



Visual Impact Assessment

Continuation of Bengalla Mine Project

visual impact assessment

June 2013



a report prepared by
JVP Visual Planning and Design

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Glossary

Contrast	The degree to which a development component differs visually from its landscape setting.
Field of View	This area includes the total view, consisting of the primary view zones above and the secondary or peripheral view zones around the primary view zone, out to about 700 either side of the central view line in both vertical and horizontal plain.
Integration	The degree to which a development component can be blended into the existing landscape without necessarily being screened from view.
Overburden Emplacement Area (OEA)	An Overburden Emplacement Area is a prominent feature on the landscape created by open cut mining operations, which involves the inert earth and rock material sitting on top of the coal seams being extracted and placed either back in the mined out areas or on virgin ground. This material is eventually shaped, topsoiled and revegetated to either pasture or forest.
Primary View Zone (PVZ)	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 300 either side of the centre line of a view and a vertical arc of 300 above the horizontal.
Primary Visual Catchment (PVC)	Areas that have potential views to the Project based on a consideration of topography alone as a screening element.
Seen Area	Areas surrounding the Project within the Zone of Visual Influence, which will have views to the Project.
Screen	The degree to which a development element is unseen due to intervening landscape elements such as topography or vegetation.
Visual Character Units (VCU)	Areas of landscape that have similar topographic, vegetation and land use features that create areas of similar visual character.
Visual Effect	A measure of the visual interaction between a development and the landscape setting within which it is located.
Visual Impact	A measure of a joint consideration of both visual sensitivity and visual effect that when considered together determines the visual impact of a development.
Visual Sensitivity	The degree to which a change to the landscape will be perceived in an adverse way

1. INTRODUCTION

JVP Visual Planning and Design has been engaged on behalf of Bengalla Mining Company (BMC) to complete visual impact assessment for the Continuation of Bengalla Mine (the Project).

The purpose of the assessment is to form part of an Environmental Impact Statement (EIS) being prepared by Hansen Bailey Environmental Consultants (Hansen Bailey) to support an application for a contemporary Project Approval under Division 4.1 of Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) to facilitate the continuation of an the Bengalla Coal Mine.

The primary objective of the assessment is to meet the Director General's Requirements (DGRs) by providing a comprehensive visual impact assessment for submission as part of the EIS.

The DGRs specifically called for:

- A detailed assessment of:
 - Changing landforms on the site during the various stages of the Project; and
 - Potential visual impacts on private landowners in the surrounding area as well as key vantage points in the public domain, including lighting impacts; and
- A detailed description of the measures that would be implemented to minimise visual impacts of the Project.

The assessment must take into account relevant guidelines, policies and plans as identified and include:

- Rehabilitation Guidelines;
- Regional Planning Guidelines - The Strategic Regional Land Use Plan – Upper Hunter; and
- Local Planning Guidelines - The Muswellbrook Shire Council Draft Land Use Development Strategy (Coal Mine Land Use Component).

This has been done by completing and documenting the following assessment and analysis steps as outlined in this report:

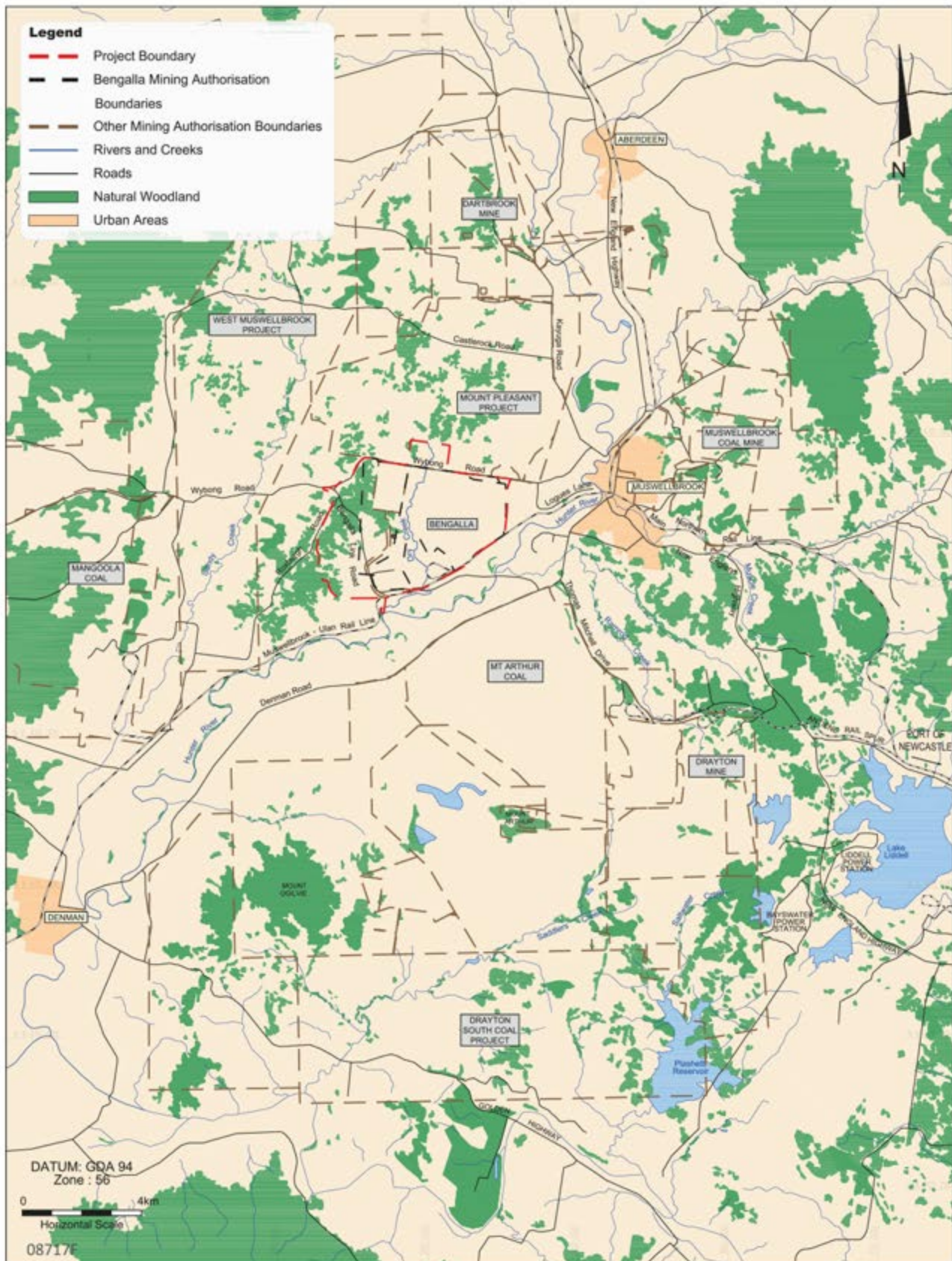
- An assessment of the existing visual settings created by various landscapes in and around the Project;
- Establishing the visual character and visual effect created by the Project;
- A consideration of the visibility of the Project from sensitive receivers;
- The likely visual impacts created by the Project (including both short term and long term) with regard to visual effect and sensitivity;
- An assessment of potential night light effects;
- Consideration of cumulative visual impacts in the locality; and
- The development of mitigation strategies to ameliorate adverse visual impacts.

1.1 The Project

BMC operates the Bengalla Mine (Bengalla) which is located approximately 4 km west of Muswellbrook in the Upper Hunter Valley, NSW (see Figure 1.1). BMC was initially granted DA 211/93 following submission of the 1993 Bengalla Environmental Impact Statement (Bengalla EIS) under the Environmental Planning and Assessment Act 1979 (EP&A Act) in August 1995. Bengalla (as modified) has approval to operate for a 21-year period from 1996, producing up to 10.7 Million tonnes per annum (Mtpa) of ROM coal.

This visual impact assessment has been prepared to support an application for Development Consent under Division 4.1 of Part 4 of the EP&A Act to facilitate the continuation of mining of coal within the Project Boundary for a further 24 years. The Project consists of the following features:

- Open cut mining at a rate of up to 15 Mtpa ROM continuing to utilise a dragline and truck / excavator fleet;
- Extending mining to the west of current operations;
- An out of pit Overburden Emplacement Area (OEA) to the west of Dry Creek which may be utilised for excess spoil material until it is intercepted by mining;
- Processing, handling and transportation of coal via the existing CHPP (to be upgraded) and rail loop for export and domestic sale;
- An additional CHPP stockpile and ROM coal stockpile;
- Continued use, extension and upgrades to existing coal infrastructure;
- The construction of a radio tower;
- Relocation of the Explosives Magazine and Reload Facility;
- Relocation of a section of Bengalla Link Road near the existing mine access road to enable coal extraction;
- The diversion of Dry Creek via dams and pipe work with a later permanent re-alignment of Dry Creek through rehabilitation areas once stability is established;
- Relocation of water storage infrastructure as mining progresses through existing dams (including the Staged Discharge Dam);
- The construction of raw water dams and a clean water dam;
- A workforce of approximately 900 full time equivalent personnel at peak production; and
- Supporting power and water reticulation infrastructure.



Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Figure 1.1 | Bengalla Mine Locality Plan

2. ASSESSMENT METHODOLOGY

2.1 Introduction

The methodology to determine the level of visual impact of the Project involves, in the first instance, a consideration of the existing visual environment (see Section 3). This includes a consideration of existing landscape settings, and how they are seen from various viewing locations. In this way the visual character of the landscape as well as visual sensitivity of the various viewing locations can be determined.

Secondly, the visual effect of the Project is determined by considering the visual characteristics of the Project in the context of the landscape within which it is seen (see Section 5).

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

2.2 Evaluation of the Existing Visual Environment

An evaluation of the existing visual environment includes an assessment of both the existing landscape setting and viewing locations within it, as described below. It also includes consideration of the statutory framework within which any development must be considered.

2.2.1 Landscape Setting

The visual character of the regional and local landscape in the vicinity of the Project is created by a mosaic of topographic form, vegetation and land cover, hydrological features and land use patterns. These landscape features combine in various ways to create areas of relative visual uniformity that can be defined as Visual Character Unit (VCU). The VCUs are rarely seen in isolation but rather in combination with one another in various vistas that are obtained from viewing locations such as residences and roadways.

This is significant as the Project is therefore always seen in the context of an existing landscape setting made up of one or more of the VCUs. The Project then combines with one or more VCU to create a view seen from various locations.

Defining the landscape in terms of these VCUs assists in understanding the visual character of the landscape as a whole with which the Project interacts.

2.2.2 Viewing Locations

Viewing locations are those areas where people are likely to obtain a view of the Project. These viewing locations have different significance based on numerous factors, collectively evaluated through land use and viewing distance to the Project. Viewing locations could include residences, roads, commercial and recreation areas as well as urban and other rural areas.

2.2.3 Visual Character of Project

The Project will have certain visual characteristics. The elements of the mine will express themselves in terms of form, shape, line, and colour and to a lesser extent texture.

An understanding of this visual character will provide an appreciation of how various mine elements will be seen in the landscape.

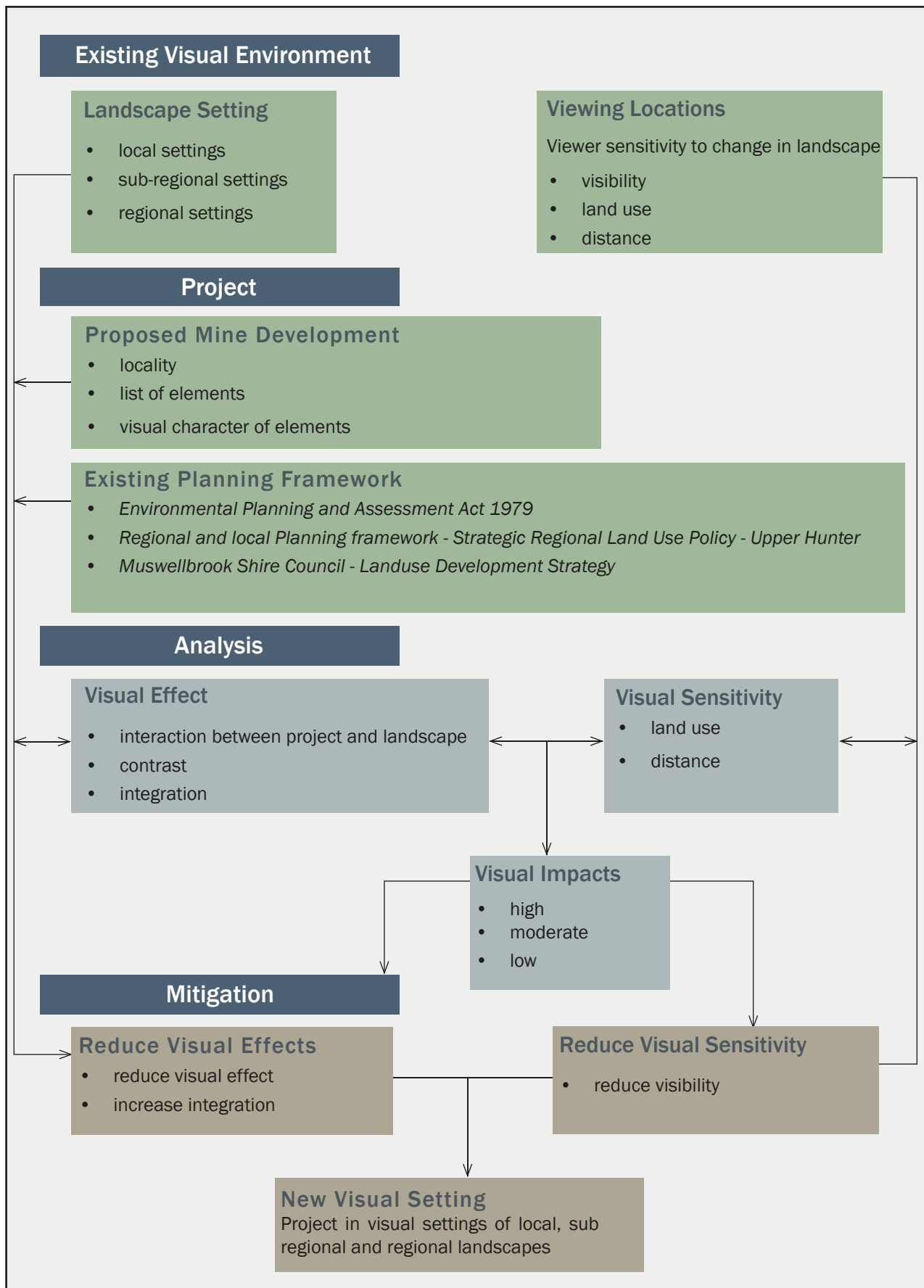


Figure 2.1 | Visual Assessment Methodology

2.3 Statutory Framework

Strategic Regional Land Use Policy – Upper Hunter

The NSW Government released the Strategic Regional Land Use Policy (SRLUP) for the Upper Hunter region in September 2012. The Plan represents a component of the government's broader Strategic Regional Land Use Policy that comprises initiatives to address land use conflicts in areas such as the Upper Hunter and with a particular focus on managing coal and coal seam gas issues.

The policy defines areas of biophysical strategic agricultural land and critical industry clusters, including clusters for the equine and viticulture industries. In accordance with the SRLUP, coal mining and coal seam gas projects that are located in areas of defined biophysical strategic agricultural land or critical industry clusters must consider the potential for impacts in accordance with the prescribed 'Gateway Criteria' listed within the plan. The Project occurs within the proposed equine critical industry cluster. As such, an assessment has been conducted against the gateway criteria for this cluster as provided in the draft plan to determine whether the Project would lead to a significant impact on the equine critical industry cluster.

The gateway criteria with regard to critical industry clusters require the following to be considered:

Whether the proposal would lead to significant impacts on the critical industry cluster through:

- Surface area disturbance,
- Subsidence,
- Reduced access to agricultural resources,
- Reduced access to support services and infrastructure,
- Reduced access to transport routes, or
- Loss of scenic and landscape values.

This visual impact assessment has considered the potential for the Project to lead to significant impacts on the equine critical industry cluster through loss of scenic and landscape values.

Draft Land Use Development Strategy (Coal Mine Land Use Component)

This plan developed by Muswellbrook Shire Council recognises the economic and employment benefits of the coal mining industry to the region. The plan draws attention to the need to consider the impacts of mines in the operational and post operational phases, especially in relation to impacts on surrounding land use especially tourism and amenity values. It recognises the importance of quality rehabilitation and post land use viability.

The plan makes specific reference to the need to respect the visual settings of specific land uses that include thoroughbred horse studs, winery cellar doors and other tourist facility or public places, including public areas within national parks.

2.4 Impact Analysis

The analysis of the interaction between the existing visual environments, including existing and approved mining operations and the Project provides the basis for determining visual impacts and mitigation strategies. This is completed by defining the visual effect of the various elements of the Project and visual sensitivity of viewing locations, to determine impact.

2.4.1 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.

In this regard, residential, tourist and / or recreation areas generally have a higher visual sensitivity than land use areas including industrial, agricultural or transport corridors. Land uses (such as residential) use the scenic amenity values of the surrounding landscape and may be used as part of a leisure experience and often over extended viewing periods. Figure 2.2 indicates the levels of visual sensitivity associated with the Project.

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

- Screening effects of any intervening topography, buildings or vegetation. Residences with well screened views of the Project will have a lower visual sensitivity than those with open views;
- Viewing distance from the residence to visible areas of the Project. The longer the viewing distances, the lower the visual sensitivity; and
- General orientation of residences to landscape areas affected by the Project. Residences with strong visual orientation towards the Project (i.e. those with areas such as living rooms and/or verandahs orientated towards it) will have a higher visual sensitivity than those not orientated towards the Project, and which do not make use of the views towards the Project.

For any area to be given a sensitivity score, it must have visibility to the Project.

This visibility was determined based on a field assessment conducted on 15-16th February 2012, as well as a computer generated assessment and evaluation of topographic and vegetation data.

Land Use \ Visibility		Visibility to Project				
		High ←————→ Low				
		Nearest visible mine elements less than 2.5km away	Nearest visible mine elements between 2.5 - 7.5 km away	Nearest visible mine elements between 7.5 - 12.5km away	Nearest visible mine 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
		Designated tourist & main roads - New England Highway, Denman Road	High Sensitivity	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
		Other roads - Roxburgh, 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
	Low	Broad acre rural lands	Low Sensitivity	Low Sensitivity	Very Low Sensitivity	Very Low Sensitivity

Figure 2.2 | Visual Sensitivity
Land Use and Project Visibility combine to create Visual Sensitivity

2.4.2 Visual Effect

Visual effect is a measure of the level of visual contrast and integration of the Project with the existing landscape. In this instance the existing landscape includes the existing mining operations.

An existing landscape has certain visual characteristics expressed through the visual elements of form, shape, line, colour and texture. A development such as mining has different visual characteristics that will create contrast with the existing landscape. However, in this case, existing and approved mining operations are part of the landscape, so to an extent, the visual effects of the Project borrow visual character from these operations, reducing visual effects.

The visual effect of a development is determined by factors as illustrated in Figure 2.3 These factors also determine the magnitude of the development on the visual effect and are determined by consideration of the following:

Contrast and Integration

The degree to which the visual characteristics of the Project contrast with the existing landscape will determine the level of visual effect. A newly created mine pit and pre-rehabilitated OEA will have high contrast and low integration with the existing landscape and create a Type 1 visual effect. Rehabilitated mine areas will have a moderate to high level of integration and low levels of contrast with the existing landscape and create a Type 2 or Type 3 visual effect.

An extension of operations to an existing mine (such as the Project) will have a lesser visual effect. A successfully rehabilitated Project will have a Type 3 visual effect due to limited contrast with the neighbouring natural landscape.

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

	Visual Properties		Visual Effect Levels			
	Visual Contrast	Visual Integration	Proportion of View Occupied by the Project			
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 and or.... 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 and or..... 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%	Type 2
	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 mine pits 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 PVZ the project can occupy.			High Visual Effect	Moderate Visual Effect	Low Visual Effect

Figure 2.3 | Visual Effect

The Proportion of a View that includes the Project

For any given level of contrast and integration there is a Type 1, 2 or 3 visual effect. For any type of visual effect i.e. Type 1, 2 or 3, the lower the proportion of the view that is occupied by a development, the lower will be the level of visual effect.

For lower visual contrast and high integration type development it will require a higher proportion of a view to be occupied to create a high visual effect, e.g. a rehabilitated OEA. Conversely a high contrast and low visual integration development type, e.g. a pre-rehabilitated OEA will only require a small area of a total view to create a high visual effect.

Thus for any development and visual effect type i.e. 1, 2 or 3, defining the proportion of the total field of view occupied by the Project will assist in determining a high moderate or low visual effect. This in turn is most appropriately determined by defining what percentage of the Primary View Zone (PVZ) it occupies, see Figure 2.3.

The PVZ is the area that is occupied by an arc created by sight lines from the eye radiating out horizontally at angles of 30° and vertically at angles of 20° around a centre view line, Figure 2.4. The PVZ is the most critical central part of a view. It is not the total view, however, still the most important part.

Estimating the percentage of the PVZ occupied by a development will provide a more critical measure than looking at the development in the context of the whole view zone. The whole view zone would include both primary and secondary view areas, representing a view arc of 120°, whereas the central view arc of 40-60° represents the PVZ only.

Generally, a high visual effect will result if the visible area of a development has a high visual contrast and low integration to the surrounding landscape. This high visual effect is further compounded when the development takes up a higher percentage of the PVZ. A low or very low visual effect will occur if there is minimal contrast between the visible area of a development and the existing landscape setting and / or the area occupied by the development forms only a small percentage of the total view.

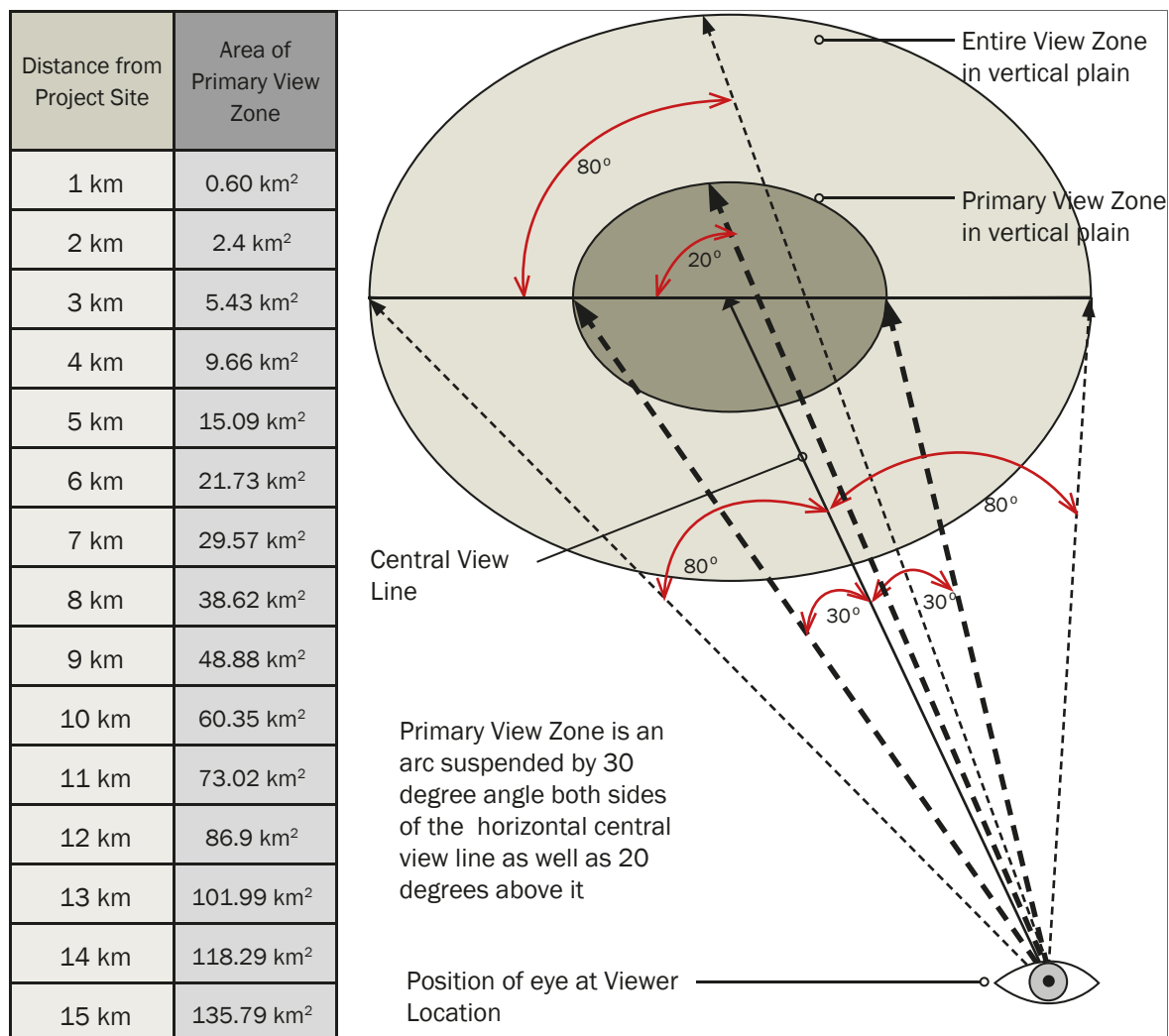


Figure 2.4 | Primary View Zone

The Area of Primary View Zone at Various Distances from the Project

		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

Figure 2.5 | Visual Impact

Visual Impact is the interaction between visual effect and sensitivity

2.4.3 Visual Impact

The visual impact of the Project has been determined by considering both visual effect and visual sensitivity, which when considered together determine impact levels. The way in which the visual parameters of visual sensitivity and visual effect are cross referenced and the outcomes are illustrated in Figure 2.5.

2.5 Application of Methodology

For the purposes of the visual impact assessment, a number of sites within key sectors of the Primary Visual Catchment (PVC) were selected as representative viewing locations. These sites were selected in consideration of the Project's evolution and previous assessments undertaken at Bengalla, for comparative purposes.

Whilst there will be variation in the impacts on specific viewing locations, an overall assessment of the visual impact on the selected locations will be representative for the views experienced from the various sectors

2.5.1 Visibility

For a visual impact to be experienced, landscape alterations resulting from the Project need to be visible. Visibility of the Project from adjoining view locations was determined by viewing into the Project Boundary from a range of potential view points.

2.5.2 Visual Sensitivity

The visual sensitivity of various viewing areas was determined by a review of aerial photography, plans of the Project and maps of the surrounding areas. This included the consideration of land use, viewing distances and the general level of screening available from topography, buildings and vegetation. The assigned sensitivities within each sector were also evaluated based on field study conducted February 2012 and other study data.

2.5.3 Visual Effect

The visual effect of the mining operations at the Project on external viewpoints has been assessed at various locations (as illustrated in a number of photomontage images and cross-sections) taken from various view points within key sectors of the PVC. Viewpoints included:

- New England Highway north of Muswellbrook;
- View Place in north Muswellbrook;
- Ironbark Road views from the Ironbark Estate;
- Racecourse Road;
- Denman Road; and
- Roxburgh Road to the west of Bengalla.

These locations were selected to illustrate views from various view points around Bengalla. The assessments from these locations have been structured to display worst case views of the Project from these areas.

2.5.4 Photomontage & Cross-Section Development

Photographs of the existing operations were taken at standing eye level from each viewing location and photograph locations were accurately surveyed. Three dimensional (3D) computer models of the Project at year 4, 15 and 25 and the surrounding area were then developed from digital surface topography and Project mine plans.

The photomontage models enabled accurate views of the Project to be generated at a specified location and take into account screening of views by natural topography. The photographs of the Project Boundary were overlain on the model view and the location of future visible components of the Project were determined considering any foreground screening from topography or vegetation in the photograph. The colours and textures of rehabilitation and the active mining from a similar viewing distance were then applied to the corresponding components of the visible sections of the Project. The end result is an accurate and realistic photomontage of the future view of the Project.

At each viewing location, a photomontage set has been completed. The first photograph in each set illustrates the existing view (a), with subsequent photographs illustrating the Project operating during various phases of the mine life. The photomontages were then used to assist in determining the level of visual effect of the Project from each of the selected representative view points. Once the visual effect of the Project was determined, the visual impact on each residential viewing sector was determined using Figure 2.5.

The explosives magazine will be located on top of the OEA for operational and safety reasons. To evaluate the visibility of this element, cross sections were completed to critical areas in Muswellbrook. These sections will determine whether the topography of the OEA will screen view lines or that the OEA will need to be complemented with micro-topographic features, e.g. bundling and or tree planting.

2.6 Treatments

Visual impact mitigation strategies were developed for both on-site and off-site situations to ensure that visual effects and / or visibility / visual sensitivity factors are decreased in appropriate time frames to achieve appropriate impact mitigation.

2.6.1 Reduce Visual Effects

Rehabilitation of the Project active mining areas within the Project Boundary will decrease the visual contrast created by mining operations to the existing landscape. In addition, rehabilitation strategies that emulate patterns, shapes, line and colour of the existing landscape will reduce the contrast between the Project and the existing landscape, reducing visual effect.

2.6.2 Reduce Visual Sensitivity

Reducing visual sensitivity is achieved by conducting treatments to minimise visibility to the Project. Due to the scale of open cut coal mining components of the Project, such as the OEA and active extraction area, screening is most effectively achieved at or close to the point of viewing. Such screening treatments can also be used to re-direct views to areas not affected by mining, as well as generally enhancing the landscape at the viewing point.

2.6.3 New Visual Setting

On completion of mining operations and following rehabilitation, a final landform will be created. This new landform will reflect the pre-mining land use of agriculture.

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 is measured.

As shown in Figure 3.1, the existing environment surrounding Bengalla 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

Bengalla is located 4 km west of Muswellbrook in the Upper Hunter Valley of NSW. The PVC represents the area within which the majority of critical views of the Project are obtained.

The Project PVC is defined by the ranges to the west and north of the site, and the town of Aberdeen to the north-east. The catchment area is further defined by Muswellbrook to the east, and 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 PVC. See Figure 3.1.

3.3 Land Ownership

The land ownership around Bengalla is dominated by land within mining leases held by various mining companies, Figure 3.2. To the north, land is within the Mount Pleasant Project Area. To the south, land is dominated by Mt Arthur Coal Mine and to the west, but in a different visual catchment is land within the Mangoola Coal Project.

Private lands are mainly located to the east and west. To the east the visual catchment is dominated by Muswellbrook. This township area 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 Project.

3.4 Visual Character of the Landscape

As described above in Section 2.2.1, the visual character of the landscape in the vicinity of the Project is created by Visual Character Units (VCU) that combine to make up a particular view from any viewing location.

While the visual character of the Project is defined in Section 4 of this report, the visual character of the existing landscape into which the Project will be placed is defined by several separate VCUs.

The Visual Character Units within the PVC include:

- Hunter River Floodplain;
- Foothills;
- Mine and industrial uses;
- Town areas; and
- Surrounding ranges.

Within each VCU there may be a range of visual receivers. These receivers have varying sensitivity to landscape modification. The more critical visual receivers include:

Towns:

- Muswellbrook; and
- Aberdeen.

Roads:

- Wybong Road;
- Kayuga Road;
- New England Highway;
- Denman Road; and
- Roxburgh Road.

Rural Areas:

- Houses along Denman Road;
- Houses in Northern Foothills;
- Houses on the edge of the Hunter River Floodplain; and
- Historic houses on Hunter River Floodplain

The PVC is strongly defined by the Hunter River Floodplain which runs from the south-west corner around Bengalla and north to the western edge of Aberdeen. A further critical element of this PVC is the existing mining operations in the area. This includes the existing Bengalla operations and Mt Arthur Coal Mine located to the south of Bengalla, and Mangoola Coal to the west. It also includes the future approved mine area to the north in the Mount Pleasant Project.

Figure 3.1 illustrates the environment and individual VCUs which are briefly described below.

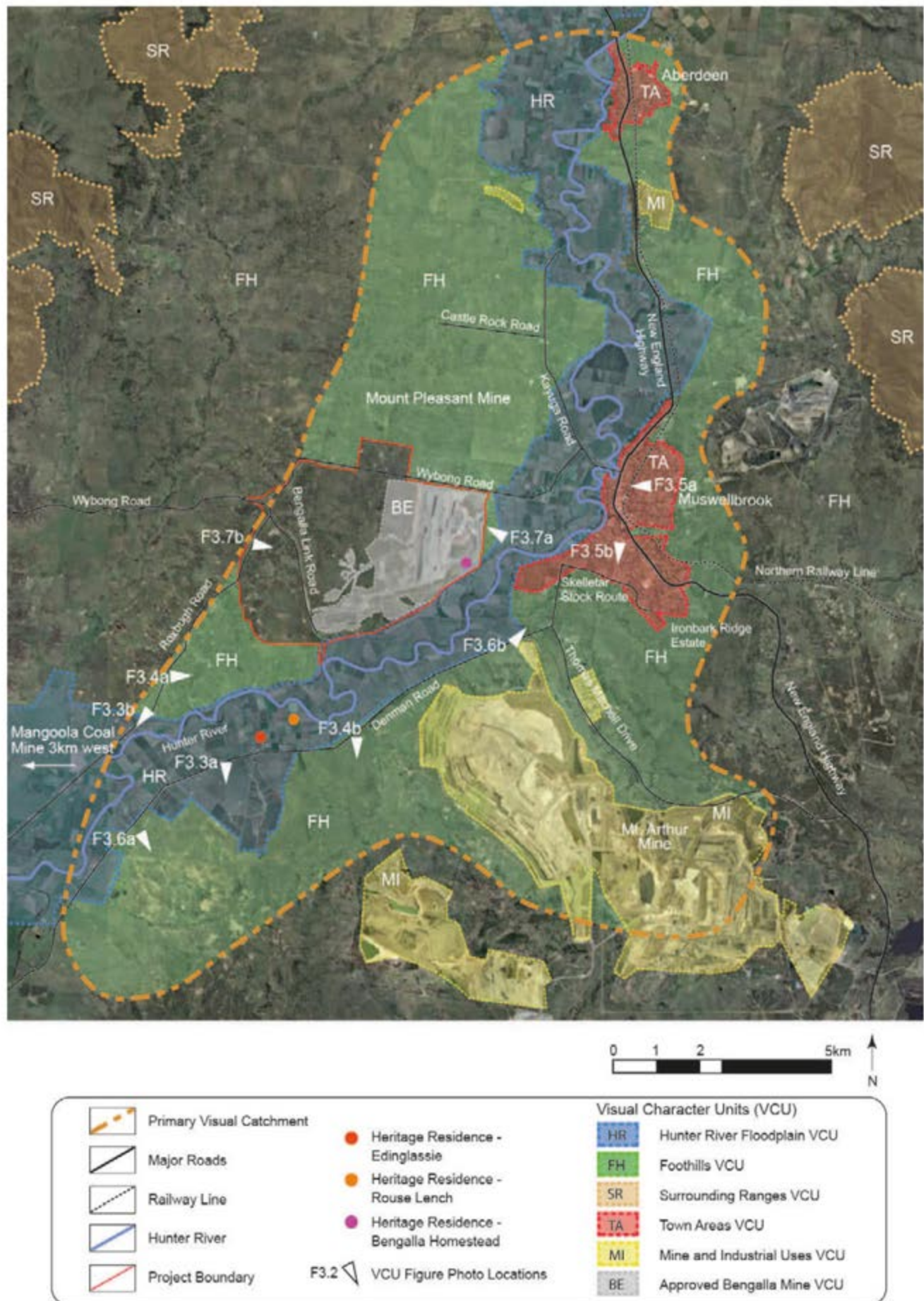


Figure 3.1 | Existing Environment

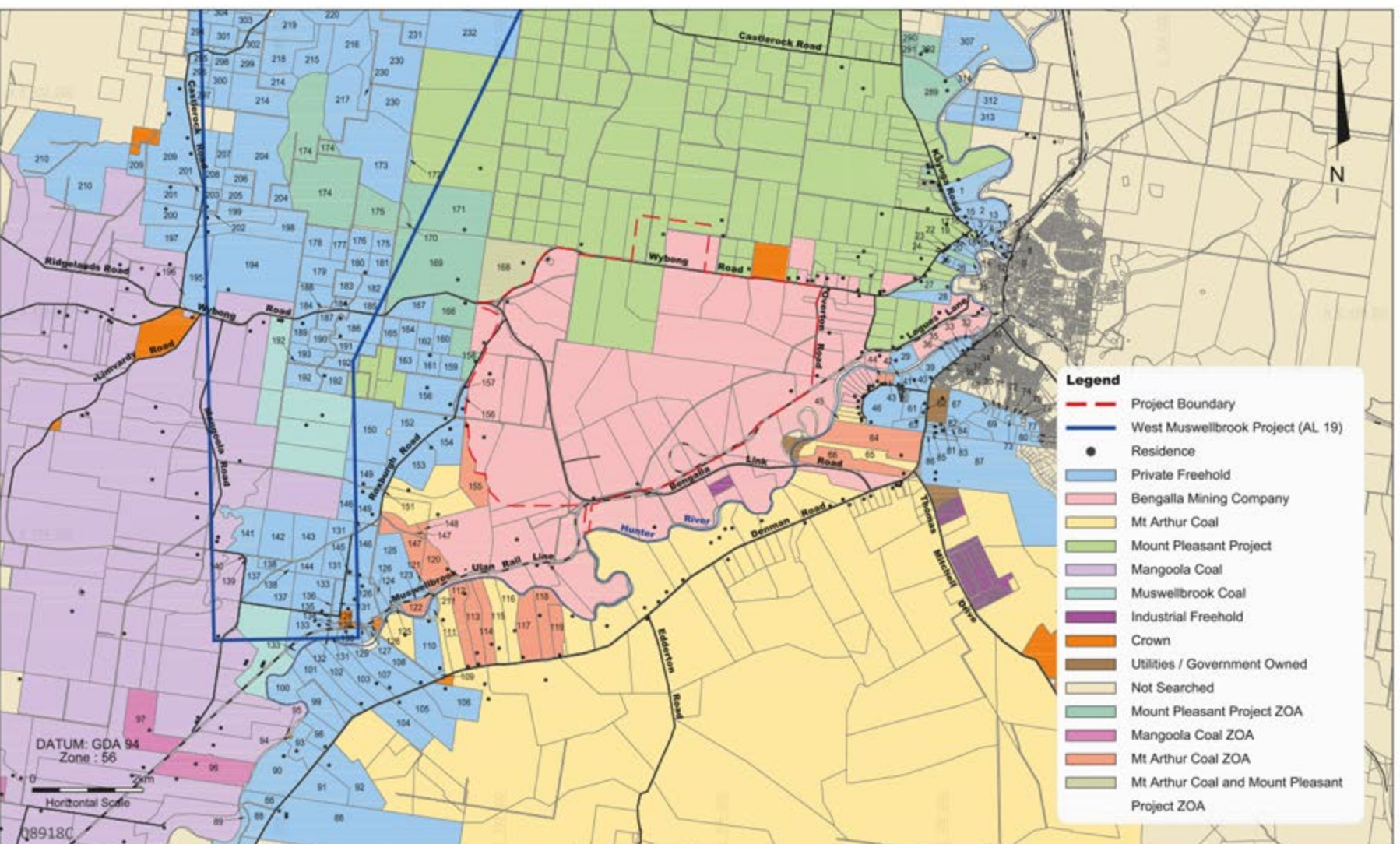


Figure 3.2 | Land Ownership



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3.4.1 Hunter River Floodplain VCU

The Hunter River Floodplain dissects the PVC, running generally from south-west to north-east. Visually, this VCU is dominated by the river flats, which as a result of soil type and irrigation, support pasture and croplands that create vivid rectilinear patterns in the midst of dry land grass and woodlands on adjoining slopes.

The Hunter River Floodplain unit creates strong contrast and visual interest to surrounding landscapes. Perhaps its greatest significance is its flatness and grass / crop cover that allows for long views from distant locations such as Aberdeen and distant highway locations.

There are some residences within this unit that have visual contact with Bengalla (see Figure 3.3). These include a cluster of houses on Kayuga Road to the north of Wybong Road.

While there are also houses on Denman Road, most of these have been acquired by BMC or Mt Arthur Coal. Parts of Muswellbrook, including the Racecourse Area are also within the Hunter River Floodplain Unit. Due to flooding, rural dwellings within the unit are generally restricted to raised knolls that are less prone to flooding.

The Hunter River Floodplain Unit supports parts of the New England Highway and Main Northern Railway Line to the north and east of Bengalla and the Project. To the south, Denman Road skirts between the Floodplain and the Southern Hills. In addition, the Hunter River Floodplain supports numerous minor rural roads. See Figure 3.3.

Historic houses on Hunter River Floodplain

The historic homesteads of Bengalla itself and Edinglassie and Rous Lench, Figure 3.1 are located on the edges of the floodplain. They are small visual focal points as currently seen from public roads and are under the ownership of Bengalla and Mt Arthur Coal. Bengalla and Rous Lench are single houses with a limited number of outbuildings and sheds, while Edinglassie is a much larger complex of main house, extensions to it and a series of outbuildings. All houses share the landscape concept of enclosing gardens of exotic trees and hedges with views beyond this in various directions to the landscapes beyond.

3.4.2 Foothills VCU

The foothills include the Southern Foothills south of Denman Road and Northern Foothills north of Denman Road around Bengalla and are adjacent to the Hunter River Floodplain, Figure 3.3. These hills are generally gently sloping with the Northern Foothills in the vicinity of Roxburgh Road having the greatest elevation (240 -260 m) within proximity of the Project

The Eastern Hills are generally low elevation hills to the east of Thomas Mitchell Drive. The land cover is a mixture of grasslands, woodlands and open forest, see Figure 3.4. The hills only have low elevations, generally in the order of 250 m with Little Grass Tree Hill having an elevation of 258 m. These hills generally continue to the east of Muswellbrook where Skelletar Stock Route has an elevation of 333 m.

The Southern Hills again have similar elevations but are flanked by the higher elevation ridges and hills that include Mt Arthur and Ogilvie Hill. These hills for the greater part have been cleared for grazing purposes and support grasslands with scattered trees with woodland or open forest on steeper areas and along some gully lines. The gentle slopes with a mixture of grasslands, woodlands and open forest create the typical rural landscapes of the region. An area adjacent to South Muswellbrook and to the east of Thomas Mitchell Drive, Ironbark Estate has been developed as a park land living estate.

The Foothills, although not highly populated, do support a limited number of private rural residences that to varying degrees have views of the Project (as shown on Figure 6.1). Most significant of these are a limited number of residences along Roxburgh Road and some residences on Denman Road. In addition, there are some houses to the north of Wybong Road, which are within the approved Mount Pleasant Project.



Figure 3.3 | Hunter River Flood Plain VCU
Cropland and grassland dominate this VCU, forming strong rectilinear patterns in an open landscape



Figure 3.4 | Foothills VCU

The foothills are generally hills with low elevation, with a landscape mix of grassland, scattered trees and open forest. Foothills have generally been cleared for grazing purposes.

3.4.3 Town Areas

Town VCUs vary in size and visual character between one town and the next (i.e. Muswellbrook and Aberdeen). They share common elements of residences, streetscapes, commercial areas, and recreation areas. The mix of these factors creates visual character of the towns. The significance of the towns is the concentration of sensitive receivers in the form of residential development areas, Figure 3.5.

The township of Muswellbrook is located on foothills to the east of Bengalla. Some parts of the town are on or adjacent to the Hunter River Floodplain. The most significant area in this regard is the Racecourse Road Precinct that contains the racecourse and some residences in close proximity to Bengalla. In the Racecourse Road Precinct there are residences to the north and east of the racetrack itself, with the race club and associated facilities to the west of the track.

A significant part of the town is located on foothills with views to Bengalla. This includes North Muswellbrook on the eastern side of the New England Highway and South Muswellbrook to the south-east of Denman Road. This includes the residential estate of Ironbark Ridge. The commercial areas of the town centre on lower slope areas that are generally not visually affected by Bengalla. However there are some views from more elevated commercial areas, such as Muswellbrook Market Place on Sowerby Street which has existing views.

Another significant feature of the town is the transport corridors of the New England Highway and the Main Northern Railway Line, both of which run through the town, Figure 3.1.

The township of Aberdeen is located some 12 km to the north-east of Bengalla. Some parts of the town are on elevated slopes with easterly and south-easterly aspects. These town areas would have some views to Bengalla as well as other mine areas such as Mt Arthur Coal Mine, Dartbrook Underground Mine facilities and approved (but yet to be developed) Mount Pleasant Project.

3.4.4 Surrounding Ranges

The surrounding ranges define the edges of the Hunter Valley and occur on both the eastern and western sides of the valley. These mountain ranges have significant elevation above the valley and foothills, are steep and forest covered however are located at significant distances from Bengalla.

The visual significance of the Ranges is that they often create the background to valley views from a full range of view locations. Areas that experience views to these distant ranges over existing mine developments include elevated areas in the foothills, and those residential areas on the western edge of Muswellbrook, Figure 3.6.

3.4.5 Mine and Industrial Uses VCU

This VCU consists of the existing Bengalla operations, as well as the larger Mt Arthur Coal Mine to the south, and the Thomas Mitchell Drive Industrial Estate. It will during the life time of the Project also include Mount Pleasant to the north. Beyond the PVC, there are also further extensive mining operations to the south-east.

Mt Arthur Coal to the south of Denman Road and Bengalla, within the Southern Foothills contributes to the 'mine' visual character in this section of the foothills. From various locations such as Aberdeen and the adjoining areas within the Southern Foothills, Mt Arthur Coal mine operations are also seen in the context of Bengalla.

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

Bengalla

Currently Bengalla consists of the active mining area and associated Main OEA, 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. The site has a strong industrial visual character due to its established use as a coal mine and coal handling area.

The OEA has two profiles: the first being the outer edge that has been progressively rehabilitated as works are completed and the active edge to which new waste material is deposited, Figure 3.7. The rehabilitated side of the OEA integrates with the existing landscape of rolling hills within the Northern and Southern Hills VCUs. The active face remains a high contrast and with low visual integration into the existing landscape. This face is dominated by the steep back slope of the OEA. These faces retain the light earth colours of the removed overburden, Figure 3.7.

The existing Main OEA has both of these faces and visual features, and sections of the OEA have an approved maximum elevation of RL 270 m. at the eastern end of the OEA.

Although clad in natural tones (greens and creams), the CHPP is a large scale industrial facility that is large in both vertical and horizontal dimension. The largest scale horizontal elements are the rail loop and the coal stockpiles. The vertical elements of the plant are also significant as these can be seen, to varying degrees, from neighbouring areas. The major vertical elements include the CHPP main building, the rail loading bin and various elevated conveyors.

Both the existing OEA and CHPP are a significant part of the existing visual setting of the proposed Project to the mine plan and works on the site. Alterations to the existing mining activities that will result in changes to the OEA are part of the current Project and are discussed in Section 4.

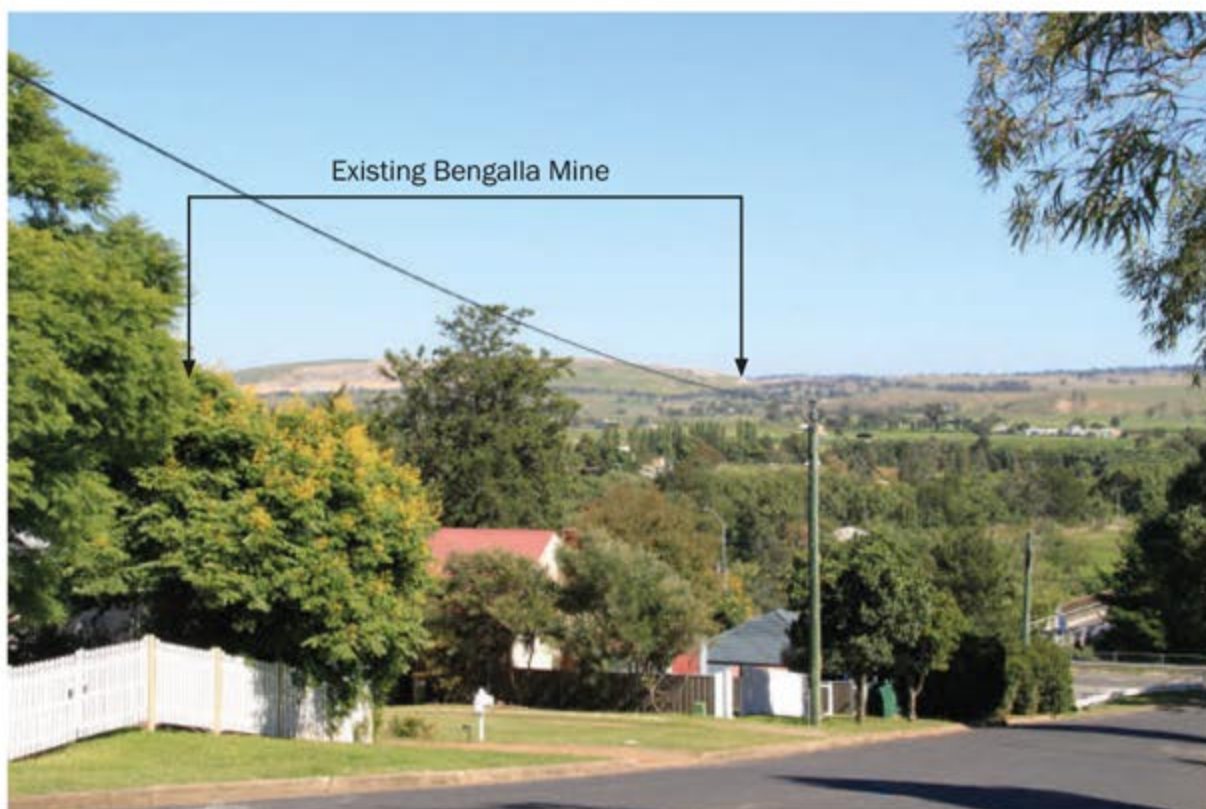


Figure 3.5 | Town Area VCU

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



Figure 3.6 | Surrounding Ranges VCU

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 3.7 | Mine & Industrial Uses VCU

The Bengalla existing OEA rehabilitated face (top) has colours and textures that are beginning to take the form of Foothills VCU. The Bengalla OEA active face (bottom) still has colour and texture indicating active mining

4. THE PROJECT

4.1 Introduction

This section, together with Section 1 describes the proposed changes to the mining operations at Bengalla. More specifically, it considers those changes that are significant to the visual values of the environment.

Although not discussed further in this section, it is important to recognise that throughout the life of the Project there is ongoing rehabilitation of the overburden emplacement. This is a key component of the implementation of any OEA, which is the most significant element in relation to visual effects and impacts on the surrounding landscape.

4.2 Project Components

Specifically the Project involves the following key components relevant from a visual impacts assessment perspective:

- Open cut coal mining at up to 15 Mtpa ROM for 24 years;
- Temporary out of pit OEA to the west of Dry Creek;
- Continue mining to the west of current operations;
- Continuous rehabilitation of OEA areas from east to west.
- Continued use, expansion and upgrades to existing site infrastructure;
- An additional CHPP coal stockpile and ROM coal stockpile;
- Realignment of Dry Creek through rehabilitated areas;
- Realignment of Bengalla Link Road; and
- An additional temporary OEA to the west of Dry Creek.

These proposed changes have to be considered in the context of mine features within the broader Mine and Industrial Uses VCU and more specifically within the context of Bengalla.

In terms of the broader Mine and Industrial Uses VCU there would be minor change to the visual effect created by this character unit by the Project. The visual effect and potential impacts within the context of Bengalla itself are considered below.

4.3 Existing & Proposed Project Condition

The existing and approved OEAs are the major mine components visible from surrounding viewing locations. The OEA has two faces, the active face and the outer edge. The active face is unshaped, steep, angular, and contains raw overburden material creating a high visual contrast and low integration with the environment, due to colour, form and scale. The outer edge has both rehabilitated and ongoing rehabilitation faces. Rehabilitated faces are graded to a slope of approximately 10 degrees and covered with grass and trees and have less visual impact on the existing landscape environment. Some pre-rehabilitated faces have been graded to their future shape, but are still in the process of gaining the vegetation cover that will be their future colour and texture.

The approved OEA at Bengalla as at 2012 is illustrated in Figure 4.1. The Project primarily relates to a continuation of the existing mining operations extending to the west.

The existing OEA will expand in a westerly direction as the pit moves west. The height of the final landform of this emplacement will not increase above the currently approved maximum elevation of 270 m, however additional area at the approved maximum height will be greater as the pit and resulting OEA expand west, Figure 4.1. If required to be constructed, the additional OEA (the Western OEA) will become a part of this overall emplacement as mining activities move west, until it is mined through.

4.4 Visual Character

A significant part of the visual environment in this locality is the existing mines areas, especially existing OEAs. Any existing approvals for mining activity also need to be considered as part of the existing visual environment. This includes the existing OEA and how it is proposed to develop over time. These elements provide an immediate backdrop to the Project and because they have similar visual character, contrast and visual effect levels minimised.

The visual effects of the Project are shown in plan on Figures 4.1 - 4.6 and the illustration of the visual effects in photomontages (see Figures 6.1 - 6.7). Visual effects will result from:

- The extension of mining activity to the west;
- Extending the existing OEA to the west;
- Rehabilitation of OEA areas from the east;
- The temporary OEA located to the west of mining; and
- Changes to infrastructure, mainly the upgrade of the CHPP, development of an additional coal stockpile and a new explosives storage area.

The extension of mining activity to the west

Extension of mining activity to the west will maintain the current visual effect experienced by surrounding areas. As the extension is on the western side of the existing OEA, the eastern rehabilitated faces will not be affected and will screen activities to the west from sensitive receivers to the north east, east and south east.

Views from these locations therefore, will not be different to those currently experienced. Even those views from elevated locations will not be altered from existing visual character. Rather, these views will be improved as the approved rehabilitation patterns of forest and grassland are established.

The extension of the OEA to the west

The visual effect of moving mining toward the west means that the active face of the OEA will be closer to some viewing locations, especially Roxburgh Road and some western viewing locations. Visual character resulting from this migration, despite being in a different view zone will be maintained with the current visual character. The scale of the OEA will decrease when compared to the existing OEA active face from 270 m gradually down to approximately 180 m in the west.

This decrease in scale will ensure that the rehabilitated OEA to the east will dominate the skyline and that the active face of the OEA will be contained in a framework of rehabilitated landscape. Also with time the intervening ridges to the west will assist in screening the west moving OEA as these areas have elevations greater than 200 m.

The visual effect of the extension to the OEA to the west will have high to low visual effects on the various viewing sectors. Visual effects on easterly viewing locations will be low as the eastern face of the OEA is rehabilitated and screens views to the mine pit and active face of the OEA.

Conversely those to the west will continue to be high, but of reduced elevation and with rehabilitated OEA visible above it.

Rehabilitation of OEA areas from the east

As mining progresses to the west, the OEA will be progressively completed to the east of the mining pit. This will allow for progressive rehabilitation of OEA areas. This will reduce the amount of the OEA that is in a pre-rehabilitated state. It will also over time create a rehabilitated rural landscape of grass and tree cover that will be greater in elevation than the active face of the OEA, thereby dominating it and assisting in achieving improved visual integration outcomes of this active face.

Temporary Western OEA

The Western OEA may be required in the early stages of the Project. The replacement Western OEA will have a limited effect on the current visual character of the Project, as it will be adjacent to an existing approved OEA. The OEA will also be mined through as the pit moves west.

This area will be against the background of the larger mine and, as was the case with the approved Western OEA, the visual character and effect of the OEA is diminished significantly due to this background character. The elevation of the Western OEA and its possible expansion will not exceed RL210 m.

The visual effect of the out of pit area will be low.

Infrastructure Relocations and Upgrades

This element of the Project involves minor changes to the mine infrastructure. These include the CHPP, water infrastructure, additional infrastructure areas, relocated explosives storage area, and upgrades to some of the existing buildings. These elements will be contained within the existing visual setting of the current CHPP and infrastructure area.

The additional coal stockpiles will also comply with the visual character of the mine. The scale of the stockpiles relative to the mine pit and OEA, and their similarity to existing stockpiles will result in no change in visual character of the mine.

The proposed radio tower will be in an isolated location in the south Western Sector of the development boundary. While its size will be minimal relative to other mine elements, the location and differing visual characteristics of the radio tower can contribute to the visual effect from certain viewing locations however its proximity to other mine infrastructure such as the CHPP can reduce this visual effect. It is expected the construction of the radio tower will have minimal visual effect on surrounding viewing locations.

The visual effect of the Infrastructure alterations will be low.

New Explosive Storage Area

A new explosive magazine and reload facility will be constructed on the rehabilitated OEA after Year 1 of the Project, Figure 4.2. These facilities and associated roads will be constructed along with access roads linking these elements to the infrastructure area. These elements will include built form with elevations no higher than 10 m and will be surrounded by screening vegetation at appropriate safety distances.

The visual effect of these elements will be low due to their limited scale, the distances from which they are viewed, the screening effect of the OEA itself, Figure 6.10 and 6.11, and screening/integration effect of vegetation planted as part of the OEA rehabilitation.

4.5 Bengalla Road Relocation

This road realignment will create new line in the landscape with minor form and shape elements being created by road cut and fill batters. The road will replace 6 km of the existing road and have similar visual effects. The road will have little effect on external sensitive views and have a low visual effect when seen from external view locations

Bengalla Road Relocation will have a low visual effect.

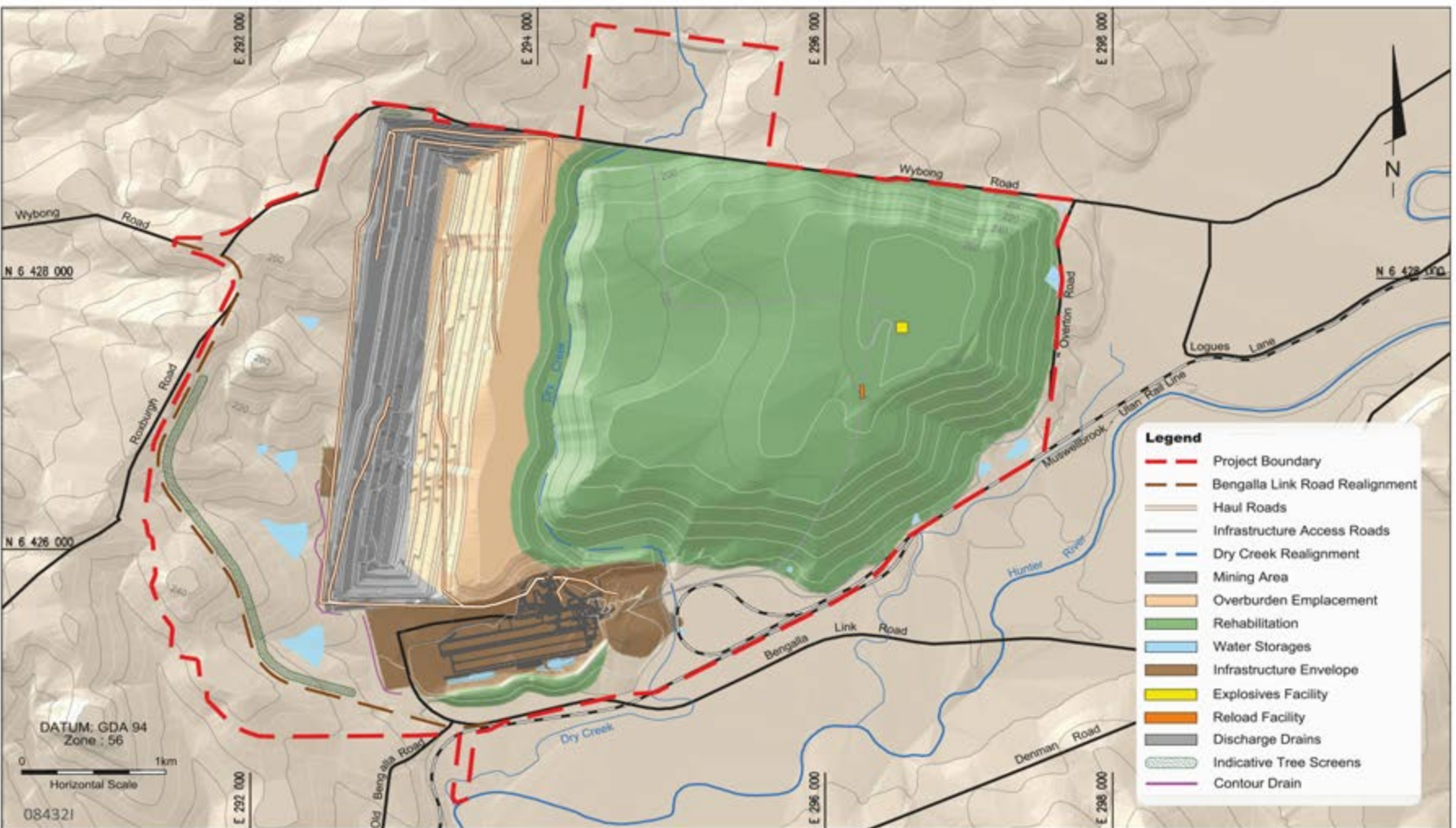
4.6 Proposed Tree Planting

The final design of the Project involves progressive tree planting once rehabilitation of the OEA has stabilised. The Landscape Management Plan to be developed in consultation with relevant regulators will determine the location and density of the tree stands.

In this context, indicative tree planting patterns have been defined in the first instance from a visual impact assessment objective only. The need for tree plantings to be responsive to other considerations remains, and will be defined in the Landscape Management Plan to be revised to incorporate the Project.

These indicative planting patterns are illustrated in the photomontage sets to indicate how planting could look as seen from various locations.

The visual effect of the tree planting will be to reduce the visual effect from Type 2 to Type 3 and should achieve visual integration of OEA structures into the landscape.



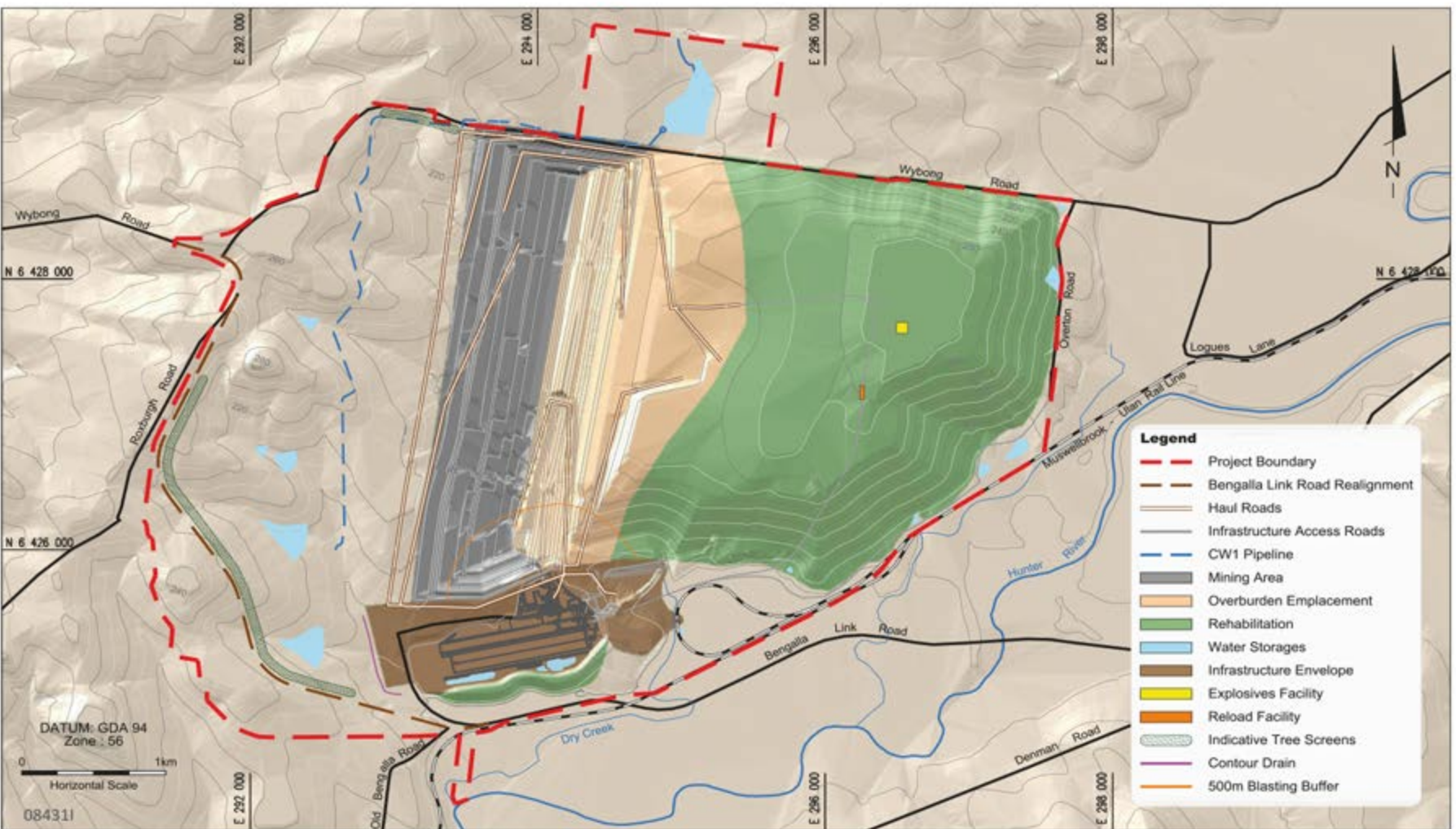
BENGALLA MINE

Conceptual Year 24 Mine Plan



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Figure 4.6 | Conceptual Year 24 Mine Plan



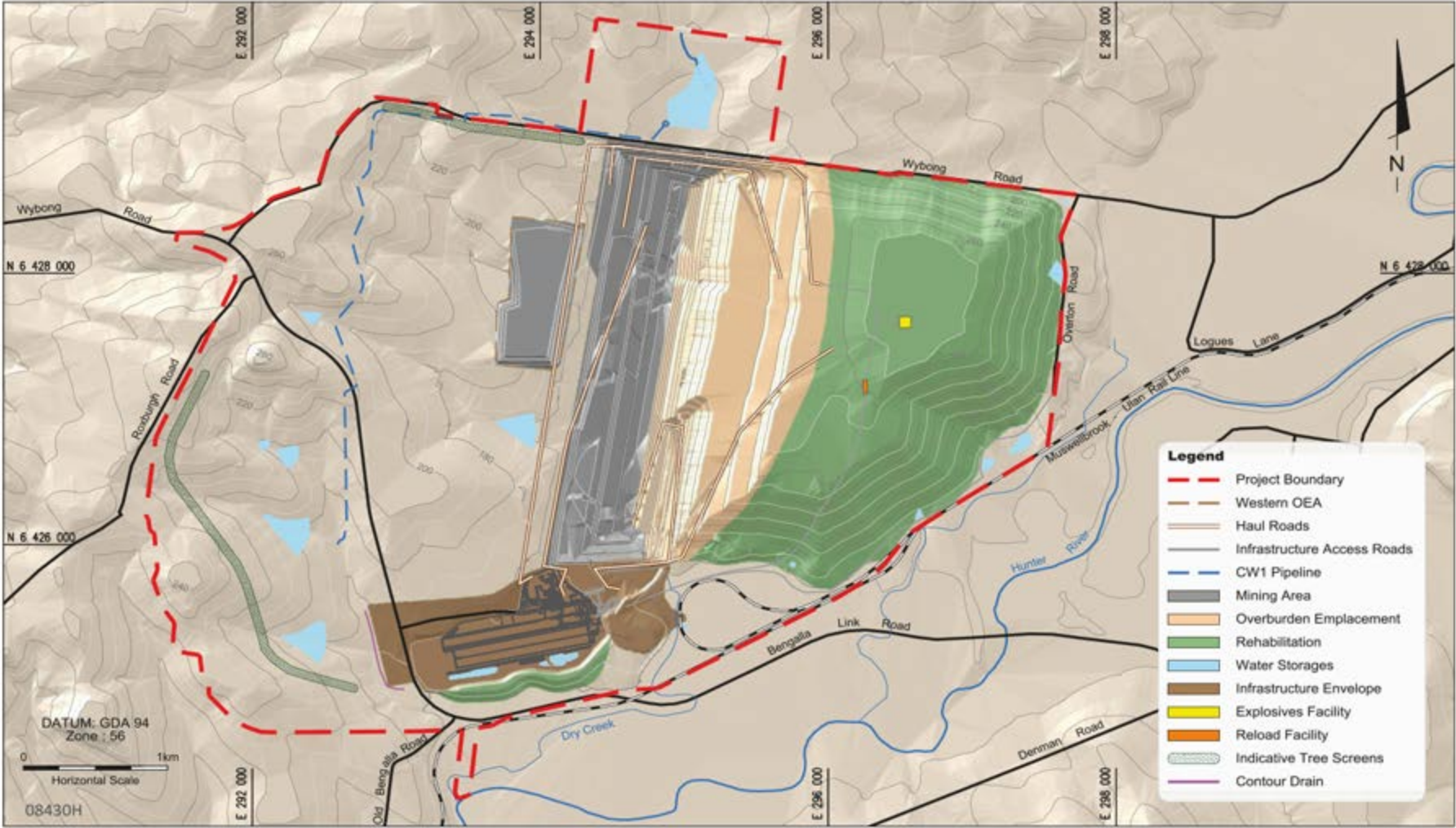
BENGALLA MINE

Conceptual Year 15 Mine Plan



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Figure 4.5 | Conceptual Year 15 Mine Plan



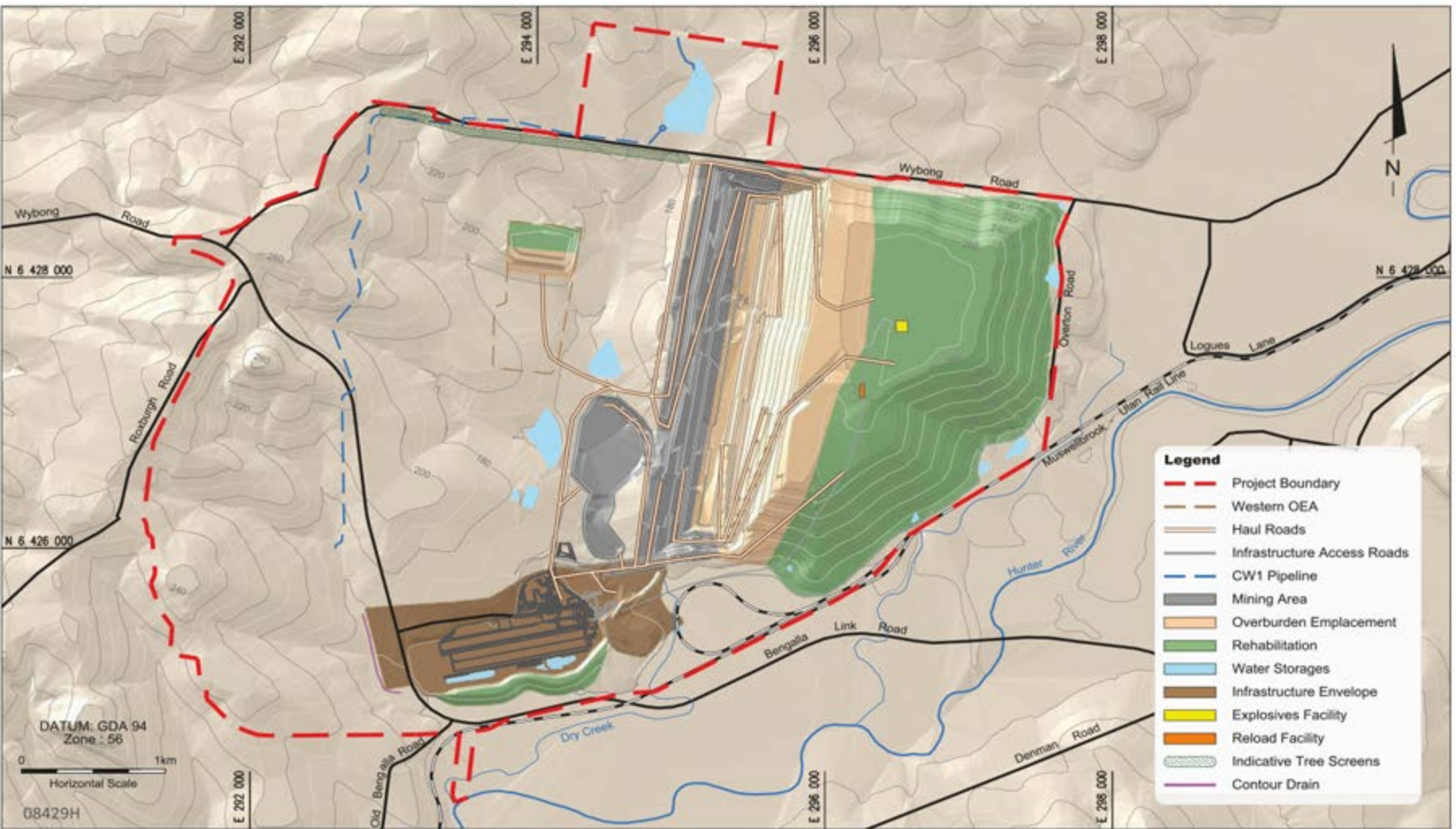
BENGALLA MINE

Conceptual Year 8 Mine Plan

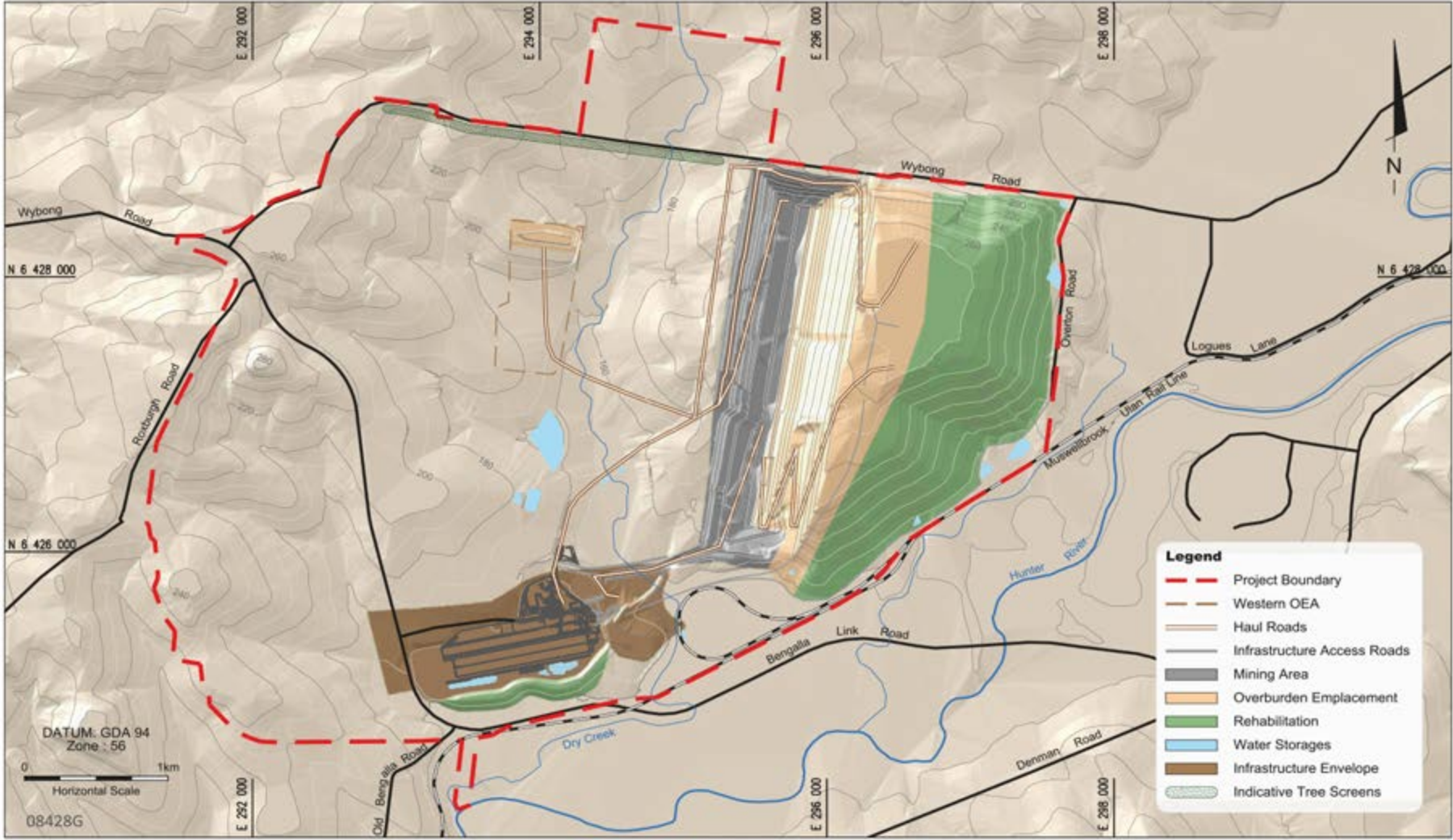


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Figure 4.4 | Conceptual Year 8 Mine Plan



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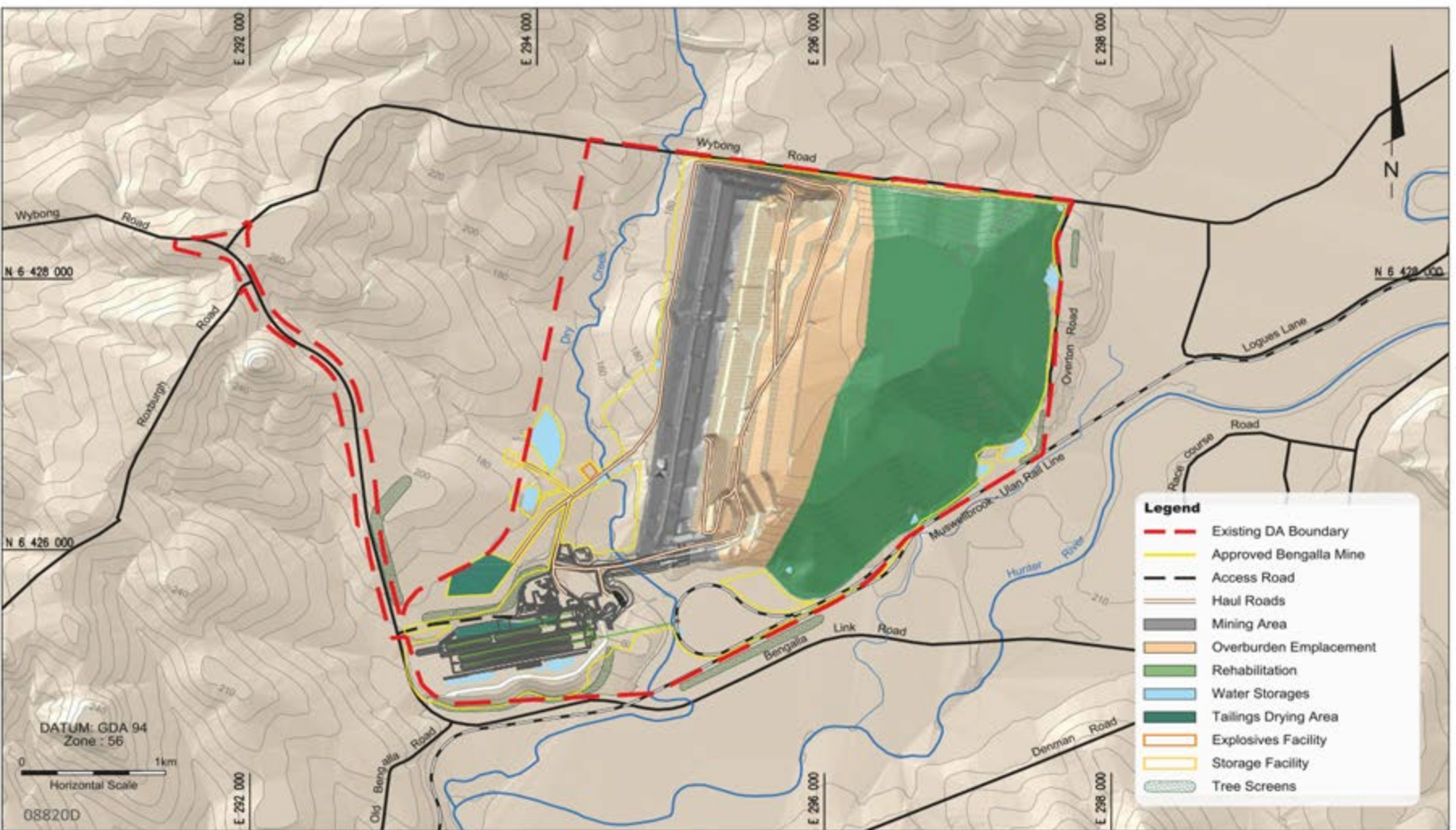
BENGALLA MINE

Conceptual Year 1 Mine Plan



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Figure 4.2 | Conceptual Year 1 Mine Plan



BENGALLA MINE

Approved Site Layout



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Figure 4.1 | Approved Site Layout

5. VISUAL SENSITIVITY

5.1 Introduction

This section of the report evaluates the visibility of various elements of the Project from various viewing locations. Visibility to the Project will depend on factors such as topography and vegetation as well as existing and approved development components of Bengalla, especially the OEA, existing visual bunds and infrastructure components.

The sensitivity of these viewing locations will depend on the land use of that location. Land uses that utilise the view (i.e. residences and recreation areas) will 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 (PVC) for the Project and various view sectors are illustrated in Figure 5.1 and defined below:

- The Northern View Sector that includes the town of Aberdeen;
- 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 ridge line of the foothills in the vicinity of Roxburgh Road.

5.3 Viewing Locations – General

Around the Project Boundary there are a number of potential viewing locations. These include:

- Town Areas such as Muswellbrook, Aberdeen, and from outside the PVC and to a lesser extent Denman;
- Rural residences. These are usually more isolated properties scattered throughout the PVC, and sometimes elevated to take advantage of views across the Hunter River Floodplain;
- Recreation areas and Tourist Facilities such as: Muswellbrook Racecourse; and Pukara Estate olive grove; and
- Roads. The Major road through the PVC is the New England Highway. Regional roads are Wybong Road, Bengalla Link Road and Denman Road, in addition to smaller local roads.
- Historic homesteads of Bengalla, Edinglassie and Rous Lench.

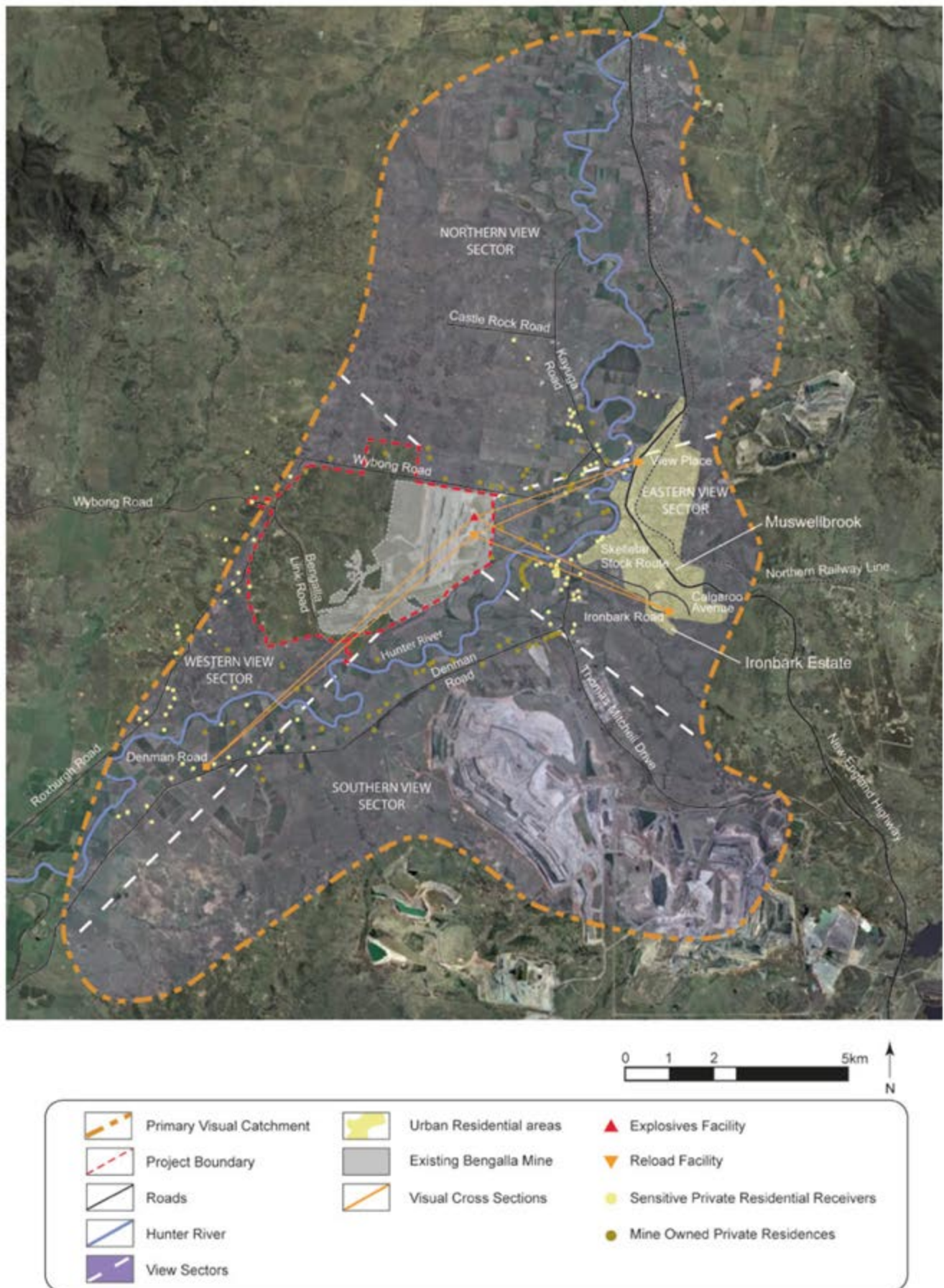


Figure 5.1 | View Sectors & Private Receivers

5.4 Visibility Considerations

5.4.1 Visibility

Factors influencing visibility vary around the Project Boundary, creating different visibility patterns. Usually the occurrence of topographic and vegetation elements close to the point of viewing are most influential in limiting visibility than elements of similar scale close to the Project itself.

However in relation to the Project, the screening influence of existing and approved mine components, especially the existing OEA are significant screening elements, see Figure 5.2. In relation to vegetation, tree cover at the point of viewing has the potential to screen views to Project areas (Figure 5.3). Vegetation close to the Project Boundary has limited effect in influencing visibility, see Figure 5.4.

In nearby towns, viewing opportunities of the Project may be limited to the outer edges as areas within 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 and/or homestead gardens and trees adjoining gardens and sheds can create foreground screens. This screening effect may be diminished when viewing locations are situated in elevated locations, Figure 5.5.

5.4.2 Land Use Sensitivity

Surrounding the Project Boundary, land use varies which then influences the sensitivity patterns towards the Project. Land use activities include a range of agricultural pursuits, rural residences and urban 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. (Land uses are discussed in more detail in Section 3 of this report).

In this context, residential areas such as Muswellbrook or rural residences will have sensitivity to larger scale changes to the landscape. As such, these have been assigned a high sensitivity up to 7.5 km away 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, see Figure 2.2.



Figure 5.2 | View of main OEA from East
The existing OEA will screen the Project.



Figure 5.3 | Tree cover at point of viewing
Trees alongside a viewing location can provide more effective screening/filtering to distant views.



Figure 5.4 | Tree cover at site

Tree plantings alongside project elements, while achieving landscape pattern outcomes, lack the size to screen large scale elements such as an OEA.



Figure 5.5 | View from elevated location

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

5.5 Visibility and Visual Sensitivity of the Northern Sector

The Northern Sector, 5.6, includes a number of sensitive receivers in the form of rural residences along Wybong, Kayuga, and St. Heliers roads and other minor roads off these roads as well as the New England Highway and Aberdeen. Much of the Northern Sector within the PVC consists of lands that are part of the Mount Pleasant Project (see Figure 1.1).

Views to the Project from the Northern Sector will be limited due to the screening of the current Project by the extent of the existing OEA and its rehabilitated outer edges and slopes.

The Northern Sector contains parts of:

- Hunter River Floodplain VCU;
- Foothills VCU; and
- Town Areas VCU (Aberdeen).

5.5.1 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. Many are screened by the adjoining foothills to the north of Bengalla. The open nature of the floodplain and associated rural lots in other areas means views in any direction are unobstructed by topographical features.

The residences are usually associated with rural lots. While the lots have low sensitivity, the residences have high sensitivity to any potential views to the proposed Project areas.

This could create a high sensitivity to views of the proposed Project areas. However views for any residence that is orientated toward Bengalla would be onto the north eastern and eastern faces of the rehabilitated OEA that are part of the current approval, meaning that visibility to Project elements is minimal. Further, intervening topography and a future Mount Pleasant Project would create further screening of Bengalla Operations.

Residences with views would have a high sensitivity. Those that are screened from the Project by rehabilitated OEA have been ascribed a low sensitivity due to lack of visibility to the Project.

5.5.2 Foothills

There are a limited number of residences in the foothills. Most are screened by the adjoining topography to the west of Kayuga Road. Closer residences adjacent to Wybong Road are owned by BMC or Coal & Allied and only have views onto rehabilitated eastern face areas.

5.5.3 Aberdeen

The Town Area VCU of Aberdeen marks the northern most point of the PVC. The southern edge of the town is over 10 km away from the Project, with most of the town being at greater distances. This distance makes for a lessening of visibility and hence sensitivity, however, as the views toward the Project are across the open floodplain, any views toward the Project will be unobstructed by middle ground topography or vegetation.

Again, views from the town are over the existing rehabilitated OEA and views onto proposed changes are negligible.

Residences over 10 km away from the Project Boundary are ascribed a low sensitivity on the basis of distance and lack of visibility to the Project.

5.5.4 Roads

The only major road in this sector of the PVC is the New England Highway which travels south through Aberdeen, heading toward Muswellbrook. As this road runs alongside or within the Hunter River Floodplain, the views in a southerly direction from the road are often unobstructed. At its closest point within the Northern View Sector it is over 5 km away.

Again, despite distance to the Project Boundary, elements of the Project will be visible while heading south. Views are limited to the rehabilitated eastern and northern faces with very minor views to the north western edge of the OEA.

As the road travels closer to the Bengalla, its sensitivity level will increase. Within the Northern Sector it will remain low due to distance and lack of visibility to the Project.

5.6 Visibility and Visual Sensitivity of the Eastern Sector

The Eastern Sector contains the highest number of potentially sensitive receivers. This sensitivity relates to the residential nature of Muswellbrook and the tourist/main road function of the highway and parts of the commercial centre.

Visibility in the Eastern Sector is high to the existing approved mining operations, but low to proposed Project areas. This is due to the western orientation and direction of the Project. Eastern Sector visibility largely focuses on the eastern part of the existing and approved OEA that has been rehabilitated and will have advanced regrowth on it by the proposed start of this Project.

The sector is dominated by Muswellbrook, the river floodplain along with some foothills to the east of Muswellbrook, Figure 5.7.

5.6.1 Hunter River Floodplain and Foothills

This VCU contains: parts of the New England Highway; some minor roads such as Wybong, Kayuga, McCullys Gap, and St Heliers roads as well as minor roads off them. These roads support rural residences.

The residences in the vicinity of Racecourse Road are the closest to the Project in the VCU (approx from 2.5 km). However the more distant residences (approx from 6.0 km) at the new Ironbark Estate have both a more critical angle of view and an elevated location. While the houses in this locality are part of Muswellbrook, the visual relationship of these areas differs from the majority of Muswellbrook. Racecourse Road to Bengalla experienced views as the rest of the floodplain, whereas Ironbark Estate experienced views similar to the foothills. The residences at Racecourse Road and rural residences on the floodplain will have a high sensitivity depending on the extent of visibility to the Project. Visibility to the Project from this sector is for the greater part screened by the existing, approved OEA. Views will be restricted to the south west edge of the OEA, which is generally in a rehabilitated state.

Other rural residences in this VCU are those isolated residences directly to the east and north. Those residences along Wybong Road and Kayuga Road and parts of Denman Road as well as those to the east of the highway (that are not mine owned) have been ascribed a high sensitivity due to their proximity to the Project Site, as well as their sensitive land use type. However these residences would have minimal views to the Project due to their orientation, and the screening effect of the existing approved and rehabilitated OEA.

The Racecourse itself is also ascribed a high sensitivity as it is a recreation area, although views to the Project are non-existent due to the screening effect of the existing approved OEA. Viewing locations are located on the eastern edge of the track, looking west. Figure 6.7 shows the view from the track.

Residences and recreation uses in this location are given a low sensitivity rating due to lack of visibility of the Project.

The Project will not be visible from Bengalla homestead which increasingly will be flanked by the rehabilitated landscapes of the OEA, complete with the landscape patterns of the surrounding hills.

5.6.2 Muswellbrook

On the basis of land use, residences in Muswellbrook are generally assessed as having moderate to high sensitivity depending on the viewing distance to the Project. However the rehabilitated Main OEA will screen the Project from most of Muswellbrook.

The exceptions are parts of South Muswellbrook, in the vicinity of the Skelletar Stock Route and Calgaroo Avenue that have a southerly aspect and view. These areas while being screened for the greater part will have views onto small parts of the southern edge of the mine pit that is not screened by the existing OEA.

The density of town development means that views from the majority of residences are screened by adjacent housing, associated structures, and garden and streetscape vegetation. Other residences on the western and southern edges of South Muswellbrook as well as some elevated residences would be most sensitive to the Project. Where these houses are less than 7.5 km away from the Project, sensitivity is high. Where there is adjacent screening, the sensitivity level of these residences may decrease to moderate and low.

Residences along and around Ironbark Road will have some visibility to the Project as foreground vegetation is limited. These residences are less than 7.5 km away from the Project. The elevation of this area also places viewing locations higher than the proposed Project. As such, their sensitivity levels will be high.

Residences with a view to the southern parts of mine extraction area and south western edge of the OEA will have a high sensitivity. Residences in north Muswellbrook would generally have a low sensitivity because of lack of visibility to the Project due to the view obstruction by the Main OEA.

5.6.3 Roads

Views from the New England Highway as it travels into Muswellbrook from the south-east will be screened from the Project by the existing rehabilitated OEA in the eastern part of the Project Boundary. Denman Road within the sector is further than 2.5 km and will have limited views from the western part of the road in the sector, creating a moderate sensitivity.

Other roads in this sector are local, rural and urban roads within the sector including Wybong and Kayuga roads, and Thomas Mitchell Drive which are screened from, or have limited views (being further than 2.5 km away) from the Project. These roads would have a low sensitivity.

Local roads will have a low sensitivity. Denman Road will have a moderate sensitivity with limited views and the existing rehabilitated OEA screening views from the New England Highway.



Figure 5.6 | View from the north
Views from Wybong Road will be onto the north western end of the emplacement.



Figure 5.7 | View from the east
Views are onto the outer rehabilitated face of the existing OEA.

5.7 Visibility and Visual Sensitivity of the Southern Sector

5.7.1 Hunter River Floodplain & Southern Foothills

The VCU contains a number of view locations. Denman Road as well as parts of Thomas Mitchell Drive and Edderton Road occur within this sector, and there are residences toward the western end of Denman Road. The sector also contains the historic homesteads of Edinglassie and Rous Lench

The most sensitive view locations in the Southern Foothills VCU include a limited number of residences, see Figure 5.1, approximately 6 km away from the Project, on the western edge of the PVC. These areas and ones similar to them that have open views to the Project will be highly sensitive up to distances of 7.5 km away. From greater distances in the background, a moderate sensitivity will be experienced.

5.7.2 Pukara Estate

Pukara Estate olive grove (Pukara) is located on Denman road approximately 5 km south-west of the Project. Pukara was established in 1999 and in addition to the olive oil products produced, Pukara supports several tourist-based elements. Tourist activities are mostly confined to tasting rooms, associated selling centres and adjoining outside patio areas, however these are visually contained within the grove and are screened from the Project by them.

There are also tours of olive grove areas. The flat levels of the terrain allow for long views. However the trees in the olive groves have the effect of creating enclosed landscapes with the exception of views from the edges of the plantation to the Project.

There are views towards the Project from the entrance to the estate on Denman Road, if travelling from the west. These views are 5 km away from the Project's western edge. Views onto the Project will not alter from current views. These views are presented in Figure 6.6 (view from Denman Road).

Views from the Pukara will have a high sensitivity; however there is a lack of visibility from many Pukara areas, due to screening from surrounding olive trees.

5.7.3 Edinglassie and Rous Lench

These homesteads are located on Denman Road approximately 4km from the Project. These homesteads would have some views to the Project but not from primary view zones around the main homesteads. The Edinglassie main view zone is to the south and Rous Lench is to the east. Further, the 2007 European Heritage plan for the properties recommended landscape treatments to screen any view from the homesteads and their curtilage towards the Project. These homesteads would have high sensitivity to the Project, but screening takes out views to it

5.7.4 Denman Road Rural Residential

The properties along Denman Road within this sector which are not owned by the mining companies and are approximately 4.5 km away from the Project Boundary and active mining areas would have some visibility toward the Project. As these properties are primarily on the edge of the Hunter River Floodplain, the landform is flat and open, allowing long views towards the Project. Properties oriented north-east have direct views, and these views can only be moderated by screening elements at the point of viewing. The majority of properties already have dense foreground vegetation around the residences and this may limit views to the Project.

Their sensitivity levels would therefore be moderate to high for those properties less than 7.5 km away, depending on individual levels of screening that may limit visibility. Houses in this location are generally less than 4 km away from the western edge of the Project.

5.7.5 Roads

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

Both Thomas Mitchell Drive and Edderton Road will have a low sensitivity due to lack of visibility of the Project and usage type. Denman Road will have a high sensitivity up to 2.5 km and a moderate sensitivity up to 7.5 km, after which sensitivity would reduce to low. This increased level of sensitivity is due to the road supporting numerous residences and Pukara.

Denman Road is more than 2.5 km away from the Project and orientated generally parallel to the Project and therefore has a moderate sensitivity. The sensitivity for other roads is moderate to low.

5.8 Visibility and Visual Sensitivity of the Western Sector

The potential view locations within the Western Sector are associated with Roxburgh Road and parts of Wybong and Denman Roads. Residences along these roads are also potential viewing locations.

5.8.1 Bengalla Link Road, Roxburgh Road, Wybong Road and Denman Road

View locations include elevated sections on Roxburgh and Wybong Roads and a limited view corridor from the relocated Bengalla Link Road to the west of the CHPP.

The Project Boundary will align with Roxburgh Road and will be approximately 1 km away from mining operations in Year 24 of the Project. The proximity of operations will create high potential visibility, although topography and roadside vegetation will screen views toward the mine.

Views from Roxburgh Road to the Project are generally limited by topographic features. Potential views are confined to the more elevated parts of the road for approximately the first 1 km from the intersection between Roxburgh Road and Wybong Road as well as from elevated parts of Wybong Road itself before the intersection.

While the Project Boundary is generally aligning with Roxburgh Road, the active mining areas will be approximately 1.5 km away from Roxburgh Road itself. This will result in a moderate sensitivity, and Wybong Road and Bengalla Link Road will also have moderate sensitivity adjacent to Bengalla.

Denman Road in the sector will be further than 2.5 km away. There will be views from the Road travelling east. This is especially from hill areas west of Pukara. Views will also be obtained from the Road within the floodplain areas.

Sensitivity levels for roads within the sector will be moderate. The higher sensitivity of Denman Road is modified by the distance the road is from the Project that create the moderate sensitivity. In a similar way the lower sensitivity of Wybong and Roxburgh Roads is increased by the proximity of the roads to the Project with Wybong road being adjacent, creating the moderate sensitivity.

5.8.2 Rural Residences in the Western Sector

Roxburgh Road

There are several rural residences along Roxburgh Road; however most are screened from the Project elements by topography and vegetation, Figure 5.1.

The exception is the Receiver 158 as shown on Figure 3.2. This residence currently has views to the active face of the OEA. As this face progresses west it will come closer although lower in elevation and to varying degrees be dominated by rehabilitated OEA further to the east. Even though this property is entitled to acquisition by mining companies, while the property remains as private freehold, its sensitivity to changes in the landscape is high. However visibility will be restricted to a portion of a topographic dip in the ridge line to the east that currently allows for views to the existing active face of the Main OEA and to a larger extent Mt Arthur Coal.

Other residences along Roxburgh Road are in elevated positions have potential views in an easterly direction of the Project. The distances to views will become less over the life of the mine; however the elevation of the OEA of the mine will progressively decrease from 270 m to 180 m. This may mean that visibility is screened by the intervening elevated topography and vegetation which will inhibit overlooking onto the active extraction area.

A limited number of houses along the lower part of Roxburgh Road will have high sensitivity if there is strong visual orientation and exposure to the Project and its elements. These residences will have visibility and high sensitivity.

Denman Road

Residences on Denman Road, especially the elevated Receiver 93 (Figure 3.2) could have views to the Project. These residences are within 7.5 km of the Project and would have a high sensitivity. Not all residences are orientated to or have open views to the Project, but such visibility would create high sensitivity.

Sensitivity to the Project would generally be low due to a lack of visibility. However, there is one location high on Roxburgh Road (Receiver 158, Figure 3.2) where a high visibility to the current and the proposed Project would result in a high sensitivity. Similarly, some lots at the lower end of Roxburgh Road and Denman Road could have similar visibility and high sensitivity.

5.8.3 Denman

Although this town is outside the PVC it does have potential views to Bengalla across the Hunter River floodplain. However due to the distance, over 18 km, the sensitivity of such views would be low.



Figure 5.8 | View from the south-west
Views are onto the south eastern and south western faces of the existing OEA.



Figure 5.9 | View from the south-west
Views are onto the active face of the existing OEA.

5.9 Visibility of Explosive Facility and Reload Facility

The Explosive Storage Facility and Reload Facility are both located on the top of the OEA, with an elevation of approximately 270 m. This location meets operational and safety needs for the Project. The prominent location created concerns regarding potential visibility from sensitive locations, especially eastern locations at Muswellbrook and South Muswellbrook.

To investigate the potential for this, inter-visibility diagrams were done with section lines from critical view points at (Figure 5.1):

- North Muswellbrook at View Place;
- South Muswellbrook at Ironbark Road for eastern and southern views ; and
- Denman Road for western views.

These view lines are illustrated at Figure 5.10, 5.11 & 12.

These visual cross sections indicate views from View Place of the Reload and Explosive Facility are not possible from this location due the shielding provided by the OEA shoulder to the east of the facilities.

Results from Ironbark Road indicated that the Reload Facility and to a lesser extent the Explosives facility would be visible from this location.

Results from Denman Rd indicate that both the Explosive Storage Facility and Reload Facility are visible from this location however are located over 8 km away.

From the above results, mitigation measures will be recommended (section 9) in terms of screening and backgrounding to minimise the potential views to sensitive receptors.

These view lines indicate that there is not a significant visual issue associated with the location of the Explosive Storage Facility and Reload Facility that cannot be overcome by simple mitigation strategies such as micro-land shaping and tree planting that would be part of normal rehabilitation strategies.

5.10 Changes to Visibility/Sensitivity Created by the Project

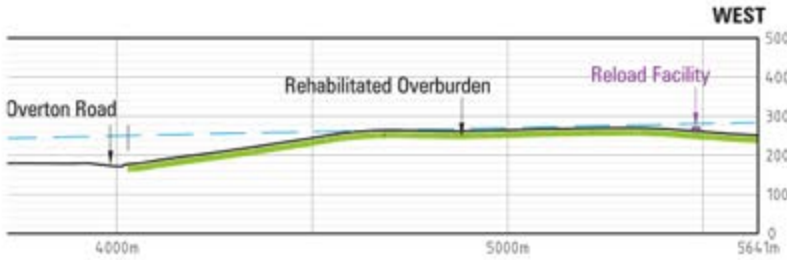
The visibility and sensitivity to the Project varies within the sectors. The Northern Sector is dominated by the approved (but not yet active mining) Mount Pleasant Project creating low sensitivity based on land use.

The Eastern Sector has high sensitivity towns in the form of Aberdeen and Muswellbrook. Aberdeen is screened from the Project by the Main OEA and foothills within the Mount Pleasant Project. Muswellbrook is similarly screened for the greater part by the Main OEA. A small section of South Muswellbrook including the new Ironbark Estate will have views onto small parts of the southern edge of the mine extraction area and the progressively rehabilitated OEA to the east of it. These areas with views will have a high sensitivity.

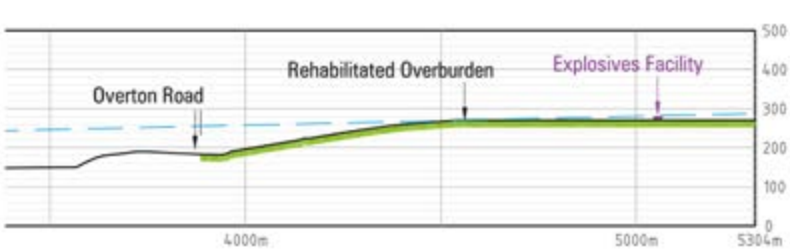
The Southern Sector is dominated by Denman Road and some residences along it that will have views to the southern edges of the extraction area and OEA creating moderate to high sensitivity for residences and moderate sensitivity for Denman Road.

There are limited sensitive receivers within the most exposed Western Sector. However some residences will have high visual exposure and sensitivity. Roads within the sector have moderate sensitivity based on distance and usage type. Significantly, views of the Project for the Western Sector will be smaller in scale (OEA elevation of less than 180 m) but in closer proximity than the current view (OEA elevation of 270 m).

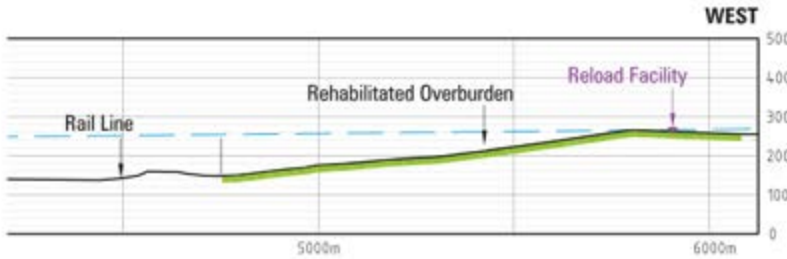
PM1 VIEW PLACE - RELOAD FACILITY - LINE OF SIGHT SECTION



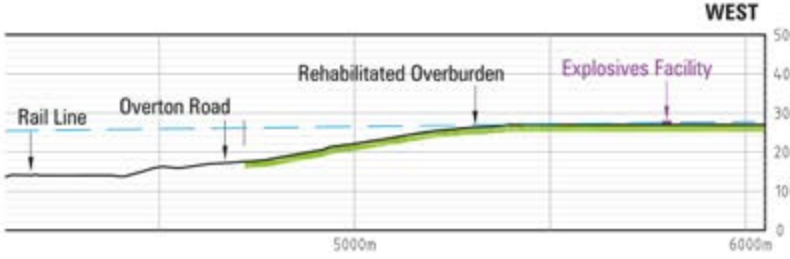
PM1 VIEW PLACE - EXPLOSIVES FACILITY - LINE OF SIGHT SECTION



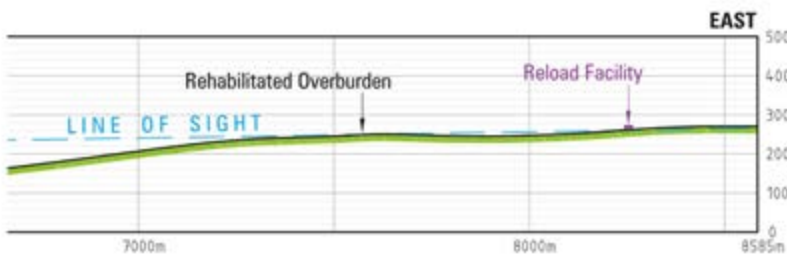
PM2 IRONBARK ROAD - RELOAD FACILITY - LINE OF SIGHT SECTION



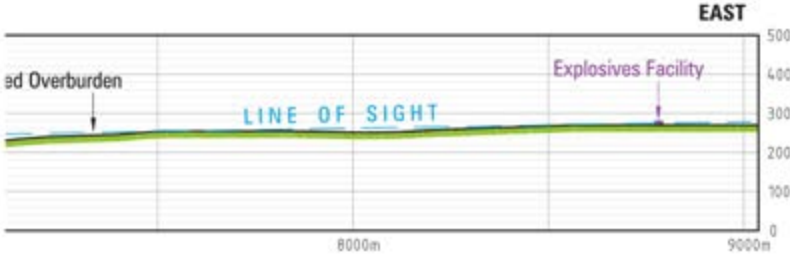
PM2 IRONBARK ROAD - EXPLOSIVES FACILITY - LINE OF SIGHT SECTION



PM4 DENMAN ROAD - RELOAD FACILITY - LINE OF SIGHT SECTION



PM4 DENMAN ROAD - EXPLOSIVES FACILITY - LINE OF SIGHT SECTION



BENGALLA MINE

Cross Sections from Photomontage Locations
to Reload and Explosives Facilities
based on Year 24 Mine Plan

BE102 - VP CROSS SECTIONS.dwg Date: 29.06.2012 Drawn: DP

Figure 5.12 | Cross Sections - Detail

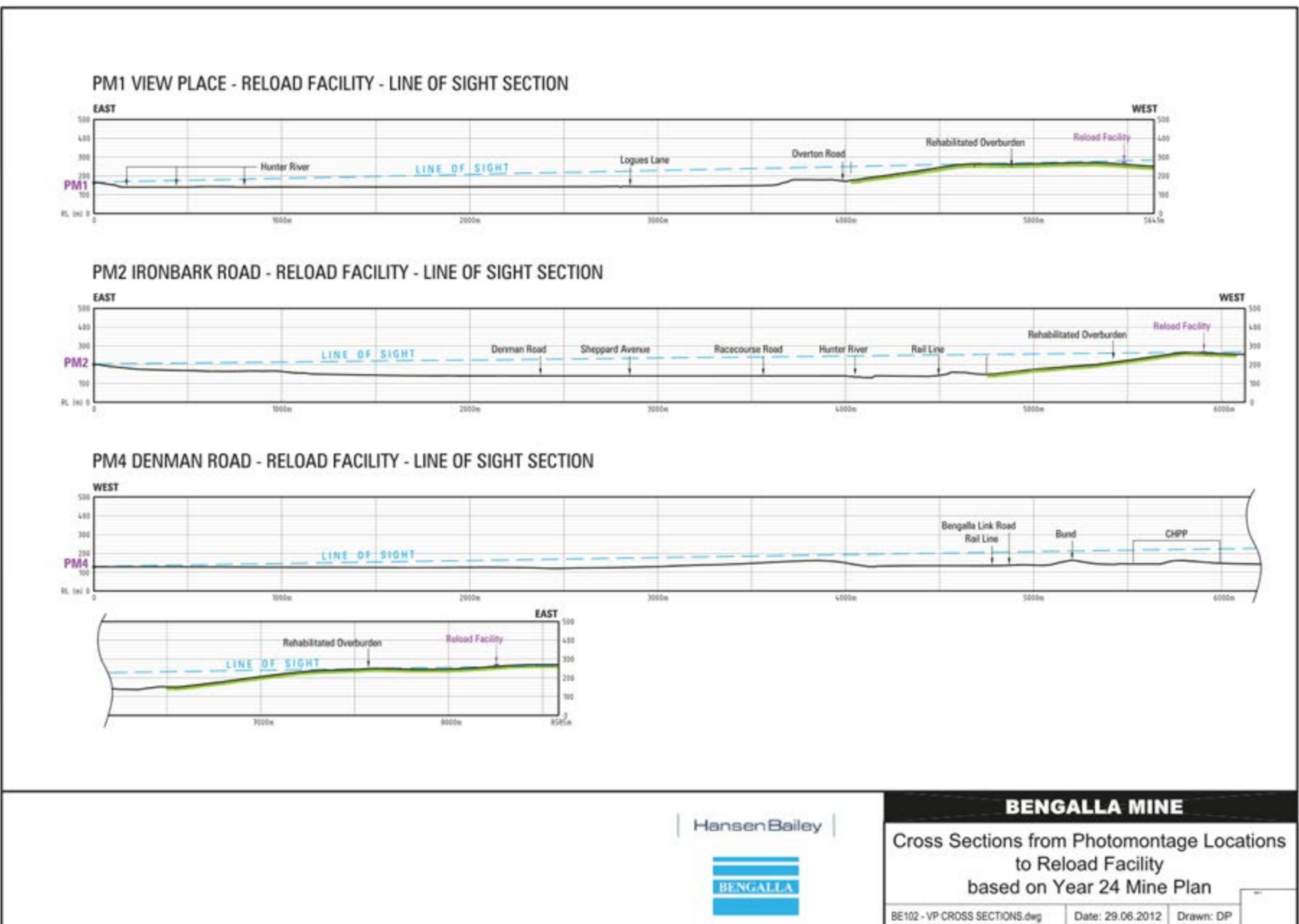


Figure 5.11 | Cross Sections - Reload Facility

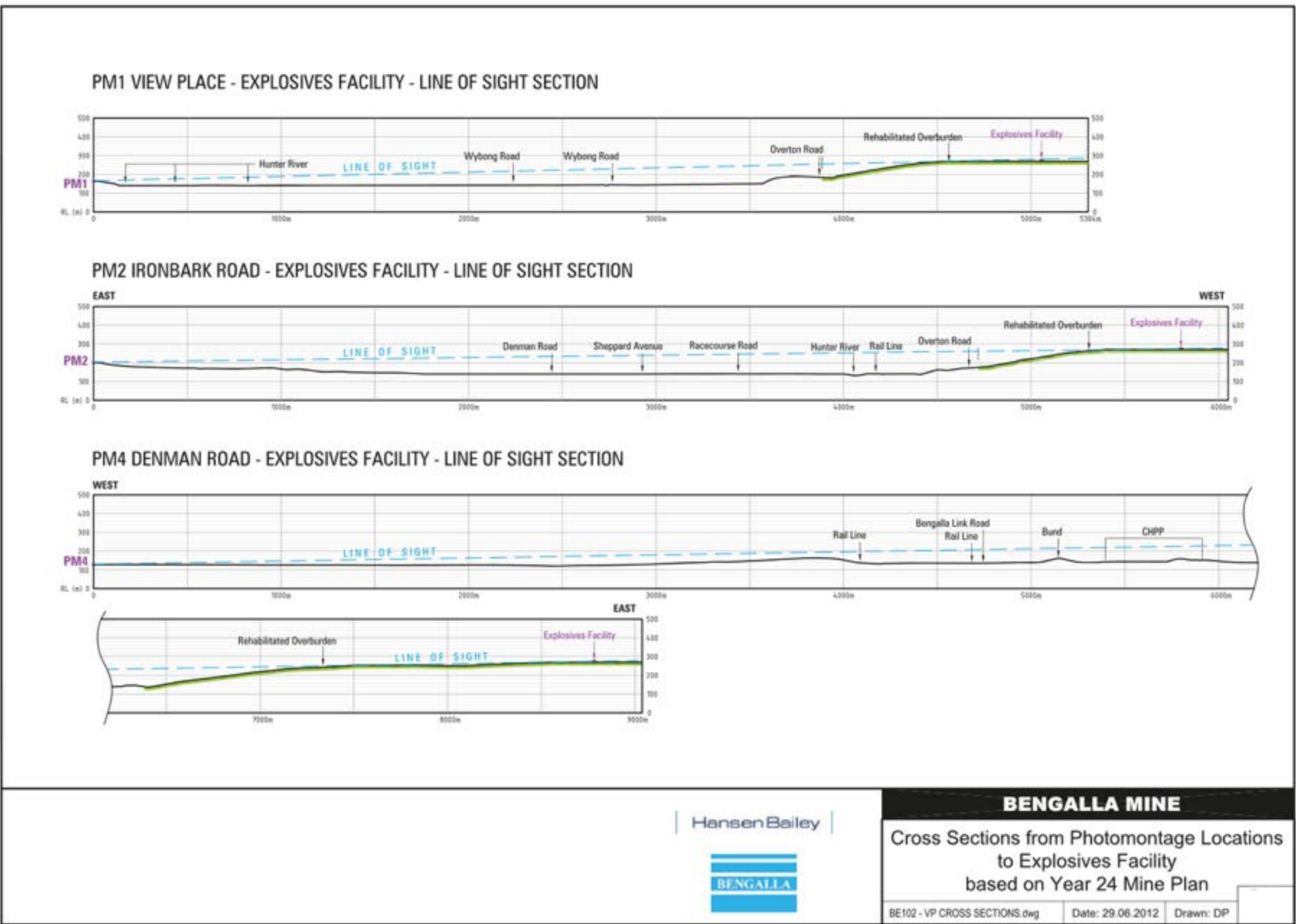


Figure 5.10 | Cross Sections - Explosives Facility

6. VISUAL EFFECTS

6.1 Introduction

In this section the visual effects of the various Project elements are considered. These effects represent the visual interaction between the various elements of the Project and the visual setting within which they occur and are seen.

The visual effect of the Project will vary as seen from various locations around Bengalla.

To illustrate these effects on view locations around the site, views were considered from the Northern, Eastern, Southern and Western Sectors. The visual effects were considered from a number of potential viewing locations and have also been assessed through photomontage development, as described above (Section 2). These viewpoints are representative of worst case scenario views that will be obtained of the Project from the various sectors. Figure 6.1 shows the location of these viewpoints.

6.2 Northern Sector

The Northern Sector is dominated by rural land used for cattle grazing on rolling hills with some improved pasture cropping along the Hunter River flood plain in the eastern part of the sector. There are some residences along Kayuga Road. Of significance is the approved, but yet to become operational, Mount Pleasant Project that dominates the sector. This will create a strong visual effect that will screen Bengalla.

The visual effect on the eastern part of the Northern Sector is generally unchanged as views for the greater part are onto the existing OEA. There are minor changes to the OEA as viewed from the north eastern parts of the Sector. These changes largely relate to an extension of the mining program to the west (across the approved but not yet commenced Mount Pleasant Project), with minor views onto the north western edge of the pre-rehabilitation OEA.

The visual effect of these changes, are in part illustrated in the photomontage from View Place. Although this is a north easterly viewing location, it is possible to interpret the visual effects on northern views from this location.

The visual effect of the Project on the Northern Sector will consist of the rehabilitated faces having a low visual effect on the north eastern part of the sector and increasingly the northern part of the sector. The north western parts of the sector will be exposed to the active face of the OEA to varying degrees and will experience moderate to high visual effects as a result. However areas of high visual effect are largely located within the Mount Pleasant Project area.

In the Northern Sector there were two photomontage locations

- New England Highway (PM1); and
- View Place (PM2)

Photomontage New England Highway (PM1)

As seen from Figure 6.2a, the existing view contains small portions of the OEA north eastern face that are still active. This area remains active and is slightly enlarged in the first year of the Project, Figure 6.2b. By Year 4 much of the visible OEA has been rehabilitated, but a sliver of active OEA is still visible, Figure 6.2c. By Year 8 the eastern face as seen from the highway is completely rehabilitated and from that time there is no further active mining activity visible from this location, Figures 6.2d & e.

Photomontage View Place (PM2)

As seen from View Place, Figure, 6.3 & Year 1, Figure 6.3a shows the extension of the OEA to the north east of the existing rehabilitated area. This extension from this viewing location is minor, and partially hidden by foreground vegetation. By Year 4, this extension has been rehabilitated and no further views toward the active OEA are visible, Figures 6.3b – e.

Visual effects will be low in the north east, and high to the north and the north west. However northern land is within the Mount Pleasant Project area and sensitive receptors in the north west on Wybong Rd are screened by the ridge in the vicinity of Roxburgh Rd.

6.3 Eastern Sector

Immediately adjoining Bengalla to the east are the rural lands of the Hunter River floodplain. The Eastern Sector contains the most sensitive land uses and is dominated by the township of Muswellbrook. The rural lands adjoining Bengalla support a number of rural residences along Kayuga Road.

This sector has the most critical view locations and is representative of the greatest population, therefore contains most of the photomontage points. Further, these points assist in illustrating potential visual effects from locations in other sectors by reference to the view points in the extremities of the Eastern Sector (e.g. consideration of potential visual effects to the north sector) by reference to a more critical view point to the north east (View Place) within the Eastern Sector. Despite the sensitive nature of these viewing locations, the visual effect of the Project will have minimal visibility from the east, as the Project is active on the western edge only.

Photomontage locations within the Eastern Sector include:

- Ironbark Estate (PM3); and
- Racecourse Road (PM4).

The Eastern Sector contains the most critical view locations, including Muswellbrook and the New England Highway. From these locations the visual effects of the Project are not visible or are low. Further, the maturing of the tree planting on the eastern side of the OEA greatly improves the visual outcomes towards the Project.

Photomontage Ironbark Estate (PM3)

The photomontage from Ironbark Road shows the rehabilitation of the existing southern faces of the OEA, Figures 6.4a & b, while mining activities toward the west becomes visible from Year 8, Figure 6.4c. Year 8 also sees the completion of rehabilitation of the existing OEA which is closer to this viewing location. Year 15 shows the progression of mining activity toward the West, Figures 6.4c & d. Year 24 sees the majority of visible mining activity rehabilitated, although there are some remnant parts of the active mining area still visible in Year 24. The proportion of view that the proposed mining activity occupies between Years 8 – 24 is minimal and less than currently visible and would create a moderate to low visual as discussed further below.

Photomontage Racecourse Road (PM4)

The view from Racecourse Road toward new mining activity is also screened by the existing OEA, Figure 6.5a. The rehabilitation of the existing OEA is completed by Year 4, Figure 6.5b, and there is only a minor view toward new mining activity above the rehabilitated OEA. This has been reduced by Year 8, Figure 6.5c and continues to remain out of sight for the life of the Project.

Visual Effects in the east will be generally screened from view by the existing and rehabilitated OEA with low visual effects occurring as seen from the southern part of this sector.

6.4 Southern Sector

The Southern Sector is dominated by rural lands. Along the river flood plain, improved pasture cropping and some grazing dominate with an olive tree orchard also occurring in this locality. The rolling rural hills to the south of Denman Rd support vineyards and open grazing lands. There are a limited number of private residences within this sector and they occur in the western edge of the sector along Denman Rd.

The visual effects on the Southern Sector vary. In the eastern portions of the sector the views are onto the rehabilitated OEA creating a level 2/3 visual effect, Figure 2.4. In the western portion of the sector the initial view will be onto the active face of the OEA creating a level 1 type visual effect. This view will progressively become rehabilitated to type 2/3 visual effects as discussed in Figure 2.4 and as illustrated by Figure 6.6.

The visual effects of the Project on the Western Sector are illustrated in photomontage form at:

- Denman Rd (PM5)

Denman Rd (PM5)

Figure 6.6a illustrates the existing view from Denman Road adjacent to the Pukara. The view from this location onto existing operations creates a moderate to high visual effect. As time progresses this visual effect is decreased as views onto the active face are decreased and rehabilitated areas of the OEA increase and visually dominate the pre-rehabilitation areas, Figure 6.6b - e. In addition intervening hills screen views past Year 15 and possibly before from this location.

Visual effects to the south will vary from low to high reflecting views onto rehabilitated OEA (low visual effects) and views onto the active face of the OEA (high visual effects). Low effects will occur in the south east with initial high to moderate visual effects in the south west modified to low by year 15.

6.5 Western Sector

The Western Sector is also dominated by rural lands, but significantly supports rural life style blocks in the elevated parts adjoining Roxburgh Road. Along the river flood plain and Denman Road there are a limited number of residences and the commercial/tourist Pukara Olive Estate.

The visual effects of the Project on the Western Sector are illustrated in photomontage form at:

- Roxburgh Rd (PM6)

Roxburgh Rd (PM6)

The view from Roxburgh Road, Figure 6.7, to the west of mining activity is currently onto the active face of the OEA. This view will continue throughout the proposed mining period. The progression of mining activity toward the west will alter the position of the active mining face, and the rehabilitated OEA over time. New mining activity will still be visible from this location during the life of the Project and visual effect levels will remain high.

The visual effect in the Western Sector will be Type 1 (Figure 2.4) and will be high in certain locations such as the higher elevation areas on Roxburgh Road. This level of visual effect is similar to existing levels, but will be closer and of larger scale at a lower point in the view. That is, the current views of OEA have a top elevation of 270 m, and as the OEA progresses to the west, its top elevation will decrease to 180 m, lowering its position in the receiver's view.

6.6 Visual Effect Summary

The visual effects of the Project vary. The Project elements will create the highest visual effect when viewed from the west. From this sector views will be onto the active face of the OEA and will create a Type 1 (Figure 2.4) Visual Effect and depending on proximity, create a high visual effect. When viewed from the east, views will be onto rehabilitated OEA that will create Type 2 & 3 visual effect that will have moderate to low visual effect levels from most view locations.

The OEA created by the Project will be of smaller scale than the current working OEA being of significantly lower elevation (180 m) compared to (280 m) in the eastern and existing OEA, so that visual effects will decrease over time.

The visual effects of the OEA and the Project as a whole when viewed from the north and the east will be low. Many areas within these sectors will be screened by the existing OEA. Where views are obtained, they will only be limited views of the southern or northern area of the mine extraction area. The exception is the North West corner as seen from Wybong Road.

The visual effects of the Project are generally low with the exception of a limited number of viewing locations in the western and south western view sectors.

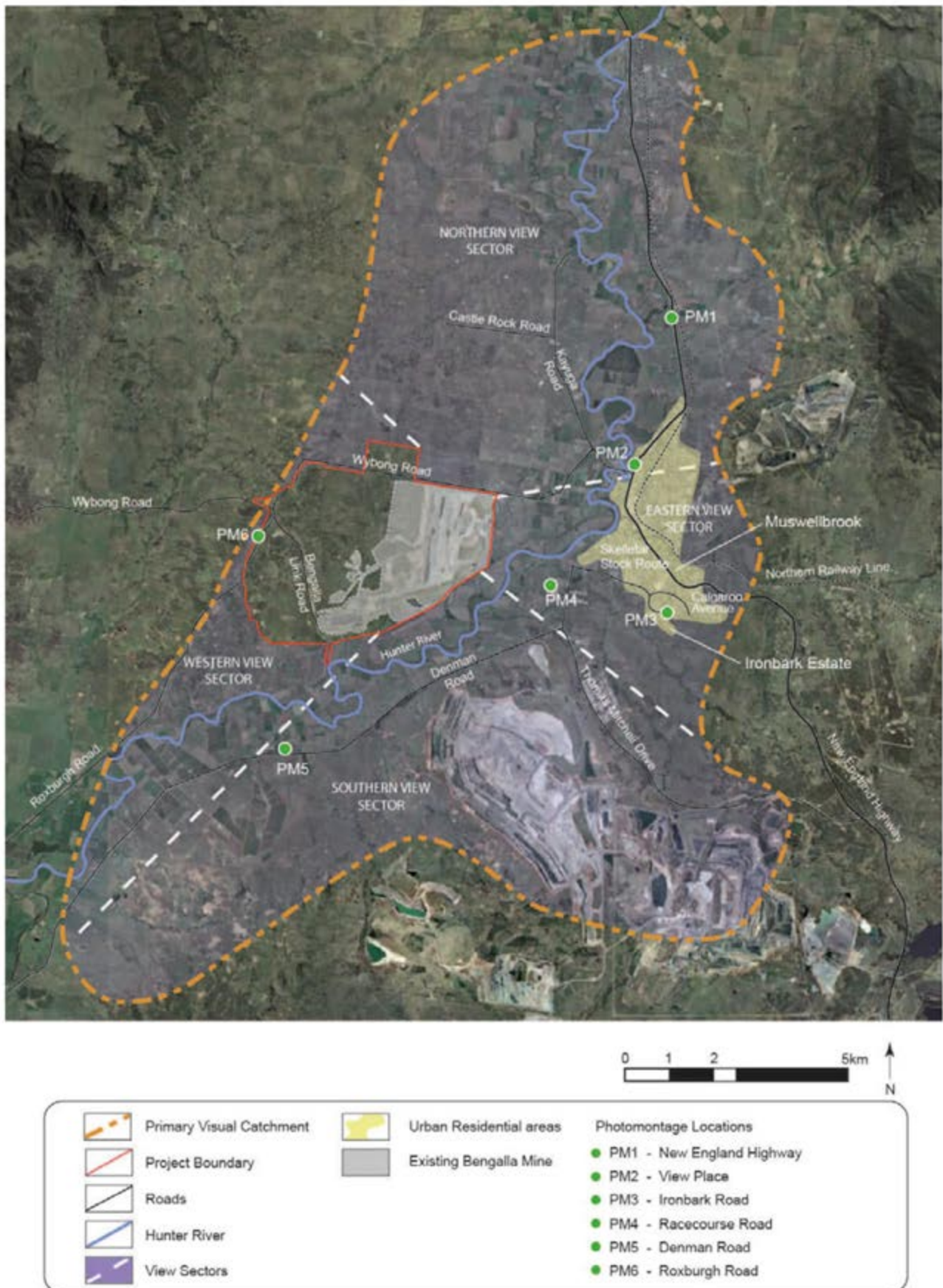


Figure 6.1 | Photomontage Locations

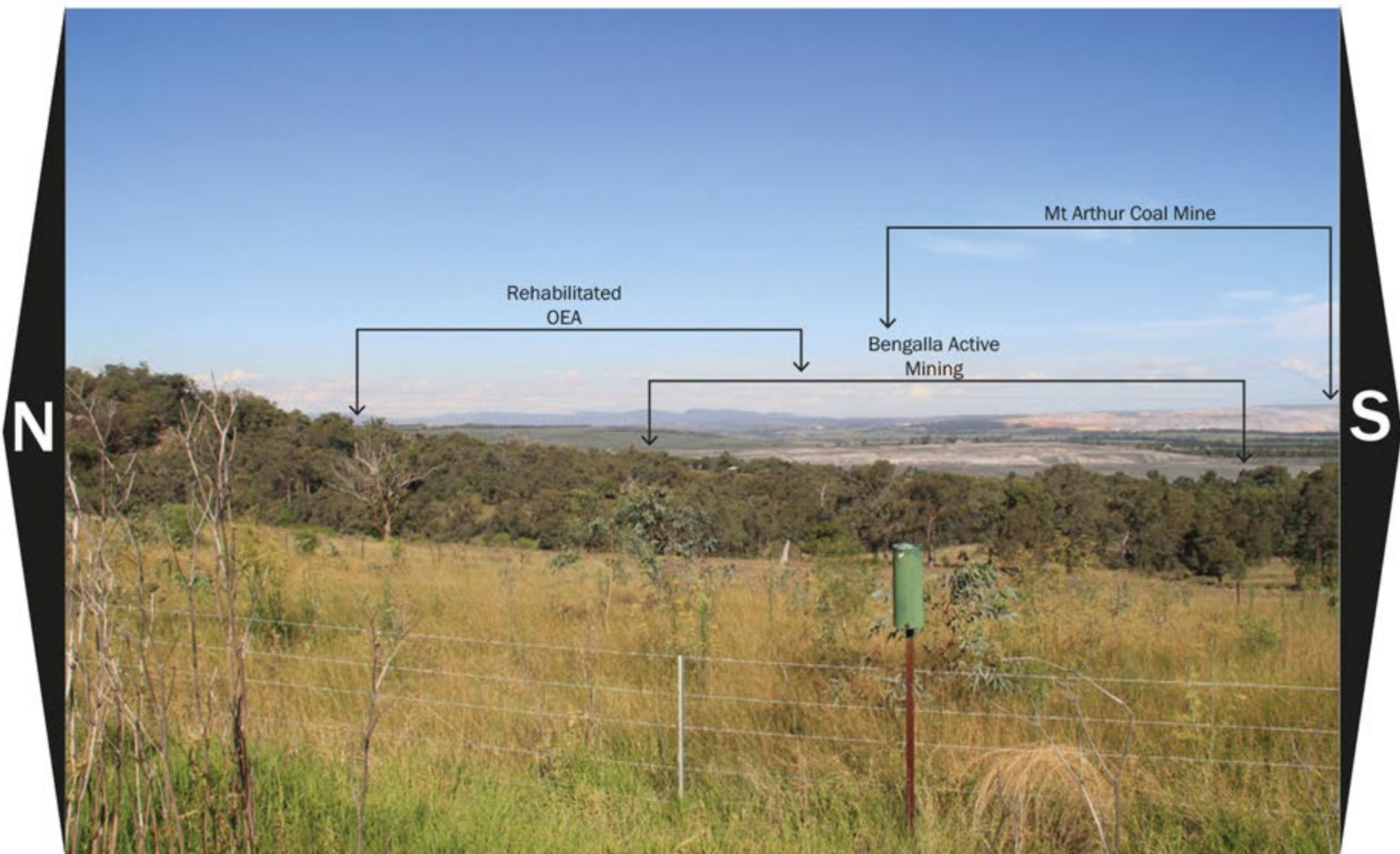


Figure 6.7f | Location 6 - Roxburgh Road - PROPOSED YEAR 24



Figure 6.7e | Location 6 - Roxburgh Road - PROPOSED YEAR 15

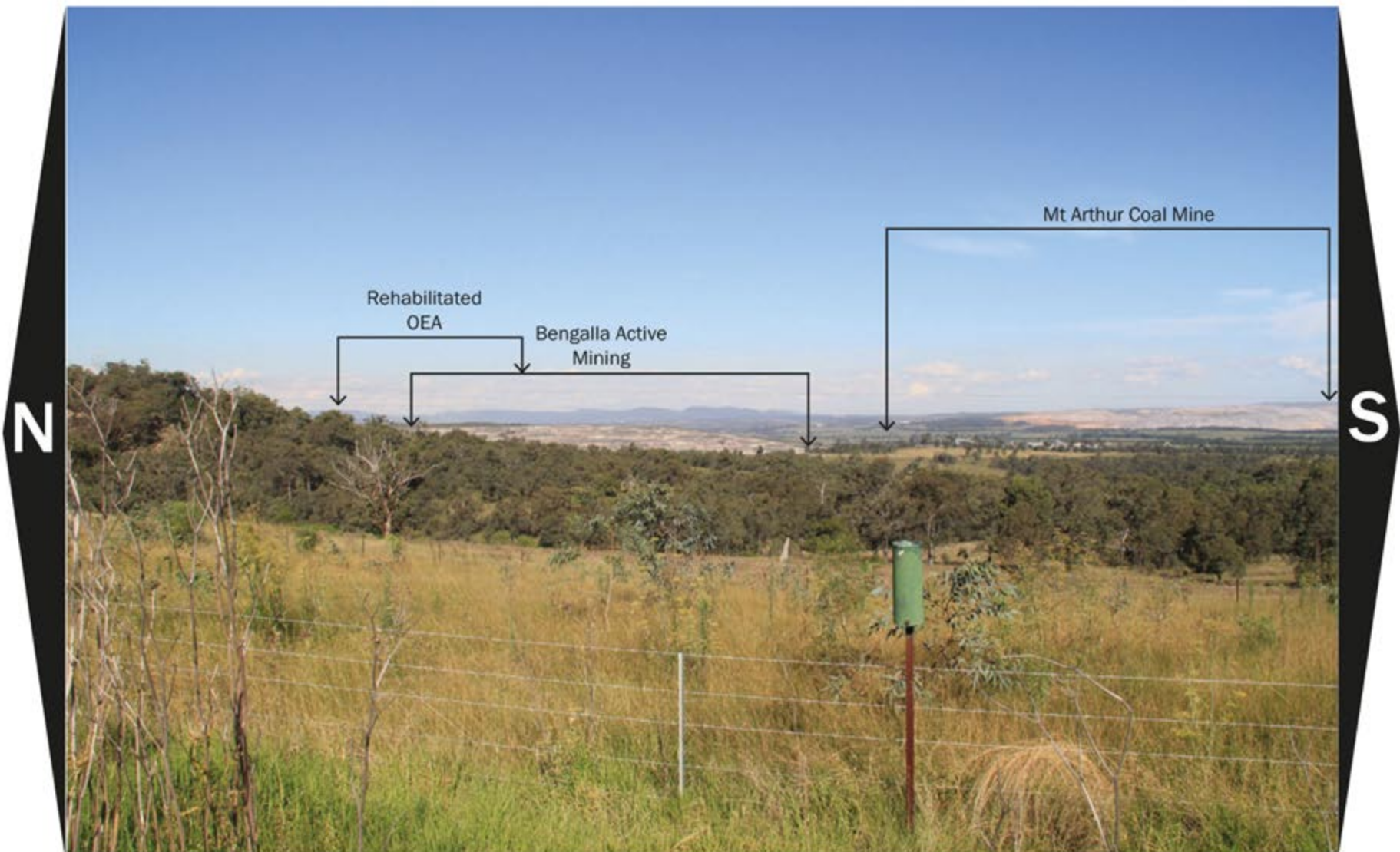


Figure 6.7d | Location 6 - Roxburgh Road - PROPOSED YEAR 8



Figure 6.7c | Location 6 - Roxburgh Road - PROPOSED YEAR 4



Figure 6.7b | Location 6 - Roxburgh Road - PROPOSED YEAR 1



Figure 6.7a | Location 6 - Roxburgh Road - EXISTING



Figure 6.6f | Location 5 - Denman Road - PROPOSED YEAR 24



Figure 6.6e | Location 5 - Denman Road - PROPOSED YEAR 15



Figure 6.6d | Location 5 - Denman Road - PROPOSED YEAR 8



Figure 6.6c | Location 5 - Denman Road - PROPOSED YEAR 4

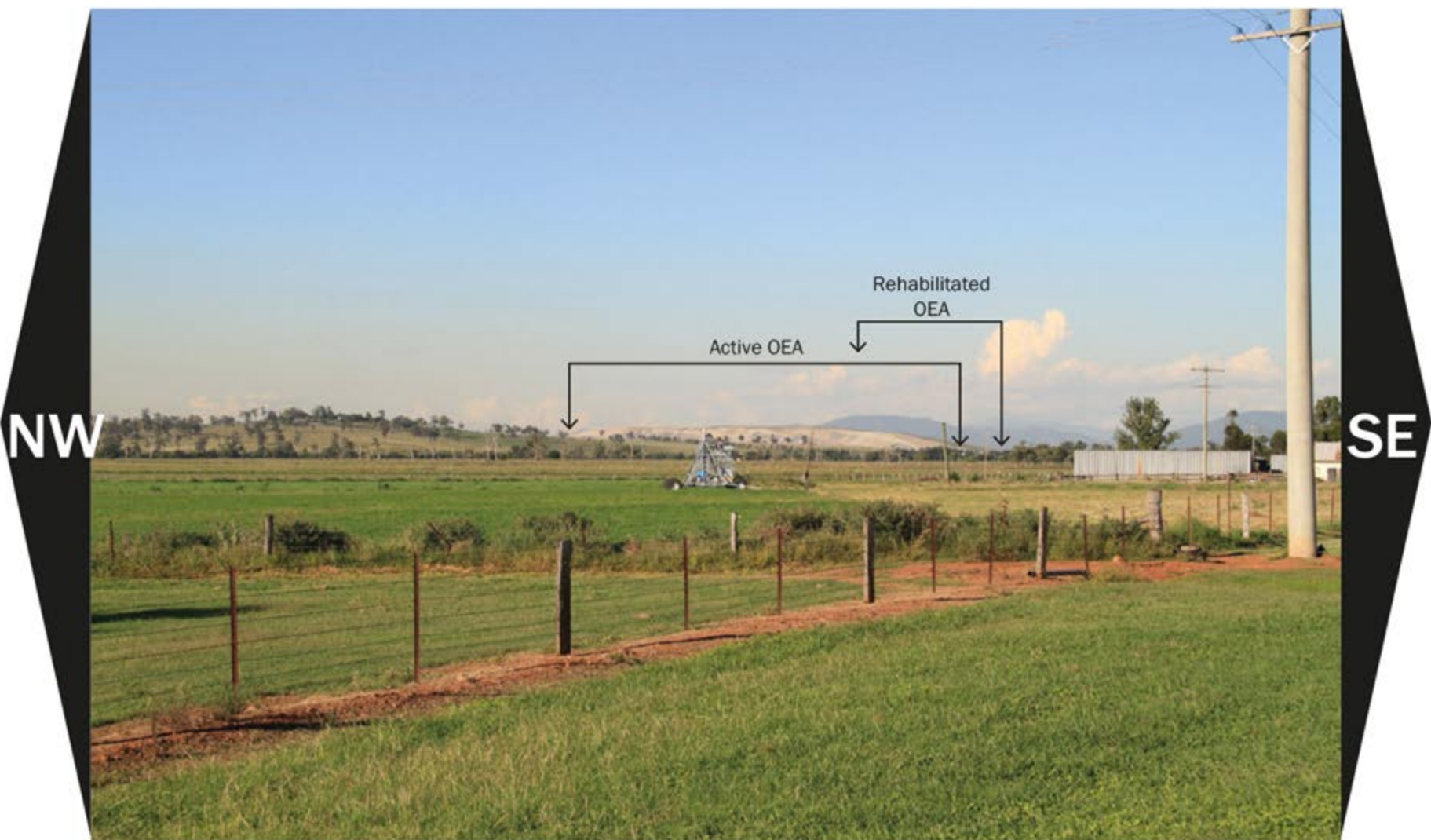


Figure 6.6b | Location 5 - Denman Road - PROPOSED YEAR 1

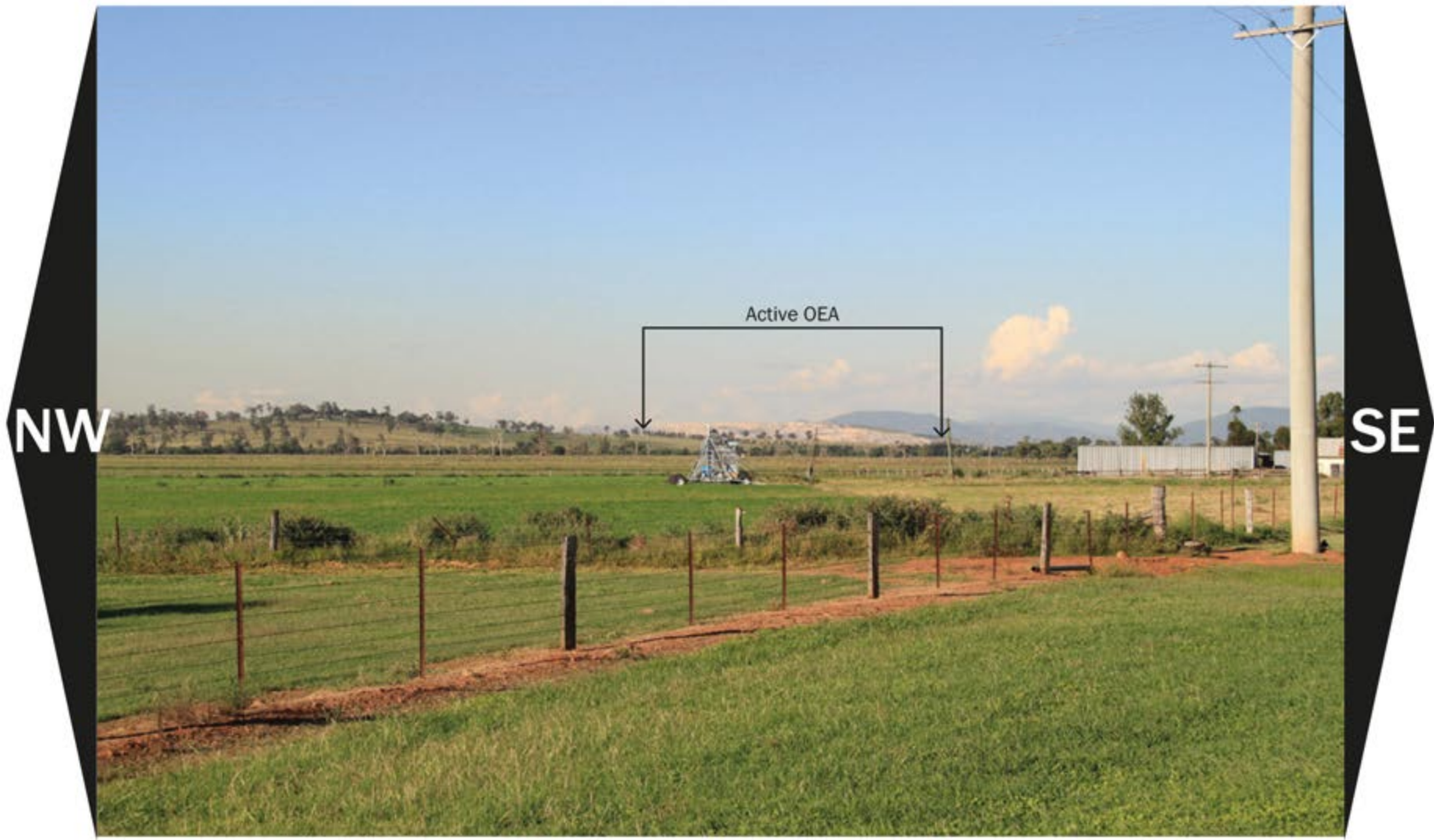


Figure 6.6a | Location 5 - Denman Road - EXISTING



Figure 6.5c | Location 4 - Racecourse Road - PROPOSED YEAR 4



Figure 6.5d | Location 4 - Racecourse Road - PROPOSED YEARS 8-24



Figure 6.5a | Location 4 - Racecourse Road - EXISTING

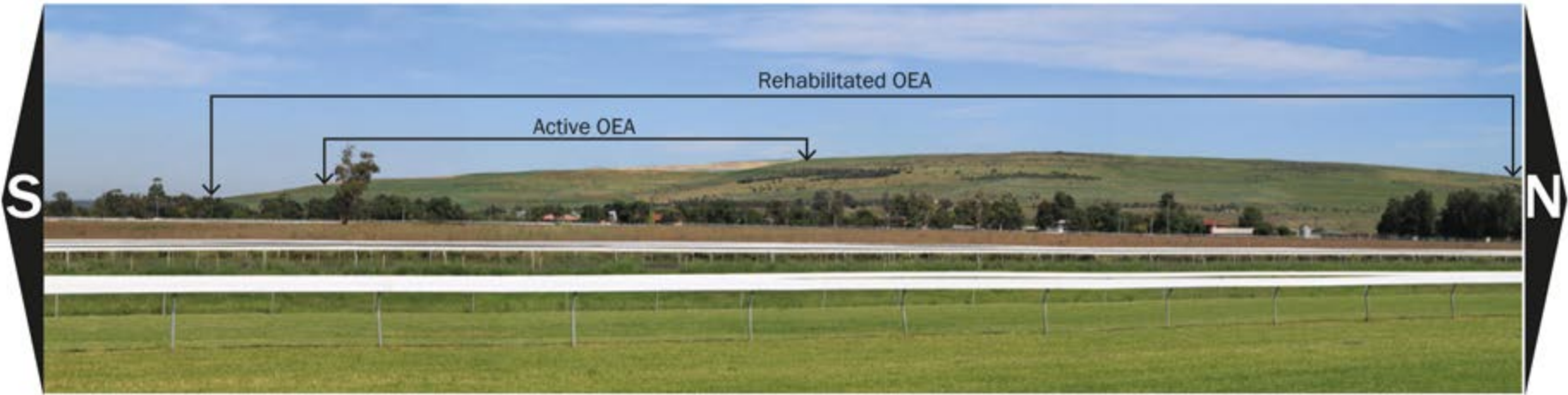


Figure 6.5b | Location 4 - Racecourse Road - PROPOSED YEAR 1



Figure 6.4f | Location 3 - Ironbark Road - PROPOSED YEAR 24



Figure 6.4e | Location 3 - Ironbark Road - PROPOSED YEAR 15



Figure 6.4d | Location 3 - Ironbark Road - PROPOSED YEAR 8

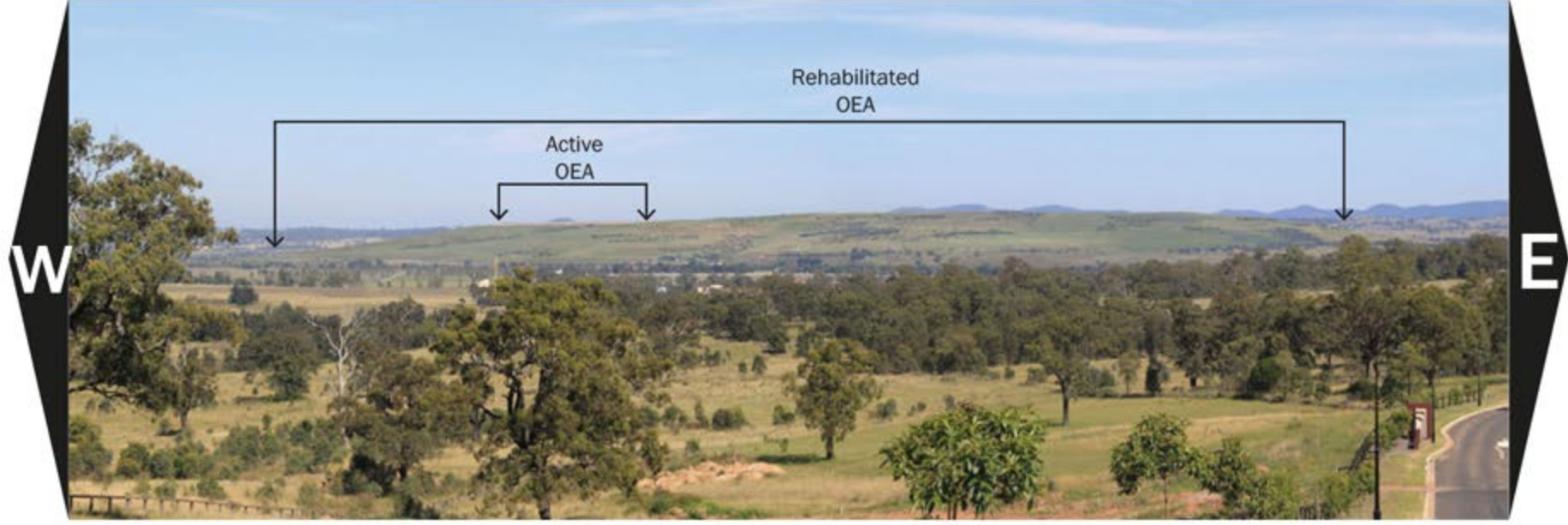


Figure 6.4c | Location 3 - Ironbark Road - PROPOSED YEAR 4

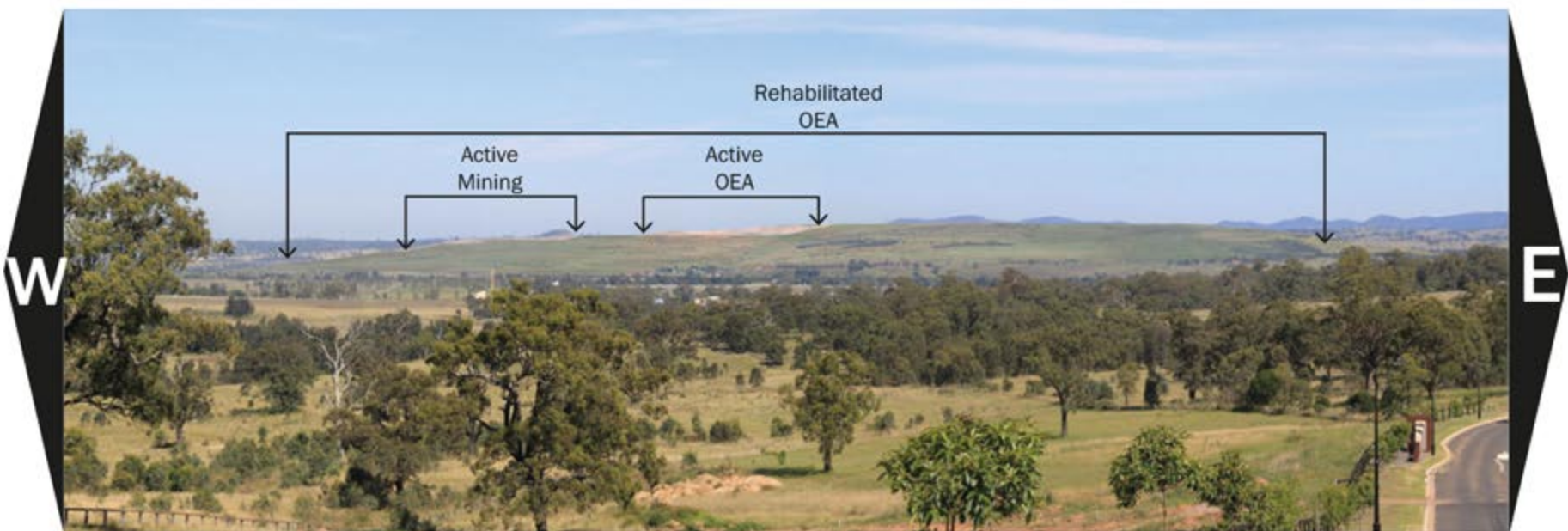


Figure 6.4b | Location 3 - Ironbark Road - PROPOSED YEAR 1

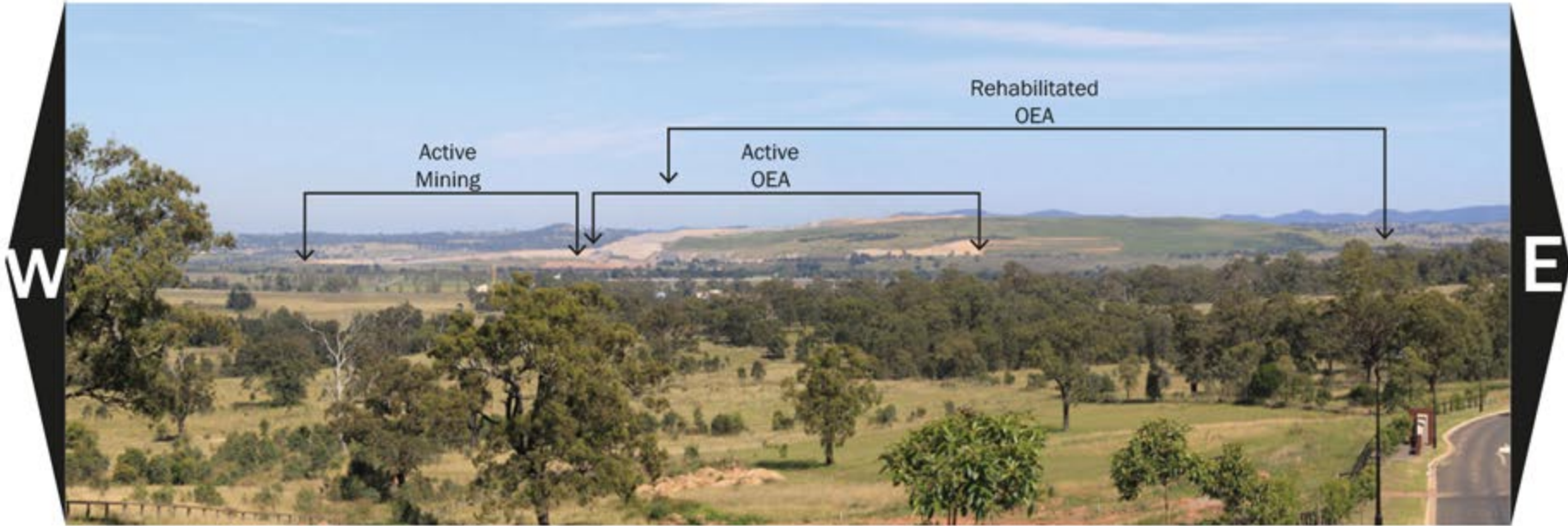


Figure 6.4a | Location 3 - Ironbark Road - EXISTING



Figure 6.3f | Location 2 - View Place - PROPOSED YEAR 24

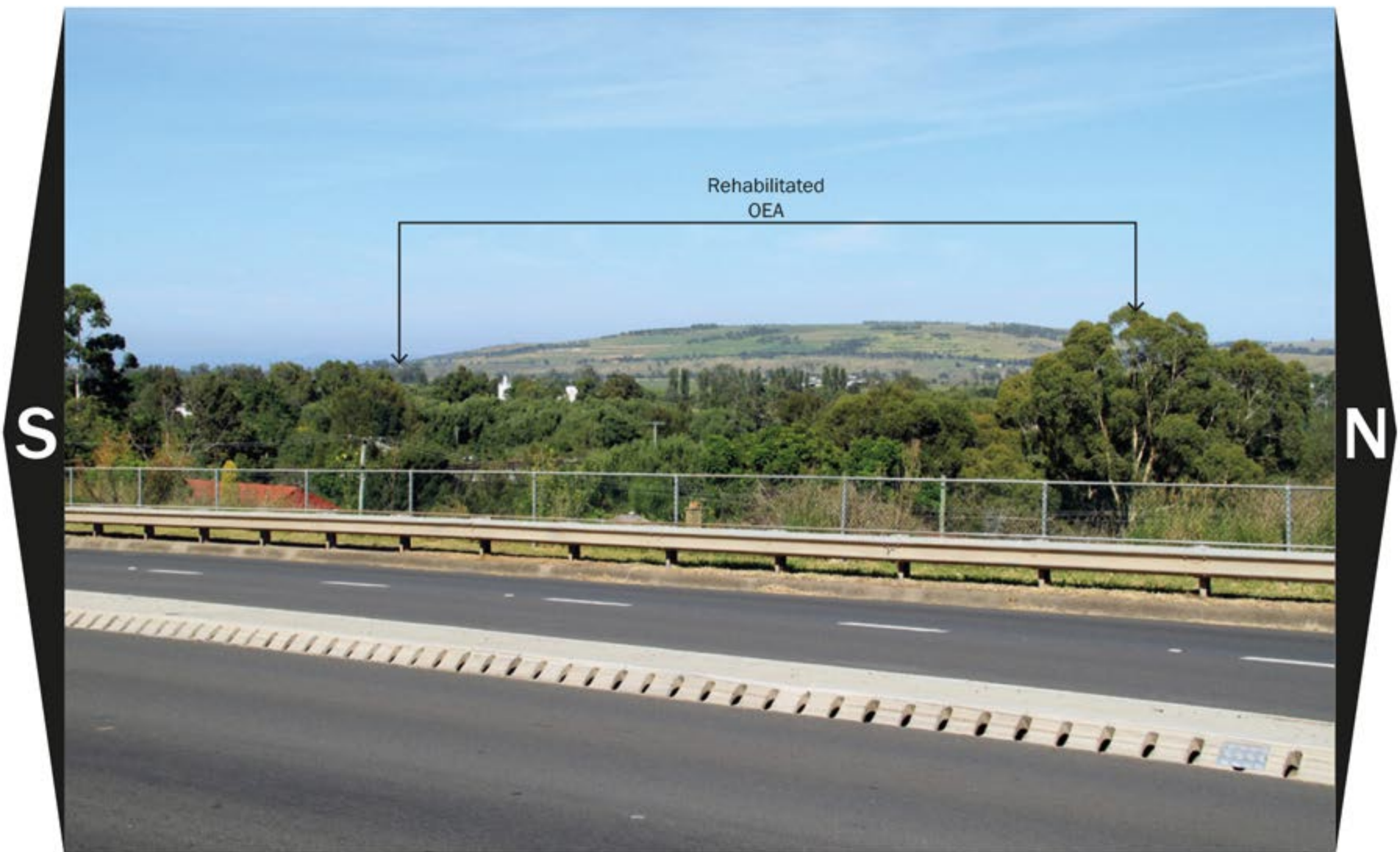


Figure 6.3e | Location 2 - View Place - PROPOSED YEAR 15

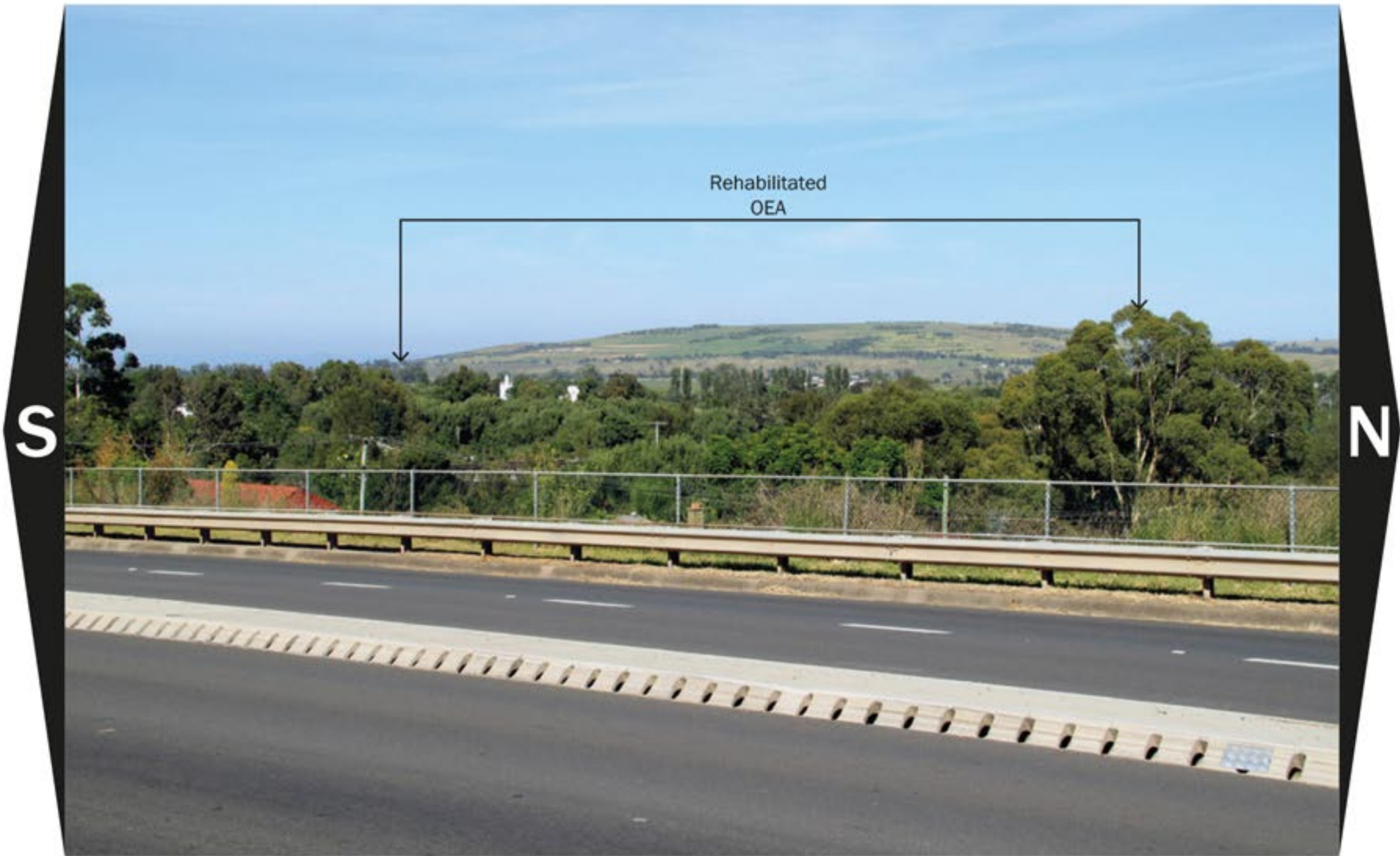


Figure 6.3d | Location 2 - View Place - PROPOSED YEAR 8

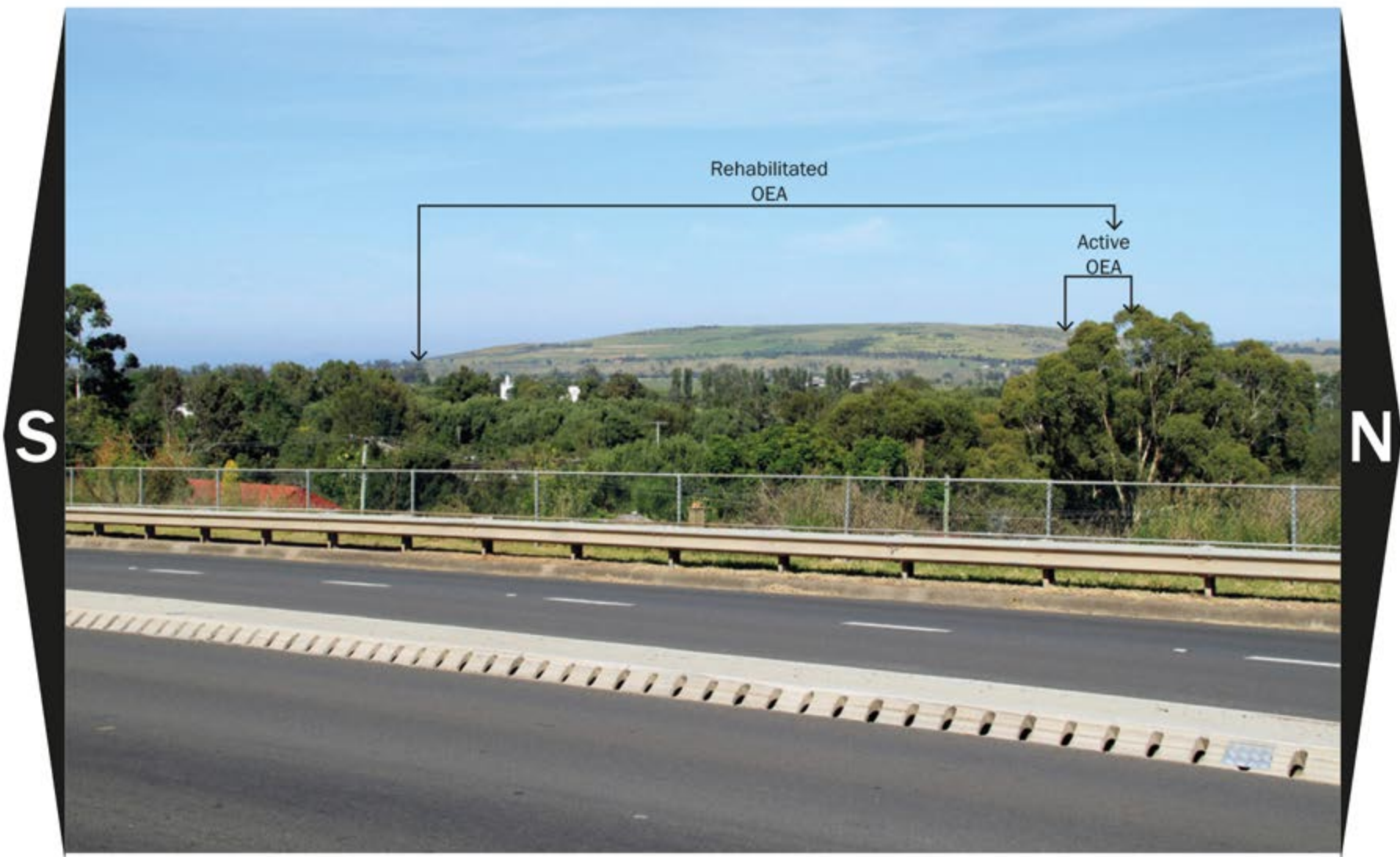


Figure 6.3c | Location 2 - View Place - PROPOSED YEAR 4

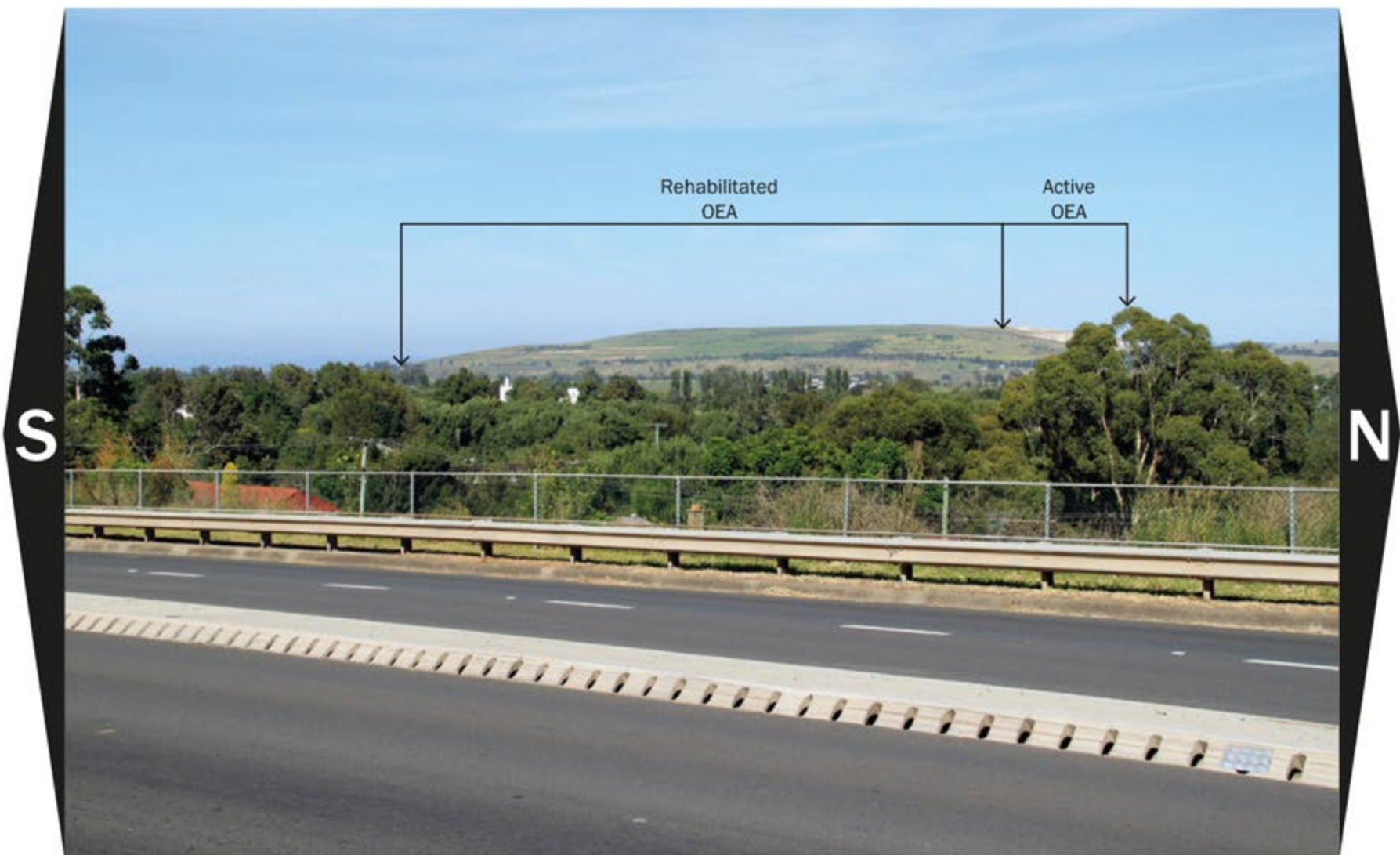


Figure 6.3b | Location 2 - View Place - PROPOSED YEAR 1

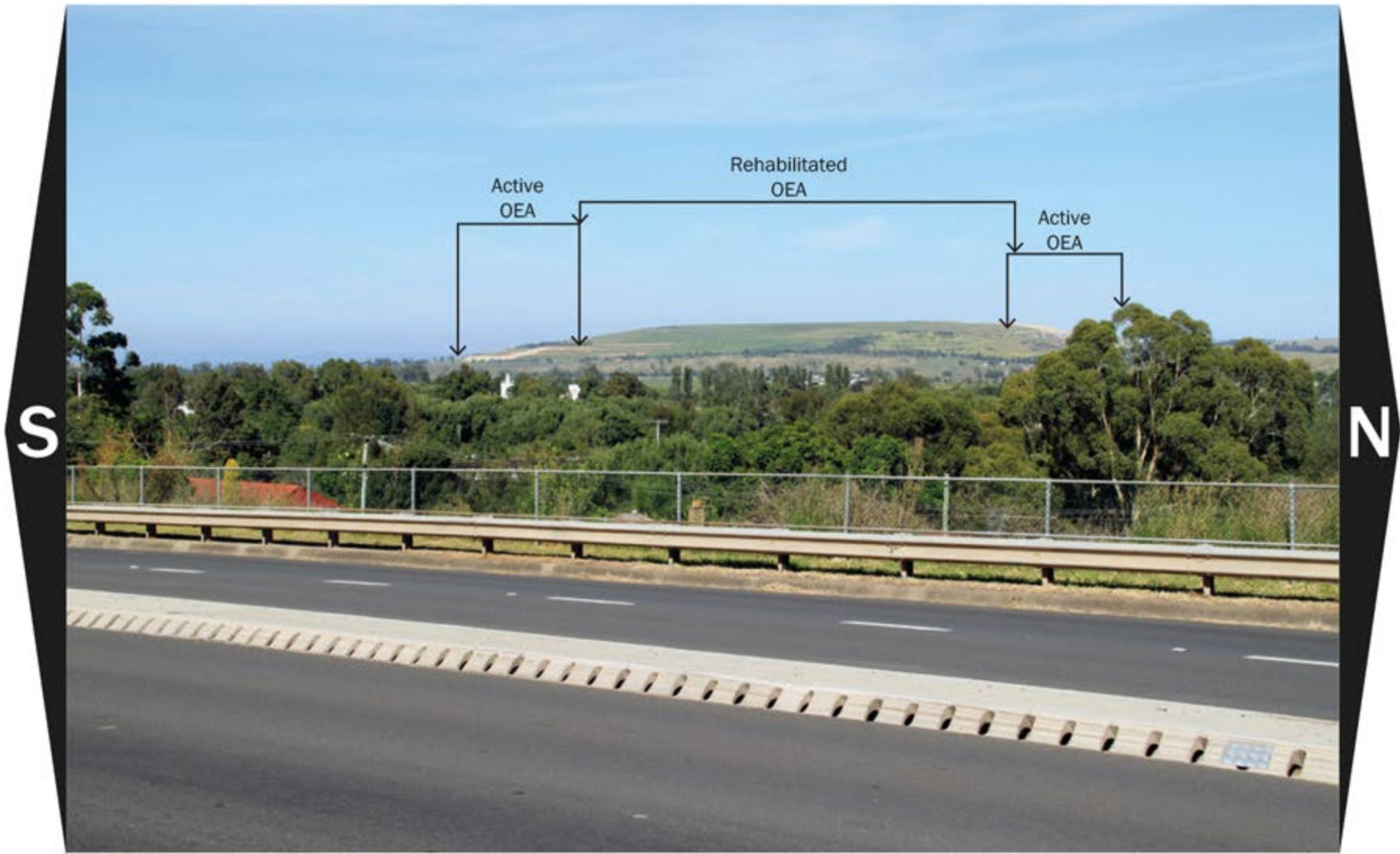


Figure 6.3a | Location 2 - View Place - EXISTING



Figure 6.2f | Location 1 - New England Highway - PROPOSED YEAR 24



Figure 6.2e | Location 1 - New England Highway - PROPOSED YEAR 15



Figure 6.2d | Location 1 - New England Highway - PROPOSED YEAR 8

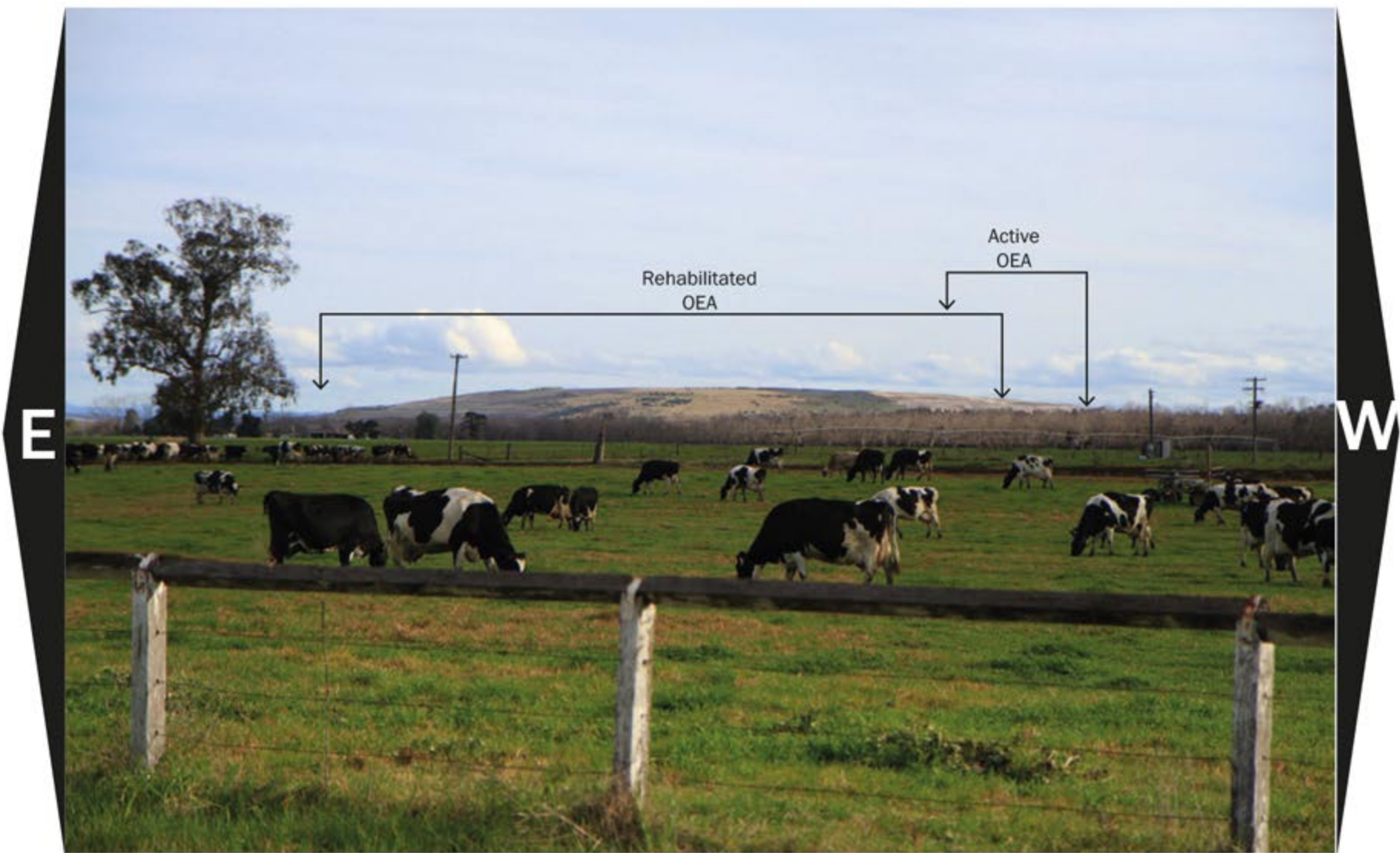


Figure 6.2c | Location 1 - New England Highway - PROPOSED YEAR 4

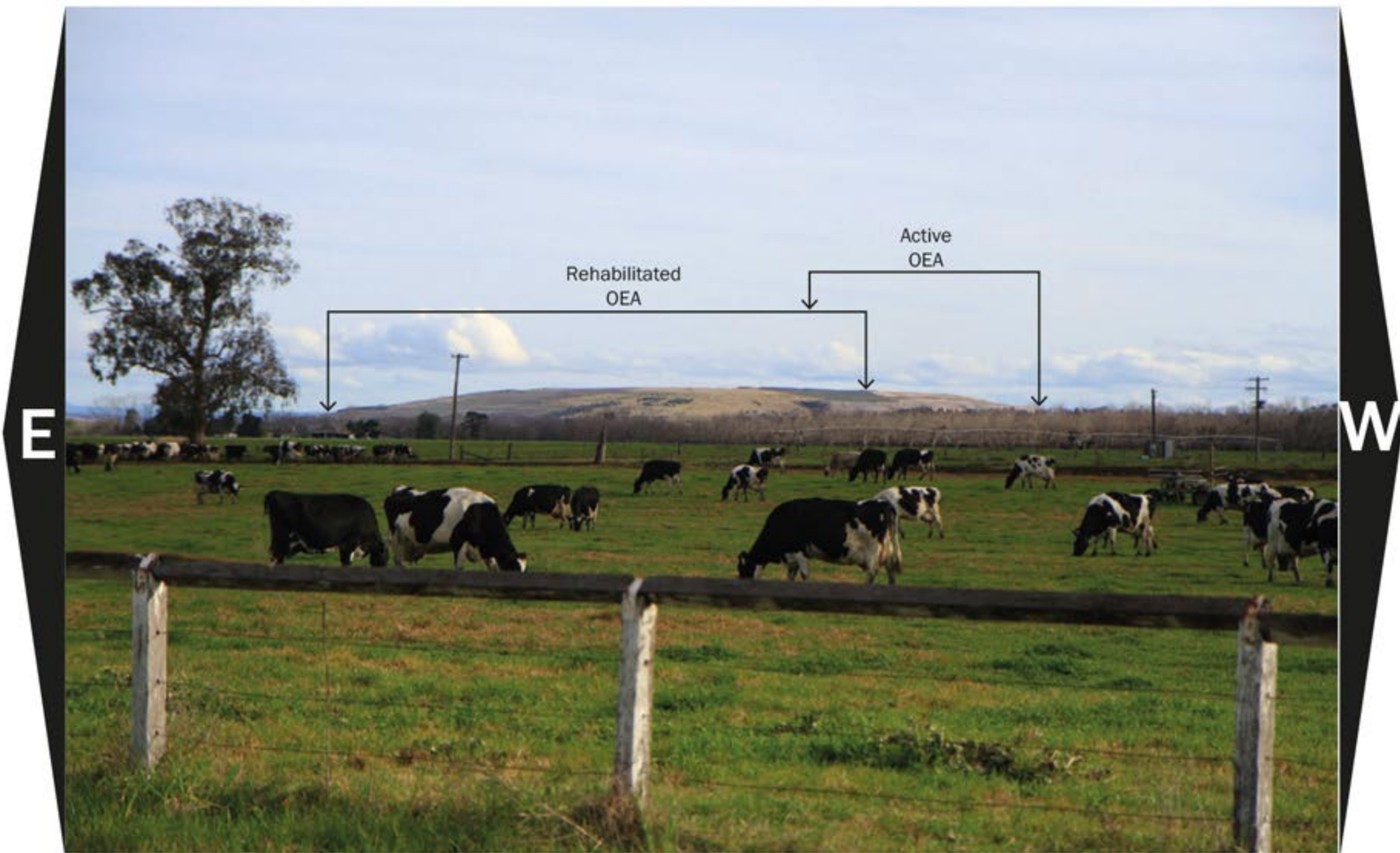


Figure 6.2b | Location 1 - New England Highway - PROPOSED YEAR 1



Figure 6.2a | Location 1 - New England Highway - EXISTING

7. VISUAL IMPACTS

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

The visual impact will vary according to the visual effect of the Project (Section 2.4.1), its visibility and the visual sensitivity of areas from which it is seen (Section 2.4.2).

The potential sensitive viewing locations (receivers) around the Project, including towns, rural residences, roads and tourist locations have been defined above in terms of visibility, with the potential impacts discussed below.

7.1 Towns

There is a range of visual impact on the towns within the PVC of Bengalla. This is based on visibility and distance.

Muswellbrook

Most parts of Muswellbrook are unsighted by the rehabilitated eastern face of the approved OEA and will experience no additional visual impact from the Project.

A small number of areas in South Muswellbrook south of Calgaroo Ave and including parts of Ironbark Estate will have limited views onto the southern edge of the extraction area of the Project. Such areas have a high sensitivity.

However the visual effects for areas with views would be low due to the limitation of exposed areas and the dominance of the rehabilitated Main OEA. The visual impacts therefore would be low and less than are experienced in establishing the existing mine plan.

The visual impact on these small parts of south Muswellbrook, generally occur on the edges of the urban areas and some elevated areas that have current and extensive views over the approved rehabilitated Main OEA. Sensitivity levels remain similar to those experienced for the approved mine plans, except where extent of visibility is altered.

There will not be additional visual impacts on most of Muswellbrook and low impacts on those areas that have limited views to the Project that will for the greater part be screened by the approved, rehabilitated OEA of the existing Bengalla.

Aberdeen

The distance of the town from Bengalla creates low to moderate sensitivity. There is little to no visual effect due to reduced visibility and screening created by the existing OEA. There is no visual impact on Aberdeen.

Denman

Most of the town is unsighted to the Project and is approximately 18 km from the Project. However the eastern edge of the town does have views on to the southern part of the active face of the existing OEA. Views to the south eastern corner of the OEA remain but will be reduced in scale (elevation of OEA 180 m) when compared to that of the approved OEA (270 m elevation).

However at a distance of greater than 12.5 km, the visual sensitivity is low. The visual effect of colour contrast created by the exposed overburden is lessened, and the Project occupies an even smaller part of the total view than that created by the existing Bengalla. Visual effect levels of the Project are low at this distance; visual sensitivity is low.

This creates a low and imperceptible visual impact at Denman.

7.2 Rural Residences

Rural residences are located throughout the local setting within the area of PVZ. The residences are located within the Foothills VCU and the Hunter River Floodplain VCU and take advantage of views in various directions.

Northern Sector

There is generally no impact of the Project on rural residences in this sector as the Project areas are screened from view. Residences in this sector are screened by the approved Main OEA and existing topography and many are mine owned.

There is generally no visual impact on residences in this sector. Any visual impacts on rural residences in the Northern Sector that have any views would be low.

Eastern Sector

In the Eastern Sector, rural residences along Wybong and Kayuga Roads are for the greater part screened from the Project by the approved rehabilitated Main OEA.

Although sensitivity is potentially high the visual effects are screened and therefore there is no impact. Any residence that did have some views to the north-west or south-west edges of the mine extraction area would experience low visual effects and impacts.

This sector contains the historic Bengalla Homestead. Although this homestead has a potentially high visual sensitivity, it will be screened from the Project by rehabilitated OEA and will therefore experience a low impact.

Southern Sector

The significant rural residences in this sector are south of the Project and generally along Denman Road with adjoining lots largely owned by Mt Arthur Coal. These residences would continue to have a high sensitivity if they have views to the Project. Residences in the south east of the sector will have limited views onto the southern edge of the mine extraction area, but views would be dominated by the rehabilitated OEA areas and visual effects would be low.

Residences in the south west in the vicinity of Pukara would have more open views onto the active face of the Main OEA. However this view is similar to that of the existing approved OEA but smaller in scale and with the dominant areas rehabilitated, lessening the visual effects progressively as the dominant elevation of the OEA decreases in RL.

A combination of restricted views and low visual effects would create low visual impacts to residences in the south west of the sector and moderate in the south western part of the sector.

This sector contains the historic homesteads of Edinglassie Homestead and Rous Lench Homestead. Both of these homesteads are owned by Mount Arthur North. These residences would have potential views to the Project and have high sensitivity, but landscape treatments recommended in the 2007 European Heritage Management Plan would screen the houses and their curtilage from views to the Project, removing potential visual impacts.

Western Sector

The residences in this sector that are impacted may continue to be impacted. The pre-rehabilitated face will be closer but will decrease in elevation from 270 m to 180 m. The view will continue to be onto the active face of the OEA. However as discussed previously it will decrease in scale and upper slopes as seen from the west will increasingly be rehabilitated through time, decreasing visual effects over that experienced currently. Visual Sensitivity will remain high so that impacts will be moderate to high for residences with open views onto the Project.

The visual impact on residences with views to the Project in this sector will continue to be moderate to high.

7.3 Roads & Rail

The roads and rail in the locality are:

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

Minor Roads

Bengalla is visible from a number of minor roads in the locality. These include Roxburgh Road, Wybong Road, Bengalla Link Road (including Relocation around Year 20), Kayuga Road, Thomas Mitchell Drive and Edderton Road. Generally, visual impacts on these roads will be screened or low. However some views from Roxburgh Road and other local roads will continue to experience high visual effects in close proximity to the Project creating moderate to high impacts. More distant views will create moderate to low visual impact.

New England Highway

The Project will continue to be visible from two locations on the New England Highway: from just north of Muswellbrook travelling south, illustrated in part by Figure 6.3, and for a short period travelling north into Muswellbrook from the south, as illustrated in part by a view from Ironbark Road Figure 6.4.

From north of Muswellbrook, the views are for the greater part on to the approved rehabilitated OEA with areas further west screened by topography north of Wybong Road. The sensitivity at these distances is generally moderate creating a low visual impact.

From south of Muswellbrook, the New England Highway would have moderate sensitivity, however again Project areas are screened and views are onto the existing rehabilitated OEA, avoiding visual impact.

Denman Road

This road experiences potential visual impact to the east, south and west of Bengalla.

From the east, impact is potentially experienced from the Denman Road in South Muswellbrook with the views onto the existing Main OEA. From the south, impact is experienced generally between Thomas Mitchell Drive and Edderton Road, and to the west from Edderton Road.

From all these locations, the visual effect of the Project will be low from the east, low to moderate to the south and moderate to high from the west.

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

The visual impact on this road will be low to the east and moderate to low on the southern and Western Sectors.

Main Northern Railway

The greatest visibility of the Project from the railway is north of Muswellbrook for trains moving south. Visibility characteristics are similar to those of the adjacent New England Highway and will be generally screened. Any views will have a moderate sensitivity at this distance and visual effects will be low creating low impact levels.

7.4 Tourist Localities

The Hunter Valley generally has a high tourist usage level. In this locality, the town of Denman and Denman Road in addition to the New England Highway are significant tourist locations. Within this broader fabric, special locations such as Pukara attract tourists to the area.

There are potential views from Pukara however such views are screened by olive trees from the sensitive tourist centre/coffee shop. The visual sensitivity at this location would be high, but views to the active face are screened except from the working northern and eastern edges of the orchard that would have a low sensitivity and high visual effect.

In terms of impact on tourism venues, the visual effects impacts will decrease for areas such as the Muswellbrook Racecourse and surrounding training facilities, which will continue to view the rehabilitated OEA. The Project is generally not visible from the sensitive thoroughbred horse studs south of the Golden Highway.

The visual impact from tourist areas within Pukara would be low while from outer edges this could be high, however it is assumed that tourists are not taken to these vulnerable view locations.

7.5 Cumulative Visual Impact

The Project will not add significantly to the cumulative visual impact created by open cut mining in the locality. The high visual effect mine face and active face of the OEA will be similar in extent to the approved Project. Rather, the high visual effect will move west while the visual effects and impacts on eastern areas will decrease.

To consider the cumulative impact of the Project, it is necessary to consider its visual effect in the context of other mines that are seen within the one view from sensitive receptors, and also as part of a progression of different views as one moves through the landscape from one visual catchment to another.

In the context of the Project's visual catchment, Mangoola Coal is not considered, as it is to the west of the Project, and would not fall into any views containing the Project. In terms of this catchment the visual impact is decreased for sensitive receptors in north eastern areas, e.g. Aberdeen, south eastern areas, e.g. Racecourse Road and eastern areas e.g. Muswellbrook, as rehabilitation of OEA areas in the east takes place as mining moves west. Visual effect is increased to the west, but is of a similar character to that currently experienced. However, there are a limited number of sensitive receptors in this location on Roxburgh Road who have views to Mt Arthur Coal and parts of the existing Project. To other areas the visual effect will decrease as the overall elevation of the active face of the OEA decreases in elevation from 270 m to 180 m. The rehabilitated OEA will dominate the active face creating a better visual integration of this element into the landscape.

In terms of sequential visual experiences, the Project as well as all mines in the locality would be seen when travelling along Wybong Road and Denman Road and to varying degrees lesser roads. In this context the overall effect of the Project would be similar to or less than is currently experienced by the existing mining at Bengalla. The reasons for this are a general lowering of visual effect compared to the existing mining operations and secondly, the significant decrease in visual exposure to sensitive receptors of active mining areas at Bengalla.

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 Project does not impact significantly on strategic tourist locations over and above that of the existing approved mine. Rather in general, the Project improves the outcomes of mining on sensitive eastern areas including Muswellbrook and Aberdeen as well as the New England Highway. The visual effect and impact on Denman Road and western view areas will remain similar to existing impacts. Although the Project will move mining closer to Pukara, the visual impact on this facility is low due to screening of the mine from most areas within the grove, including the cafe/shop and driveway by the grove of trees itself and intervening topography. The exception to this is the outer edge of the grove that is not screened by adjacent olive trees.

The Project is a continuation of an existing mine and is contained in a small visual catchment with limited extent from sensitive preceptors in the critical western areas. It is also a visual catchment that currently supports mines at Bengalla and Mt Arthur Coal.

7.7 Lighting Impacts

7.7.1 Introduction

The visual effect of lighting surrounding the Project will remain similar to that experienced as part of the current operation, except that operational lighting in pit areas will move further west. This could marginally increase lighting effects to the west while decreasing them in the east.

Light effects will be influenced by the locality of operations on-site at any one time, the relative level at which the viewing location is situated and the presence of any off-site barriers such as topographic features and / or vegetation.

There are two types of lighting effects that could be experienced from the Project. The first effect is where the light source is directly visible, and will 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 will create a strong local focal point and the effect will 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

The only locations that will have direct line of sight to night lighting are elevated locations such as Roxburgh Road that overviews any screening topography and vegetation. Such lighting from Bengalla is currently experienced at these locations.

As is currently experienced, any direct night lights in this viewing zone may also include Drayton Mine and Mt Arthur Coal lighting.

7.7.3 Diffuse Light Effects

At the Project, operational areas and machinery night lighting will not be directly visible to most locations due to the screening effect of OEAs 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 Project. Again, the other mines including Mt Arthur and Drayton contribute to this diffuse lighting effect.

7.8 Visual Impact Summary

The visual impacts associated with the Project are generally low on the Northern, Eastern and Southern Sectors. This is mainly as a result of the visual effects being low due to the western extension of the OEA being screened by the approved and rehabilitated eastern and southern OEA areas.

Views from the west are onto the active face of the OEA. However, the OEA is decreasing in scale (180 m) and becomes backgrounded by the larger, more dominant Main OEA (270 m) that will be rehabilitated. This will progressively lessen the visual effect and impacts as experienced from the west with the exception of Roxburgh Road.

7.8.1 Lighting Impacts

The visual effect of lighting associated with the Project would be at a similar level to that currently approved and experienced at Bengalla.

Some direct lighting impacts will occur when operational areas located on the southern parts of the OEA are not screened by overburden or topography. Existing night time operations have direct views to lighting from various locations around Bengalla and as such the proposed operations will be similar to the existing environment.

8. MITIGATION

Mitigation measures in relation to reducing visual impact relevant to the Project include:

- On-site treatments to reduce visual effects; and
- Treatments at viewer location to reduce visual sensitivity (off-site treatments).

On-site treatments involve rehabilitation of landforms and land cover, while viewer location treatments could involve a range of treatments to screen views, filter views and or re-orientate primary views should this be needed. It should be noted that on-site treatments have already been carried out as they relate to Main OEA establishment and rehabilitation.

The existing Landscape Management Plan will be updated to include commitments in this Visual Impact Assessment and include detailed landscape plans for on-site and off-site treatments in consultation with a landscape architect.

8.1.1 On-Site Treatments

The following on-site treatments will be implemented for the Project. They are in keeping with ecological mitigation recommendations which in part state:

“Ongoing progressive rehabilitation of mining areas will take place across the Disturbance Boundary and will reinstate agricultural land with open woodland corridors following mining. Although the Disturbance Boundary will be returned to agricultural land, there is still opportunity to achieve some biodiversity outcomes. This is because the agricultural matrix will include treed areas that can provide some fauna habitat and movement corridor values for a number of locally occurring fauna species. These treed areas will comprise at least 10% of the post-mining landscape and will be located principally on either side of the retained part of Dry Creek frontage, along paddock fencelines and as copses in paddocks. In addition, the eastern face of the OEA will be revegetated with high density tree plantings.

Rehabilitation and revegetation work will aim to restore grassland and tree cover on mined land throughout the course of the Project and will be conducted in accordance with the Biodiversity Management Plan for the Project. The Project will be staged such that vegetation clearing will be conducted progressively over the life of the Project in concurrence with rehabilitation and revegetation works, so that the impacts can be minimised as far as practicable at all stages of the Project.”

- Prepare detail landscape plans to achieve outcomes that emulate the grassland open woodland/ scattered tree landscapes of surrounding hills, as generally illustrated in Figure 8.1 and the photomontage at Figures 6.3a-f, to achieve a minimum of 10% tree cover as recommended in the ecological impact assessment;
- As part of above, complete landscape design for Dry Creek along with the OEAs, incorporating the ecological mitigation strategies for the Project to achieve a more natural riparian setting;
- Early, progressive establishment and rehabilitation of the outer faces of the OEA, especially in relation to the southern slopes adjacent to the Main Northern Rail Line and CHPP to minimise pre-rehabilitation areas to external sensitive view locations;
- Continuation of the rehabilitation of the outer faces of the Main OEA with planting patterns to emulate agricultural landscapes as defined above;
- Consistent with maintaining tree planting areas, prepare landscape design for planting areas to achieve the best visual outcome to critical eastern and southern views. This means planting patterns consistent with the existing adjacent woodland and grassland of the existing landscape;
- Ensure the Western OEA is seeded with grass cover as soon as practical, commencing from the western and northern sides to reduce visibility;

- Re-establish agricultural use of rehabilitated areas consistent with successful tree establishment upon completion of mining;
- Design drop down drainage structure alignments to vary with the topographic form of the OEAs and avoid extensive straight line drop downs;
- Utilise tree areas to assist in breaking up views to drainage structures;
- Utilise dark rock where possible in such structures to minimise colour contrast with surrounding landscape;
- New infrastructure developments, including explosive storage and recharge facilities to be finished in forest tones such as olive green or grey as far as practical to reduce visual contrast with the surrounding landscape, consistent with regulatory and safety requirements;
- Complete topographic and tree planting design around explosive magazines and reload facilities to ensure that it is not the dominant elevated element in the landscape; and
- Where consistent with health and safety requirements, ensure lights are hooded or directed away from sensitive receivers to avoid direct light spillage from the site.

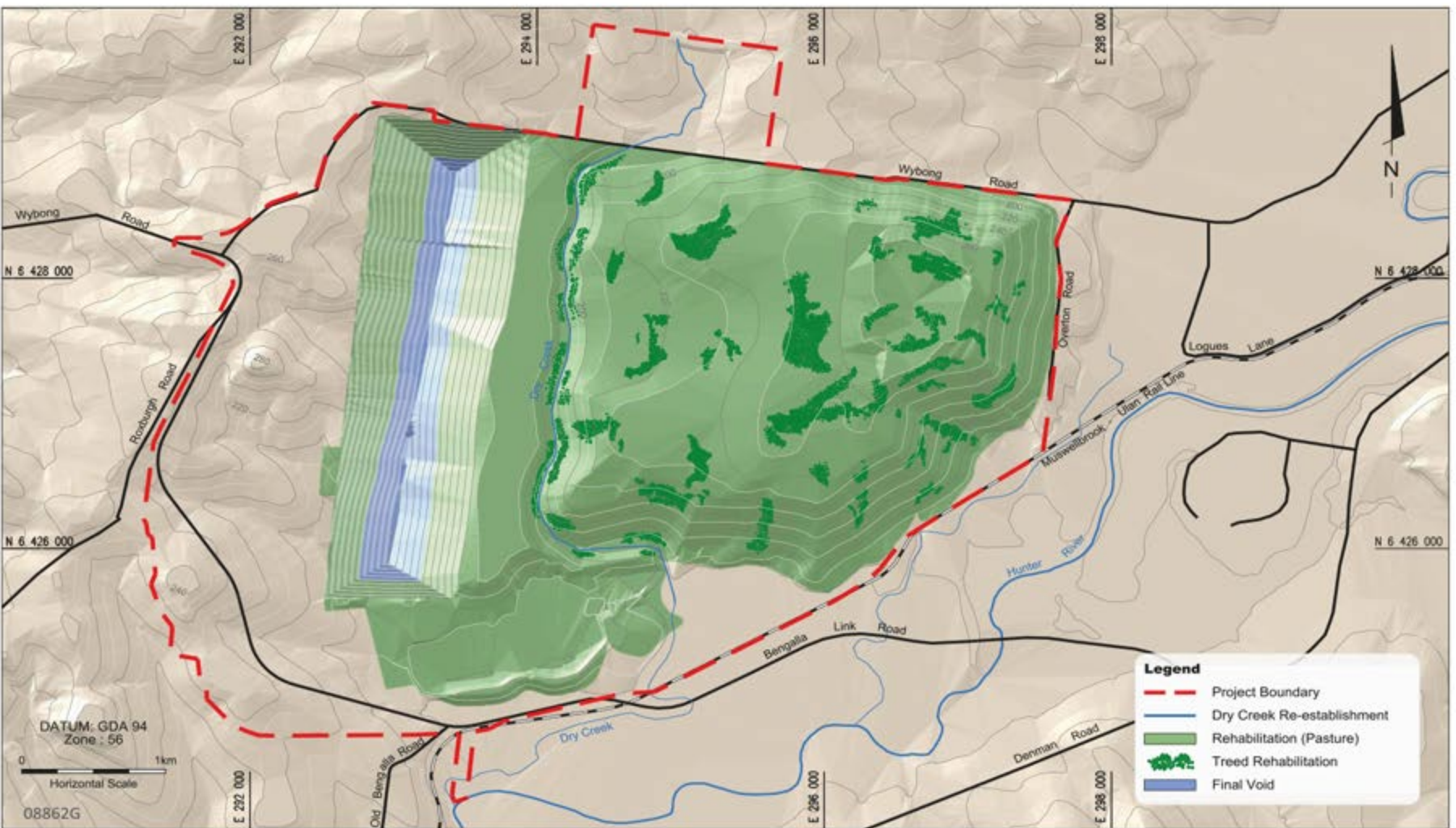
8.1.2 Off-site Treatments

The following off-site treatments will be implemented for the Project:

- Prepare and implement a consolidated Rehabilitation and Landscape Management Plan for the Project. This plan should be prepared to consider specific impact mitigation strategies for sensitive viewing locations;
- Extend tree screen planting along Wybong Road to the western extent of the Project Boundary;
- Prepare and implement landscape plans for screening the eastern side of Bengalla Link Road. Extend clump planting already established on Bengalla Link Road along the deviation and Roxburgh Road (where private residences exist);
- Where appropriate, carry out tree screen planting along Denman Road in the vicinity of privately owned receivers including Receiver 93 and Pukara, Receivers 102, 103 & 107 (in consultation with landowners and the RTA) as shown on Figure 3.2;
- Complete a site inspection and where required, prepare landscape strategies for receivers that will experience prolonged high levels of visual impact, where requested;
- Implement landscape strategies according to plans as agreed with the landholder and land management agencies to achieve visual screening at sensitive viewing locations along Roxburgh Road, Wybong Road and Denman Road; and
- Ensure off site landscape treatments at Edinglassie and Rous Lench create visual separation between these elements and active faces of the OEA.

8.1.3 Lighting

- Design of fixed night lighting to the minimum level necessary for operations and safety;
- Use of low flux lamps and direction of fixed lights toward the ground, where practical;
- Implementation of work procedures related to the use of mobile lighting plants to avoid adverse off-site lighting impacts;
- Where possible, conduct operations behind noise/light barriers, especially at night, particularly on the OEA, to avoid adverse off-site lighting impacts; and
- Off-site treatments may include the reinforcement of plantings close to viewing locations.



BENGALLA MINE

Conceptual Final Landform



Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Figure 8.1 | Rehabilitation Plan

9. CONCLUSION

The continuation of mining at Bengalla by extending mining to the west will increase screening from sensitive locations to the north, east (particularly Muswellbrook township and Racecourse Road) and to the south. The Main OEA will continue to be rehabilitated. This element is of a much larger scale with elevations up to 270 m than the Project with an OEA elevation of 180 m. The Main OEA will further reduce views of the mine extraction area from most sensitive receivers to the north east, east and south east.

The sector that will continue to be impacted is to the west. However, the number of sensitive visual receivers are limited to a small number of residences on Roxburgh and to the south west on Denman Road (including parts of Pukara as well as Denman Road itself).

The visual effect of the western side of the OEA will decrease over time as the overall scale of the active face of the OEA is reduced from 270 m to 180 m. In addition, the creation of a backgrounding and dominant rehabilitated OEA will also reduce the visual effect of the active face of the OEA to the east. Eventually (after 15 years) the active face will not be visible to sensitive view locations in the western and south western areas with the exception of the upper section of Roxburgh Road.

The visual impact of the Project will decrease impact levels as the Project progresses with the rehabilitated Main OEA areas dominating and screening the Project from sensitive receivers in the east and increasing dominating views from the west.

The implementation of suggested mitigation strategies will further ameliorate visual impacts.