1 Pipeline             |
| <span style="background-color: #404040; border: 1px solid black; padding: 2px;"> </span>    | Topsoil Stockpile                                      |   |  |
| <span style="background-color: #202020; border: 1px solid black; padding: 2px;"> </span>    | Infrastructure and Borrow/Stockpile                    |   |  |
| <span style="border-bottom: 2px solid blue; width: 20px; display: inline-block;"> </span>   | Key Surface Water Drain (Conceptual)                   |   |  |
| <span style="border-bottom: 2px solid black; width: 20px; display: inline-block;"> </span>  | Access Road  |   |  |
| <span style="border-bottom: 2px solid black; width: 20px; display: inline-block;"> </span>  | Northern Link Road Option 1 Centreline*                |   |  |
| <span style="border-bottom: 2px dashed black; width: 20px; display: inline-block;"> </span> | Northern Link Road Option 2 Centreline                 |   |  |
| <span style="border: 1px solid black; padding: 2px;"> </span>                               | Bengalla Mine Approved Disturbance Boundary (SSD-5170) |   |  |

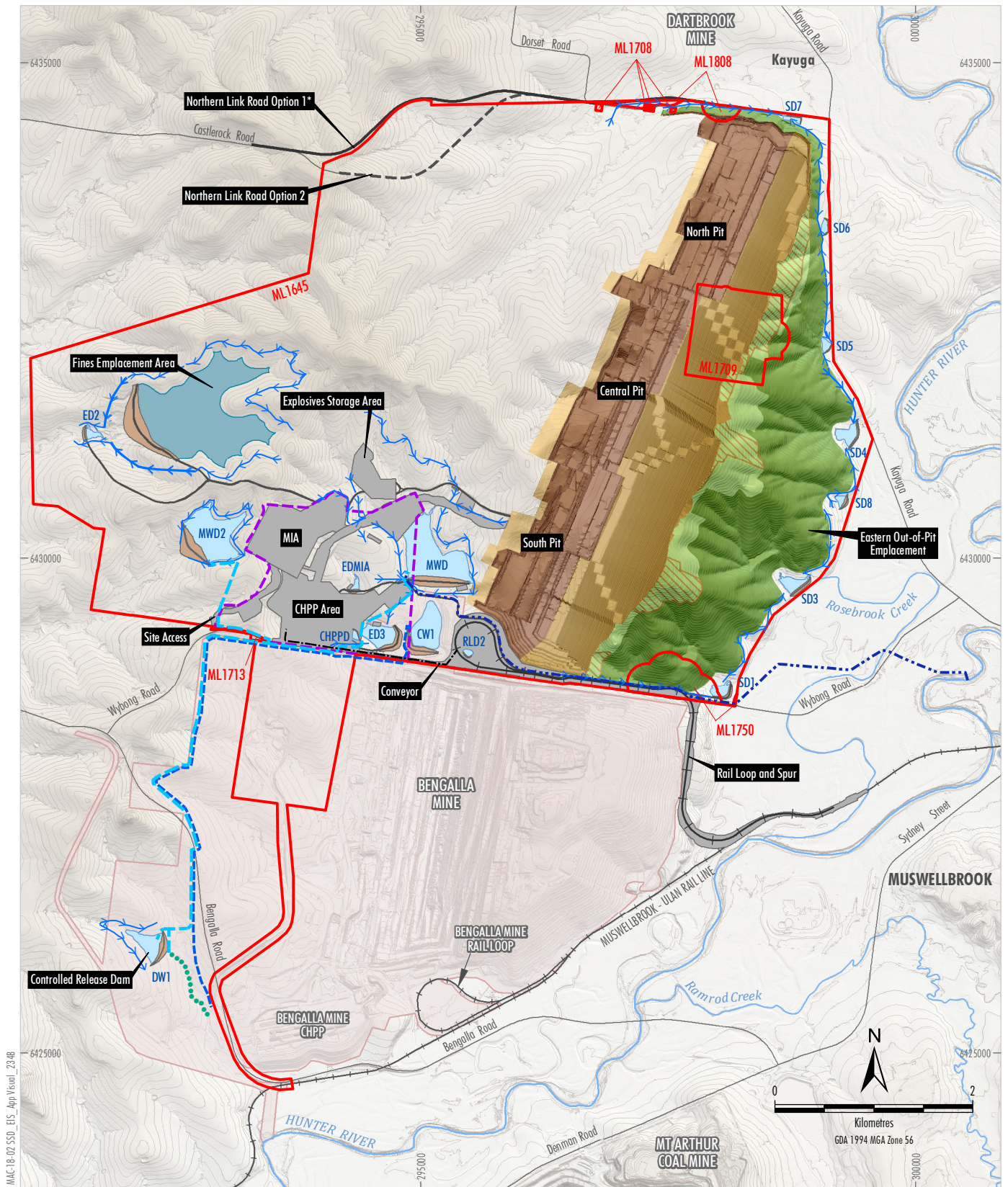
\* Preferred alignment subject to landholder access.

Source: MACH (2020); NSW Spatial Services (2020)

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**Figure A-3**





Source: MACH Energy (2020); NSW Spatial Services (2020)

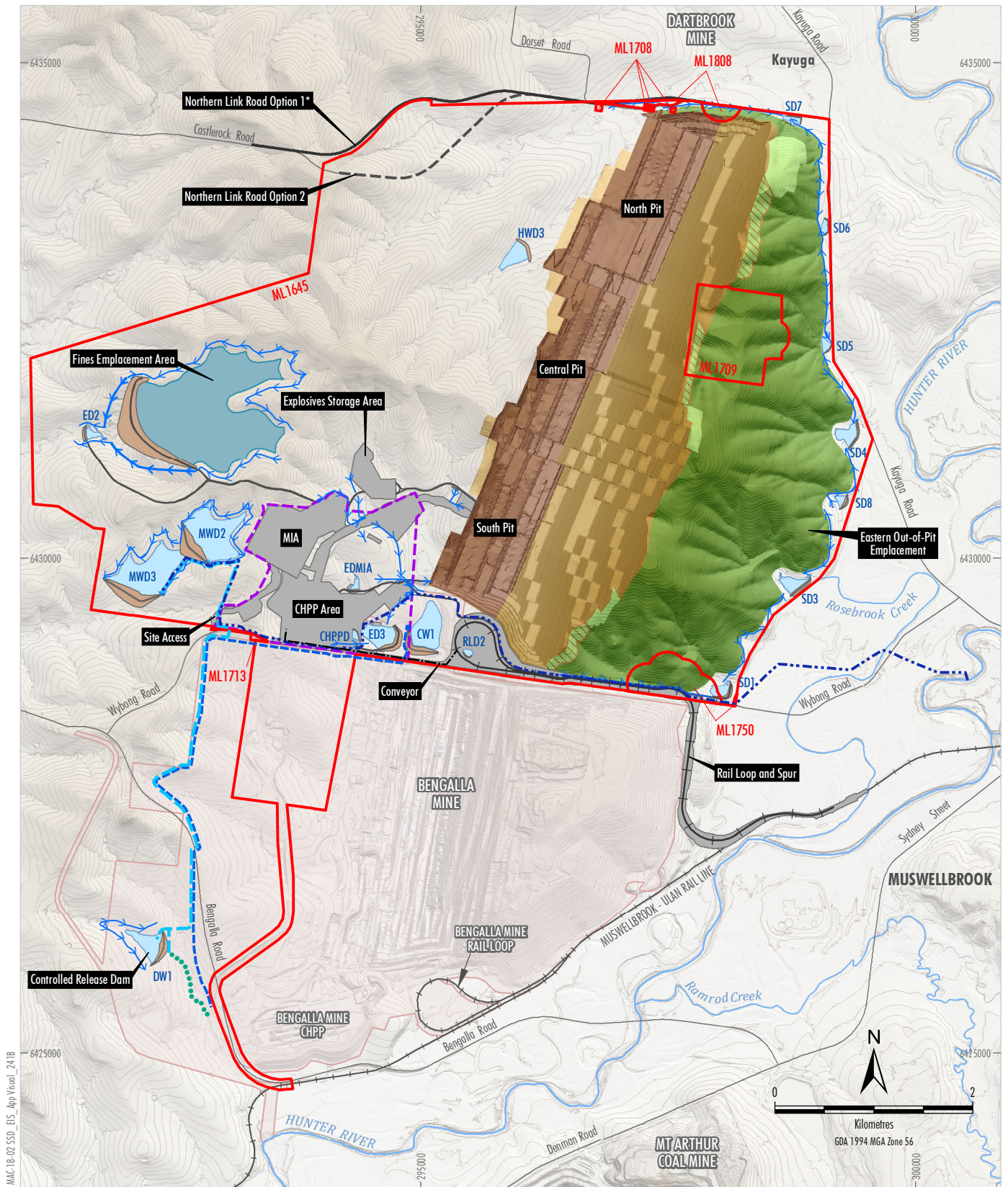
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| <span style="border: 2px dashed purple; padding: 2px;"> </span> Revised Infrastructure Area Envelope                               | <span style="background-color: #e0f0ff; border: 1px solid blue; padding: 2px;"> </span> Water Dam                                  |
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| <span style="background-color: #d0d0d0; border: 1px solid black; padding: 2px;"> </span> Active Mining                             | <span style="border-bottom: 2px dashed blue; width: 50px; display: inline-block;"> </span> Indicative Water Pipeline Alignment     |
| <span style="background-color: #a0a0a0; border: 1px solid black; padding: 2px;"> </span> Active Overburden Emplacement             | <span style="border-bottom: 2px dashed blue; width: 50px; display: inline-block;"> </span> Hunter River Supply Pipeline            |
| <span style="background-color: #808080; border: 1px solid black; padding: 2px;"> </span> Initial Rehabilitation                    | <span style="border-bottom: 2px dashed blue; width: 50px; display: inline-block;"> </span> DW1 Pipeline (Bi-directional)           |
| <span style="background-color: #606060; border: 1px solid black; padding: 2px;"> </span> Established Rehabilitation                | <span style="border-bottom: 2px dashed blue; width: 50px; display: inline-block;"> </span> Bengalla Mine CW1 Pipeline              |
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| <span style="border-bottom: 2px solid blue; width: 50px; display: inline-block;"> </span> Key Surface Water Drain (Conceptual)     |  |
| <span style="border-bottom: 2px solid black; width: 50px; display: inline-block;"> </span> Access Road                             |  |
| <span style="border-bottom: 2px solid black; width: 50px; display: inline-block;"> </span> Northern Link Road Option 1 Centreline* |  |
| <span style="border-bottom: 2px dashed black; width: 50px; display: inline-block;"> </span> Northern Link Road Option 2 Centreline |  |
| <span style="border: 1px solid black; padding: 2px;"> </span> Bengalla Mine Approved Disturbance Boundary (SSD-5170)               |  |

\* Preferred alignment subject to landholder access.

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**Figure A-4**





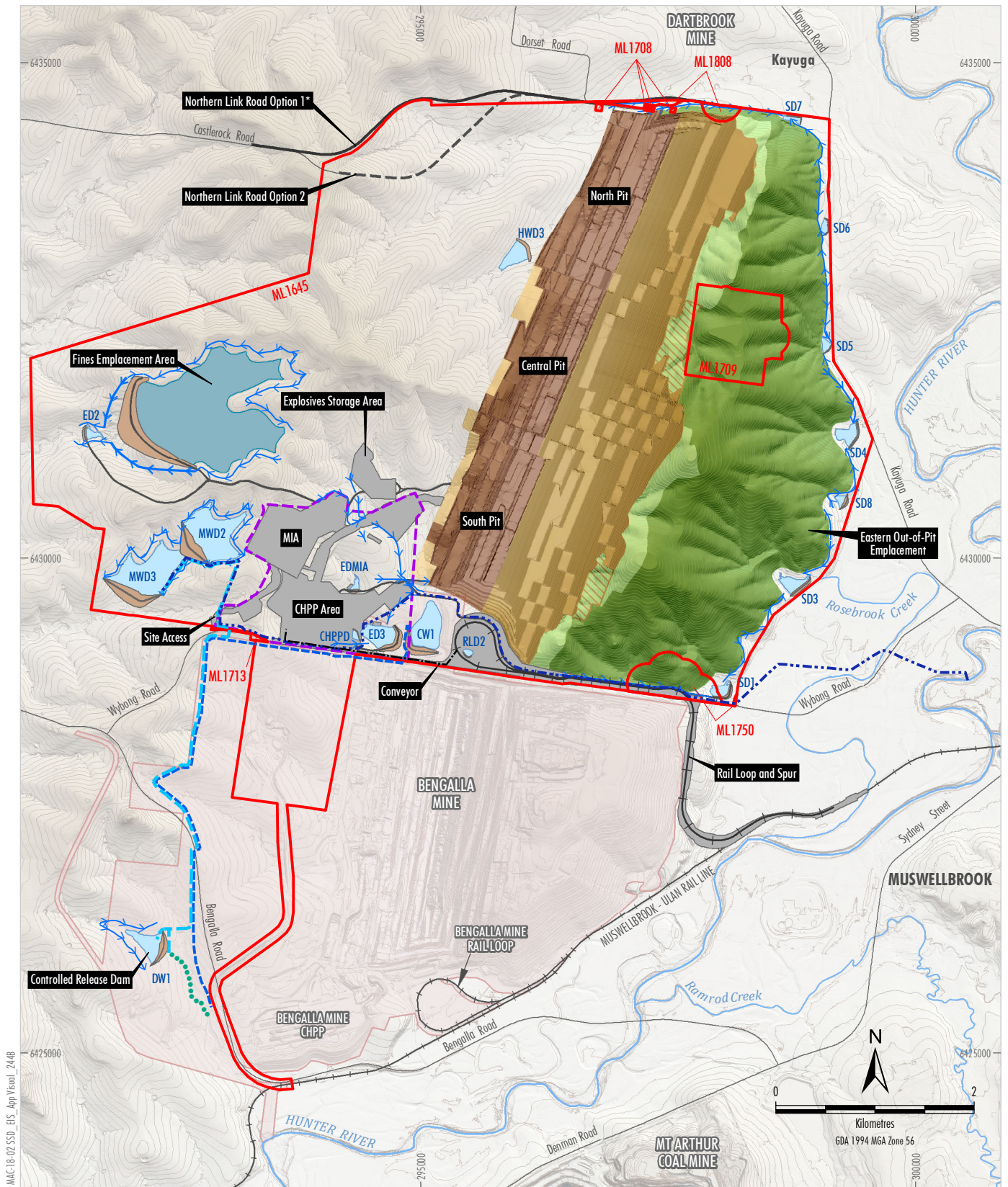
Source: MACH (2020); NSW Spatial Services (2020)

- LEGEND**
- Mining Lease Boundary (Mount Pleasant Operation)
  - Revised Infrastructure Area Envelope
  - Topsoil Stripping
  - Active Mining
  - Active Overburden Emplacement
  - Initial Rehabilitation
  - Established Rehabilitation
  - Topsoil Stockpile
  - Infrastructure and Borrow/Stockpile
  - Key Surface Water Drain (Conceptual)
  - Access Road
  - Northern Link Road Option 1 Centreline\*
  - - - Northern Link Road Option 2 Centreline
  - Bengalla Mine Approved Disturbance Boundary (SSD-5170)
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  - Water Dam
  - Approximate Extent of Scour Protection
  - Indicative Water Pipeline Alignment
  - Hunter River Supply Pipeline
  - DW1 Pipeline (Bi-directional)
  - Bengalla Mine CW1 Pipeline
- \* Preferred alignment subject to landholder access.

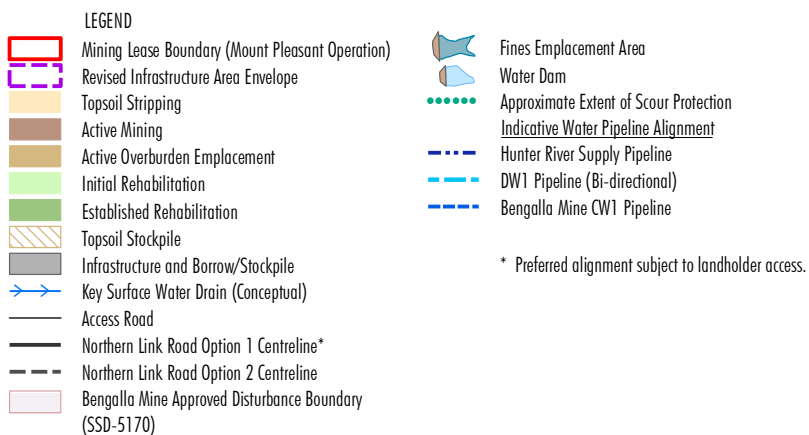
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**Figure A-5**





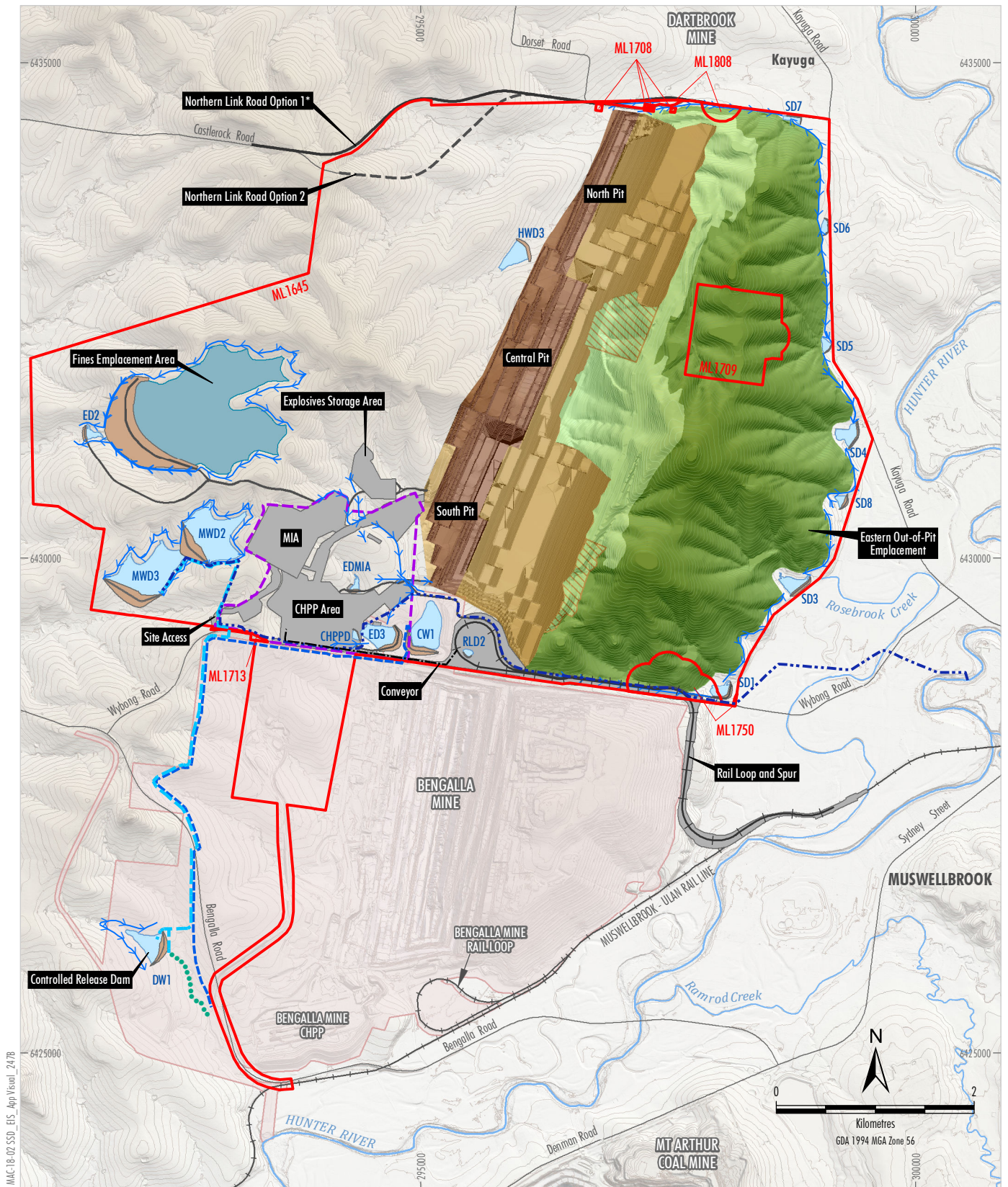
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Figure A-6



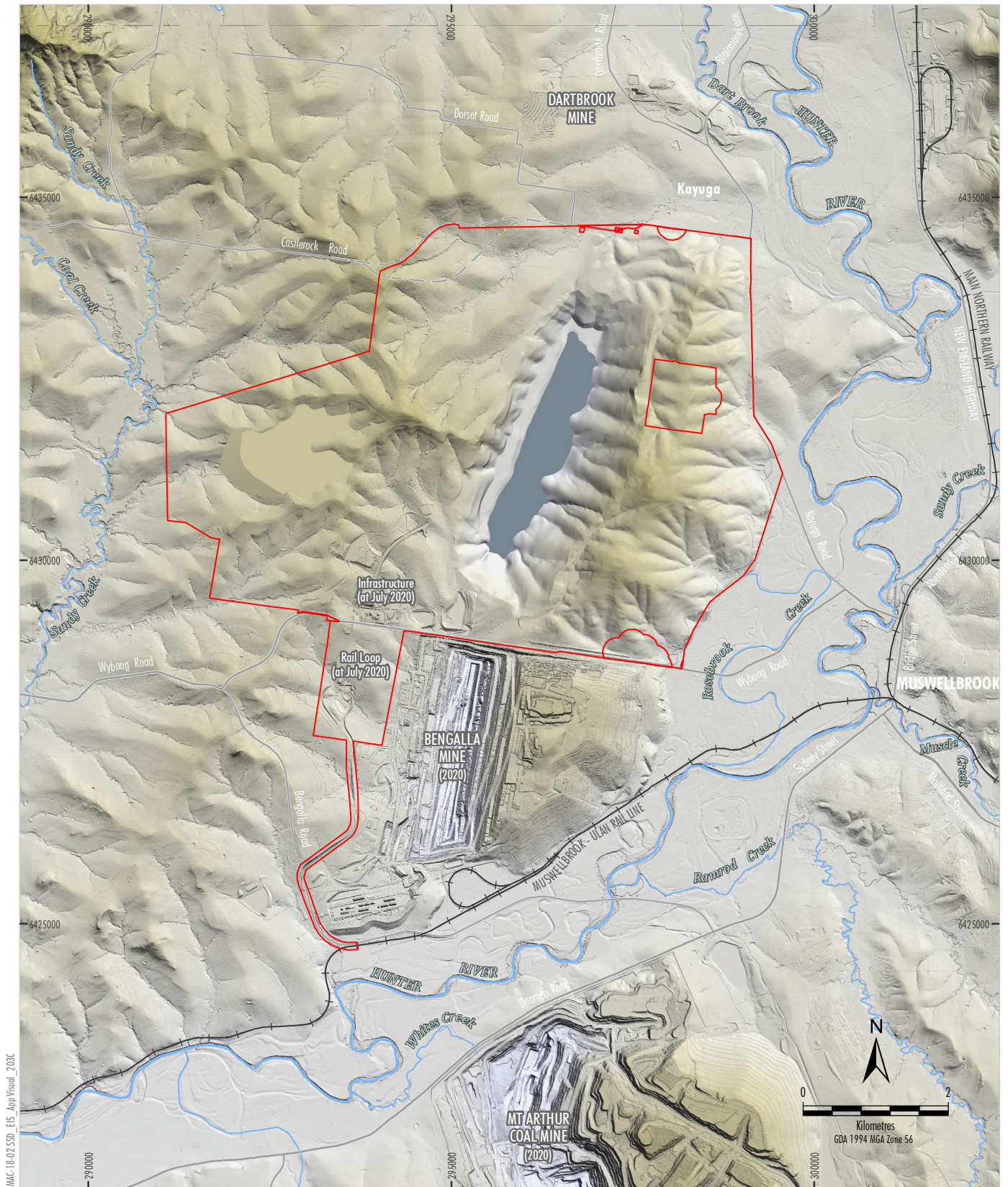


Source: MACH (2020); NSW Spatial Services (2020)

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**Figure A-7**





#### LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)

Source: MACH (2020); NSW Spatial Services (2020)

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Conceptual Final Landform

Figure A-8