

# MACH**Energy**



## **Appendix C**

Visual  
Assessment

# Mount Pleasant Operation

## RAIL MODIFICATION

## Visual Assessment

Prepared for MACH Energy



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# Mount Pleasant Operation | Rail Modification

## Visual Assessment

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## Glossary and Abbreviations

<i>ARTC</i>	<i>Australian Rail Track Corporation Ltd</i>
<i>Contrast</i>	The degree to which a development element differs visually from its landscape setting.
<i>CHPP</i>	Coal Handling and Processing Plant
<i>Integration</i>	The degree to which a development element blends into the existing landscape without necessarily being screened from view.
<i>Landscape Character Unit (LCU)</i>	The landscape features of the locality (topography, vegetation and land use features) combine in various ways to create areas of relative visual uniformity that can be defined as LCUs.
<i>Photomontage</i>	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.
<i>Focal View Area (FVA)</i>	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.
<i>Scenic amenity</i>	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.
<i>Screen</i>	The degree to which a development element cannot be seen due to intervening landscape elements such as topography or vegetation.
<i>The Modification</i>	Duplication of approved rail spur, rail loop and associated infrastructure as described in this report.
<i>Visual Character Unit (VCU)</i>	Visual Character Unit. Areas of landscape that have similar topographic, vegetation and land use features that create areas of similar visual character
<i>Visual Effect</i>	A measure of the visual interaction between the Modification and the landscape setting within which it is located.
<i>Visual Impact</i>	A measure of a joint consideration of both visual sensitivity and visual effect that considered together determine the visual impact of a development
<i>Visual Sensitivity</i>	The degree to which a change to the landscape would be perceived in an adverse way.
<i>Primary Visual Catchment</i>	The primary visual catchment includes the most significant parts of the total visual catchment from which the Modification potentially could be seen. This is the area containing the most critical locations with potential views to the Modification, which will be the focus of visual impact assessment.

# 1. INTRODUCTION

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

The purpose of the assessment is to form part of an Environmental Assessment (EA) being prepared to support an application for a Modification of consent under section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This assessment will:

- Provide a detailed assessment of the visual character and visual effects of the Modification and the changes to the visual landscape as a result of the Modification;
- Compare the new rail spur and its visual effects with the existing/approved Mount Pleasant Operation rail spur;
- Assess potential visual impacts on private landowners in surrounding areas as well as key vantage points in the public domain, including night lighting impacts; and
- Provide a detailed description of the measures that MACH Energy would implement to minimise visual impacts of the Modification.

## 1.1 Overview of 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 & Allied Operations Pty Ltd (Coal & Allied) 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.

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 will be transported by rail to the port of Newcastle for export or to domestic customers for use in electricity generation.

The ultimate extent of the approved Bengalla Mine open cut intersects the approved Mount Pleasant Operation rail spur.

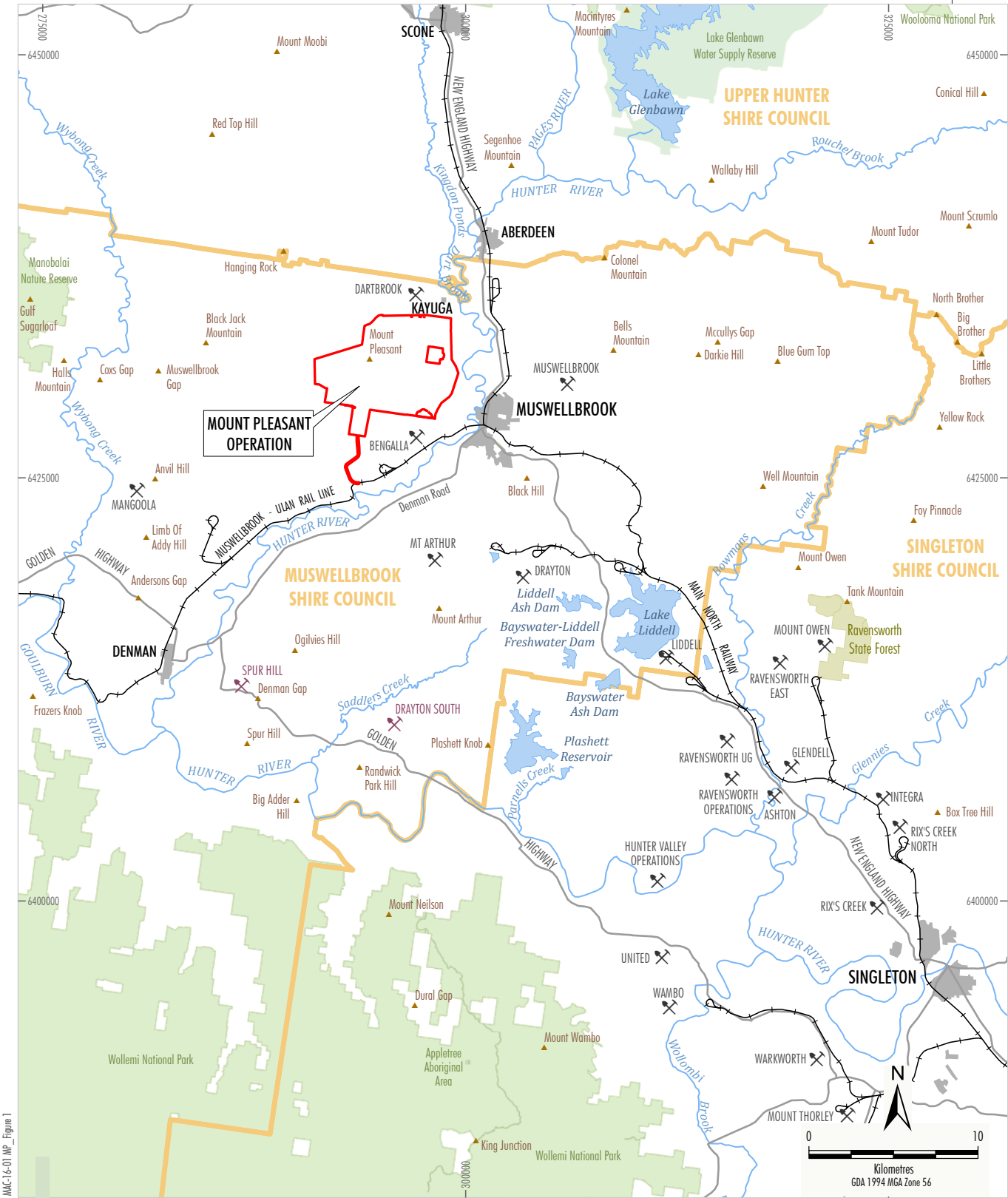
While the intersection of the Bengalla Mine open cut with the approved Mount Pleasant Operation rail infrastructure is still some years away, MACH Energy is proposing a Rail Modification to obtain approval for future rail and/or conveyor product transport facilities to manage this future interaction.

## 1.2 Overview of the Modification

The Rail Modification would primarily comprise:

- Duplication of the approved rail spur, rail loop and associated conveyor and rail loading systems and associated services;
- Duplication of the Hunter River water supply pumping station and associated water pipeline and electricity supply that currently follows the rail spur alignment; and
- Demolition and removal of the redundant approved infrastructure within the extent of the Bengalla Mine, once the new rail, product loading and water supply infrastructure has been commissioned and is fully operational.





Source: Geoscience Australia (2006); NSW Division of Resources & Energy (2017); Land and Property Information (2017)

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MOUNT PLEASANT OPERATION

Figure 1.1 | Mount Pleasant Operation Regional Context

## 2. ASSESSMENT METHODOLOGY

### 2.1 Introduction

This assessment considers how the Modification would affect the existing approved levels of visual impact from the Mount Pleasant Operation and neighbouring mines. It also includes consideration of new elements within the existing landscape setting and how they are seen from various viewing locations.

This assessment is informed by the visual character of the landscape as well as the visual sensitivity of the various viewing locations.

A combined consideration of both visual sensitivity (Section 5) and visual effect (Section 6) identifies visual impacts (Section 7) and directs if any mitigation strategies are required (Section 8). The overall method of visual assessment of the existing landscape is outlined in Figure 2.1.

The assessment takes into account relevant guidelines, policies and plans including:

- Regional Planning Guidelines - The Strategic Regional Land Use Plan – Upper Hunter Valley (NSW Government, 2012).
- Local Planning Guidelines - The Muswellbrook Shire Council Draft Land Use Development Strategy (Coal Mine Land Use Component).
- Previous Visual Impact Assessments (Coal & Allied, 1997 and 2010) and recent Visual Impact Review (MACH Energy, 2017) prepared for the Mount Pleasant Operation.
- Visual Impact Assessments prepared for the neighbouring Bengalla Mine.
- Mount Pleasant Operation Landscape Management Plan.
- Rehabilitation Guidelines.

Where relevant, this assessment has adopted a similar visual impact assessment methodology relied on for the Visual Impact Assessment prepared for the original Mt Pleasant Mine Environmental Impact Statement (ERM Mitchell McCotter, 1997) (1997 EIS). This included:

- Establishing the visual character and visual effect created by the Modification;
- Review of the approved mine plans with existing rail spur and Coal Handling and Preparation Plant (CHPP) within the context of the existing visual settings created by various landscapes in and around Mount Pleasant Operation;
- Consideration of the visibility of the Modification from sensitive receivers using photomontage/visualisations;
- Identification of the likely visual impacts of the Modification (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 Landscape Management Plan.

### 2.2 Consideration of Visual Effect and Sensitivity

The analysis of the interaction between the existing visual environment and the Modification provides the basis for determining impacts and developing mitigation strategies. The impact levels of the Modification are determined by the defined visual effects of the Modification in the landscape and the visual sensitivity at specific viewing locations.

The Modification is evaluated to define the elements that are most significant from a visual perspective in the context of the existing environment. The key Modification elements from a visual context are defined as being “*major*” or “*minor*” and are considered in terms of how they contrast with the main elements of the existing visual environment.

#### 2.2.1 Visual Effect

Visual effect is a measure of the level of visual contrast and integration of the Modification with the existing landscape.

The degree of this contrast with the existing landscape would determine the level of visual effect. A new mining development would have a higher visual effect due to strong contrast with the existing visual environment. Extensions to the operations of an existing mine would have a lesser visual effect due to elements of the development being present in the landscape. The successful completion of rehabilitation would likely reduce the visual effect of a previously operating mine due to the limited residual contrast with the existing landscape.

In a similar way, a development is considered integrated with the existing landscape based on issues of scale, position in the landscape and contrast with the surrounding environment. High visual integration is achieved if a development is dominated by the existing landscape, is of small scale or of limited contrast.

The magnitude of the visual effect for a development, outlined in Table 2.1, is determined by a balanced analysis of the following factors.

## Contrast and Integration

The level of contrast and integration of the Modification with its surrounding landscape determines visual effect. Modification elements as expressed through the visual expression elements contrast and integrate to varying degrees with the surrounding landscape. Visual expression elements include form, shape, pattern, line and colour with minor consideration in relation to texture).

## The Proportion of a View that includes Modification elements

A lower proportion of the view that is occupied by the Modification elements would result in a lower level of visual effect. This is determined by defining what percentage of the Focal View Area it occupies (see Figure 2.2). The Focal View Area is the area that is occupied by an arc created by sight lines from the eye radiating out vertically and horizontally, at angles of 30 degrees (°) around a centre view line from a nominated viewing location.

The Focal View Area is not representative of the total view, but is the most critical and central part of a view.

Measuring the percentage of the Focal View Area occupied by a development would provide a more conservative measure than the consideration of the development in the context of the whole view zone, which would include both primary and secondary view areas (representing a total view arc of 120° instead of the Focal View Area view arc of 60°).

Generally, a high visual effect would result if a visible element of the Modification occupies a large percentage of the FVA and has a high visual contrast and low integration to the surrounding landscape.

A low or very low visual effect would occur if there is minimal contrast between the visible area of the Modification in the Focal View Area and the existing landscape setting, or the area occupied by the Modification represents only small parts of the total view.

### 2.2.2 Visual Sensitivity

Visual sensitivity is a measure of how critically a change to the existing landscape is viewed by people from different land use areas in the vicinity of a development.

Residential, tourist and/or recreation areas generally have a higher visual sensitivity than other land use areas such as industrial, agricultural or transport corridors. Land uses with a higher visual sensitivity, such as residential, use the scenic amenity values of the surrounding landscape (e.g. as part of a leisure experience), often over extended viewing periods. Table 2.2 indicates the levels of visual sensitivity associated with land uses relevant to the Modification.

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

- Screening effects of any intervening topography, buildings or vegetation. Viewing locations with wellscreened views of the Modification would have a lower visual sensitivity than those with more open views.
- Viewing distance from the viewing location to visible areas of the Modification. The longer the viewing distances, the lower the visual sensitivity.
- General orientation of residences to landscape areas affected by the Modification. Viewing locations with

strong visual orientation towards the Modification (i.e. those residences with areas such as living rooms and/or verandas orientated towards it) would have a higher visual sensitivity than those not orientated towards the Modification, and which do not make use of the views toward the Modification.

For any area to be given a sensitivity rank, it must have views to the Modification. This visibility was determined based on field assessment, evaluation and computer analysis of topographic and vegetation data.

## 2.3 Visual Impact

The visual impact of the Modification has been determined by considering both visual effect and visual sensitivity. The way in which the parameters of visual sensitivity and visual effect are utilised to determine visual impacts is illustrated in Table 2.3.

## 2.4 Mitigation

Visual and landscape impact mitigation strategies identified as a result of this Visual Assessment would be considered as additional measures to those identified in previous Landscape Management Plans. Visual mitigation measures can be implemented on-site or at the receiver. Mitigation measures are implemented progressively so that visual effects and/or visibility/visual sensitivity factors are decreased in appropriate timeframes to appropriately mitigate impacts. General strategies to reduce visual impacts that may be recommended are outlined below.

### 2.4.1 Reduce Visual Effects

Rehabilitation of disturbed areas associated with the Mount Pleasant Operation would decrease the visual contrast created by mining operations to the existing landscape. Rehabilitation strategies that emulate patterns, shapes, lines and colours of the existing landscape can reduce the contrast between the Mount Pleasant Operation and the existing landscape, reducing visual effect.

### 2.4.2 Reduce Visual Sensitivity

Reducing visual sensitivity is achieved by carrying out treatments to minimise the visibility of the Modification. Due to the scale of Modification components (such as the rail spur) screening treatments may be beneficial at the location of the Modification infrastructure or at the point of viewing. Screening treatments implemented at the point of viewing can also be used to redirect views to areas not affected by mining activities as well as generally enhancing the landscape at the viewing point.

### 2.4.3 Reduce Visual Impacts

Reducing visual impacts is also achieved by the mine plan design and siting that maximises screening of Modification elements by utilising existing topographic features. Maintaining significant high points, and topographic and vegetation features, also contributes to a reduction of visual impact. Measures to reduce visual impacts can also include visual screens that serve to impede potential lighting impacts at night.

### 2.4.4 Post-mining Visual Setting

On completion of mining operations and following decommissioning of rail spur and rehabilitation, a post-mining local landscape would be created. This landscape would generally reflect post-mining landforms and land use.

## 2.5 Implementation of Study Method

A combination of the following evaluation processes and analyses were used to determine the potential visual impact of the Modification.

- Evaluation of Modification plans, elevations, maps, aerial photography and reports;
- Field assessment; and
- Photomontage development.

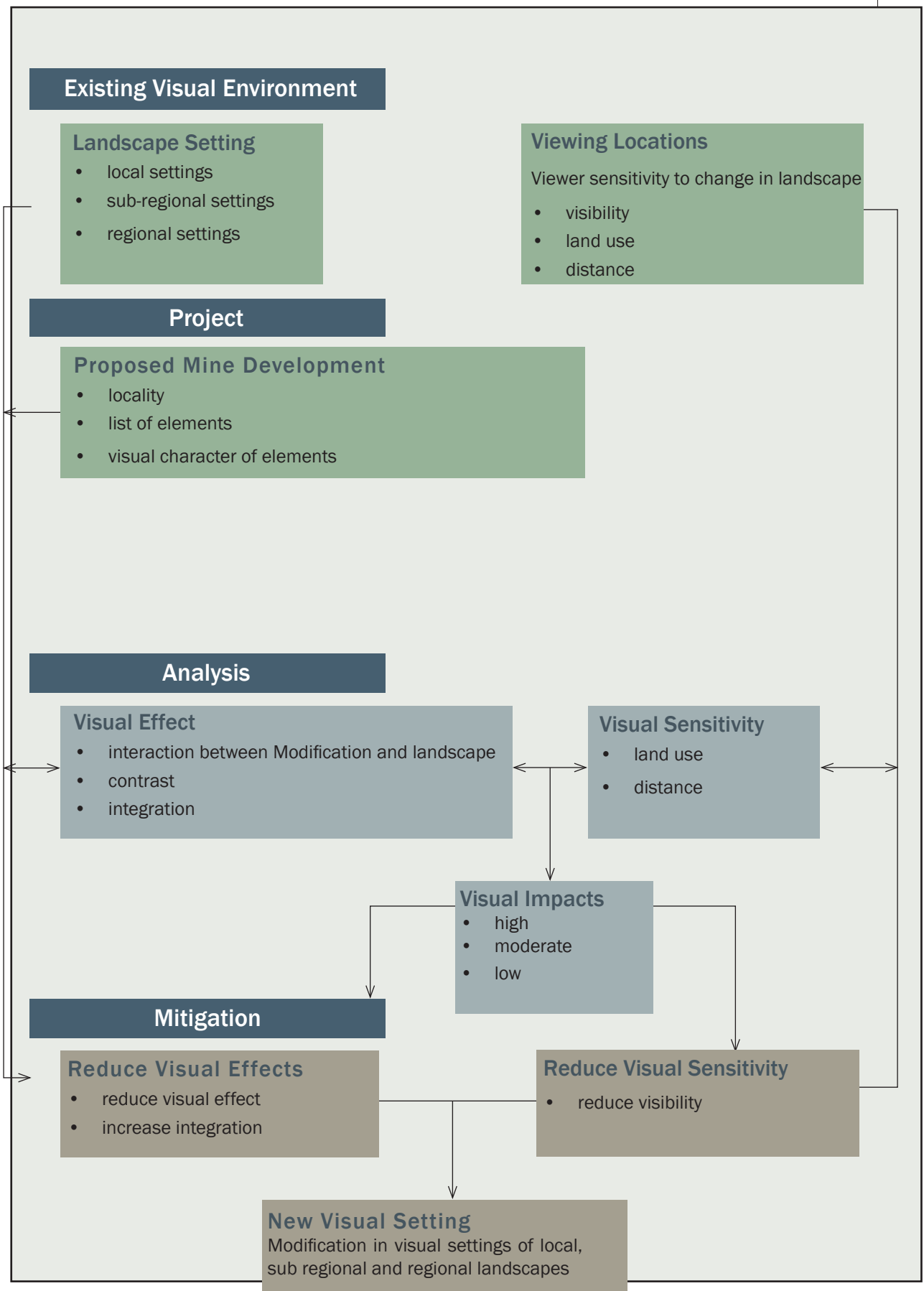


Figure 2.1 | Visual Assessment Methodology



### 2.5.1 Evaluation of Plans and Reports

Evaluation of the various components of the Modification was based on the Modification description and associated figures provided by MACH Energy.

Topographic mapping and aerial photography provided the basis for the establishment of landscape and visual character.

Aerial photography, along with computer analysis also assisted in evaluating the visibility, sensitive receptor locations and potential extent of views to the Modification.

Modification plans were considered in the context of mine plans, rehabilitation and final landform maps of the approved Mount Pleasant Operation to assist in defining visual effects of the Modification.

### 2.5.2 Field Assessment

A field assessment undertaken in areas surrounding the Mount Pleasant Operation and the proposed rail alignment assisted in confirming previously documented Landscape Character Units and identifying key sensitive receptors for the Modification. The field assessment involved visits to locations within the Primary Visual Catchment including New England Highway, Denman Road, Wybong Road, privately owned rural properties on the Hunter River floodplain and key vantage points within Muswellbrook.

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

### 2.5.3 Photomontage Analysis

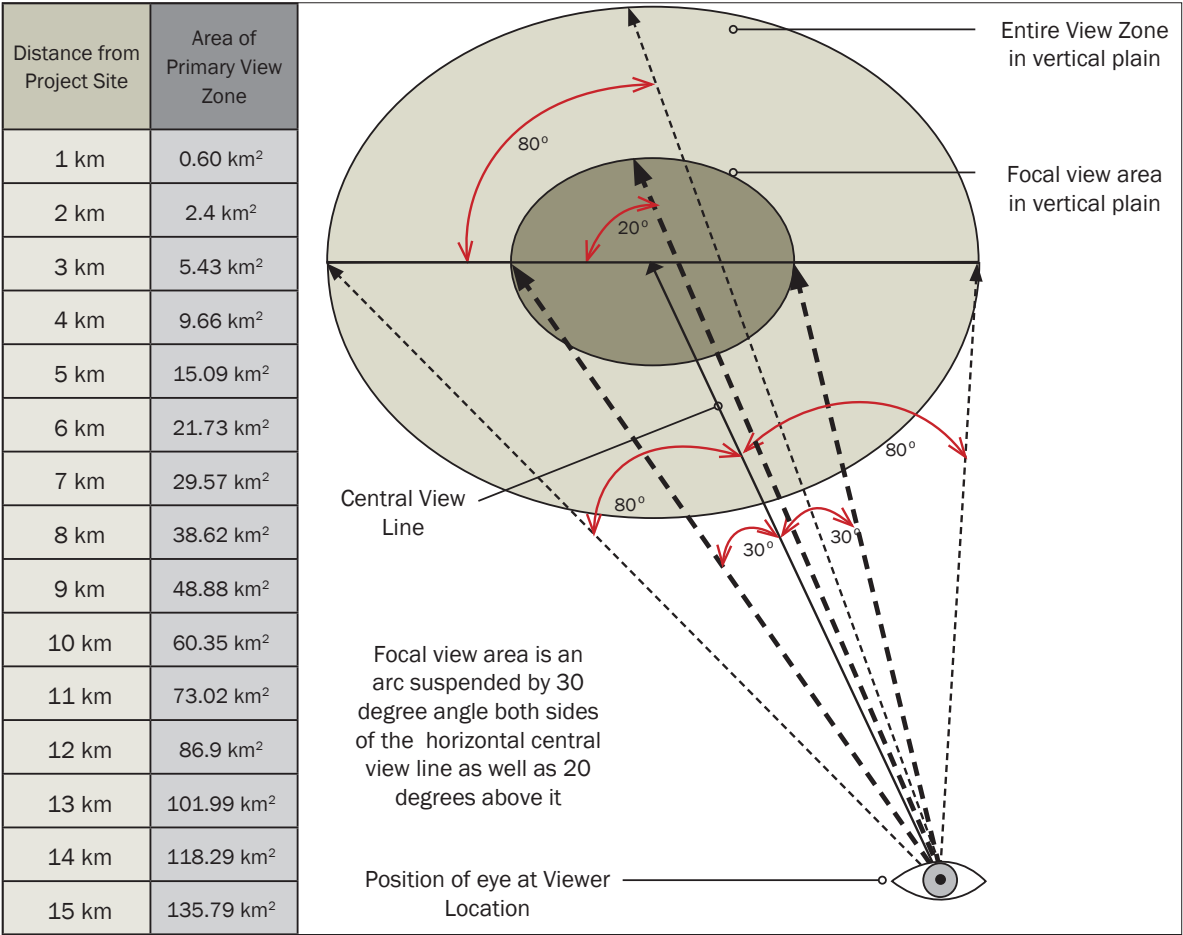
Photomontages are images that bring a computer model of the terrain and the Modification together with a photograph of the existing landscape to illustrate what the Modification may look like from a given location at various points in time. Photomontages for three locations were developed to illustrate likely visual effects of the proposed rail spur as seen from various nearby locations (refer Section 6).

Photographs towards the proposed Modification location were taken at standing eye level from viewing locations. The location of each of these photograph positions was recorded using GPS. The photomontages provide a realistic representation of the site landscape and how the Modification would be seen from each viewing location in response to light and atmospheric conditions.

The photomontages were used to assist in determining the level of visual effect of the Modification from each of the representative viewing locations (see Section 6).

	Visual Properties		Visual Effect Levels			
	Visual Contrast	Visual Integration	Proportion of View Occupied by the Modification			
Visual Properties in Primary View Zone	High  Development elements do not borrow, form, shape, line, colour or texture or scale from existing features of the visual setting and contrast levels are high with existing landscape.  eg. Active face of OEA	Low  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 the development.	It occupies more than 2.5% of the primary view shed	It occupies between 1 - 2.5% of the primary view shed	It occupies less than 1% of the primary view shed	Type 1
	Moderate  Development elements borrow from some features of the visual setting in terms of form, shape, line pattern and or colour and scale, reducing visual contrast with existing setting.  eg. newly rehabilitated pit area	Moderate  The development has some degree of visual integration with setting from other features, vegetation and or topography achieve some level of integration	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%	
	Low  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.  eg. rehabilitated landscape pattern	High  Visual integration is high due to other features, vegetation and or topography achieving dominance and screening or filtering	It occupies more than 40% of the primary view shed	It occupies 40-30% of the primary view shed	It occupies less than 30% of the primary view shed	Type 3
	Note: The visual effect of the Modification changes through time with the process of rehabilitation. The more advanced the level of rehabilitation, the higher the visual integration, and the higher the percentage of FVA the modification can occupy.			High Visual Effect	Moderate Visual Effect	

Table 2.1 | Visual effect



**Figure 2.2 | Focal View area**  
The Area of focal view at Various Distances from the Modification

Land Use			Visibility	Visibility to Modification			
			High	Low			
			Nearest visible Modification elements less than 2.5km away	Nearest visible Modification elements between 2.5 - 7.5 km away	Nearest visible Modification elements between 7.5 - 12.5km away	Nearest visible Modification elements more than 12.5km away	
Sensitivity of Land Use	High	Urban and rural houses	High Sensitivity	High/Moderate Sensitivity	Moderate Sensitivity	Low Sensitivity	
		Tourist destination of visually sensitive land uses eg. horse studs, vineyards etc.	High Sensitivity	High/ Moderate Sensitivity	Moderate/Low Sensitivity	Low Sensitivity	
	Low	Designated tourist & main roads - New England Highway, Denman Road	High Sensitivity	Moderate Sensitivity	Low Sensitivity	Low Sensitivity	
		Other roads - Edderton, Wybong, Thomas Mitchell Drive	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	

**Table 2.2 | Visual sensitivity**

Land Use and Project Visibility combine to create visual sensitivity

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

**Table 2.3 | Visual impact**

Visual Impact is the interaction between visual effect and sensitivity

## 3. EXISTING ENVIRONMENT

### 3.1 Introduction

This section of the report describes the visual character of the existing environment. This is necessary in order to establish a baseline on which changes are compared against, and the Visual Effect measured.

As shown in Figure 3.1, the existing environment surrounding Mount Pleasant Operation is comprised of 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

Mount Pleasant Operation is located west of Muswellbrook in the Upper Hunter Valley of NSW. The Primary Visual Catchment represents the area that contains the majority of critical viewpoints of the Modification. The Modification Primary Visual Catchment is defined by the topography of Mount Pleasant and adjacent foothills to the north-west, the altered topography of Bengalla Mine to the south and west of the site, and the town of Kayuga to the north. The Primary Visual Catchment is further defined by Muswellbrook to the east, the hills behind, 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 Primary Visual Catchment (Figure 3.1).

### 3.3 Land Ownership

The land ownership around Mount Pleasant Operation is dominated by various mining companies (Figure 3.2). To the immediate south, land is primarily owned by the Bengalla Mine. Beyond that, land ownership is dominated by Mt Arthur Coal Mine. To the west, but in a different visual catchment, is land owned by Mangoola Coal. To the north, adjacent the Kayuga township, is the Dartbrook Mine.

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 Modification.

### 3.4 Visual Character of the Landscape

The existing visual environment has been previously described in the 1997 EIS (ERM Mitchell McCotter, 1997) and Mount Pleasant Project Modification Environmental Assessment (EA) (EMM, 2010), Continuation of Bengalla Mine Visual Impact Assessment (JVP Visual Planning and Design, 2013), Bengalla Mine Development Consent Modification – Statement of Environmental Effects (VPA Visual Assessment and Planning, 2016) and Mount Pleasant Operation Mine Optimisation Modification EA (MACH Energy, 2017). This visual assessment confirms previous studies, reiterating summary findings regarding the visual character of the landscape.

The regional visual landscape surrounding the Modification is strongly defined by the Hunter River Floodplain and contains strongly modified landscapes characterised by existing mining activities and supporting infrastructure surrounded by agricultural and pastoral land uses and remnant woodland along the Hunter River flood plain and surrounding foothills.

The critical existing mining operations in the area including:

- Approved Mount Pleasant Operation;
- Dartbrook Mine to the north;
- Bengalla Mine to the south and west;
- Mt Arthur Coal Mine located to the south;
- Mangoola Coal further to the west; and
- Muswellbrook Coal further to the east.



The visual character of the Modification is defined by several separate Visual Character Units, which include:

- Hunter River Floodplain (Figure 3.3);
- Foothills (Figure 3.4);
- Mine and industrial uses (Figure 3.5 and Figure 3.6);
- Town areas (Figure 3.7); and
- Surrounding ranges (Figure 3.8).

Within each Visual Character Unit there may be a range of visual receivers. These receivers have varying sensitivity to landscape modification. Relevant potentially sensitive visual receivers include:

#### **Towns:**

- Muswellbrook; and
- Kayuga.

#### **Roads:**

- Wybong Road;
- Racecourse Road;
- New England Highway;
- Foley Street;
- Sydney Road; and
- Denman Road.

#### **Rural Areas:**

- Houses and Equestrian Stables along Denman Road;
- Houses in northern Foothills;
- Houses on the edge of the Hunter River Floodplain; and
- Historic houses on Overton Road.

The area within the Mount Pleasant Operation is currently undergoing approved clearance and earthworks, therefore altering the visual character from pastoral grazing to mining.

Several historic homesteads are also located within the visual setting of the Modification.

Figure 3.3 illustrates the more local environment and individual Visual Character Units relevant to the Wybong Rail Loop Study Area.

#### **3.4.1 Mine and Industrial Uses Visual Character Unit**

This Visual Character Unit consists of the existing approved Mount Pleasant Operation, Bengalla Mine, Dartbrook Mine to the north, the larger Mt Arthur Coal Mine to the south, and the Thomas Mitchell Drive Industrial Estate. Beyond the Primary Visual Catchment, there are also further extensive mining operations to the south-east, Muswellbrook Coal to the east and Mangoola Coal to the west.

Both Mt Arthur Coal Mine and Bengalla Mine, contribute to the 'mine' visual character in this section of the foothills.

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

#### **3.4.2 Mount Pleasant Operation**

MACH Energy has commenced construction of mine infrastructure and begun overburden removal for open cut mining at the Mount Pleasant Operation. A visual bund is also under construction along its southern boundary adjacent to Wybong Road. This bund is one of the visual mitigation strategies proposed in the Landscape Management Plan.

The Mount Pleasant Operation would consist of active mining areas and an associated out of pit overburden emplacement, with the latter being the element that is visually prominent 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).

The CHPP is a large scale industrial facility clad in natural tones (greens and creams), that is large in both vertical and horizontal dimension. The largest scale horizontal elements are the rail loop and the coal stockpiles. The major vertical elements include the CHPP main building, the rail loading bin and various elevated conveyors.

The CHPP, rail spur and rail loop are significant parts of the approved Mount Pleasant Operation which now are part of the existing visual setting. Alterations to the approved mining infrastructure activities that would result in changes to the visual landscape as part of the current Modification are discussed in Section 4 below.

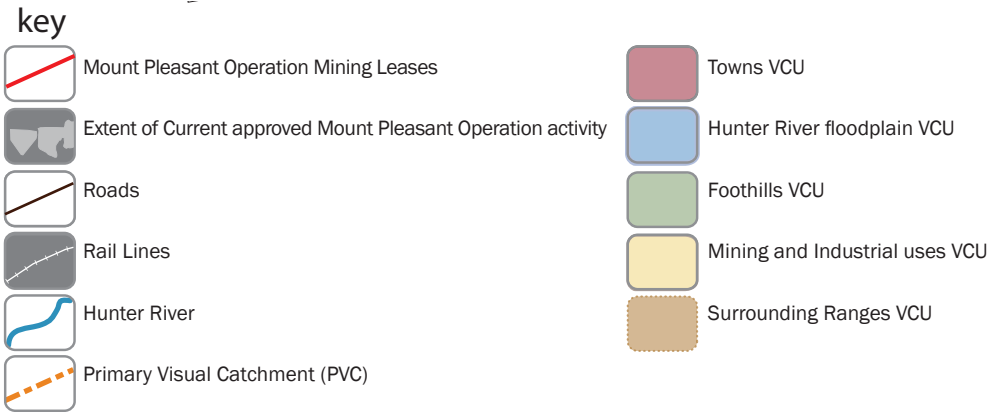
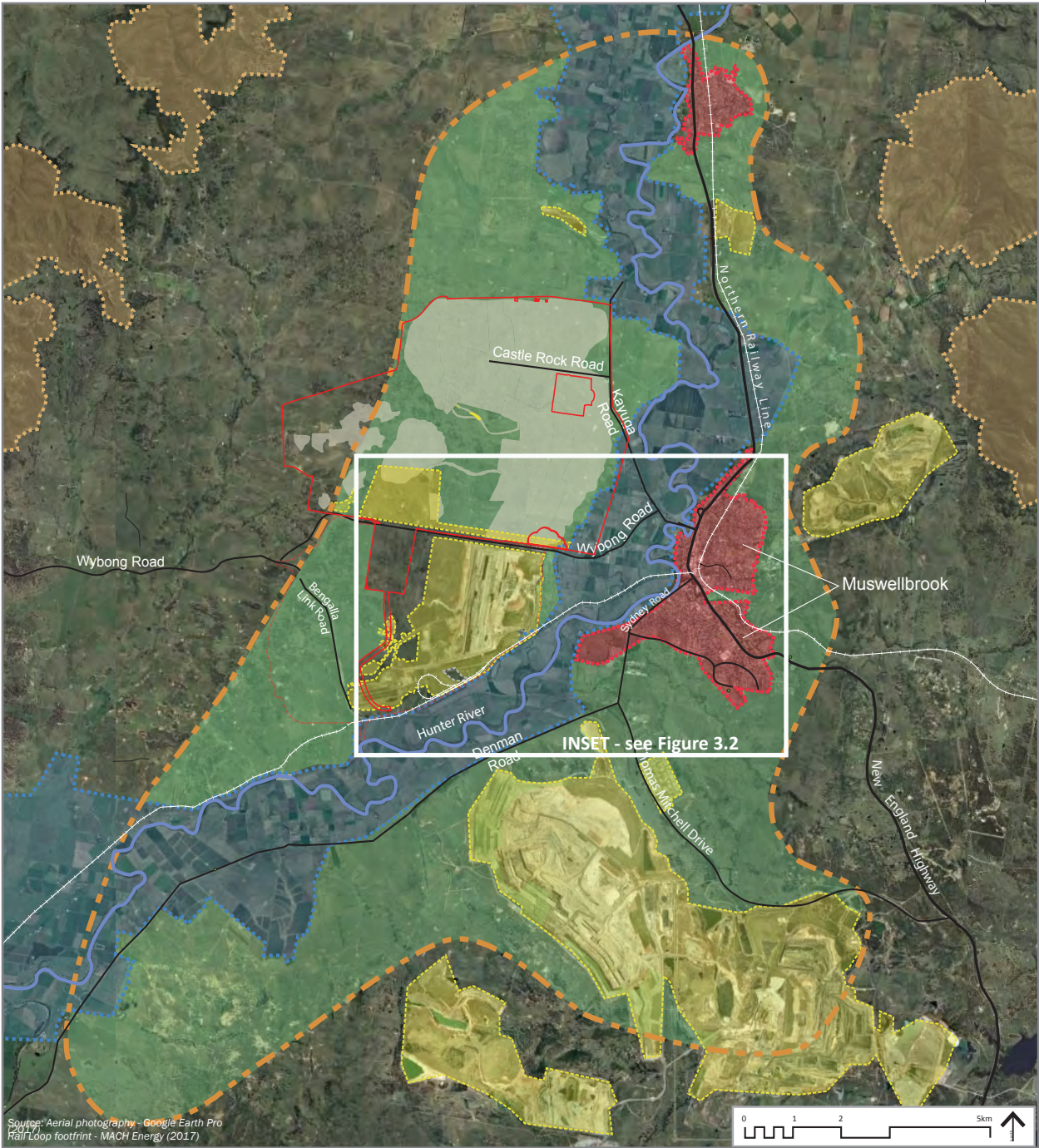


Figure 3.1 | Primary Visual Catchment and Visual Character Units



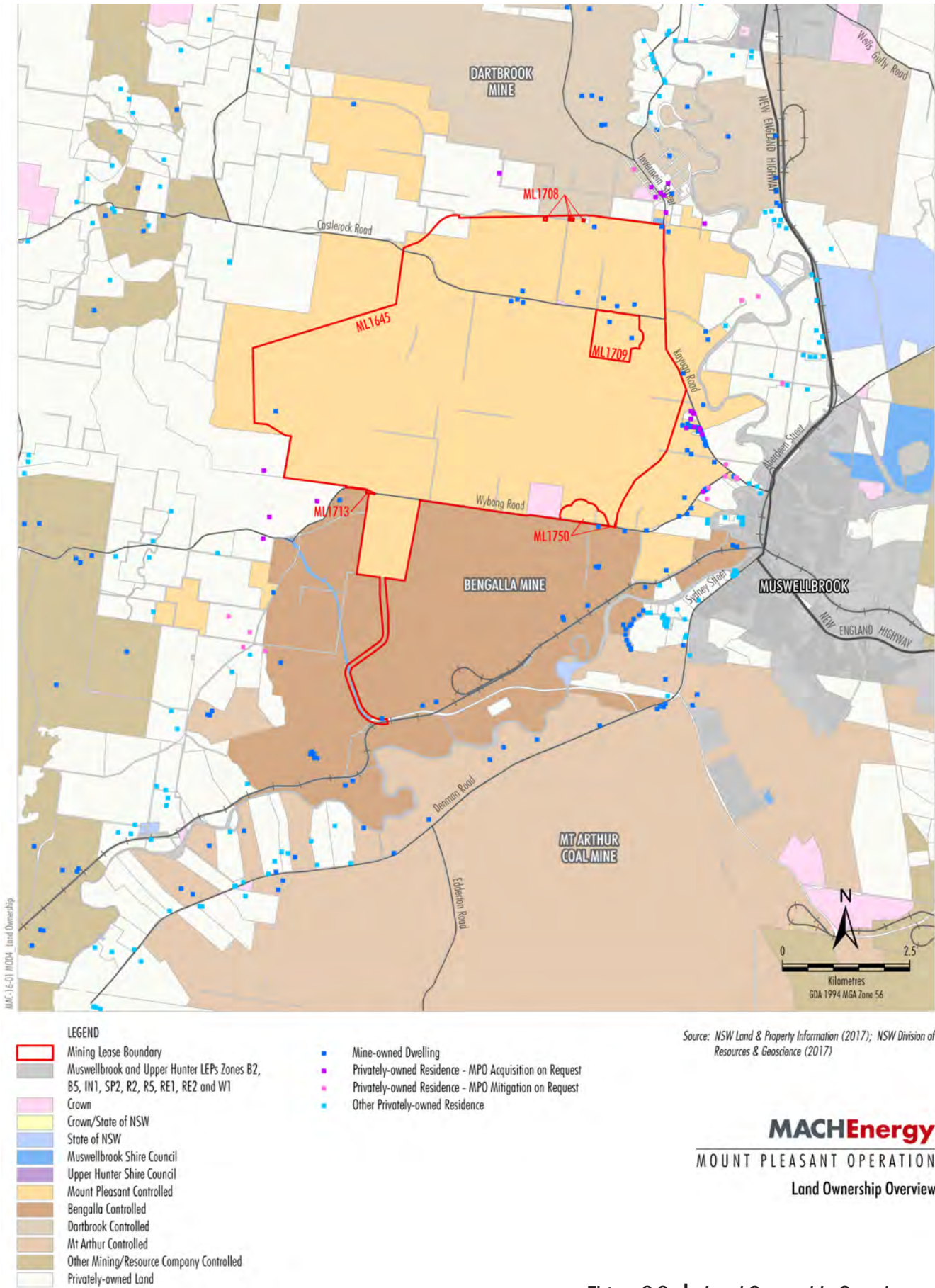
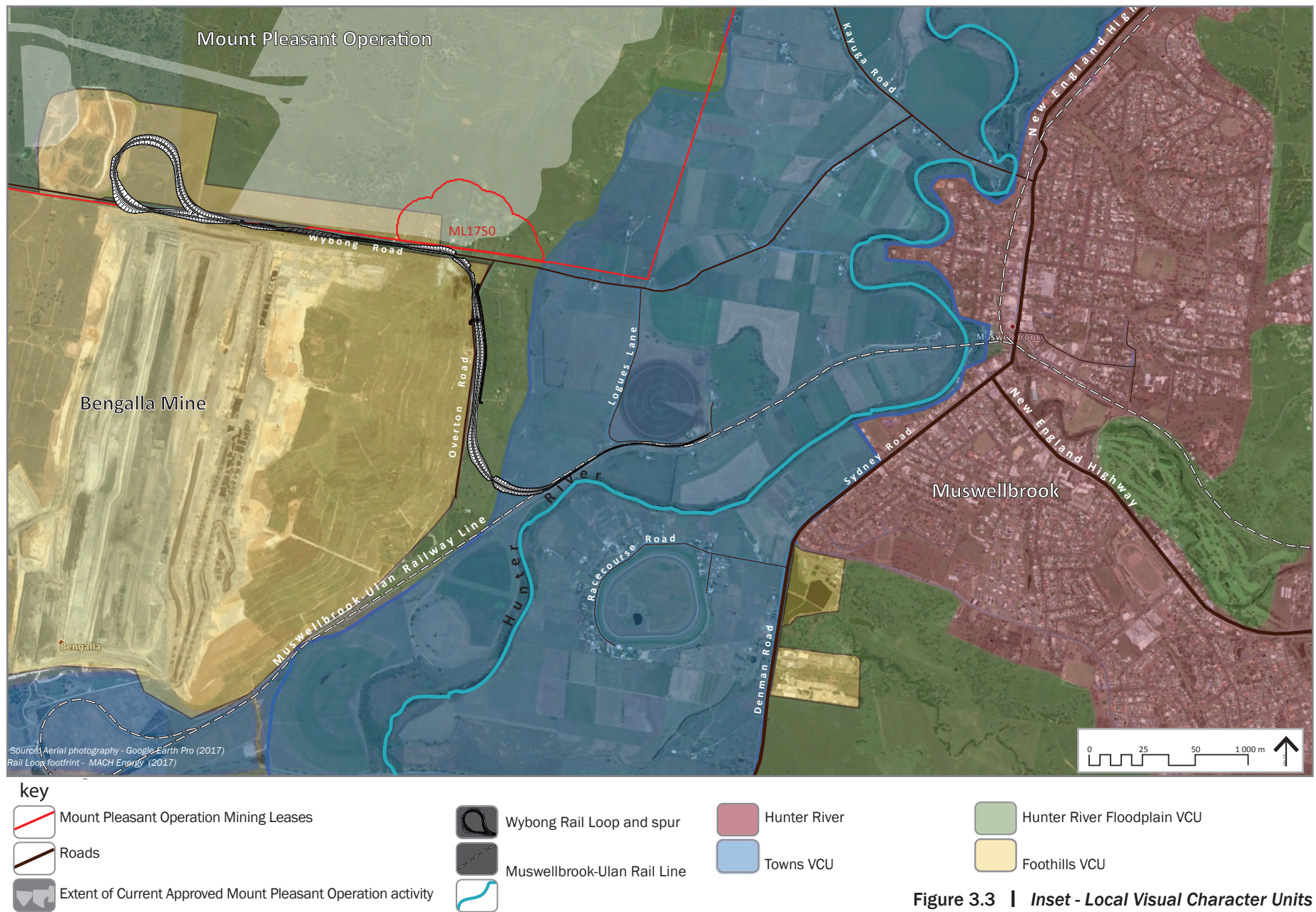


Figure 3.2 | Land Ownership Overview





**Figure 3.3 | Inset - Local Visual Character Units**





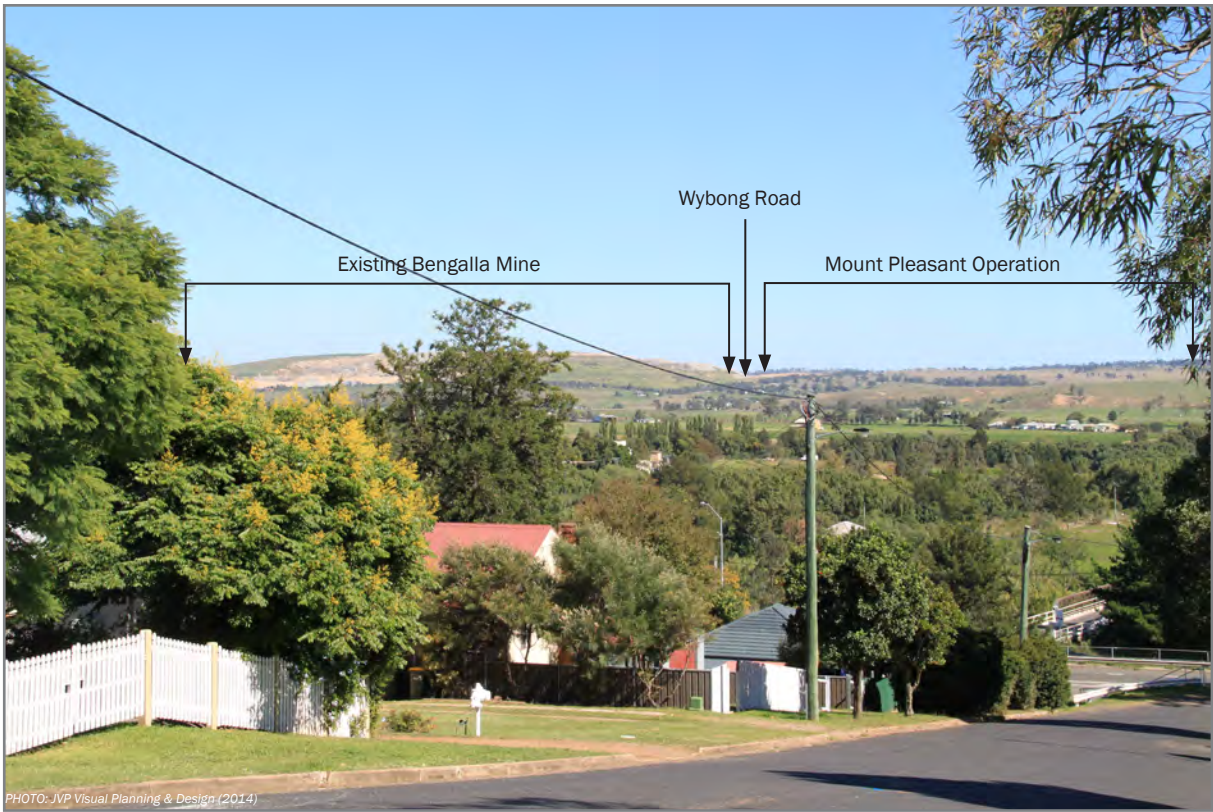
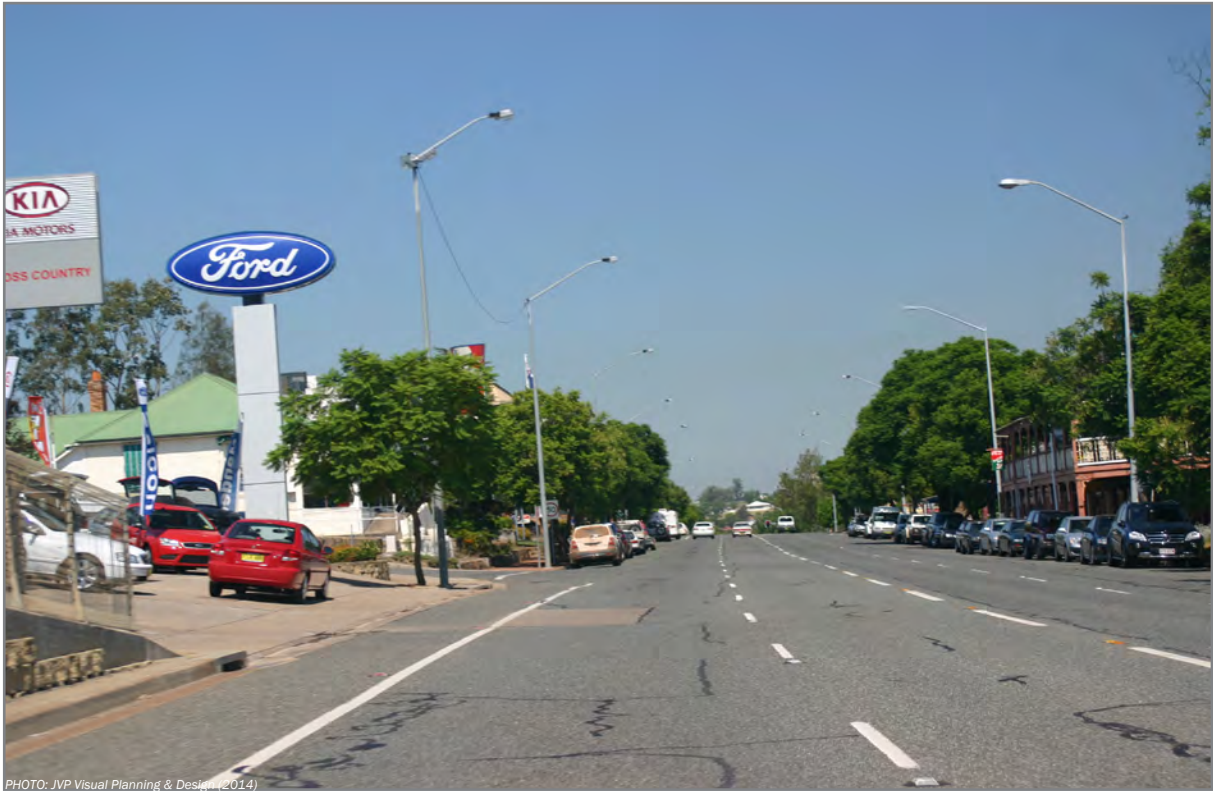
**Figure 3.4 | Hunter River Flood Plain Visual Character Unit**  
Cropland and grassland dominate this VCU, forming strong rectilinear patterns in an open landscape



**Figure 3.5 | 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.





**Figure 3.6 | Town Areas Visual Character Unit**

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





**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 | Mine and Industrial Uses Visual Character Unit**

Earth works and ground clearing within Mount Pleasant Operation (top) has colour and texture indicating active mining. Adjacent open cut pit of Bengalla Mine is typical of modified mining landscapes in the region.





**Figure 3.9 | Mine and Industrial Uses - rail infrastructure**

Scale of rail loop components familiar within the visual catchment . Coal loading carriages (top) rail line with rock ballast embankment and signal light (bottom) on flood plain near Logues Lane.

## 4. THE MODIFICATION

### 4.1 General

This section describes the components of the Modification with the potential to cause visual impacts.

Throughout the life of the approved mining operations (including coal transportation), MACH Energy would implement the visual mitigation strategies described in the Landscape 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 Mount Pleasant Operation (incorporating the Modification) on the surrounding landscape.

The approved rail spur and rail loop are located south of Wybong Road and access the Muswellbrook-Ulan Rail Line (see Figure 4.1).

### 4.2 Modification Components

Development components associated with the Modification that have potential for material visual implications include:

- Rail Spur and Loop duplication;
- Associated rail load-out infrastructure;
- Water pumping station and above ground sections of pipeline and overhead electricity transmission line;
- Overpass Rail bridge on Wybong Road; and
- Train headlight Screens.

Figure 4.2 identifies the proposed general arrangement of the above key Modification elements.

### 4.3 Rail Spur and Rail Loop

The rail spur and rail loop duplication would be constructed to the north of Wybong Road adjacent Bengalla Dam Clean Water 1 to the east of the approved Mount Pleasant Operation CHPP. The rail alignment runs to the east, parallel with Wybong Road; it would cross Wybong Road via an overpass near the Tintersection with Overton Road. The alignment curves to follow a southerly alignment to the west of Local Environment Plan (LEP) heritage homestead of “Overdeen” on Overton Road (which is owned by the Bengalla Mining Company).

A section of Overton Road would be relocated to the east of the proposed rail alignment with a road bridge over the line to maintain access to the existing residences (see Figure 4.2 – inset B).

Between “Overdeen” and “Overton” Homesteads, the alignment turns south-east to traverse across the Hunter River floodplain and connect with existing Muswellbrook-Ulan Rail Line, which is also located in the Hunter River floodplain.

Railway signals would be located on the spur/loop and within the Australian Rail Track Corporation Ltd (ARTC) rail corridor as required to control trains entering the Muswellbrook-Ulan Rail Line.

The rail spur would be designed to meet ARTC standards, including cut and fill in some areas of its proposed easement with rock ballast (incorporating flood management structures) forming the spur and loop embankments. While not a specific night-lighting mitigation measures, those locations where the Modification rail spur is located in cuttings would reduce both direct lighting and indirect lighting impacts due to the physical containment of the cutting walls.

The engine and coal carriages would be intermittent elements with up to nine scheduled departures per day. As the mine operates 24 hours per day, train head lighting would be an additional visual factor, with some potential for headlight spill into Muswellbrook.

The rail spur and rail loop would be constructed at suitable grades for the train movement and include some sections of cut and fill. The section of the rail spur parallel to Overton Road is predominantly in cut whereas the section of the rail spur that crosses the floodplain would be on fill. Disturbance required for the rail spur would create some landform contrast with associated colour contrast in the cuttings and fill embankments. The contrast would be similar to that created by the existing Muswellbrook-Ulan Rail Line and approved Mount Pleasant Operation rail spur and loop.



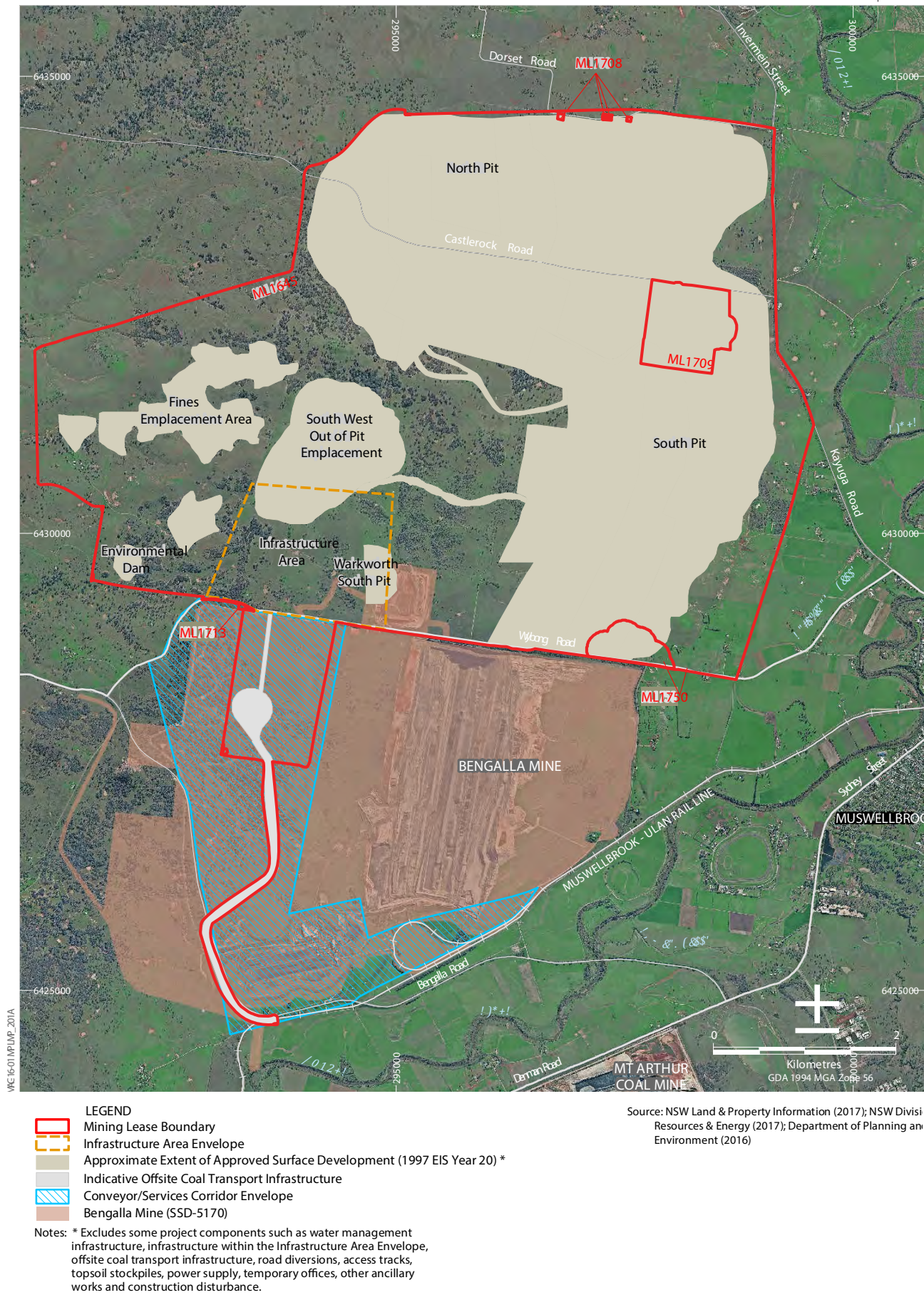


Figure 4.1 | General Arrangement of the Mount Pleasant Operation



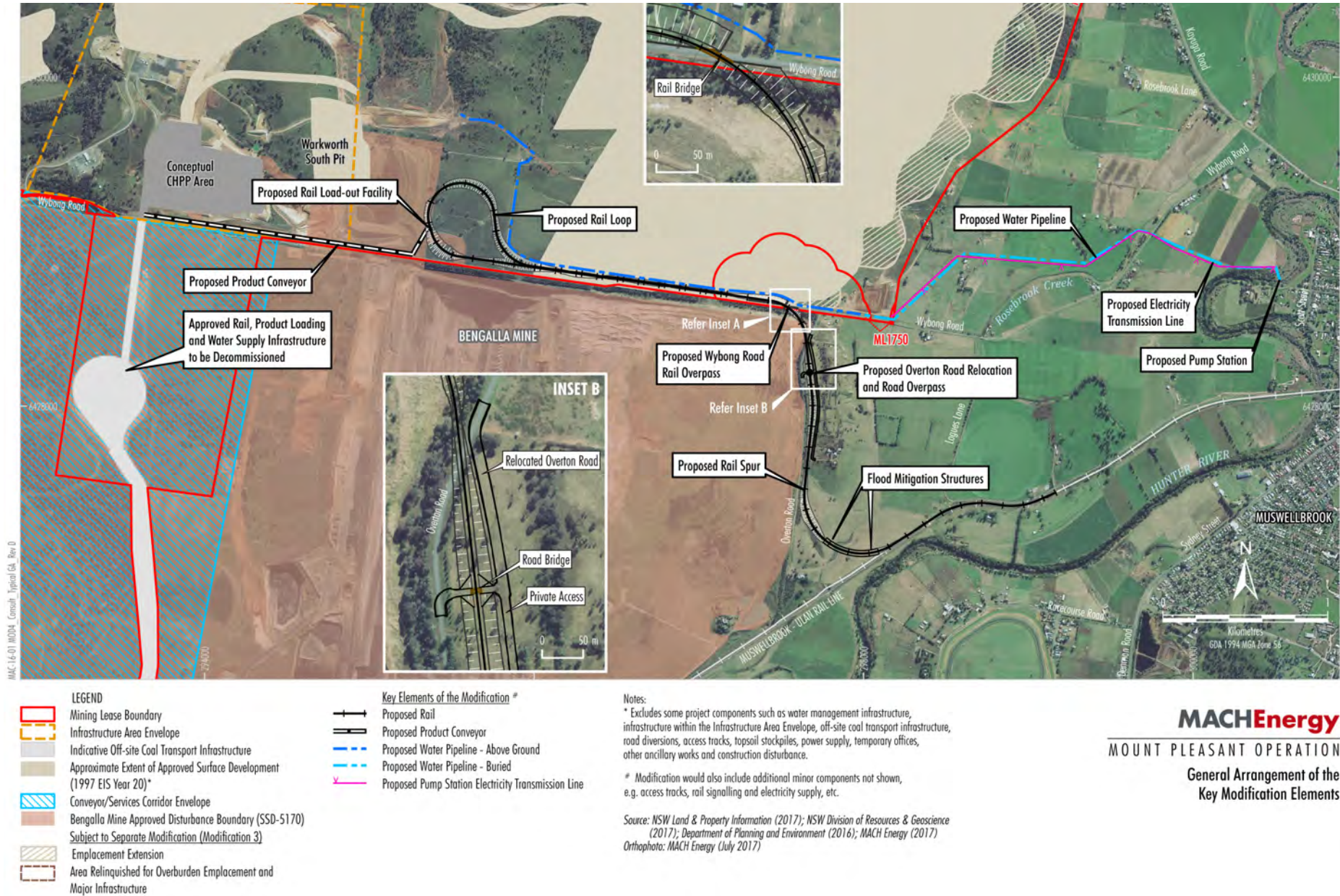


Figure 4.2 | General Arrangements of Key Modification elements



The proposed railway overpass over Wybong Road is discussed in Section 4.6.

#### 4.3.1 Visual Characteristics

Horizontal, linear familiar infrastructure consistent with other local rail lines in scale, materials and general visual character. Initially, metals would be more reflective. Over time, metal surfaces would oxidize, reducing the reflectivity and visual contrast of metal rail line components.

Any new railway signals are small vertical elements consistent with existing railway signals evident in existing rural landscape (see Figure 4.3).

#### 4.3.2 Visual Effects

The visual effect of the rail spur and loop would be low where it follows the alignment of the visual bund along Wybong Road and for works at both the mine site and at the junction with the Denman-Muswellbrook section of the Hunter Valley Rail Network as those elements already exist in that location.

The visual effect would initially be high for cut and fill batters as well as box cuts associated with establishing the rail spur, especially to the east of the intersection with Overton Road and Wybong Road. However, this visual effect would be reduced to low when rehabilitation is completed.

The road works associated with Overton Road relocation would have a high visual effect for those using Overton Road to access mine-owned residences due to the prominence of alterations to visual landscape within their view.

The visual contrast of the Wybong Road overpass would be high in the immediate foreground for those travelling along Wybong or Overton Roads.

### 4.4 Associated Rail Load-out Infrastructure

The conveyor, rail loop and rail loading systems would be located immediately north of Wybong Road. The previously approved position was south of Wybong Road but with greater set back. The components would be consistent with the approved rail load-out infrastructure and would be located within comparable mine site contexts (see Figure 4.4).

#### 4.4.1 Visual Characteristics

The visual character is consistent with the approved rail load-out infrastructure.

#### 4.4.2 Visual Effects

Visual effects would be similar to those of the approved rail load-out infrastructure; scale and viewing perspective may be altered due to rearrangement in the proposed location. The changes would be viewed from Wybong Road in the context of an approved mining operation.

### 4.5 Water Pumping Station and Pipeline and Overhead Electricity Transmission Line

The proposed pumping station is located adjacent the Hunter River, generally west of and opposite of Lower Hill Street. An underground water pipeline and parallel overhead electricity transmission line connect the pumping station to Mount Pleasant Operation; the water pipeline becoming above ground near the south-eastern corner of the Mount Pleasant Operation Mining Lease boundary near Wybong Road.

#### 4.5.1 Visual Characteristics

The pump station facility would largely be above ground but would also include submerged pumps and a water inlet system adjacent to the Hunter River. The pump infrastructure and enclosure would be of small industrial character, clad in natural tones (greens and creams) and built on a concrete pad.

A 22 kiloVolt (kV) overhead electricity transmission line from the Mount Pleasant Operation substation would supply the pump station with electricity. The overhead transmission line would consist of timber vertical and cross arms used to support suspended cables. The alignment would generally follow the underground pipeline to the Mining Lease boundary.



Figure 4.3 | Typical existing Muswellbrook-Ulan rail signal components



Figure 4.4 | Typical CHPP components



Figure 4.5 | Above ground pipeline under construction

#### 4.5.1 Visual Effects

The pumping station would have a moderate visual effect due to contrasting shape and form in the context of a riparian/agricultural landscape. Scale and character would be similar to agricultural irrigation machinery being utilised in local pastoral areas and other existing mine water supply infrastructure. Visual effect may be reduced by existing vegetation prevalent at pumping location adjacent to the river bank.

The underground pipeline would have a low visual effect, while under construction due to contrasting colours of ground disturbance (Figure 4.5). This would reduce to negligible once ground cover/grasses are reestablished along the disturbed trench line.

The overhead transmission line would have a low visual effect as it would be similar in appearance to other local overhead transmission lines.

### 4.6 Wybong Road Overpass

Subject to detailed design, it is anticipated that a rail bridge would be constructed over Wybong Road. The conceptual design of the rail bridge over Wybong Road comprises a single span precast girder or steel composite bridge and piled abutments with reinforced earth walls either side of Wybong Road, allowing for approximately 4.6 metres (m) vertical and 10 m horizontal clearance for vehicles travelling along Wybong Road.

#### 4.6.1 Visual Characteristics

The overpass would be similar in scale and character to rural road/rail bridges seen elsewhere throughout Hunter Valley.

#### 4.6.1 Visual Effects

As the overpass would contrast with existing open rural landscape and create a visual barrier to views along Wybong Road, visual effect is determined to be Type 2 High to Moderate dependent upon viewing distance from the overpass.

### 4.7 Headlights – Night Lighting

The train headlight path has been calculated to reach Muswellbrook from a distance of over 4 km (Figure 4.6). This is an ephemeral component lasting limited periods at night. Frequency is low as there is a total of up to nine coal loadouts per 24 hour period. Notwithstanding, the headlight spill has been mitigated with screens as described in following section.

### 4.8 Headlight Screens

MACH Energy proposes to establish visual screens to mitigate the potential light spill of train headlights affecting Muswellbrook. The screens would be constructed in three locations on the Wybong Road section of rail spur. There are two variations in the screen format (see Figure 4.7):

- Overhead light screens – portal screens to block light from trains travelling east along the rail spur parallel with Wybong Road.
- Overpass light screens – ground level - located at curved section of rail spur to block light from trains turning south across Wybong Road.

#### 4.8.1 Visual characteristics

Overhead light “Portal” screens would extend across the rail spur at two locations along Wybong Road. Width and height for the two screens vary dependent upon position and light mitigation requirements. Type A is taller but narrower than Type B.

Overpass “Ground Level” light screens comprise multiple frames in a continuous fence on the eastern side of the rail spur as it turns south across Wybong Road. Figure 4.8 shows images taken from another comparable project, which illustrates the visual character of the ground level screens *in situ*.



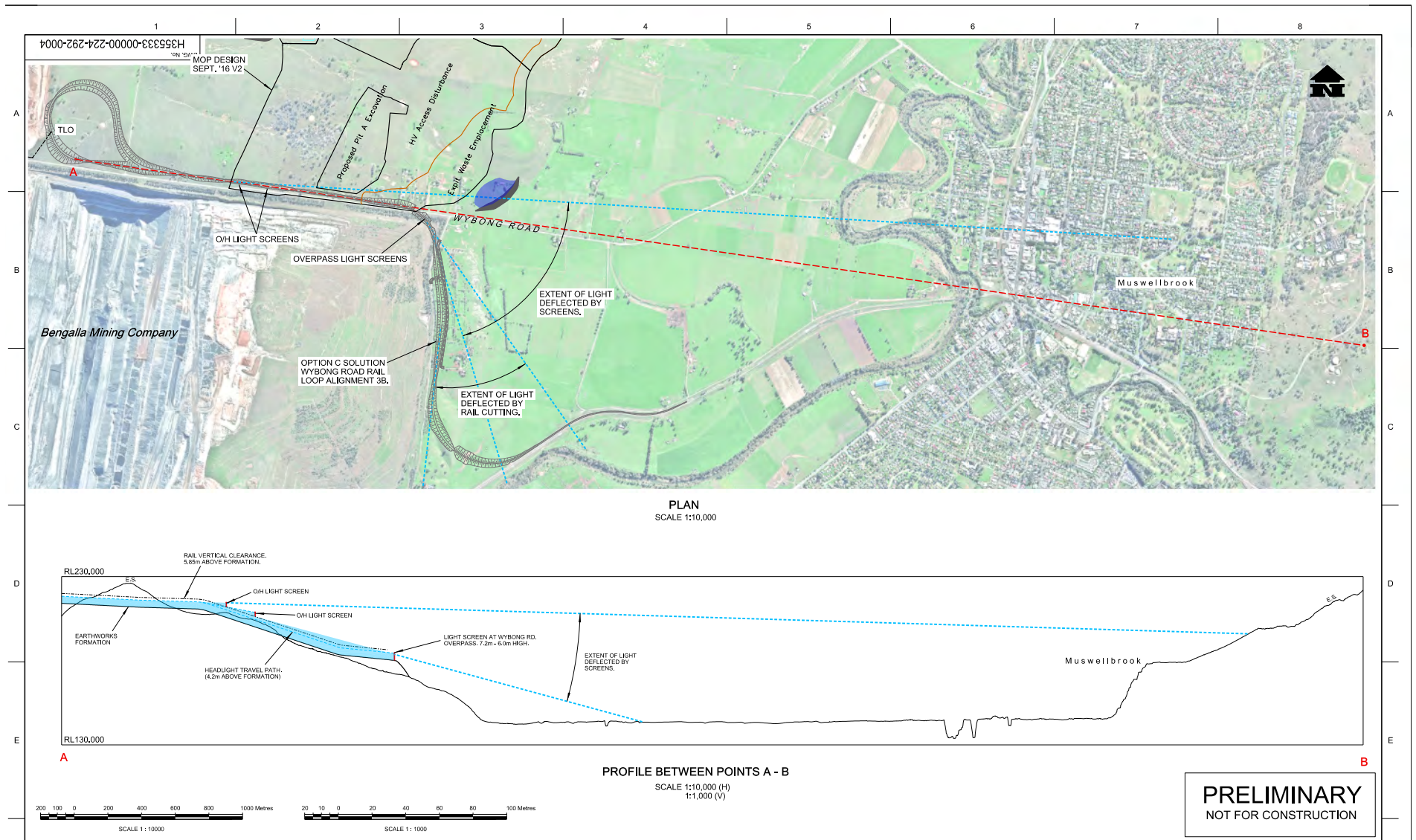


Figure 4.6 | Headlight Profile

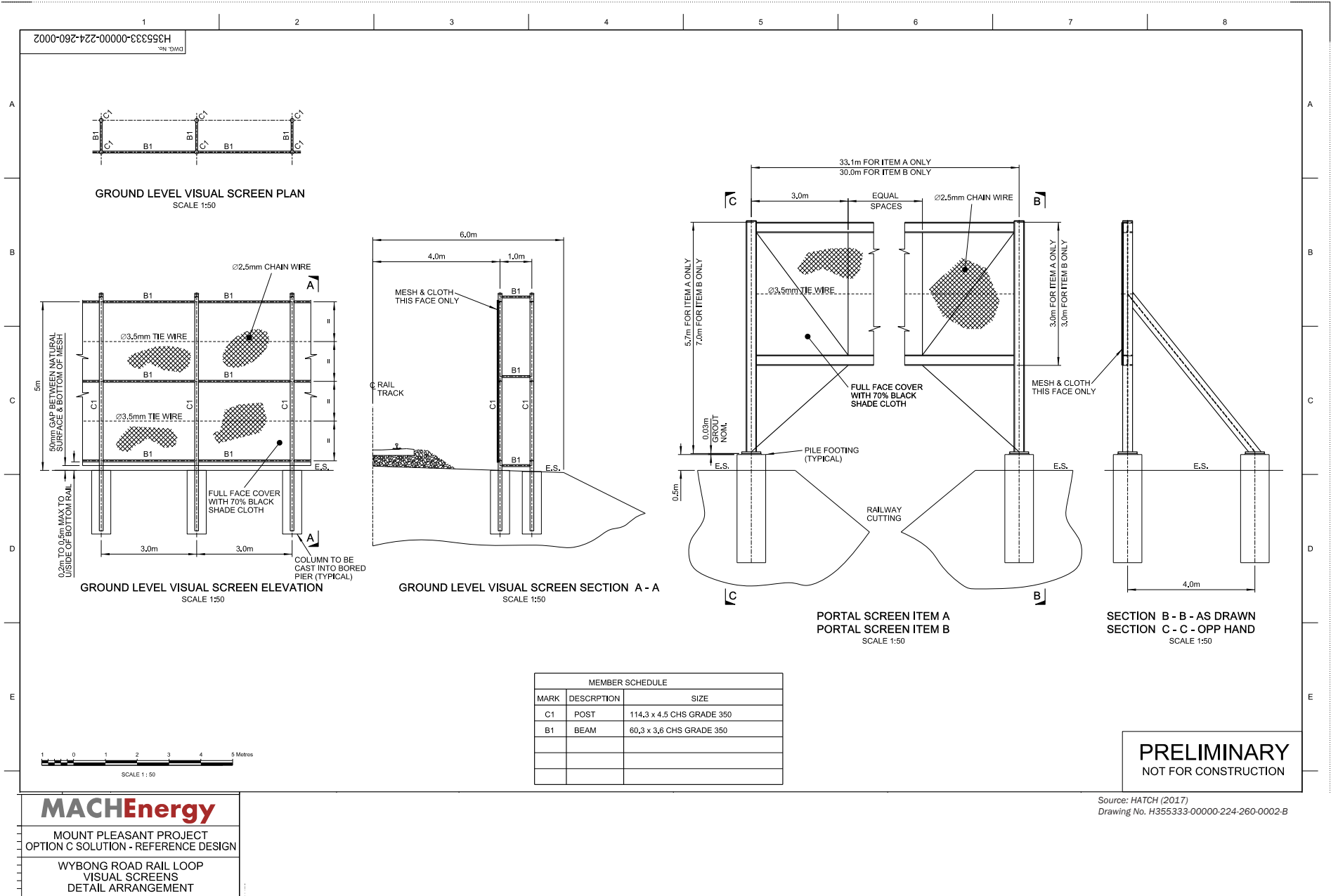


Figure 4.7 | Overhead light screens - detail arrangement

Both screen formats would be constructed of a galvanised metal frame supporting a chain wire mesh and dark green shade cloth screen to western face. Dark green shade cloths would be used to reduce visual contrast and increase integration with the surrounding areas.

#### 4.8.1 Visual Effects

The visual effect of the headlight screens would be high as the materials, black colour, form and scale contrast with existing landscape. The black screens would be large and visually incongruous components within this rural setting. The ground level overpass screen would create the highest visual effect due to the overall width and height of these structures. At up to approximately 7 m in height, visual mitigation measures to filter views to these components may be 3 to 4 years before achieving any integration with surrounding landscape.

### 4.9 Rehabilitation

With respect to the removal of redundant infrastructure within the footprint of the Bengalla Mine open cut, no regrading of the rail spur and loop batters, replacement of topsoil or other rehabilitation measures would be implemented in areas that would subsequently be disturbed by the Bengalla Mine.

Rehabilitation of the Modification disturbance areas would be consistent with DA 92/97 and *Mount Pleasant Operation – Mining Operations Plan (MOP)* which would be updated should the Modification be approved.

The Modification would not materially alter the final landform of the Mount Pleasant Operation. At the cessation of mining operations it is anticipated that the conveyors and rail infrastructure would be removed, the rail corridor cut and fill areas regraded and the rail corridor and rail loop would be rehabilitated.

This outcome would be subject to consultation with regulatory agencies including the Muswellbrook City Council and the Division of Resources and Geoscience with respect to final land use of the mine site (i.e. the rail infrastructure could alternatively represent a valuable facility for use by other intensive employment generating industries). MACH Energy would also consult with the Bengalla Mine (with respect to Bengalla Mine land that is the subject of the Modification).





Source: HATCH (2017)



Source: HATCH (2017)

**Figure 4.8 | Ground level headlight screens and rail line - visual characteristics**

This image conveys the finished appearance of the rail spur and broad horizontal ground level headlight screens proposed for location adjacent the Wybong Road overpass. Included in this view are the linear rail lines, rock ballast embankments, metal frame structure and black mesh screening.



## 5. VISUAL SENSITIVITY

### 5.1 General

Visibility to the Modification depends on factors such as topography and vegetation, and views from the existing and approved components of the Mount Pleasant Operation including the approved visual impact mitigation measures (e.g. visual bunds).

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 boundary of the Primary Visual Catchment for the Modification and various view sectors are illustrated in Figures 5.1 and 5.2 and defined below:

- The Central View Sector that includes the Modification and surrounding rural areas on foothills and flood plain;
- The Northern View Sector that includes the town of Kayuga;
- The Eastern View Sector that includes the town of Muswellbrook and adjoining foothills;
- The Southern View Sector that includes the foothills south of the Hunter River Floodplain; and
- The Western View Sector that includes the ridgeline of the foothills in the vicinity of Denman Road.

### 5.3 Viewing Locations – General

In the vicinity of the Modification there are a number of potential viewing locations. These include:

- Town area of Muswellbrook particularly elevated areas orientated west;
- Rural residences these are usually more isolated properties scattered throughout the adjacent region, and sometimes elevated to take advantage of views across the Hunter River flood plain;
- Recreation areas and Tourist Facilities such as Muswellbrook Racecourse;
- Roads the major road through the Primary Visual Catchment is the New England Highway. Regional roads include Wybong Road, Bengalla Link Road and Denman Road, in addition to smaller local roads; and
- Historic homesteads of 'Overton', 'Overdeen', 'Bengalla' and 'Balmoral'.

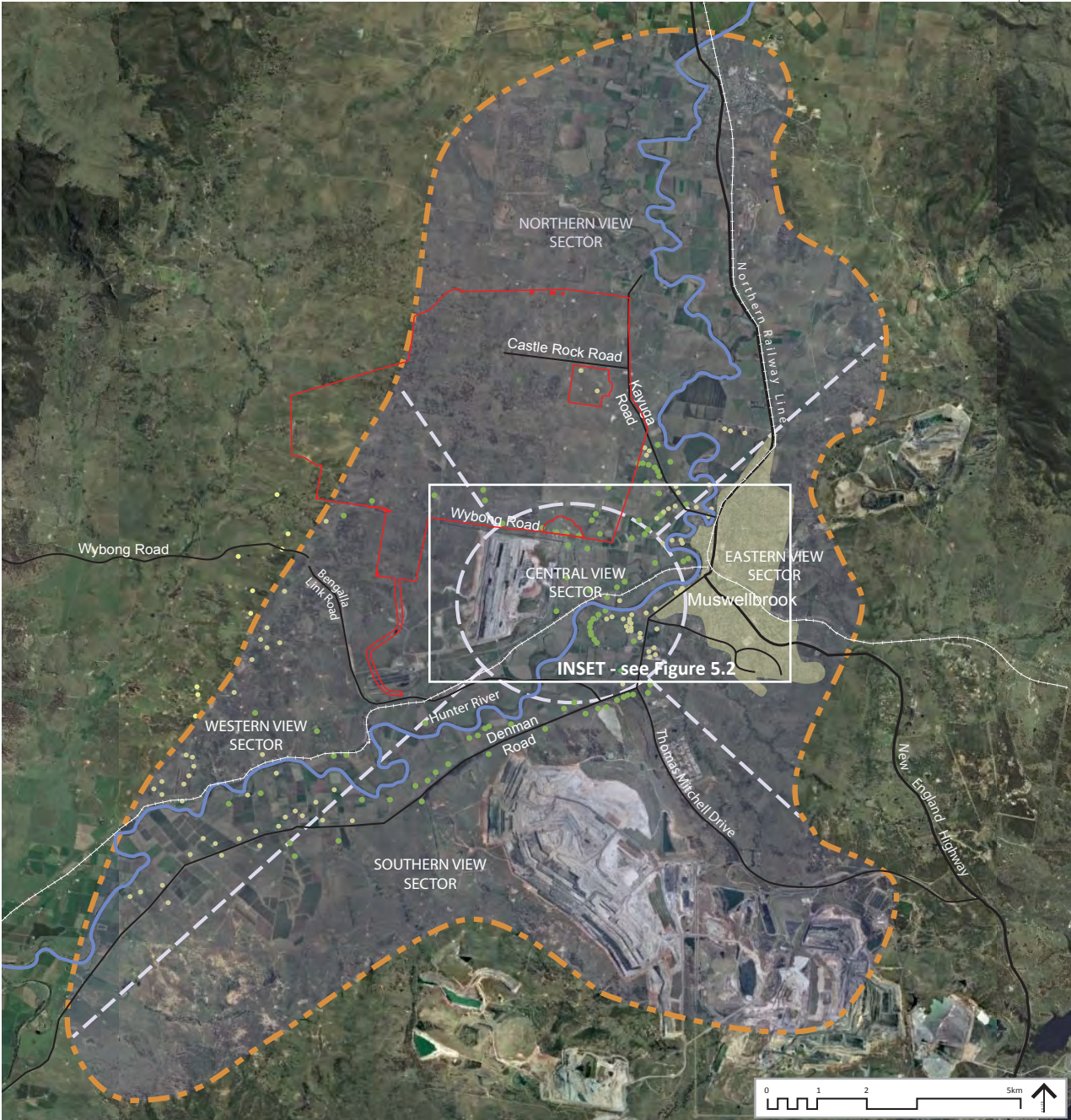
For the purposes of this assessment, computer generated photomontages have been developed from three key sensitive viewing points within the Primary Visual Catchment to illustrate the potential visual effect of the Modification (refer Section 6). Potential views from some additional locations have been illustrated using photographs taken during the site visit.

### 5.4 Visibility Considerations

#### 5.4.1 Visibility

The influence of vegetation and tree cover at the point of viewing has the potential to screen views to the Modification and approved Mount Pleasant Operation (refer Figure 5.3). Vegetation close to the approved Modification would also influence visibility due to the modest scale of the rail spur and headlight screens (refer Figure 5.4). There is opportunity to mitigate potential visibility through strategic visual mitigation planting.

In Muswellbrook, viewing opportunities of the Modification are limited to elevated areas of the township, as lower view locations are screened by adjoining buildings, gardens and street trees. 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 elevated locations (Figure 5.5).



Source: Aerial photography - Google Earth Pro (2017)

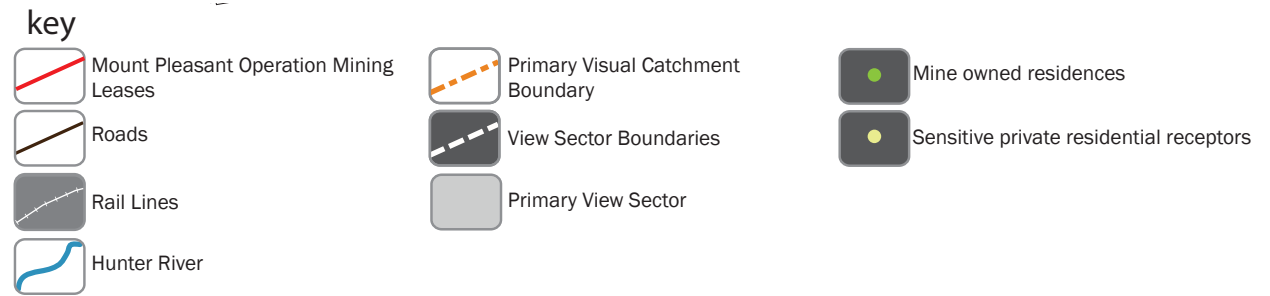
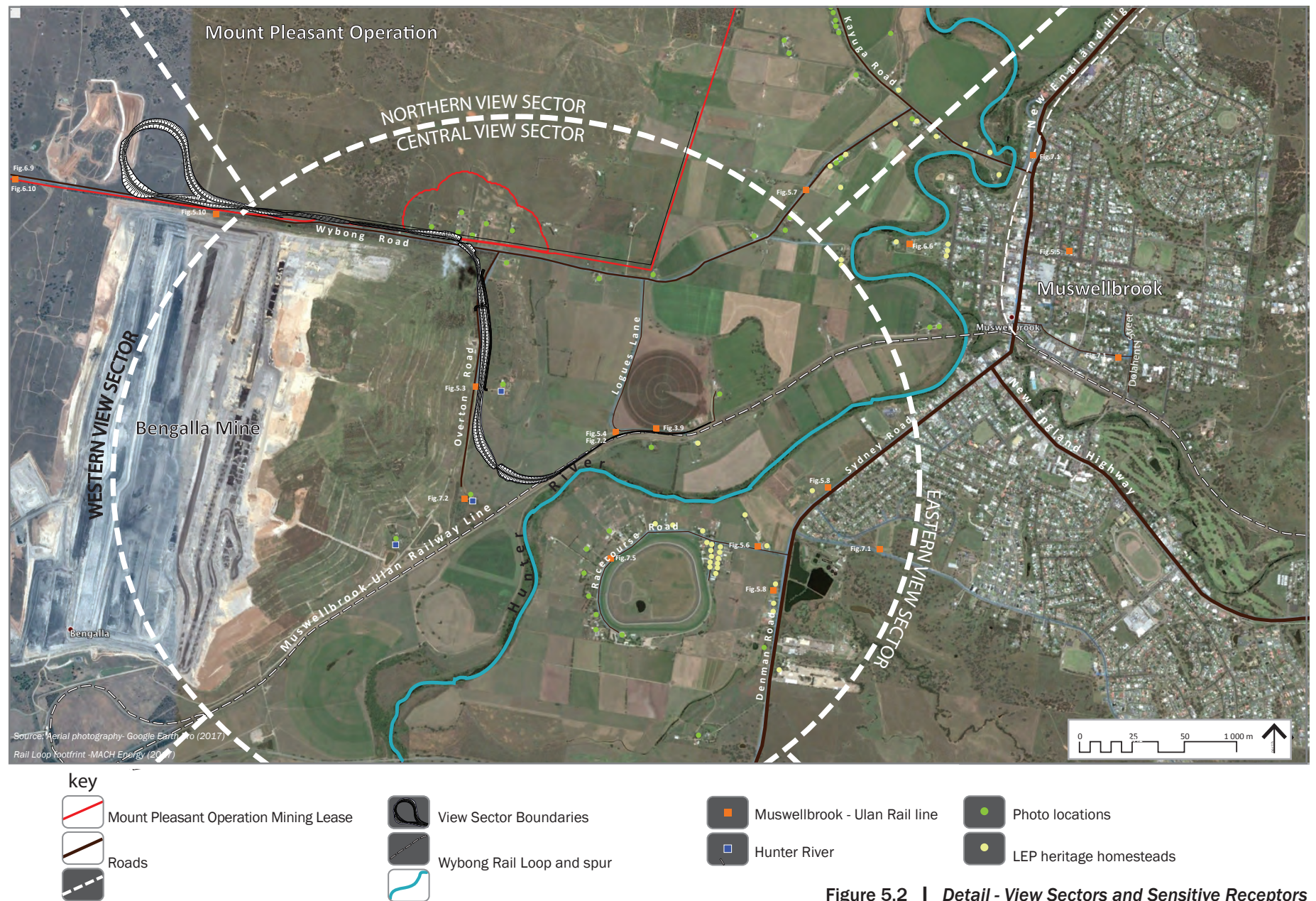


Figure 5.1 | View Sectors and Private Receptors





**Figure 5.2 | Detail - View Sectors and Sensitive Receptors**





**Figure 5.3 | Tree Cover at Point of Viewing**

Trees alongside a viewing location can provide more effective screening/filtering to distant views. This view is of existing roadside vegetation on Overton Road adjacent the proposed Modification location.



**Figure 5.4 | Tree Cover at Site**

Existing woodland in the vicinity of the Modification, while achieving landscape pattern outcomes, lack the size to initially screen larger elements such as headlight screens.

## 5.4.2 Land Use Sensitivity

Land use in the vicinity of the Modification varies, which influences the sensitivity of receptors. Land use activities include a range of agricultural pursuits, rural residences, suburban residential areas, tourism and recreation locations, road and rail corridors, as well as coal mining. 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 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 modification component with a moderate sensitivity resulting for homesteads further away. In the same way, recreation and tourist facilities, 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 receiving a low sensitivity (Figure 2.2).

Visual sensitivity to the Modification remains constant as it is a relatively smaller scale component of the overall approved Mount Pleasant Operation. The relatively small scale changes to land profiles due to cut and fill embankments have a minor affect on the extent of visual sensitivity in the view catchment. The actual visual impact relates to the overlay of visual effect of the Modification over time due to the approved rehabilitation regime and any additional visual mitigation responses to the Modification. This is discussed further in Section 6: Visual Effect.

## 5.5 Central View Sector – Visibility and Visual Sensitivity

The Central View Sector contains the Modification and includes a number of sensitive receivers in the form of rural residences along Racecourse Road, Overton Road, Wybong Road, Sydney Road and other minor roads off these roads.

Views to the Modification would vary dependent upon the location of the receptor within the view sector. Hunter River riparian vegetation creates significant visual screening from some locations. Other closer sensitive receptors have direct unimpeded views towards to Modification infrastructure components.

### 5.5.1 Rural Residences

Rural residences on the floodplain at Wybong Road, Racecourse Road, Sheppard Avenue and Sydney Road would have a high sensitivity depending on the extent of visibility to the Modification.

Visibility to the Modification from this sector is variable. Residences in the vicinity of Racecourse Road are the closest to the Modification in the Visual Character Unit (less than 1 km at the closest point). These residences experience views similar to the rest of the floodplain with potential for long views over flat topography except where intervening vegetation provides filtering and screening of views. Views of the Modification from privately owned receptors on Racecourse Road would be minimal due to the presence of screening vegetation along the intervening Hunter River, which currently screens views of the existing Muswellbrook-Ulan Rail Line (see Figure 5.6).

Residences along Wybong Road are less than 2.5 km from the Modification and some would have direct views onto the headlight screens, rail spur and embankments, trains and any potential lighting spill. As a result, residences along Wybong Road have a high visual sensitivity.

Views of the Modification from the Racecourse are limited by intervening vegetation and topography (see Figure 5.6). The Modification visual character and scale is also consistent with the existing Muswellbrook-Ulan Rail Line, thereby reducing contrast of components within existing landscape resulting in reduced visual sensitivity.

Residences and recreation uses in this location have been assigned a high sensitivity rating.

The Modification infrastructure elements would also be visible from 'Overton' and 'Overdeen' heritage listed homesteads on Overton Road, however both properties are mine owned residences.

### 5.5.2 Roads

Parts of main roads (Sydney Road and Denman Road) lie within 2.5 km of the southern section of the rail corridor. However, views of this infrastructure would be limited by existing intervening vegetation in most locations. Where there are views to the more elevated components such as headlight screens, 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).





**Figure 5.5 | Views from Elevated Locations**  
Elevated viewing locations bypass the effects of foreground screens of vegetation or other buildings, to obtain views to distant elements.



**Figure 5.6 | View from Racecourse Road - Central View Sector**  
Views are towards Modification area.

Minor roads, including 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 Modification.

Parts of Wybong Road would have direct views of most of the Modification elements including rail spur and loop and headlight screens to the north of the road. The overpass across Wybong Road is significant as it would partially obstruct views east towards Muswellbrook while introducing a new visual element to Wybong Road. As a minor road, it has a low sensitivity land use.

## 5.6 Northern View Sector – Visibility and Visual Sensitivity

The Northern View Sector includes a number of sensitive receivers in the form of rural residences along Wybong and Kayuga Roads and other minor roads, as well as the New England Highway and the Northern Railway Line.

Views to the Modification infrastructure elements from the Northern View Sector would be limited due to the screening of the area from the north by intervening topography and vegetation.

The Northern Sector contains parts of:

- Hunter River Floodplain Visual Character Unit; and
- Foothills Visual Character Unit.

### 5.6.1 Hunter River Floodplain

The Hunter River Floodplain supports a number of rural lots with improved pasture and cropping land, along with scattered rural residences along roadways. The adjoining foothills to the north of the Modification screen many of these residences. The open nature of the floodplain and associated rural lots in other areas means views in any direction are unobstructed by topographical features.

Geoffrey Britton and Associates (1997) determined that high visual impacts would occur at rural properties on the floodplain due to the development of the Eastern Out of Pit Emplacement (including the initial development of the outer face) and the initial development of the active mining areas.

Views for any residence that is orientated toward the Modification would mainly be onto the above ground headlight screens associated with the overpass on Wybong Road. Visibility to other at grade linear components of the Modification, such as the rail spur, would be minimal due to intervening vegetation and topography (see Figure 5.7).

Other ephemeral components, such as the coal trains traveling along higher ridgeline past Overton Road, would also be in the view for intermittent intervals up to nine times per day.

Residences with views of the Modification have been assigned a high sensitivity.

### 5.6.2 Foothills

There are a limited number of residences in the foothills. Most are screened by the adjoining topography to the west of Kayuga Road. Some closer residences adjacent to Wybong Road are owned by Bengalla Mining Company or Mount Pleasant Operation. These mine owned residences have views of the proposed rail spur.

### 5.6.3 Roads 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. As they run alongside or within the Hunter River Floodplain, the views in a south-westerly direction from the road and rail spur are often unobstructed. At the closest point within the Northern View Sector they are over 5 km away.

Views of the Modification from Overton Road would be limited to the elevated components such as headlight screens, overpass, and rail spur along Overton Road ridge as it turns south.

As the road and rail spur travel closer to the Modification, their sensitivity levels would increase. Within the Northern View Sector, sensitivity would remain moderate due to distance and limited visibility to the Modification.





**Figure 5.7 | View from the north**  
Views from Wybong Road in the Northern View Sector are generally screened by existing roadside vegetation.



**Figure 5.8 | View from the east**  
Views from Sydney Road towards the Modification are generally screened by riparian vegetation.

## 5.7 Eastern View Sector – Visibility and Visual Sensitivity

This sector contains the highest number of potentially sensitive receivers. This relates to the residential nature of Muswellbrook, the parts of commercial centre and the tourist/main road function of the New England Highway.

Visibility to the existing approved mining operations in the region is high due to the town's partially elevated topography and western orientation. Visibility of the Modification is limited due to the smaller scale and differing characteristics of its components.

Elevated components of the Modification which include the headlight screens, overpass and rail spur along Overton Road ridge as it turns south, and ephemeral components described in Section 5.6.1, would be visible from the Eastern Section.

### 5.7.1 Hunter River Floodplain and Foothills

These Visual Character Units contain parts of the New England Highway, Sydney Road and some minor roads including Kayuga Road and Skellatar Stock Route. These roads support rural residences.

Other isolated rural residences are those directly to the east and north. Those residences along Kayuga Road and parts of Sydney Road and to the east of the highway (that are not mine owned) have been ascribed a high sensitivity due to their proximity and orientation to the Modification, and their sensitive land use type.

### 5.7.2 Muswellbrook

The approved visual impact and viewer sensitivity of receivers in Muswellbrook were both determined to be high (Geoffrey Britton and Associates, 1997). Since preparation of the 1997 EIS, residents of Muswellbrook may have become more accustomed to significant modifications to the landscape due to the ongoing development of the Bengalla and Mt Arthur Coal Mines. However, tourists visiting Muswellbrook may not be accustomed to views of mine operations.

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

The exceptions are parts of South Muswellbrook that have a southerly aspect and view in the vicinity of the Skellatar Stock Route and Calgaroo Avenue.

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 Modification. Where these houses are less than 7.5 km from the Modification, sensitivity is moderate to high. Where there is adjacent screening, the sensitivity of these residences may decrease to moderate and low.

The Modification would be visible for some residences around Ironbark Road, particularly the vertical headlight screens, as foreground vegetation is limited. These residences are less than 7.5 km from the Modification. The elevation of this area also places viewing locations above topography and vegetation screening resulting in high sensitivity levels.

Residences in North Muswellbrook would generally have high sensitivity due to visibility to the Modification including the headlight screens.

### 5.7.3 Roads

There would be views to the Modification from the New England Highway entering Muswellbrook from the south-east. Views from this location are further than 2.5 km from the Modification in this view sector resulting in high to moderate sensitivity. Sydney Road within the sector is also less than 2.5 km and travellers would have limited views from the road due to existing intervening vegetation, resulting in moderate sensitivity (Figure 5.8).

Geoffrey Britton and Associates (1997) determined that high visual impacts would occur to people travelling on the New England Highway as a result of the approved Mount Pleasant Operation.

## 5.8 Southern View Sector – Visibility and Visual Sensitivity

### 5.8.1 Hunter River Floodplain & Southern Foothills

Denman Road, parts of Thomas Mitchell Drive and Edderton Road, and the historic homesteads of ‘*Edinglassie*’ and ‘*Rous Lench*’ occur within this sector over 2.5 km to the south of the Modification.

The most sensitive view locations include a small number of residences (refer Figure 5.1) approximately 3 km from the Modification on the northern edge of the view sector on Denman Road. These locations and similar areas with open views to the Modification would have high sensitivity up to distances of 7.5 km. Views to the Modification would be limited due to the scale of the Modification components and distances.

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

### 5.8.2 Edinglassie and Rous Lench

These homesteads are located on Denman Road approximately 2 km from the Modification rail/spur junction with the existing Muswellbrook-Ulan Rail Line. These homesteads would have no views to the Modification due to screening from Bengalla Mine Emplacement Area, local intervening topography and vegetation.

### 5.8.3 Denman Road Rural Residential

The private residential properties along Denman Road within this sector are approximately 2.5 km away from the southern extent of the Modification.

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

Properties further south are elevated allowing long views towards the Modification. Properties oriented north and north-west have direct views of the Modification (see Figure 5.9). Some properties already have dense foreground vegetation around the residences which may limit views to the Modification.

Sensitivity levels would therefore be moderate to high for properties less than 7.5 km away from visible modification areas, 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 Modification.

### 5.8.4 Roads

The main road running through this sector is Denman Road. Other roads include Edderton Road and Thomas Mitchell Drive.

Driving north, the intersection of Thomas Mitchell Drive with Denman Road has roadside vegetation, which filters views towards the Modification 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 Modification. Vegetation in the middle ground filters visibility of Modification components during the day. Train headlights may be visible intermittently at night as there are no headlight screens for light spill in this direction.

Edderton Road would not have views to the Modification due to the existing Bengalla Mine Emplacement Area and intervening vegetation along the floodplain.

Some residences along Denman Road would continue to have views to both the approved Mount Pleasant Operation and the Modification resulting moderate to high sensitivity for residences and moderate sensitivity for Denman Road.

Thomas Mitchell Drive is more than 2.5 km away from the Modification and orientated towards the Modification; it therefore has a moderate sensitivity. The sensitivity for other local roads is moderate to low.

## 5.9 Western View Sector – Visibility and Visual Sensitivity

The few potential view locations within this sector are associated with Wybong Road. All other roads in this view sector would be screened from the Modification by existing topography or existing Bengalla Mine Emplacement Area.

The majority of rural residences in this view sector are either owned by mining companies or have low visual sensitivity

due to a lack of views to the Modification due to Bengalla Mine or local topography.

View locations are on elevated sections of Wybong Road (see Figure 5.10). There would be views of the rail loop and spur, three headlights screens from the west and the rail overpass across Wybong Road.

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

### 5.10 Changes to Visibility/Sensitivity Created by the Modification

The visibility and sensitivity to the Modification varies within the sectors. The Northern Sector is dominated by the approved Mount Pleasant Operation, creating low sensitivity based on approved land use.

The Eastern View Sector contains the high sensitivity town of Muswellbrook and locality of Kayuga. Foothills within the Mount Pleasant Operation screen Kayuga. Parts of Muswellbrook would have views to the Modification. A small elevated section of South Muswellbrook, including Ironbark Ridge Estate, would have views onto the Modification. Those areas with views would continue to have a high sensitivity.

The Southern View Sector is dominated by Denman Road. Some residences along Denman Road would continue to have views to both the approved Mount Pleasant Operation and the Modification resulting moderate to high sensitivity for residences and moderate sensitivity for Denman Road.

Sensitive receivers within the Western View Sector would be limited to vehicles traveling along Wybong Road. Roads within the sector have varying sensitivity based on distance and usage type. Views of the Modification would have greater vertical built profile than the existing view but overall scale would remain small due to viewing distances and within the context of approved mining activity.

### 5.11 Summary of Viewpoint Sensitivity

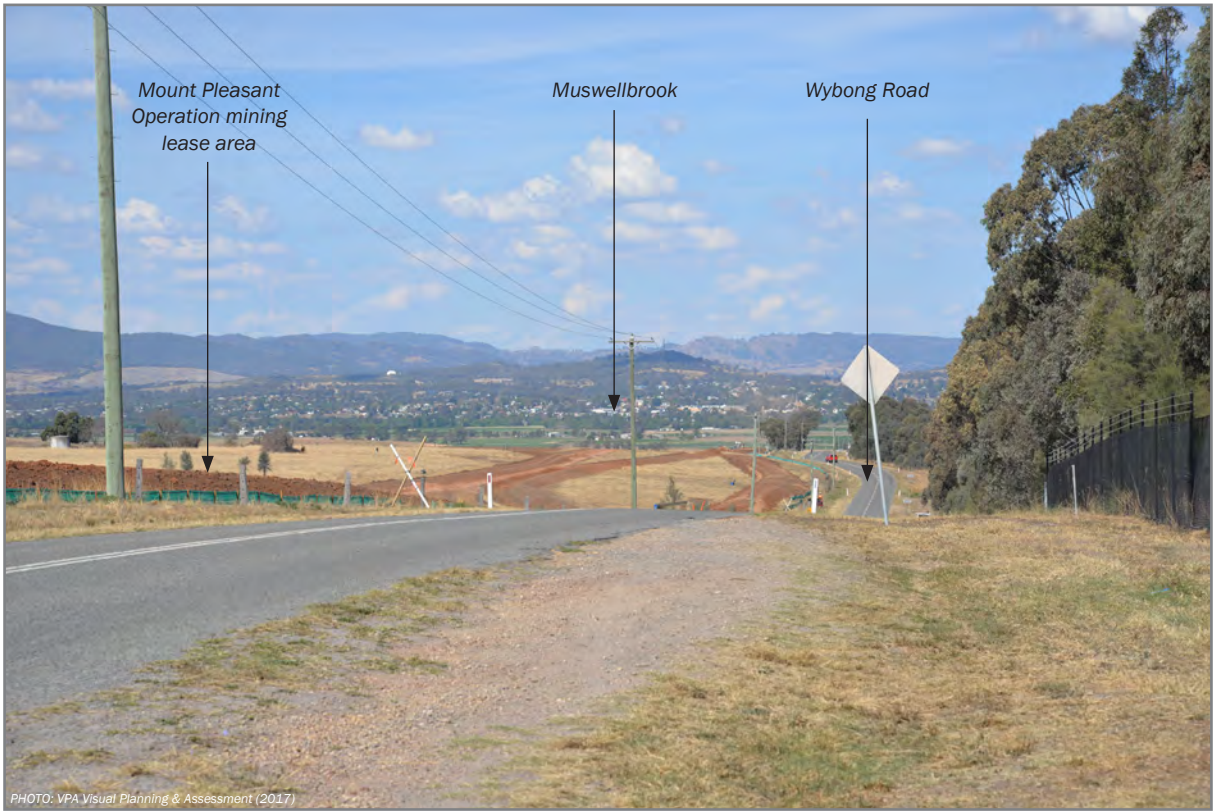
Table 5.1 provides a summary of the sensitivity of various viewpoints.





Loc 36

**Figure 5.9 | View from the south**  
Views from Denman Road towards Overton Road foothills (proposed Modification alignment) and flood plain containing existing coal haul rail line.



**Figure 5.10 | View from the west along Wybong Road**  
Views are towards Muswellbrook and proposed Modification alignment.



Receptor	Sensitivity of Land Use	Visibility to Modification		Visual Sensitivity
		Distance to nearest visible Modification Element	Visibility category	
<b>Central View Sector</b>				
Rural Residences on Floodplain	High	Less than 2.5 km	High	High
Racecourse	High	Less than 2.5 km	High	High
Wybong Road	Low	Less than 2.5 km	High	Moderate / Low
Denman Road	Moderate	2.5 to 7.5 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
<b>Northern View Sector</b>				
Rural Residences on Floodplain	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
<b>Eastern View Sector</b>				
Muswellbrook	High	2.5 to 7.5 km	Moderate	High/Moderate
Rural Residences on Floodplain	High	Less than 2.5 km	High	High
New England Highway	Moderate	2.5 to 7.5 km	Moderate	Moderate
Sydney Road	Moderate	2.5 to 7.5 km	Moderate	Moderate
<b>Southern View Sector</b>				
Rural Residences on Denman Road	High	2.5 to 7.5 km	Moderate	High/Moderate
Denman Road	Moderate	2.5 to 7.5 km	Moderate	Moderate
Thomas Mitchell Drive	Moderate	2.5 to 7.5 km	Moderate	Moderate
Edderton Road	Low	Not visible	Nil	Nil
<b>Western View Sector</b>				
Wybong Road	Low	Less than 2.5 km	High	Moderate to Low

Table 5.1 | Summary of Viewpoint Sensitivity

## 6. VISUAL EFFECTS

### 6.1 Introduction

The visual effect of the Modification would vary from key locations around Mount Pleasant Operation. Potential effects at a number of potential viewing locations in the Central, Northern, Eastern, Southern and Western Sectors and have been assessed through photomontage development. These viewpoints are representative of worst-case scenario views of the Modification obtained from those selected viewpoints as illustrated in Figure 6.1. Visual effects are determined using the methodology referred to in Table 2.1 – Visual Effects.

### 6.2 Central View Sector

The Sector is dominated by the existing Bengalla Mine Emplacement Area and the improved pasture cropping along the Hunter River floodplain in the eastern part of the sector. There are some rural residences scattered about the floodplain.

Residential properties along Racecourse Road, Sheppard Avenue and Sydney Road west are in close proximity to some Modification components. Some properties are associated with equestrian activity (horse studs and horse stables) potentially increasing the sensitivity of these receptors.

The rural lands adjoining the Modification support a number of rural residences along Wybong Road, Overton Road and Logues Lane.

Photomontage locations in Central View Sector:

- Wybong Road (VP1).
- Horne Residence (VP2).

#### *VP1 - Photomontage Wybong Road*

This view from Wybong Road looks west towards the Modification. The location is already west of the Mining Lease eastern boundary. The existing view includes Hunter Valley flood plain pastoral lands in the foreground and middle ground to left of view and foothills with scattered woodland and the Bengalla Mine Emplacement Area in the background.

Rural residential properties at the intersection with Overton Road can be seen centre view to the left of Wybong Road.

To the right of existing view, Mount Pleasant Operation has commenced work within approved mining lease, with clearing and earthworks underway along the north side of Wybong Road. This view includes an existing timber pole type overhead electricity transmission line parallel to Wybong Road (see Figure 6.2).

Geoffrey Britton and Associates (1997) determined that Wybong Road would be subject to high residual visual impacts (with the implementation of mitigation measures) from the following components of the approved Mount Pleasant Operation:

- visual bund emplacements;
- ancillary structures;
- active mine areas; and
- construction of the fine rejects emplacement.

The Modification is less than a kilometre from this location with a high percentage of the Focal View Area is occupied by the Modification (see Figure 6.3).

The visual effects of the earth works for rail spur cuttings and the embankments are high due to the scale, high levels of visual contrast and lack of visual integration with the surrounding landscape in the construction phase where bare exposed soils create high levels of colour contrast. This will reduce after post-construction rehabilitation of disturbed areas with cover crops improving visual integration. Use of alternative colour headlight screens as recommended in Section 8 further will lower contrast.

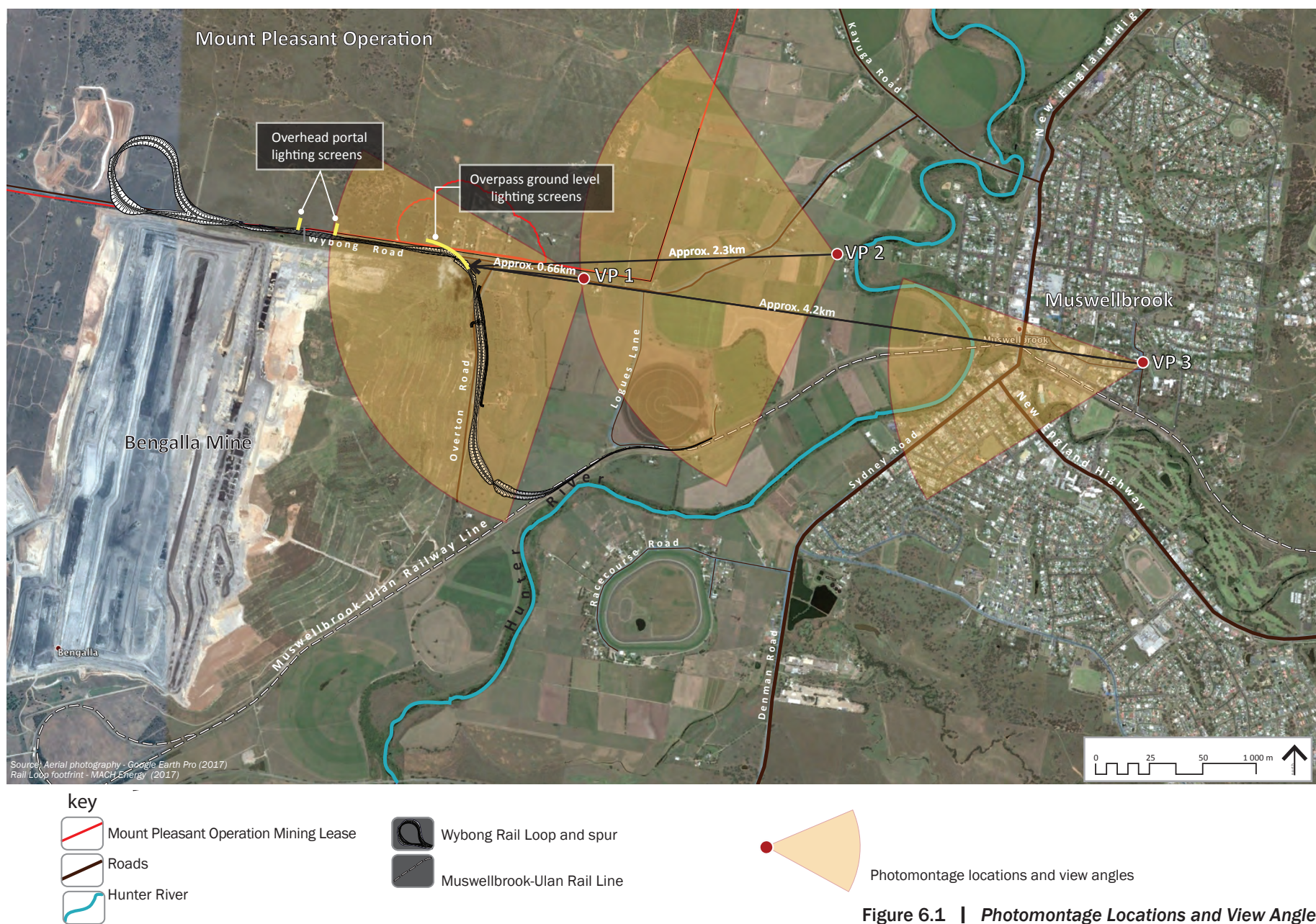


Figure 6.1 | Photomontage Locations and View Angles





Figure 6.2 | Viewpoint 1 - WYBONG ROAD - existing view



Figure 6.3 | Viewpoint 1 - WYBONG ROAD - proposed Modification

Figure 6.3 illustrates headlight screens well integrated into existing woodland from this viewpoint. The overpass is moderately contrasting with surrounding landscape character and partially screened by intervening vegetation.

From this distance, the view of embankments, screens and overpass would occupy approximately 4% of the total Focal View Area resulting in a Type 2 Low visual effect (refer Appendix A).

The above ground water pipeline may also be visible along the north side of Wybong Road when it enters the mining lease, however it would be viewed in the context of the approved Mount Pleasant Operation mining areas and supporting infrastructure located north of Wybong Road. Accordingly, it is anticipated the pipeline would have a low visual effect as it is consistent with existing mine elements in this view.

Other components such as overhead transmission line would have low visual effect, as they are consistent with existing elements in this view.

### *VP2 - Photomontage Horne Residence*

This view location is within private residence #35 (Horne Residence) on Wybong Road approximately 2.3 km to the east of the Modification (see Figure 6.4). The existing view includes Hunter Valley floodplain pastoral lands in foreground and middle ground on both sides of property driveway. Rural residential properties opposite on Wybong Road are seen to right of view. Riparian vegetation along the banks of the Hunter River limit views beyond to the left of view. Dominating the background centre view is Bengalla Waste Emplacement Area with Overton Road ridge discernable as line of woodland along the eastern face.

Geoffrey Britton and Associates (1997) determined that high visual impacts would occur at rural properties on the floodplain (including the Horne Residence) due to the development of the Eastern Out of Pit Emplacement (including the initial development of the outer face) and the initial development of the active mining areas for the approved Mount Pleasant Operation.

The view location is 2.3 km away from the nearest rail spur and headlight screens, and the Modification occupies a moderate percentage of the Focal View Area (see Figure 6.5).

The visual effect of the Modification is low due to the scale and moderate levels of visual contrast and integration with the surrounding landscape in the construction phase where bare exposed soils create high levels of colour contrast. As the approved mining activities have been previously assessed as having high visual effects, the incremental change of the Modification will not contribute significantly to the accumulative visual effects.

From this distance, the view of screens, earthworks for cuttings and embankments would occupy approximately 1.2% of the total Focal View Area (refer Appendix A). This will reduce after postconstruction rehabilitation of disturbed areas with cover crops improving visual integration.

The total of all visible Modification components from this location occupies less than 10% of the Focal View Area, resulting in a Type 2 Low visual effect.

## **6.3 Northern View Sector**

The Northern View Sector is dominated by rural cattle grazing land on rolling hills with some improved pasture cropping along the Hunter River floodplain in the eastern part of the sector. There are some rural residences along Kayuga Road. Of significance is the approved Mount Pleasant Operation that dominates the sector. This would create a strong visual effect and would screen the Modification from areas to the north.

The visual effect on the more eastern part of the Northern View Sector is generally unchanged as views are predominantly onto the intervening topography of ridges and riparian vegetation on the flood plain between view locations and the Modification.





Figure 6.4 | Viewpoint 2 - HORNE RESIDENCE - existing view



Figure 6.5 | Viewpoint 2 - HORNE RESIDENCE - proposed Modification



## 6.4 Eastern View Sector

The Eastern View Sector contains the most sensitive land uses and is dominated by the township of Muswellbrook. The rural lands adjoining the Wybong Rail Loop Study Area support a number of rural residences along eastern end of Kayuga Road. It also contains the New England Highway, a main road and tourist route through the Hunter Valley region.

The visual effect of the Modification would have varying visibility from the east, as surrounding buildings and vegetation, particularly on lower elevations, screen some view locations. The riparian vegetation along the Hunter River provides significant screening as seen in Figure 6.6, view taken near a private residence on Lower Hill Street at the western edge of this view sector.



**Figure 6.6 | Views west towards the Modification**

This sector has the most critical view locations and is representative of the greatest population, therefore contains the most relevant photomontage point. Viewpoint 3 (Figure 6.7) and following photomontage (Figure 6.8) provide a reference point for assessing sensitive views in elevated areas of the eastern sector.

The visual effects on the Eastern View Sector will result from the following:

- Construction activity associated rail spur and loop, Overton Road relocation, underground pipeline and overhead electricity transmission line (components previously not visible from many receptors in this view sector for the currently approved infrastructure);
- Cut and fill embankments to rail line and overpass, rock ballast embankments;
- Rail spur and signal lights;
- Coal train movement;
- Headlight screens erected to mitigate the night head lighting of east bound coal trains;
- Overhead electricity transmission line and above ground water pipeline;

Photomontage location within the Eastern Sector include:

- Muswellbrook High School - Foley Street/Dolahenty Street, Muswellbrook (VP3).

### *VP3 - Photomontage Muswellbrook High School - Foley Street/Dolahenty Street*

This view location is taken from adjacent the Dolahenty Street entrance to Muswellbrook High School, near the T-intersection with Foley Street. Included in view residential and commercial areas of lower Central Muswellbrook in foreground; middle ground is occupied by Hunter River floodplain and riparian vegetation between the town and the background foothills. Wybong Road is seen straight on between Bengalla Mine Emplacement Area dominating the background to left of Wybong Road, and existing Mount Pleasant foothills and early mining activity are to right and north. This is considered to be representative of potential views of the Modification from elevated locations in Muswellbrook.

From this elevated location, the ridgeline adjacent Overton Road is discernable from the horizontal band of woodland midway up the Bengalla Waste Emplacement area face (see Figure 6.7). Overton House is also in view from this viewing distance of approximately 4.2 km.

Visual effects of the Modification from this location are reduced by distance from visible components but sensitivity of receptors is high (see Figure 6.8). Components such as the water pipeline, transmission line, signal lights and rail line would be barely discernable. The larger components (Wybong Road overpass and headlight screens) would be visible, creating minor changes to that focal area of the view. This focus is due to the arrangement of the visual elements of Wybong Road being located centre view between two hills; this naturally draws the eye towards this location within the view.

At a distance of approximately 4.2 km, the Modification, including all ephemeral elements and headlight screens, has been conservatively calculated to occupy less than 1% of the Focal View Area (i.e. conservatively assuming all Modification components are visible). At this distance the visual effect of the Modification would be in a Type 1 Low (refer Appendix A).

## **6.5 Southern View Sector**

Rural lands dominate the Southern View Sector. Along the river floodplain, improved pasture cropping and some grazing dominate. Rolling rural hills to the south of Denman Road support vineyards and open grazing lands. There are a limited number of private residences within this sector occurring in the western edge of the sector along Denman Road.

The visual effects on the Southern View Sector would vary but would be limited. In the eastern portions of the sector, the views are onto the southern end of Overton Road ridgeline where the Modification would traverse the south-east face to join existing rail line on the floodplain.

The visual effects on the Southern View Sector will result from the following:

- Construction activity associated rail spur and overhead electricity transmission line (approved components previously not visible from many receptors in this view sector);
- Cut and fill embankments to rail line and overpass;
- Rail spur and signal lights;
- Coal train movement; and
- Headlight screens erected to mitigate the night head lighting of east bound coal trains.

Most visible would be ephemeral components such as train movements across the foothill and headlights at night shining towards the south within the rural context.

Distances of rural residences from this point of Modification are between 2.5 km and 3 km. This distance results in less than 1% of Focal View Area being occupied by visible components of the Modification. At this distance the visual effect of the Modification would be in a Type 2 Low to Very Low (refer Appendix A).



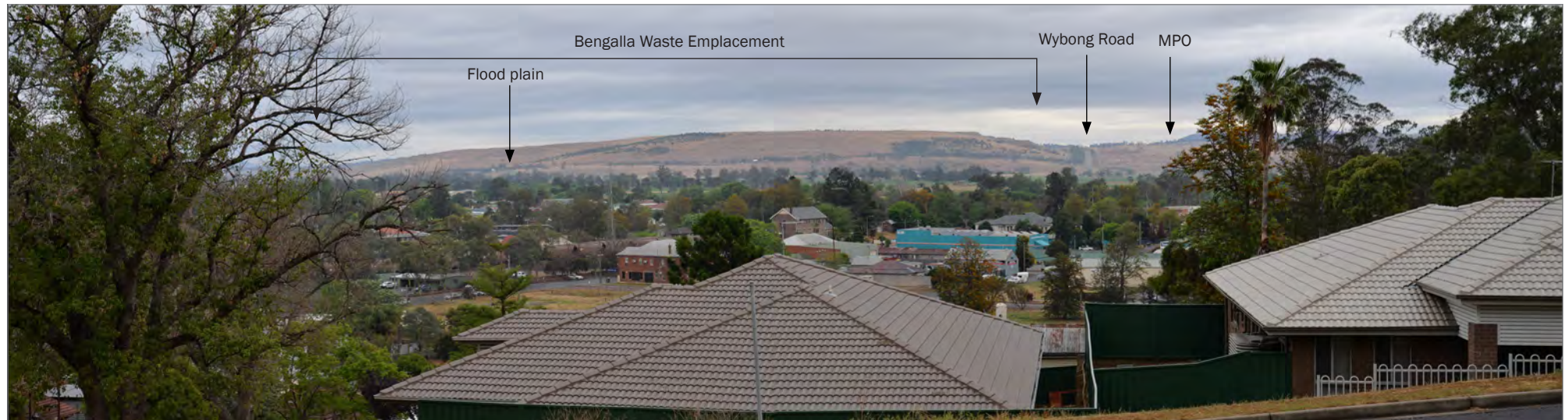


Figure 6.7 | Viewpoint 3 - Muswellbrook High School - Foley Street/ Dolahenty Street - existing view



Figure 6.8 | Viewpoint 3 - Muswellbrook High School - Foley Street/ Dolahenty Street - proposed Modification



## 6.6 Western View Sector

The Sector is also dominated by rural lands that support rural life style blocks in the elevated parts west of the existing approved mining leases. Along Denman Road and the river flood plain there are a limited number of residences and the commercial/tourist Pukara Olive Plantation.

Views to the Modification would be limited to those from along Wybong Road as the existing Bengalla Mine screens views to the Modification's southern rail spur. Views from the elevated ridge just inside this view sector include an existing highly modified landscape with large scale disturbance to the rural setting of this region (Figure 6.9). The Modification would contribute a low percentage of additional cumulative visual effect in this context.

The majority of Modification components lie east of the furthest crest in this view, reducing the visible components to the following:

- Construction activity associated with the rail spur and loop and pipeline;
- Cut and fill embankments to rail line and rock ballast embankments;
- Rail spur, loop and signal lights;
- Coal loading and coal train movement; and
- Night lighting from train headlights heading west.

As the Modification activity in the Western View Sector is within one km of this view location, it would occupy a greater percentage of the FVA. As the visual contrast would be low and visual integration is consistent with existing broad scale mine activity in this view, it would have a Type 3 Low visual effect as it occupies less than 30% of the Focal View Area. (Refer Table 2.1 Visual effects).

Existing visual bund and early screen planting being implemented by MACH Energy along the northern side of Wybong Road would further reduce visual effects of the Modification (see Figure 6.10).

## 6.7 Visual Effect Summary

The visual effects of the Modification vary. The Modification 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.

From this sector, views would be onto the headlight screens and Wybong Road rail overpass, the rail spur and embankments along Wybong Road and Overton Road, Overton Road relocation works, above ground pipeline and overhead transmission line.

The headlight screens create the highest visual effect of all components due to their scale, appearance and location; also being a constant visible element. Coal loadout journeys from the CHPP occur up to nine times per day, with an average of one or two journeys at night, resulting in ephemeral night lighting (see Section 7.7).

Table 6.1 provides a summary of the visual effect of the Modification at various viewpoints.



Figure 6.9 | View east from Wybong Road - Western View Sector



Figure 6.10 | Existing visual mitigation bund and screen planting along Wybong Road

Receptor	Visual Contrast	Visual Integration	Proportion of View Occupied by Modification	Visual Effect Level
<b>Central View Sector</b>				
Rural Residences on Floodplain	Moderate	Moderate	Less than 10%	Type 2 Low
Racecourse	Moderate	Moderate	Less than 10%	Type 2 Low
Wybong Road	Moderate	Moderate	Less than 10%	Type 2 Low
Denman Road	Moderate	Moderate	Less than 10%	Type 2 Low
Sydney Road	Moderate	Moderate	Less than 10%	Type 2 Low
Racecourse Road	Moderate	Moderate	Less than 10%	Type 2 Low
<b>Northern View Sector</b>				
Rural Residences on Floodplain	Moderate	Moderate	Less than 10%	Type 2 Low
New England Highway	Moderate	Moderate	Less than 10%	Type 2 Low
Northern Railway Line	Moderate	Moderate	Less than 10%	Type 2 Low
<b>Eastern View Sector</b>				
Muswellbrook	Moderate	Moderate	Less than 10%	Type 2 Low
Rural Residences on Floodplain	Moderate	Moderate	Less than 10%	Type 2 Low
New England Highway	Moderate	Moderate	Less than 10%	Type 2 Low
Sydney Road	Moderate	Moderate	Less than 10%	Type 2 Low
<b>Southern View Sector</b>				
Rural Residences on Denman Road	Moderate	Moderate	Less than 10%	Type 2 Low
Denman Road	Moderate	Moderate	Less than 10%	Type 2 Low
Thomas Mitchell Drive	Moderate	Moderate	Less than 10%	Type 2 Low
Edderton Road	Moderate	Moderate	Less than 10%	Type 2 Low
<b>Western View Sector</b>				
Wybong Road	Moderate	Moderate	Less than 10%	Type 2 Low

**Table 6.1 | Summary of Visual Effects**



## 7. VISUAL IMPACTS

This section defines the visual impact and mitigation that is anticipated from various viewing locations around the Modification. The visual impact levels are a determinant for potential mitigation strategies.

The visual impact of the Modification would vary according to the visual sensitivity and the areas of visibility (Sections 2.2.1 and 2.2.2).

The potentially sensitive viewing locations (receptors) around the Modification, which includes a town, rural residences, roads and tourist locations, have been defined in Section 5 in terms of visibility. The potential visual impacts based on this sensitivity and predicted effects are discussed below.

### 7.1 Muswellbrook

Muswellbrook occupies most of the Eastern View Sector.

Areas at lower elevation within the town would generally have no views, therefore no sensitivity.

Many elevated parts of Muswellbrook would have direct views (Figure 7.1) onto the most visible components of the Modification (e.g. light screens). Such areas have high visual sensitivity. Minor components such as the Hunter River pump station, pipeline and overhead transmission line have minimal visual effect from these distances.

Areas that would have limited views to the Modification are typically already subject to high visual impacts from the approved Mount Pleasant Operation.

The Modification components located to the west of Wybong Road such as the rail loop, would be out of view due to screening provided by the existing foothills and Bengalla Mine Emplacement Area therefore would not generate additional visual impacts.

### 7.2 Rural Residences

Rural residences are located throughout the local setting within the Modification view catchment. The residences are located within the Foothills Visual Character Unit and the Hunter River Floodplain Visual Character Unit and take advantage of views in various directions.

Geoffrey Britton and Associates (1997) determined that high visual impacts would occur at rural properties on the floodplain (including the Horne Residence) due to the development of the Eastern Out of Pit Emplacement (including the initial development of the outer face) and the initial development of the active mining areas for the approved Mount Pleasant Operation.

#### Central View Sector

There are varying levels impact of the Modification on rural residences in this sector as some of the components are screened from view (Figure 7.2).

Any visual impacts on rural residences with views in the Central View Sector would be Moderate. There is no increase to visual impact from the existing high impacts as described above.

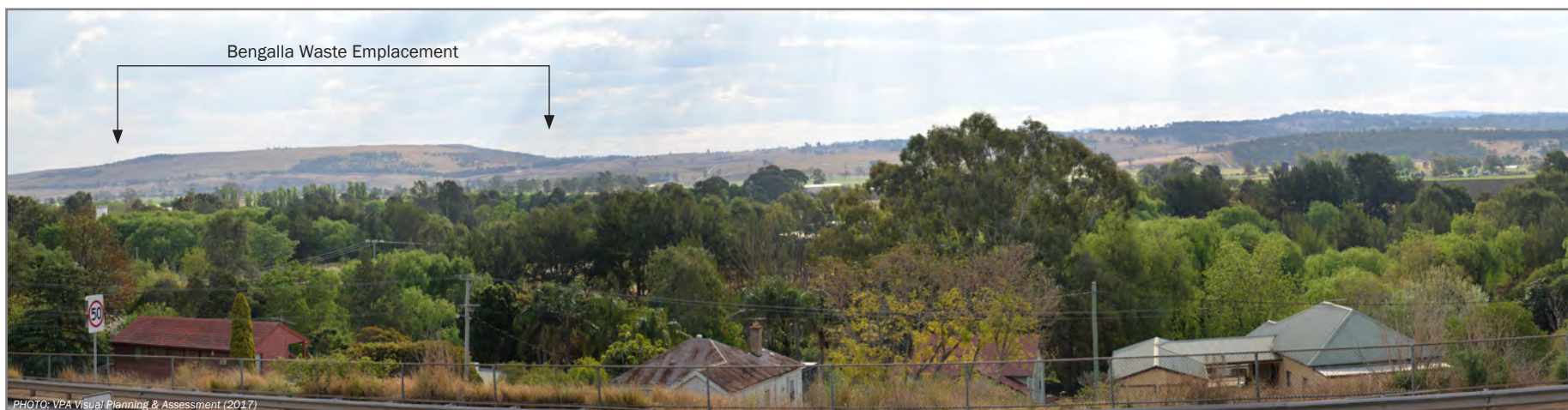
#### Northern and Eastern View Sectors

There are varying levels impact of the Modification on rural residences in these sectors (many are mine owned) as most of the Modification components are screened from view by intervening vegetation and/or topography.

Any visual impacts on rural residences that have views in the Northern and Eastern View Sectors would be very low to none.

#### Southern View Sector

As residences in the south-west further along the flood plain would not have views to the Modification, there would be no additional visual impacts.



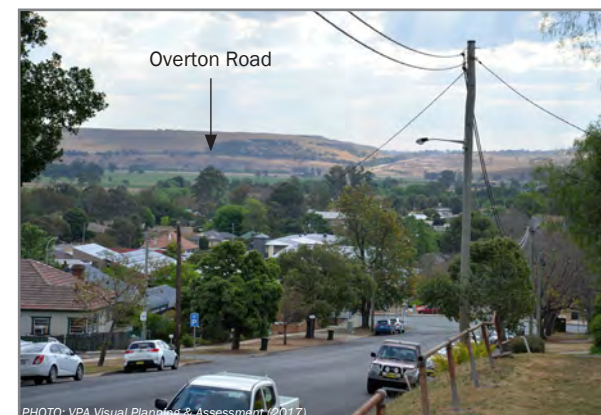
North Muswellbrook - View Place



South Muswellbrook - Slellatar Stock Route



Central Muswellbrook - Foley Street



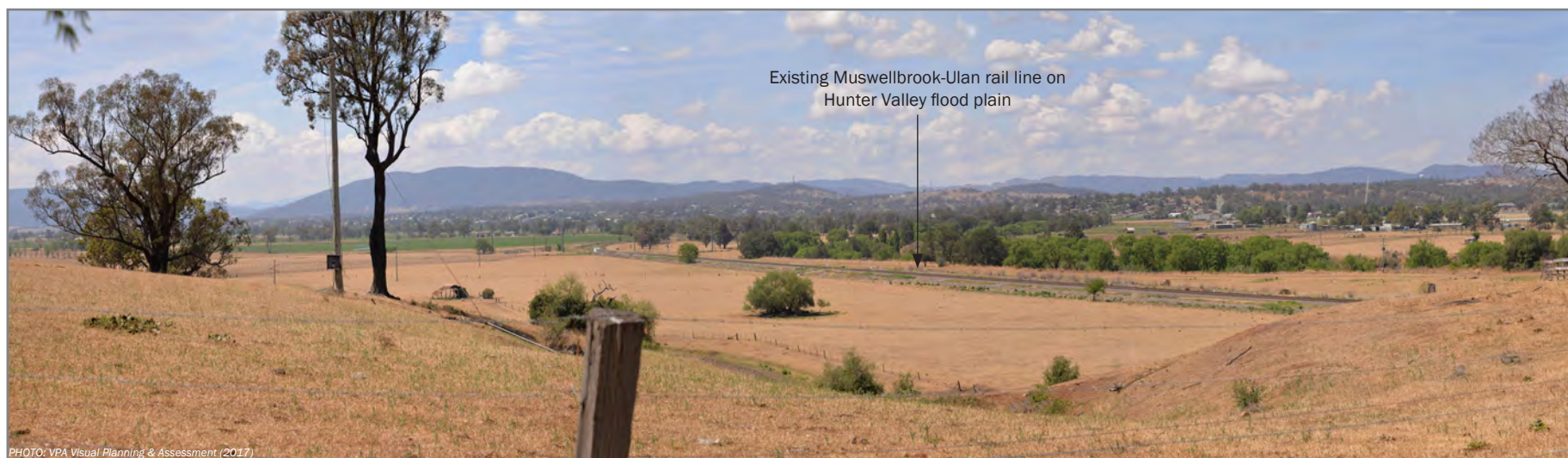
North Muswellbrook - Hill Street

**Figure 7.1 | Views from elevated locations around Muswellbrook**  
View west towards Modification area





View towards the Modification location. Potential views to rail spur and ground level headlight screens from this location.



View from Overton Road adjacent mine owned 'Overton' House

**Figure 7.2 | Rural residences - Central View Sector**



A combination of distant views and moderate to low visual effects would create Moderate to Low visual impacts to residences in the south-east of the sector (Figure 7.3).

This sector contains the historic homesteads of ‘*Edinglassie*’ and ‘*Rous Lench*’. Both homesteads are owned by Mount Arthur North. These residences would have potential views to the Modification and have high sensitivity, but landscape treatments recommended in the 2007 European Heritage Management Plan would screen the houses and their curtilages from views to the Modification.

#### Western View Sector

As there are no private rural residences with views to the Modification, levels of impact to residences would be unchanged.

### 7.3 Roads and Rail

The roads and rail in the locality are:

- Minor Roads;
- New England Highway;
- Denman Road and Sydney Road; and
- Main Northern Railway.

#### Minor Roads

The Modification is visible from a number of minor roads. These include Wybong Road, Overton Road, Logues Lane, Kayuga Road and Thomas Mitchell Drive. Visual impacts on these roads would vary due to viewing distance from Modification.

Wybong Road is most affected by the Modification. Existing uninterrupted views east towards Muswellbrook and the surrounding ranges would be impeded by the rail overpass structure, the above ground screens to the north of Wybong Road and the portal ground level screen to the east. In this context, the visual impact is Moderate to Low due to existing broad scale approved modifications to the surrounding landscapes along Wybong Road.

Overton Road would be impacted due to the partial relocation east of the rail spur, with a rail bridge across the road to provide continued access to residences on Overton Road. Visual effects would be high as Modification components are very close to all view locations along road. Sensitivity is low being a minor rural road. Visual impacts for this road would be Moderate to Low.

For other minor roads where there are views, (Wybong Road, Logues Lane and Kayuga Road, all less than 2.5 km), levels of visual impact would be Moderate to Low. Thomas Mitchell Drive (between 2.5 km and 7.5 km away) would have Low to Very Low visual impacts.

#### New England Highway

From south-east of Muswellbrook, the New England Highway would have moderate sensitivity.

The Modification would be visible from one location for a short period travelling north into Muswellbrook from the south-east. Any visual impacts from transient views to the Modification while travelling past this location would be Moderate to Low (Figure 7.4).

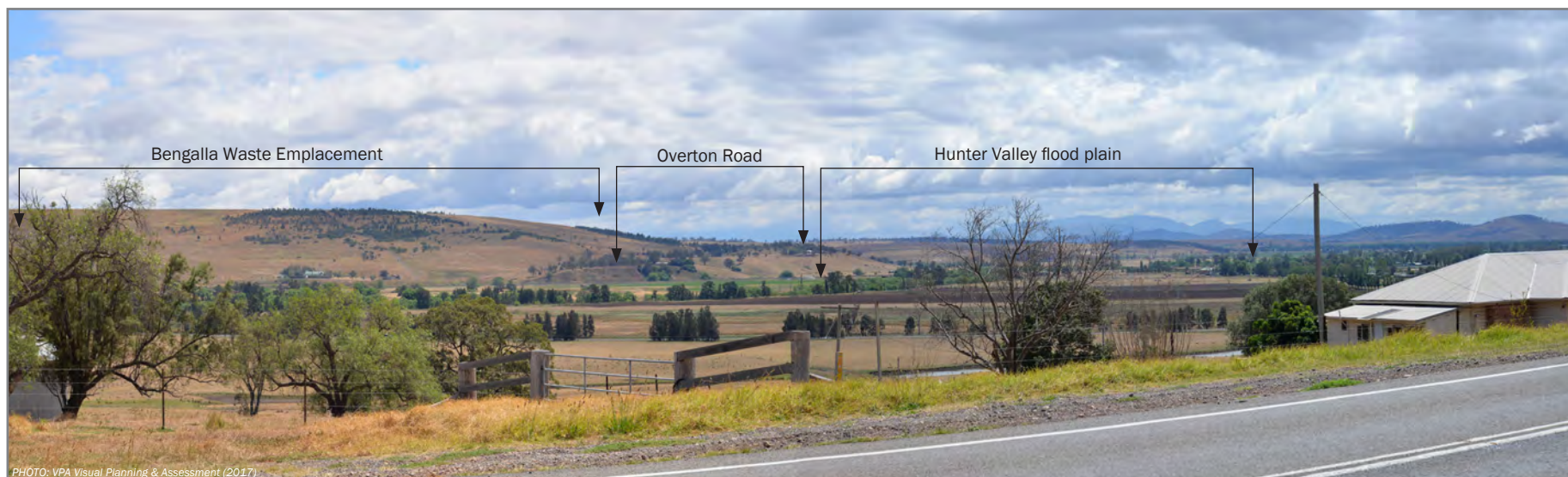
#### Denman Road

This road experiences potential visual impact to the east and south of the Modification.

The visual sensitivity of Denman Road given its tourist use would be moderate at distances greater than 2.5 km.

From the east, visual impact is potentially within south Muswellbrook along Sydney Road. From the south, visual impact is experienced generally between Thomas Mitchell Drive and Edderton Road. From all these locations, the visual effect of the Modification would be low to very low.

The visual impact on this road would be Moderate to Low to the east within Central View Sector and Low to Very Low in the Southern View Sector.



**Figure 7.3 | Rural residences - Southern View Sector**  
View north towards Modification area





**Figure 7.4 | Views north-west towards the Modification from New England Highway**  
View towards Modification area are screened by vegetation.



**Figure 7.5 | View towards the Modification from Racecourse Road.**



## Main Northern Railway

The Modification is most visible from the railway, north of Muswellbrook, for trains moving south. Visibility characteristics are similar to those of the adjacent New England Highway and would be generally screened. Any views would have a moderate sensitivity at this distance with low visual effects creating Low impact levels.

### 7.4 Tourist Localities

The Hunter Valley generally has a high tourist usage. In relation to the Modification, Denman Road and the New England Highway are significant tourist locations. Within the broader context, special locations such as Pukara Estate olive grove and Muswellbrook Racecourse attract tourists to the area.

There are no views from Pukara Estate in the Southern View Sector, therefore there are no additional visual impacts.

Visual effects impacts would remain high for areas such as the Muswellbrook Racecourse and surrounding training facilities, which would have limited views of the Modification at close proximity within the Central View Sector (see Figure 7.5). Some local vegetation filters views to the Modification. *Where there are views, the visual impact would be Moderate to Low.*

### 7.5 Cumulative Visual Impact

The visual impacts of the Modification would be primarily be due to the Wybong Road overpass, the headlight screens erected to mitigate headlight pathway spill into Muswellbrook and the unscreened areas of headlight spill south of the screens.

The other approved mining activities in the area would remain visually dominant, as they are of a much greater scale than the Modification.

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

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

From the south, there would be an increased cumulative impact due to the existing rail line potentially being within view from various locations. The proposed Modification would contribute to the number of visible rail line components viewed from elevated locations in the Southern View Sector.

As the existing rail line has limited viewing from the rest of the view catchment, the proposed Modification would not contribute to an increased cumulative visual effect from these areas.

More generally, the visual impact would be viewed in the context of the approved Mount Pleasant Operation, which involves broad scale earthworks and disturbance to the existing landscape north of Wybong Road. Therefore the Modification would not add significantly to the cumulative visual impact created by open cut mining in the locality.

Visual effect of the Modification to the west is of a similar character but lesser overall scale to that currently experienced. However, the only sensitive receptors in this location is people travelling on Wybong Road who have views to Bengalla Mine, Mt Arthur Coal Mine and the approved Mount Pleasant Operation.

Mangoola Coal is not considered as it is to the west of the Modification and would not fall into any views that contain the Modification.

To other areas the visual effect would NOT be significantly increased, as the overall scale of all the components is small.

In terms of sequential visual experiences, the Modification as well as the approved Mount Pleasant Operation and all mines in the locality, would be seen when travelling along Wybong Road and Denman Road and to varying degrees from lesser roads. In this context the overall effect of the Modification would be similar to that experienced for the existing approved Mount Pleasant Operation.

## 7.6 Visual Impact in Context of Regional Plans

In the context of the NSW *Strategic Regional Land Use Plan – Upper Hunter* and the local *Land Use Development Strategy (Coal Mine Land Use Component)* September 2012, the Modification does not impact significantly on strategic tourist locations over and above that of the existing approved Mount Pleasant Operation and other nearby mines. The visual effect and impact on Denman Road and western view areas would remain similar to existing impacts.

The Modification is a continuation of an existing approved mine and is contained in a small visual catchment with limited extent from sensitive receptors in the western areas. It is also a visual catchment that currently supports mines at Bengalla Mine, Mt Arthur Coal Mine and Dartbrook Mine.

Muswellbrook Shire Council's 2015 report *Mine Affected Road Network Plan* proposes to 'construct a Southern Link Road connecting Wybong Road (East) via Overton Road to the Bengalla Link Road west of the Hunter River crossing (Option 2B)' (Muswellbrook Shire Council, 2015). The visual effect created by both the Modification and this potential Southern Link Road would increase cumulative visual impacts to areas with views from the south such as Denman Road and associated rural residences.

## 7.7 Lighting Impacts

### 7.7.1 Introduction

A key component of this visual assessment is to consider the potential visual impact of the ephemeral night lighting from train headlights as part of the Modification's visual effects.

There are two types of lighting effects that could be experienced from the Modification. The first effect is where the light source is directly visible, and would be experienced if there is a direct line of sight between a viewing location and the light source. The second effect relates to the general night-glow (diffuse light) that results from light of sufficient strength being reflected into the atmosphere. This type of effect would create a strong local focal point and the effect would vary with distance and atmospheric conditions such as fog, low cloud and/or dust particles which all reflect light.

### 7.7.2 Direct Light Effects

Studies by Hatch Lighting for MACH Energy determined potentially direct rail locomotive light spill pathways onto potentially sensitive areas of Muswellbrook and rural residences in the vicinity of the rail spur on the adjacent floodplain (Figure 4.6). The horizontal arc of light spill extended from approximately Hill Street, south to Denman Road near Thomas Mitchell Drive intersection.

Visual sensitivity varies within this arc with any residential areas and rural residences remaining high.

This Modification includes proposed night lighting mitigation via:

- Rail cuttings (refer Section 4.3); and
- Headlight screens (refer Section 4.8).

Figure 4.6 illustrates how these two forms of lighting mitigation deflect direct lighting effects away from Muswellbrook.

The visual effect of direct lighting to Wybong Road would increase locally, with lateral light spill to either side of the headlight pathway along the rail spur in both easterly and westerly directions. This would be influenced by operation times and frequency, the relative level at which the viewing location is situated and the presence of any off-site barriers such as approved visual bunds and screen planting as part of Mount Pleasant Operation approved visual mitigation, topographic features and/or vegetation.

The proposed Light Screens would limit visual effects to other areas surrounding the Modification including Muswellbrook and would remain similar to that experienced as part of the approved operation.

### 7.7.3 Diffuse Light Effects

At the Modification, operational areas and machinery night lighting would not be directly visible to most locations due to the screening effect of adjacent Emplacement Areas and adjoining topography and vegetation. Rather, a diffuse effect of light and its interaction with atmospheric conditions may from time to time create a glow around the CHPP, rail spur and approved Mount Pleasant Operation. The contribution of the Modification to this diffuse lighting effect would be negligible in the context of the existing effect from the approved Mount Pleasant Operation, Bengalla Mine, Mt Arthur Coal Mine and Drayton Mine (currently in care and maintenance).

## 7.8 Visual Impact Summary

The visual impacts associated with the Modification are generally low to moderate on all the View Sectors. This is mainly as a result of the following:

- Scale and horizontal profile of rail loop and spur in relation to the overall surrounding approved mining activities is minor;
- Visual effects of minor elements (water pumping station, pipelines and overhead electrical transmission line) is low;
- Visual effects during construction and rehabilitation are consistent with existing approved Project elements; and
- Visual effects would lessen following visual mitigation screening and rehabilitation.

Importantly, these rural residences on the floodplain are already predicted to experience high levels of visual impact from the approved Mount Pleasant Operation (Geoffrey Britton and Associates, 1997).

Table 7.1 provides a summary of potential visual impacts.

### 7.8.1 Lighting Impacts

The visual effect of lighting associated with the Modification would be minimally higher than that for currently approved Mount Pleasant Operation.

The screened intermittent isolated direct lighting from the train headlights adds a minor cumulative impact to overall lighting associated with all other approved mining activities.

Direct and diffuse lighting effects from the rail loading infrastructure were previously more contained behind the Bengalla Mine Emplacement Area. The proposed Wybong Road location results in more exposure to Wybong Road and reduced intervening topography, however, this lighting would only represent a small proportion of Mount Pleasant Operation nightlighting and therefore would have negligible additional impact on the Muswellbrook.



Receptor	Existing/Approved Visual Impact*	Visual Sensitivity	Incremental Modification Effect	Incremental Modification Impact
<b>Central View Sector</b>				
Rural Residences on Floodplain	High	High	Low	Moderate
Racecourse	N/A^	High	Low	Moderate/Low
Wybong Road	Moderate	Moderate/Low	Low	Low
Denman Road	Moderate	Moderate/Low	Low	Low
Sydney Road	N/A^	Moderate/Low	Low	Low
Racecourse Road	N/A^	Moderate/Low	Low	Low
<b>Northern View Sector</b>				
Rural Residences on Floodplain	High	High	Low	Moderate
New England Highway	High	Moderate	Low	Low
Northern Railway Line	High	Moderate	Low	Low
<b>Eastern View Sector</b>				
Muswellbrook	High	High/Moderate	Low	Moderate/Low
Rural Residences on Floodplain	High	High	Low	Low
New England Highway	High	Moderate	Low	Low
Sydney Road	N/A^	Moderate	Low	Low
<b>Southern View Sector</b>				
Rural Residences on Denman Road	Moderate	High/Moderate	Low	Moderate/Low
Denman Road	Moderate	Moderate	Low	Low
Thomas Mitchell Drive	N/A^	Moderate	Low	Low
Edderton Road	N/A^	Nil	Low	Low
<b>Western View Sector</b>				
Wybong Road	Moderate	Moderate/Low	Low	Low

**Table 7.1 | Summary of Visual Impacts**

\* Existing/approved visual impact described in Geoffrey Britton and Associates (1997) and the Mount Pleasant Operation Modification 3 Environmental Assessment (MACH Energy, 2017). Note that the existing/approved visual impact considers the sensitivity of the receiver.

^ Viewpoint not previously assessed in Geoffrey Britton and Associates (1997) as very limited views of the approved Mount Pleasant Operation are available from these vantage points due to intervening topography/vegetation.

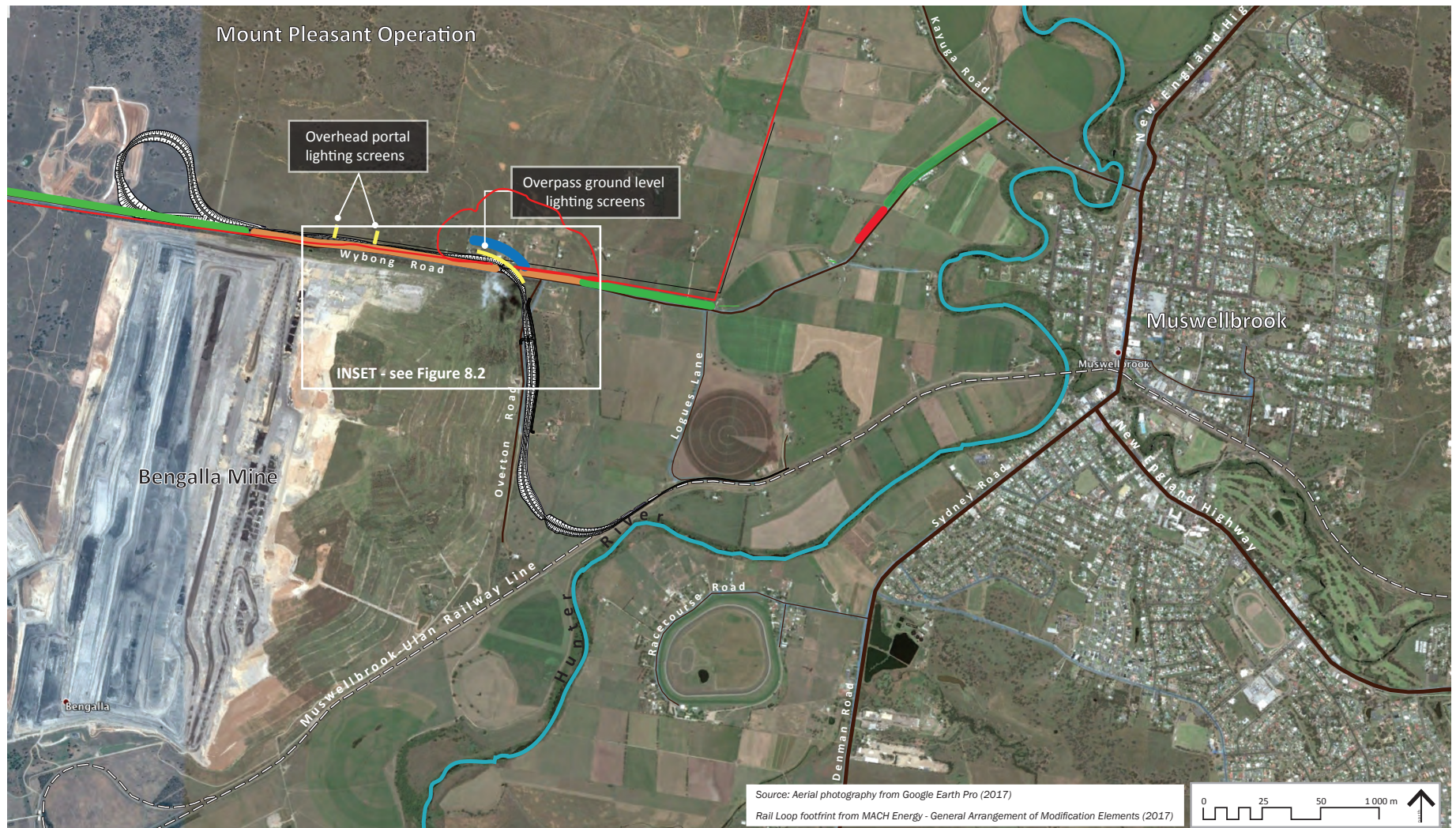
## 8. MITIGATION

Mitigation measures proposed for the Modification include additional visual screen planting to assist integration of the headlight screens over time. Following initial visual assessment of preliminary headlight screens, use of alternative lighter coloured mesh was recommended; preferred colours being khaki green, eucalyptus tones or beige.




This early mitigation implementation is reflected in the reduced visual contrast and resulting improved visual integration as illustrated in Section 6 visualisations (Figures 6.3, 6.5 and 6.7).



The existing Landscape Management Plan would be updated to include any additional commitments in this Visual Impact Assessment.





The proposed additional visual mitigation measures for the Modification are shown on Figure 8.1 and Figure 8.2.



### key

-  Mount Pleasant Operation Mining Leases
-  Roads
-  Muswellbrook-Ulan Rail Line

-  Rail Loop and Spur
-  Hunter River

-  Approved planted visual screening
-  Approved bund/ planted visual screening
-  Existing screen planting
-  Additional visual mitigation planted visual screening

**Figure 8.1 | Additional visual mitigation**





#### Typical headlight screen embankment treatment

- Screen trees planted as tube or advanced stock
- Shrubs planted by seeding or tubestock
- Grasses and herbs planted by direct seeding
- Large shrubs / small trees planted on lower slopes of embankments to screen at lower level
- Tall trees planted on top of embankment or bund to give maximum height

Figure 8.2 | On-site mitigation to headlight screens

## 9. CONCLUSION

The key features of this Modification are the alteration to the realignment of the rail loop and spur, and the associated visual screening proposed to mitigate train headlight spillage into Muswellbrook.

Some of the components, including associated night lighting effects, would be visible from locations predominantly to the east of the Modification, particularly elevated locations within the township. Local topography, visual bunds and existing vegetation of the local landscape limit viewing opportunities of the proposed Modification areas.

The rail loop and spur would result in minor changes to views due to horizontal profile of the visible components. The associated cuttings and headlight screens would have higher visibility from the east, south-east and south due to being seen in elevation from viewing locations. Some sensitive view locations in close proximity to the screens and rail cutting embankments would experience high visual impacts. These sensitive view locations already experience high visual impacts from the approved Mount Pleasant Operation and therefore there would be negligible change to the level of impact at these receivers.

Minor modification components including water pumping station, pipelines and transmission line would result in very minor visible changes to the existing landscape; some being consistent with existing elements in the landscape.

The visual impact of the Modification would decrease as the existing visual bunds and screen planting matures to provide improved visual integration.

The implementation of suggested mitigation strategies would further ameliorate visual impacts. These include:

- Alternative low contrast backing mesh to light screens; and
- Additional screen planting to embankments on eastern side of headlight screens (if practical).

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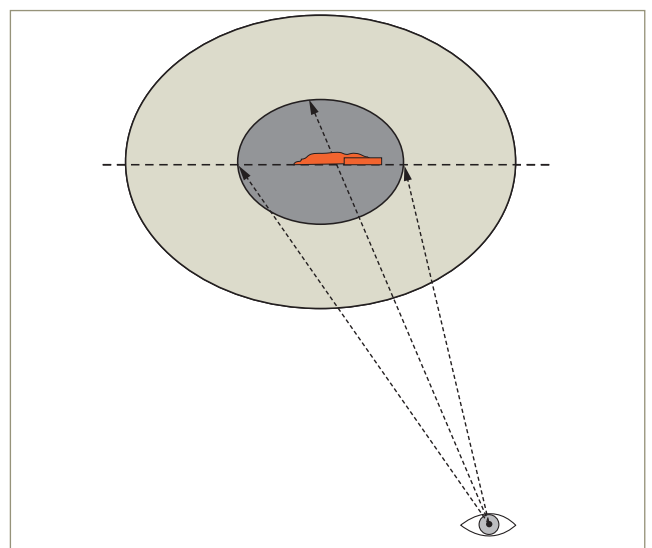
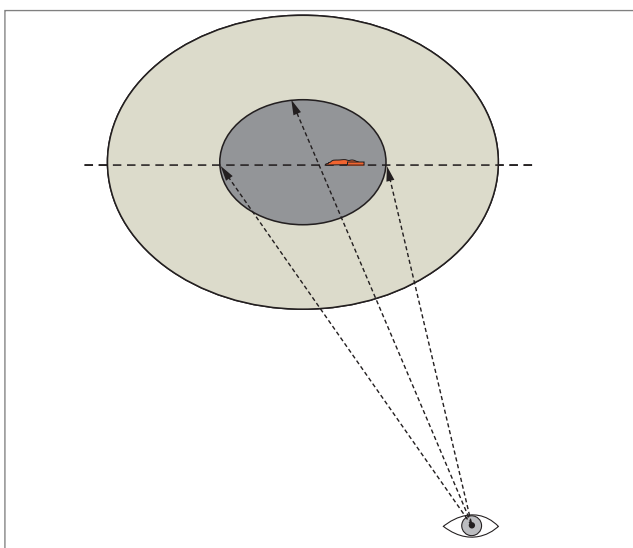
# APPENDIX A

Table 11.1 | Visual Effect Calculations

1	2	3	4	5	6	7	8
Distance from TL (m)	Radius of FVA (m)	Area of FVA (m <sup>2</sup> )	Diameter of FVA (m)	100% area of affected area	60% area of screen coverage (m <sup>2</sup> )	Visual Percentage	Visual Effect
250	143.75	32459.03347	287.5	3450	2070	10.63%	HIGH
500	287.5	129836.1339	575	6900	4140	5.31%	HIGH
660	379.5	226226.4797	759	9108	5464.8	4.03%	HIGH
750	431.25	292131.3012	862.5	10350	6210	3.54%	HIGH
1000	575	519344.5355	1150	13800	8280	2.66%	HIGH
1250	718.75	811475.8368	1437.5	17250	10350	2.13%	HIGH
1500	862.5	1168525.205	1725	20700	12420	1.77%	MODERATE
1750	1006.25	1590492.64	2012.5	24150	14490	1.52%	MODERATE
2000	1150	2077378.142	2300	27600	16560	1.33%	MODERATE
2300	1322.5	2747332.593	2645	31740	19044	1.16%	MODERATE
2500	1437.5	3245903.347	2875	34500	20700	1.06%	MODERATE
3000	1725	4674100.82	3450	41400	24840	0.89%	LOW
3500	2012.5	6361970.56	4025	48300	28980	0.76%	LOW
4000	2300	8309512.569	4600	55200	33120	0.66%	LOW
4200	2415	9161237.607	4830	57960	34776	0.63%	LOW
5000	2875	12983613.39	5750	69000	41400	0.53%	LOW
6000	3450	18696403.28	6900	82800	49680	0.44%	VERY LOW
7000	4025	25447882.24	8050	96600	57960	0.38%	VERY LOW

Together with calculations derived from Figure 2.2 – Area of focal view area at various distances the horizontal area can be conservatively calculated using vertical height of visible components as a percentage of the Focal View Area.

For example, for the headlight screens (7.5 m maximum height) plus embankments and cuttings add additional 7 vertical metres to altered view. Then consider what percentage of the horizontal width is occupied by these elements based on distance.



The two illustrations demonstrate the concept of percentage of Focal View area the same occupied by any visible element from varying distances. The area of focal view increases with distance.