

APPENDIX I

VISUAL IMPACT ASSESSMENT

Mt Arthur Coal Consolidation Project visual impact assessment study

August 2009



volume one

a report prepared by

integral
landscape architecture
& visual planning

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GLOSSARY

Areas of Primary Visual Concern	Areas that have potential views to the Mt Arthur Coal Consolidation Project based on a consideration of topography alone as a screening element.
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 70° 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.
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 30° either side of the centre line of a view and a vertical arc of 30° above the horizontal.
Screen	The degree to which a development element is unseen due to intervening landscape elements such as topography or vegetation.
Seen Area	Areas surrounding the Project within the Zone of Visual Influence which will have views to the Project.
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 considered together determines the visual impact of a development.
Visual Management Unit (VMU)	A Visual Management Unit is a landscape area with similar visual characteristics.
Visual Sensitivity	The degree to which a change to the landscape will be perceived in an adverse way.
Overburden Emplacement Area (OEA)	An Overburden Emplacement Area is a predominant feature created by open cut mining operations, which involves all waste overburden being placed and shaped.
Zone of Visual Influence (ZVI)	Areas surrounding the Project which have been assessed following topographic and vegetation analysis to potentially have views to the Project.

1. INTRODUCTION

1.1 Background

Hunter Valley Energy Coal (HVEC) owns and operates the Mt Arthur Coal Mine Complex (Mt Arthur Coal). Mt Arthur Coal includes the combined operations of the Mt Arthur North Mine, the Bayswater No. 2 Mine, Bayswater No. 3 Mine, South Pit Extension and the Mt Arthur Underground (MAU) Project. Mt Arthur Coal is located south west of Muswellbrook off Thomas Mitchell Drive in the Muswellbrook Shire Council (MSC) Local Government Area (LGA) in the Upper Hunter Valley of NSW, see Figure 1.1.

1.2 Existing Operations

The currently approved Mt Arthur Coal complex consists of the following mining areas:

- Bayswater No. 2 open cut pit (extraction completed);
- Bayswater No. 3 open cut pit (operated since 1995);
- Mount Arthur North open cut pit (operated since 2001);
- South Pit Extension open cut pit (approved in 2008 – extends the Mt Arthur Coal South Pit 2.5 km south);
- Exploration Adit (commenced operations in 2007); and
- Mt Arthur Underground Project (MAU) (approved in December 2008).

Mt Arthur Coal currently has approval to produce up to 28 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal from the complex, of which 8 Mtpa is from underground mining methods.

Coal production from the Mt Arthur North mining area has been the focus of Mt Arthur Coal's operations since 2002. Open cut coal mining is conducted via shovel and excavator. In 2008, coal was mined from the Glen Munro seam to the Ramrod Creek seam within the Wittingham coal measures. Open cut mining methods at Mt Arthur Coal allow the full recovery of all coal down to the Ramrod Creek seam.

Coal preparation, handling and loading is undertaken at the centralised Mt Arthur Coal, Coal Handling and Preparation Plant (CHPP), which is strategically located in a valley to minimise environmental and visual amenity impacts. Export coal is loaded onto trains via the Rail Loading Facility whilst domestic coal is transported via conveyor directly to Macquarie Generation's Bayswater Power Station.

1.3 The Project

HVEC is applying for a new Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to gain a single, contemporary planning approval for its open cut operations and the mining of additional areas within Mt Arthur Coal's current Mining Leases (ML) (the Project). The Project Application Boundary (EA Boundary) is consistent with the Project Approval area for the MAU.

Specifically, the Project comprises the following:

- Extending the mine footprint to uncover additional coal reserves within the current MLs;
- Increasing the Mt Arthur Coal complex approved production levels by 8 Mtpa up to 36 Mtpa ROM coal. This will be achieved by;
 - Increasing open cut coal production by up to 8 Mtpa; and

- Having the flexibility to increase either open cut or underground production by an additional 4 Mtpa if the maximum production from either underground or open cut methods is not being met (total to not exceed 36 Mtpa).
- Relocation of a section of Edderton Road in approximately 2019;
- Upgrading the existing Mt Arthur CHPP to process up to 36 Mtpa of ROM coal and allow the inclusion of an ultra-fine coal circuit to re-process fines which will facilitate increased resource recovery and reduce water demand;
- Increasing the approved rail haulage capacity (in line with the increased coal production) from 19 Mtpa to 27 Mtpa, with the construction of a second rail loading facility and associated conveyor system;
- Modifications to existing infrastructure (such as workshop and bath house), construction of additional ROM coal hoppers and the extension of ROM and product coal stockpiles; and
- A total workforce of approximately 2,600 at peak production, which represents an increase of approximately 1,610 from current staffing levels and an estimated additional 720 positions directly attributable to the Project.

No changes to the mining method or hours of operation are proposed, although a gradual increase in the mobile equipment fleet will be required.

1.4 Description of the Project Surrounds

The EA Boundary (to which the Project applies) is located to the south west of Muswellbrook in the Upper Hunter Valley. The EA Boundary is located in rolling hills that support open grassland with scattered tree cover. The exception to this is Mount Arthur itself that is steep and supports an increased degree of tree cover.

The visual setting surrounding Mt Arthur Coal is also dominated by the existing open cut coal mines at Bengalla Mine and Drayton Mine. These existing mining operations, in conjunction with Mt Arthur Coal, provide a significant component of the landscapes in this locality to the south west and west of Muswellbrook.

1.5 Objectives of the Visual Assessment

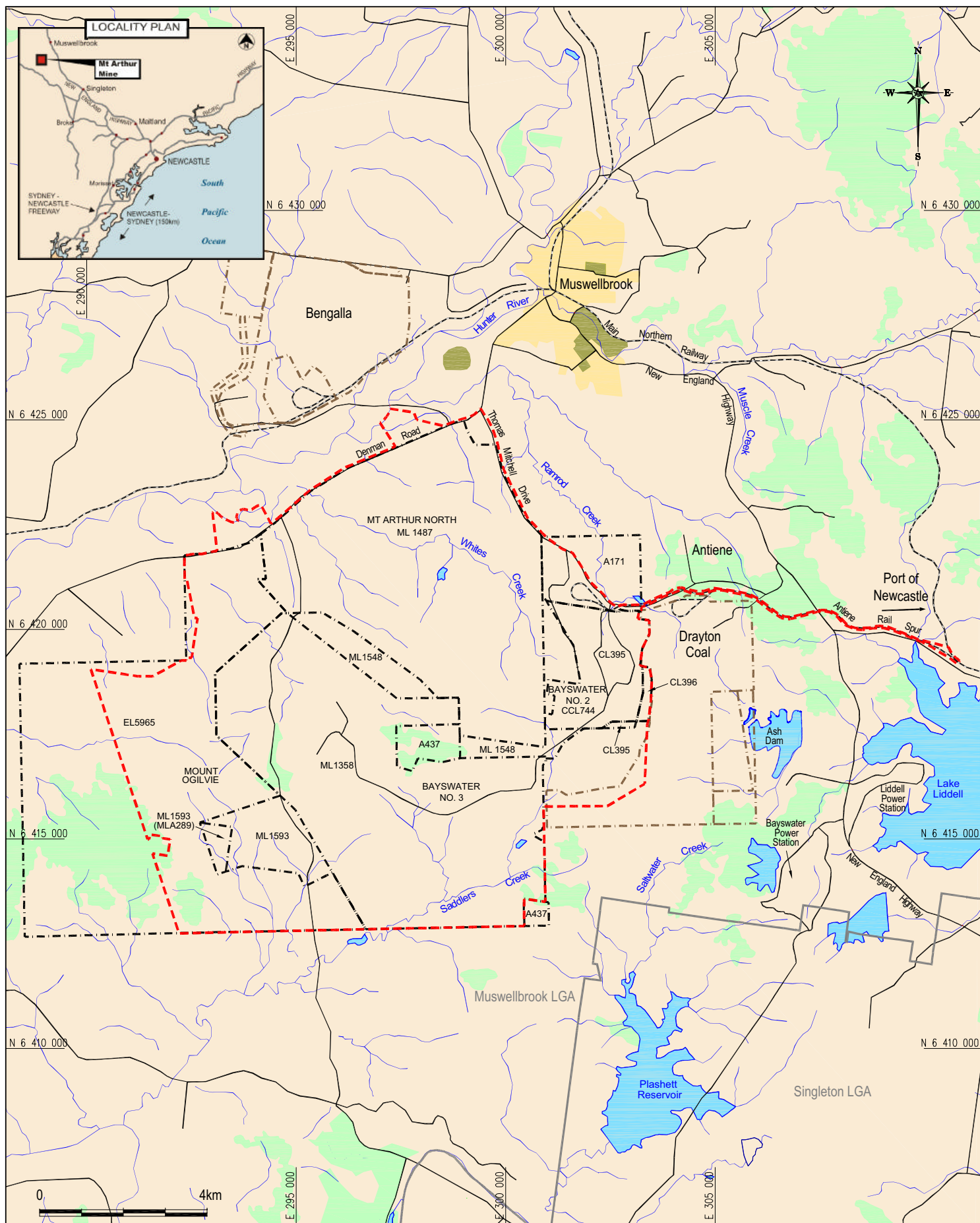
This technical report is a visual assessment of the potential impacts of the Project on the existing landscape and visual values of the area, including existing mine areas. The report identifies the visual character of the existing landscape as well as that proposed for the Project.

The visual and lighting impacts of the Project, including both short term and long term impacts, have been assessed with visual impact mitigation strategies developed in accordance with the Director-General's Environmental Assessment Requirements (EARs) for the Project.

The Director – General's EARs issued for the Project required the following:

“A detailed assessment of the potential visual impacts of the Project on the amenity of the surrounding area, paying particular attention to the potential impacts of the Project on the residential area of South Muswellbrook and the views of the Project from the surrounding road network; and

A detailed description of the measures that would be implemented to minimise these impacts, including the proposed landscaping to screen the surface facilities and operations and the proposed measures to minimise the potential lighting and signage impacts of the Project.”



- EA Boundary
- Mt Arthur Mining & Exploration Leases
- Other Mining Leases
- Roads
- Railways
- Creeks
- Local Government Boundary

Hansen Bailey



Co-ordinate System: MGA Zone 56

MT ARTHUR COAL

Regional Location

Cad File: 03335D.dwg

Date: 27.01.09

Drawn: CS

Figure
1

2. ASSESSMENT METHODOLOGY

2.1 General Method

This section outlines the methodology used to assess the visual impact of the Project. 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 setting and how the EA Boundary is 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 (see Section 6) and visual effect determines impacts (see Section 7) and gives some direction on mitigation strategies (see 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 Existing Visual Environment

The evaluation of the existing visual environment (see Section 3) consists of the assessment of both the landscape setting, and viewing locations within it, as described below.

2.2.1 Landscape Setting

The landscape setting can be defined in terms of topography, vegetation, hydrology and land use features. These elements define the existing visual character of the landscape with which the Project interacts. There are areas of similar visual features within any landscape that can be defined as a Visual Character Unit (VCU). Defining the landscape in terms of these VCU's assists in understanding the visual character of the landscape as a whole to 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.

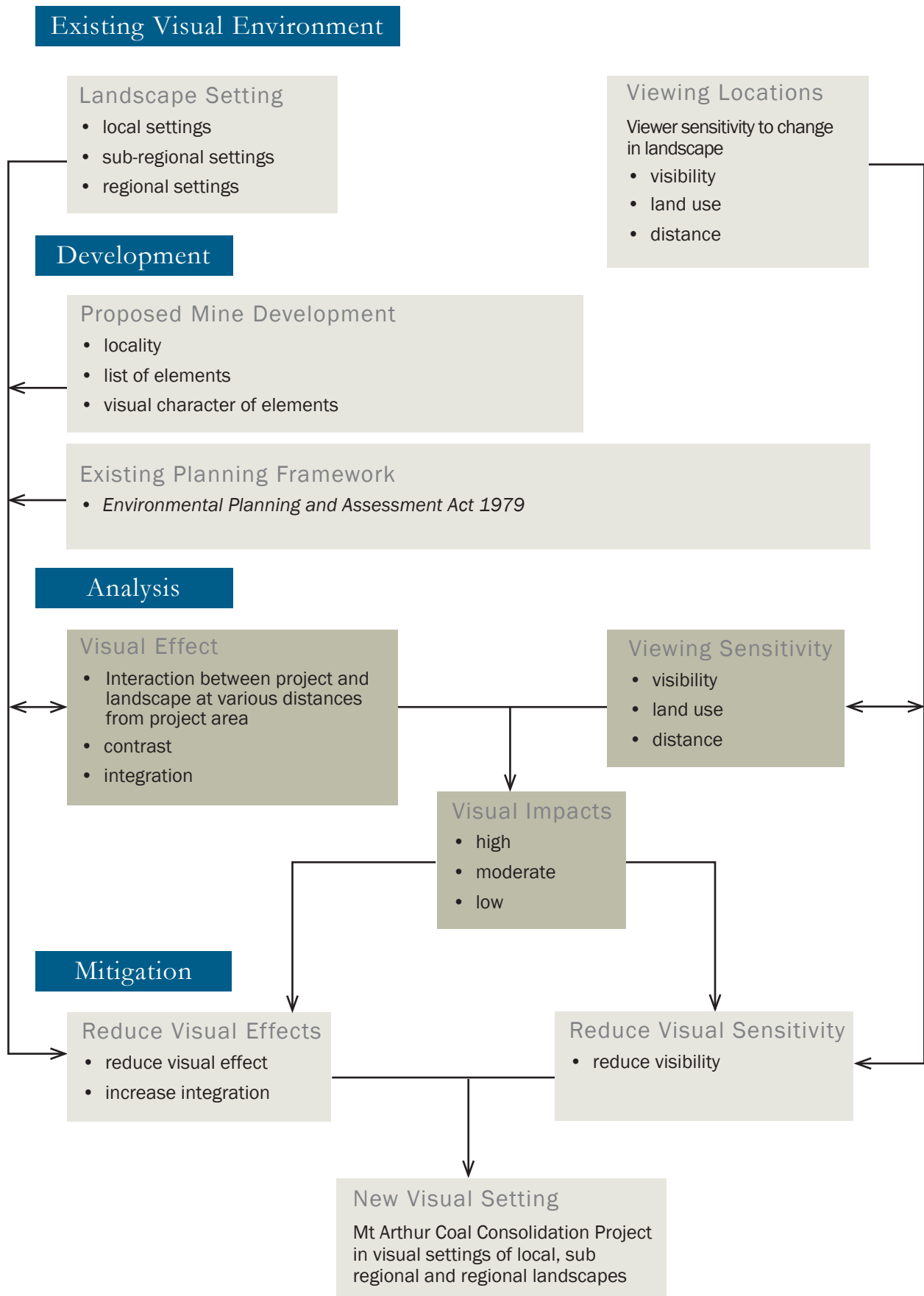


Figure 2.1 | Visual Assessment Methodology

2.3 The Project

The Project will have certain visual characteristics associated with the extension of mining operations proposed. These elements will express themselves in terms of form, shape, line, 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.

Consideration to the relevant legislation applicable to the Project, namely Part 3A of the EP&A Act and associated EARs for the Project, are also an important component of understanding the scope of visual impact assessment.

2.4 Impact Analysis

The analysis of the interaction between the existing visual environment and the Project provides the basis for determining visual impacts and mitigation strategies. This is completed by defining the visual effect of the Project and visual sensitivity of viewing locations to determine impact.

2.4.1 Visual Effect

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

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 mining operations are part of the existing landscape, so to an extent, the visual effects of the Project borrow visual character from these operations, reducing visual effects.

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 will have a high visual effect due to strong contrast. An extension of operations (such as for the Project) in an existing mine will have a lesser visual effect. A successfully rehabilitated mine area will have a low visual effect due to limited contrast with the existing landscape.

In a similar way, a Project 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.

The visual effect of a Project is determined by factors as illustrated in Figure 2.2.

The magnitude of the visual effect of a Project as outlined in Figure 2.2 is determined by a balanced consideration of the following:

Contrast and Integration

The level of contrast and integration of the Project with its surrounding landscape determine visual effect. Project elements as expressed through visual expression elements (i.e. form, shape, pattern, line and colour with minor consideration in relation to texture) contrast to varying degrees with the surrounding landscape and also to varying degrees, integrate with it.

The Proportion of a View That Includes the Project

For any given level of contrast and integration, the lower the proportion of the view that is occupied by the Project, the lower will be the level of visual effect which is determined by defining the proportion of the total field of view occupied by the Project. This in turn is most appropriately determined by defining what percentage of the Primary View Zone (PVZ) it occupies, see Figure 2.3.

Visual Properties		Visual Effect Levels		
Contrast Levels with elements in primary view zone	Visual Integration with elements in primary view zone	High Visual Effect	Moderate Visual Effect	Low Visual Effect
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.... 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
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..... Newly rehabilitated pit area	Moderate The development has some degree of visual integration with setting from other features, vegetation and or topography achieve some level of integration	It occupies more than 20% of the primary view shed, generally when in a foreground location	It occupies between 20-10% of the primary view shed	It occupies less than 10%
Low Development elements borrow extensively from features in visual setting in terms of form, shape, line, pattern colour and scale minimizing contrast with the existing setting and / or..... Rehabilitated landscape pattern	High Visual integration is high due to other features, vegetation and or topography achieving dominance and screening or filtering	The development occupies more than 40% of the primary view shed	The development occupies 40-30% of the primary view shed	The development occupies less than 30% of the primary view shed

Note: The visual effect of the mine pits changes through time with open pits having high contrast and low visual integration, thus creating high impacts at low levels of exposure (i.e. 2.5%). Rehabilitated pits with rehabilitated landscape patterns create moderate to low contrast and higher integration levels increasing the percentage of a primary view shed permissible for moderate and low visual effects.

Figure 2.2 | Visual Effect

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

Measuring the percentage of the PVZ occupied by a development will provide a more critical measure than a measure of 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°, instead of a view arc of 60° represented by the PVZ only.

Generally, a high visual effect will result if a visible area of the Project has a high visual contrast and low integration to the surrounding landscape. A low or very low visual effect will occur if there is minimal contrast between the visible area of the Project and the existing landscape setting and / or the area occupied by the Project are only small parts of a total view.

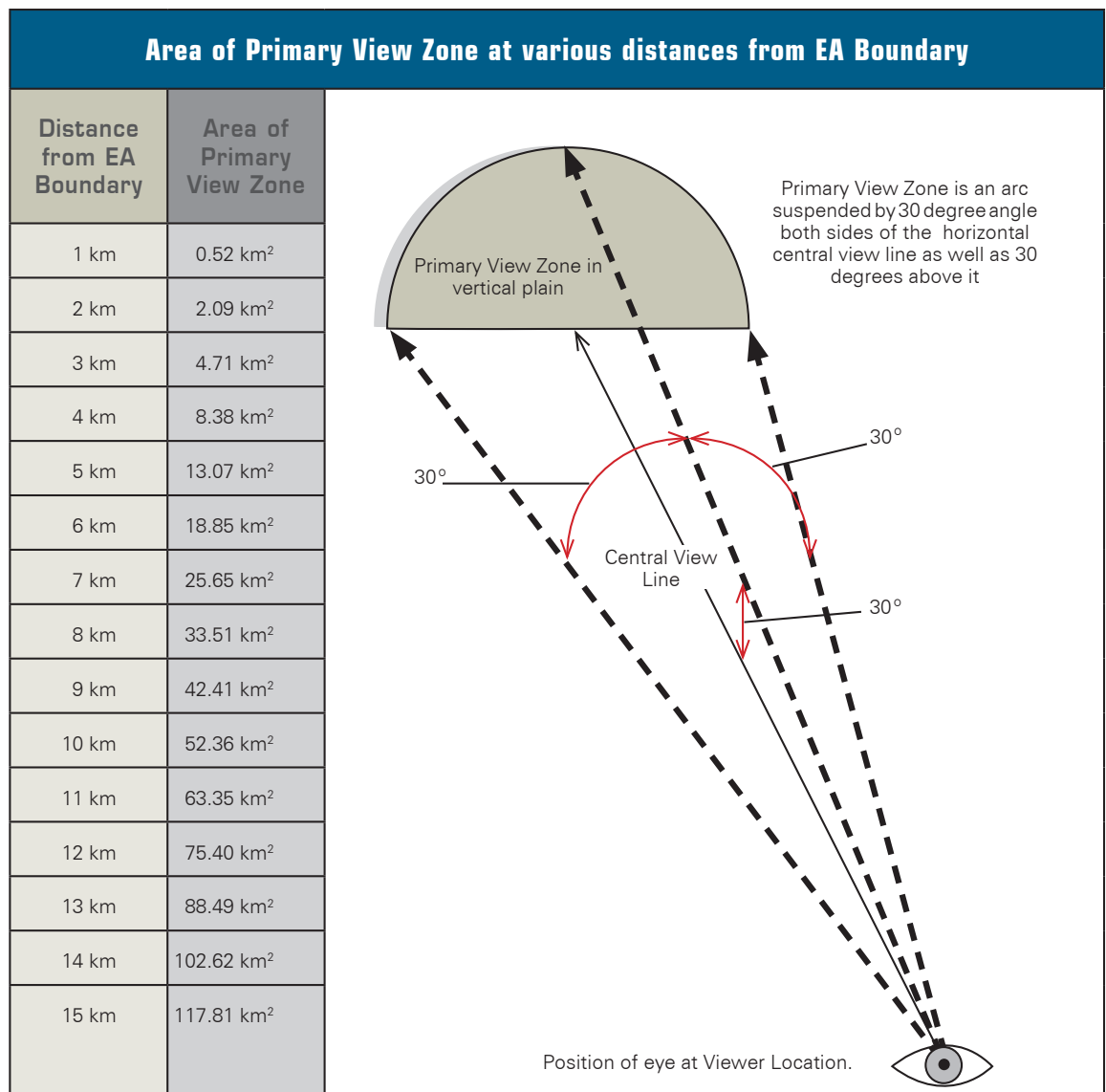


Figure 2.3 | Area of Primary View Zone at Various Distances from the EA Boundary. The Primary View Zone being the most critical and central part of any view.

2.4.2 Visual Sensitivity

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

In this regard, residential, tourist and / or recreation areas generally have a higher visual sensitivity than other land use areas including industrial, agricultural or transport corridors, because 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 2.4 indicates the levels of visual sensitivity associated with the Project.

However, the visual sensitivity of individual 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 verandas 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 toward the Project.

Land Use	Visual Sensitivity Levels			
	Nearest visible mine elements less than 2.5 km away	Nearest visible mine elements between 2.5 - 7.5 km away	Nearest visible mine elements between 7.5 - 12.5 km away	Nearest visible mine elements more than 12.5 km away
Urban and rural houses	High Sensitivity	High / Moderate Sensitivity	Moderate Sensitivity	Low Sensitivity
Designated tourist and main roads - New England and Golden Highways, Denman Road	High Sensitivity	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
Other roads: Edderton, Thomas Mitchell and Wybong Roads	Moderate Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Minor local roads in rural zone	Moderate / Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Broad acre rural lands	Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity

Figure 2.4 | Visual Sensitivity

For any area to be given a sensitivity score, it must have visibility to the EA Boundary. This visibility was determined based on field assessment, evaluation of topographic and vegetation data as well as computer assessment of those two parameters. A resulting Zone of Visual Influence (ZVI) map was produced to assess the contribution of topographic and vegetation data to determine the visibility of the project from locations within the region (Figure 3.2).

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 resultant impacts is illustrated in Figure 2.5.

Visual Effect	Visual Sensitivity		
	High	Moderate	Low
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

Visual Impact is dependant on the interaction between visual effect and sensitivity.

Figure 2.5 | Visual Impact

2.5 Application of Methodology

There are numerous locations in the vicinity of the Project that will be visually impacted by the Project to various levels. For the purposes of the visual impact assessment, a number of sites within key sectors of the PVC were selected as representative viewing locations (Section 3). These sites were selected with reference to field assessment, aerial photography, topographic plans and ZVI plans to determine the visibility of the Project. Whilst there will be some variation in the impacts on specific viewing locations, an overall assessment of the visual impact on the selected locations will be representative for the majority of views experienced.

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 EA Boundary from a range of potential viewpoints. This was further assisted through the production of computer generated seen area maps (i.e. ZVI maps). In these maps, visibility of the Project was determined by an analysis of topography and vegetation to determine areas screened from view.

2.5.2 Visual Sensitivity

The visual sensitivity of various viewing areas was determined by review of aerial photography, plans of the Project, ZVI plans and topographic plans 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 and other study data.

2.5.3 Visual Effect

The visual effect of the mining operations at Mt Arthur Coal on external viewpoints is illustrated in a number of photomontage images taken from various viewpoints within key sectors of the Primary Visual Catchment (PVC) around the EA Boundary. Viewpoints included:

- Racecourse Road, South Muswellbrook and Ironbark Ridge Estate in the north east;
- Golden Highway to the south; and
- Roxburgh Road, Roxburgh Vineyard, Denman Road and Denman township to the north west.

These points were selected to illustrate views from various viewpoints around Mt Arthur Coal. Many locations are the same as those used for the Mt Arthur North Environmental Impact Statement (EIS) to enable comparisons with the currently approved mine. The assessments from these locations have been structured to display worst case views of the Project from these areas.

2.5.4 Photomontage Development

Photographs of the existing operations and location of the proposed Project were taken at standing eye level from each viewing location and the location of each photograph position was accurately surveyed. Three dimensional (3D) computer models of the Project at 2011, 2016 and 2022 and the surrounding area were developed from digital surface topography and Project mine plans. The models enable accurate views of the Project to be generated from any specified location and account for screening of views by natural topography. The photographs of the EA Boundary were overlain on the model view and the location of future visible components of the Project were determined taking into account 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 viewpoint, a photomontage set has been completed. The first photograph in each set illustrates the existing view (a), with subsequent photographs illustrating Mt Arthur Coal during various phases of the Project mine life, 2011 (b), 2016 (c) and 2022 (d). An additional image compares the final landforms for the Project with the final landforms that are currently approved mine plans. To illustrate the comparisons with existing approvals, a red line was placed on the photomontage images to illustrate the elevations of the currently approved overburden emplacements areas (OEAs) on the Mt Arthur North eastern and central emplacement area.

The photomontages were then used to assist in determining the level of visual effect of the Project from each of the selected representative viewpoints. Once the visual effect of the Project was determined, the visual impact on each residential viewing sector was determined using Figure 2.3.

2.6 Treatments

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

2.6.1 Reduce Visual Effects

In the first instance, mine plans were workshopped with mine planners and visual consultants to create a final landform with elements of surrounding natural geomorphology, to reduce the visual effects of the Project. This mine planning added more variety in form to the OEAs and lessened the visual effects of the Project.

Rehabilitation of the Project active mining areas within the EA Boundary will decrease the visual contrast created by mining operations to the existing landscape. The 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 carrying out treatments to minimise visibility to the Project. Due to the scale of open cut coal mining components of the Project, such as the OEAs, screening is best done at or close to the point of viewing. Such screening treatments can also be used to redirect 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 new local landscape will be created. This new landscape will reflect post mining land uses including conservation and agricultural land uses on previously mined areas.

3. EXISTING ENVIRONMENT

3.1 Introduction

This section of the report establishes the visual character of the existing environment. This is needed to establish the change created by the Project and provides a base line against which visual effect is measured. A significant part of the existing visual environment in the vicinity of the Project is the existing operations at Drayton Mine and Bengalla Mine.

As shown in Figure 3.1, the existing visual setting of Mt Arthur Coal is created by a range of different landscapes and features within and surrounding the site, which vary as a result of topography, vegetation cover and land use types. The visual character of these features and how they interact to define the existing visual setting for the Project is provided below. Portions of the EA Boundary are dominated by woodland, for instance, at Mount Arthur and Macleans Hill. However, the existing mining operations, including Bengalla Mine to the north and Drayton Mine to the east, have created a strong visual character of their own. This contrasts with the surrounding open woodland hills of the locality.

The topography, vegetation and river and creek systems of the area, coupled with the land use features create a range of unique visual settings that are experienced in this locality.

Topography and vegetation will be the major determinants of visibility to the Project. They are also the major 'natural' features of the landscape in this location.

3.2 Primary Visual Catchment

The Primary Visual Catchment (PVC) represents the area within which the majority of critical views of the Project are located. This in turn is defined primarily by topography that defines features beyond which the Project cannot for the greater part be seen. The PVC is illustrated in Figure 3.1.

At a regional scale, the PVC is defined by Mount Ogilvie and associated ridges to the south and the Mount Royal Ranges to the east. The meandering Hunter River also means that in this locality the PVC is also defined to the south by the mountain ranges bordering the alluvial lands of the Hunter River. To the north, the PVC is defined by rolling hills that limit the extent of views in that direction. The exception to this is along the floodplain adjoining the Hunter River floodplain, where more open views are possible, until these too are cut off by adjoining hills.

The areas from which the EA Boundary can be seen on the basis of approved mining operations are illustrated in Figure 3.2.

3.3 Visual Character of the Landscape

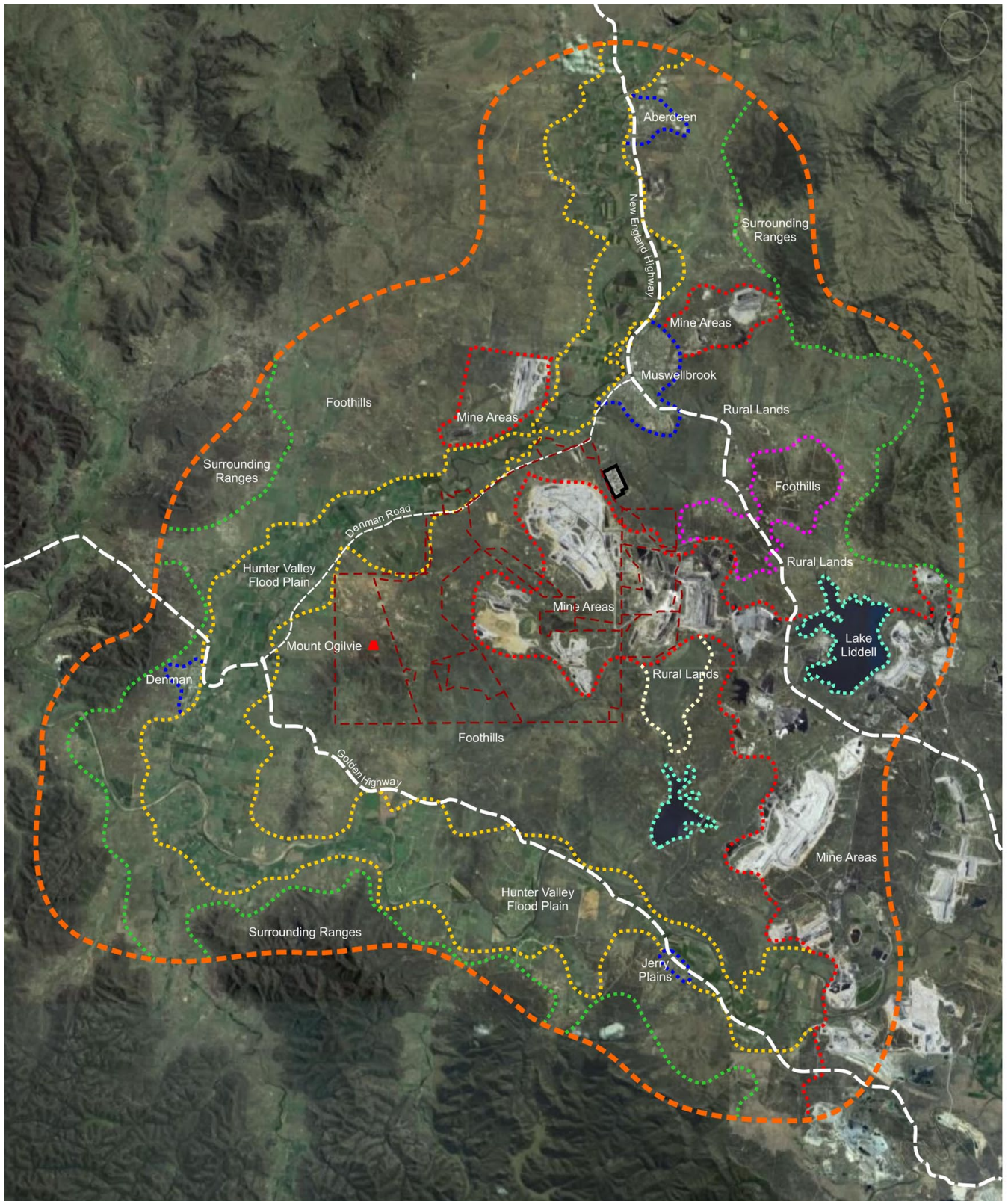
The visual character of the regional and local landscape in the vicinity of Mt Arthur Coal is created by the mosaic of topographic form, vegetation and land cover, hydrological features and land use patterns. These landscape features combine in various ways to create areas of relative visual uniformity that can be defined as Visual Character Units (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 from all viewing locations the Project is seen in the context of an existing landscape setting made up of one or more VCUs. The Project combines with one or more VCUs to create a view as seen from various locations that are within the seen area of the Project.

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 the VCUs.

The VCUs shown on Figure 3.1 within the PVC are briefly described below and include:

- Hunter Valley Floodplain;
- Foothills;
- Rural Lands;
- Mine and Industrial Areas;
- Town Areas;
- Surrounding Ranges; and
- Lake Areas.

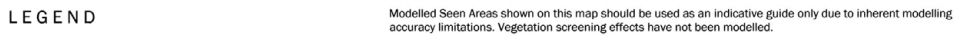


LEGEND



Figure 3.1 | Existing Visual Setting





SEEN AREAS

- | | |
|---|--|
|  | < 2.5km - zone of highest visual perception, perception of detail but not necessarily the whole EA Boundary |
|  | 2.5 to 7.5km - zone of high appreciation of overall activity within the EA Boundary |
|  | 7.5 to 12.5km - zone where overall appreciation of activity may be mitigated in part by intervening topography and increased influence of distance and diurnal effects |
|  | > 12.5km - zone where perception of active areas decreases as compared to adjacent undisturbed or rehabilitated areas. Increasing capacity for intervening topography and or vegetation to partially or fully screen mine elements from view |

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3.3.1 Hunter River Floodplain VCU

The Hunter River Floodplain VCU dissects the PVC. Visually, the VCU is dominated by the expansive river flats that by virtue of soils and irrigation, support verdant green grass and croplands, creating vivid rectilinear patterns in the midst of dryland grass and woodlands on adjoining slopes (see Figure 3.3).

Of major significance in this VCU is the location of major thoroughbred horse studs to the south of Mt Arthur Coal along the Hunter River, as well as vineyards and olive groves to the north (see Figure 3.4).

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 a number of rural residences within this unit. However, these residences are generally located on higher ground due to the flood potential within the VCU and subsequently have a less expansive view of the Project. Residence locations generally occur at the edges of the floodplain or more often in the lower part of the adjoining Foothills VCU described in Section 3.3.2.

3.3.2 The Foothills VCU

The Foothills VCU include the northern, eastern, southern and western foothills around Mt Arthur Coal and is located adjacent to the Hunter River Floodplain VCU (see Figures 3.5 – 3.7). The hills vary from low elevation and gently sloping to steep slopes and higher elevation ridges and hills. This VCU supports many rural homesteads in the lower and more gently sloped areas adjacent to the floodplain and in the more intensively cleared grazing areas.

The elevation of the hills in the vicinity of Roxburgh Road and Wybong Road limit visibility to Mt Arthur Coal from the northerly sectors, while homesteads in the elevated areas of this part of the Foothills VCU have potential views to Mt Arthur Coal.

The southern hills of the Foothills VCU adjoin Parnells, Saltwater and Saddlers Creeks and are generally heavily cleared with scattered tree cover. General elevations to the south of Mt Arthur Coal are in the order of 200 m with Plashetts Knob having an elevation of 227 m, see Figure 3.5. The area is generally used for grazing purposes only and does not support any rural homesteads, with the southern hills providing significant visual shielding to sensitive locations adjacent to the Hunter River.



Figure 3.3 | *Hunter Valley Floodplain VCU*
This VCU has a strong rectilinear pattern of green grass and cropland in the midst of dry grassland.



Figure 3.4 | *Hunter Valley Floodplain VCU*
Major horse studs to the south of Mt Arthur Coal are a prominent feature in this unit.



Figure 3.5 | *The Foothills VCU - Northern*
The northern foothills with grasslands and scattered trees have, for the greater part, been cleared for grazing purposes.



Figure 3.6 | *The Foothills VCU - Eastern*
The eastern foothills are also dominated by gently sloping low elevations, with a mixture of grasslands, woodlands and open forest.



Figure 3.7 | *The Foothills VCU - Southern*
The southern foothills are generally heavily cleared with scattered tree cover.



Figure 3.8 | *Townships VCU*
The Township VCUs contain sensitive residential areas that utilize views as part of the residential amenity.

3.3.3 Townships

There are a number of townships within the PVC (see Figure 3.8) that vary in size. The closest and largest of these is Muswellbrook, with the smaller villages of Denman to the south west and Aberdeen to the north. The village of Jerrys Plains is located to the south of Mt Arthur Coal.

Townships, to varying degrees and depending on size, have a mix of residential, institutional, commercial and industrial land uses. This mix, along with open space and streetscape character, create the visual character of the townships (see Figure 3.8). The significance of each town with views to the Project is related to the concentration of sensitive receptors in the form of residential development areas.

The township of Muswellbrook is located within the foothills to the north east of Mt Arthur Coal. The most significant areas in regard to visual impact are the Racecourse precinct (including the race club facilities and residences to the north and east of the racetrack itself) and parts of South and North Muswellbrook that may experience westerly views over Mt Arthur Coal.

The township of Aberdeen is located some 15 km to the north of Mt Arthur Coal. These town areas currently have potential views to Mt Arthur Coal as well as Bengalla Mine in parts of the town on elevated slopes with southerly and south westerly aspects.

The township of Denman lies approximately 12 km to the south west of Mt Arthur Coal. The topography of the township and intervening landscapes generally limits long distant views to the Project with the exception of the eastern edge of the town that has extensive views over the Hunter River Floodplain VCU to the east.

The village of Jerrys Plains is located approximately 12 km to the south / south east of Mt Arthur Coal and is screened by hills immediately to the north of the Hunter River in this location. There will be no visual impact from the Project on the village of Jerrys Plains.

3.3.4 Surrounding Ranges

The surrounding mountain ranges define the edges of the PVC and occur on both the eastern and western sides of the Hunter Valley. These mountain ranges are steep and forest covered and have significant elevation above the valley and foothills (see Figure 3.9). These features are located at significant distances from Mt Arthur Coal, however they often create the background to views from a full range of locations within other VCUs. Areas that experience views of these distant ranges over existing mine developments include elevated areas in the southern foothills such as Roxburgh Road.

3.3.5 Mine and Industrial Areas

The Upper Hunter Region has a number of coal mines that along with Liddell and Bayswater Power Stations create a strong visual component in the landscape (see Figure 3.10). The existing mines and especially their OEAs are a major visual element of many views in this locality. Within the visual setting of Mt Arthur Coal are the pits and OEAs of Mt Arthur North, Bayswater No. 2 & 3, adjacent Drayton Mine and Bengalla Mine.



Figure 3.9 | Surrounding Ranges VCU
This VCU defines the edges of the Hunter Valley creating a backdrop to valley views.



Figure 3.10 | Mine Areas VCU
The mine areas of Bengalla Mine as seen from Denman Road are also part of the existing landscape and can be seen from various viewing locations.

The Mt Arthur North, Bayswater No. 2 and Bayswater No. 3 are the established open cut operational areas that currently make up Mt Arthur Coal. Mt Arthur Coal is bounded by Denman Road to the north, Drayton Mine to the east, Thomas Mitchell Drive to the north east and Edderton Road to the west. Mt Arthur Coal is located in the foothills VCU. The visual character and scale of Mt Arthur Coal and the adjoining mining and power generating operations are strong enough to create a VCU based on the visual character of these industries.

The Bengalla Mine site is visually dominated by the out of pit OEA in the eastern part of the mine. The CHPP is also visually evident 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.

While the rehabilitated side of the Bengalla Mine OEA quickly integrates with the existing landscape of rolling hills within the Western and Southern Foothills VCUs, the active face remains a high contrast with a low visual integration into the existing landscape. This active face is dominated by the steep back slope of the OEA. These faces retain the light earth colours of the removed overburden.

Drayton Mine is located immediately adjacent to the east of Mt Arthur Coal. It is similar in character to Bengalla Mine and the Mt Arthur North mining area and is visible to the New England Highway, south of the site.

The Muswellbrook Industrial Estate is an industrial area that occurs in the eastern Foothills, located on Thomas Mitchell Drive. Although the area has views to the Project, the area is not visually sensitive or significant due to its industrial use.

3.3.6 Lake Areas

This unit essentially consists of Lake Liddell and its foreshores. The visual character of the unit is created by the lake itself with its edges being defined by gently sloping lands that are a combination of grassland, open woodland and tree planting areas. The area supports some shore line recreation areas including camping and picnicking. The lake creates a feature landscape when seen from locations such as the adjoining New England Highway.

4. THE PROJECT

4.1 General

This section, together with sections 1.1 and 1.2 of this report describes the mining operations at Mt Arthur Coal. More specifically, it considers the mining operations that are significant to the visual values of the environment. A number of the Project elements (e.g. the mine infrastructure area), while being significant to Mt Arthur Coal operations, do not have a significant visual impact and are not further considered.

Although not discussed further in this section, it is important to recognise that ongoing rehabilitation is a key component of the implementation of the overburden emplacement, which is the most significant element in relation to visual effects and impacts.

4.2 Project Components

The Project is described here only in relation to its visual implications. Essentially the main component of the Project from a visual perspective relates to increasing the scale of two major elements, being the active mining area and OEAs. There will be some additional infrastructure required to process the increased coal production levels that are major mine development elements. However these are located with existing infrastructure and are not generally visible to external sensitive view areas.

In relation to the visual effects of the Project, development elements can be divided into major and minor elements. Major elements have the potential for major visual effect in relation to external views. Minor elements, although not insignificant in horizontal scale, have a less significant visual effect due to a lack of vertical scale and visual projection outside Mt Arthur Coal's EA boundary.

All of these components, both major and minor, already occur within the existing open cut coal mines in the locality including at Mt Arthur Coal, Drayton and Bengalla Mines.

Project components that have visual significance include the active mining areas, overburden dumps, as well as associated infrastructure including railways, powerlines, sedimentation dams and roadways.

Major mine development components include:

- Active mining areas;
- OEAs;
- Realignment of Edderton Road;
- Other Infrastructure Elements.
 - CHPP;
 - ROM stockpile and facility; and
 - Rail Loading Facility.

Of these, only the mine pits, OEAs and the realignment of Edderton Road have visual significance and are considered further in this report.

Minor mine development components include modifications to:

- Surface facilities (including administration buildings, workshops, vehicle parking);
- Internal haul roads and internal light vehicle road network;
- Conveyor systems;
- Storage and sediment dams; and
- Drainage system.

As stated above, all of these elements are in place currently at Mt Arthur Coal and to varying degrees create the visual effects of the mine as seen from external areas. Many of the components, e.g. the CHPP, ROM stockpile and rail loading facility are well screened and / or are visible from minor local roads only.

4.3 Active Mining Areas

4.3.1 Physical Character - General

The Project extends coal extraction to the north adjacent to Macleans Hill and further west impacting upon Edderton Road. Coal extraction continues in the Saddler's Pit area, in the southern half of the operation. The Belmont Pit mining area to the west of Edderton Road (as approved in the Bayswater No. 3 Development Consent) will be maintained and developed to allow access to the Glen Munro Seam, as described in the MAU Project Approval. Coal and overburden removal will continue to be undertaken by excavators and shovels, supported by associated truck fleets.

4.3.2 Visual Effect

The active mining face is a secondary visual component of the proposed Project, as the OEAs are visually dominant. This is due to the active mining face being below natural ground level and therefore only visible to viewpoints with higher elevations, that look onto the active mining face. Elevated areas such as Roxburgh Road look onto the active face of the OEA.

The visual effect of active mining areas is created by the colour of the raw earth and exposed rock contrasting with the surrounding landscape. The open mining face also creates strong form, shape and line characteristics that differ from the existing landscape.

Active mining areas create a high to moderate visual effect depending on the percentage of the PVZ occupied by these highly contrasting features.

4.4 Overburden Emplacement Areas

4.4.1 Physical Character - General

The OEA at Mt Arthur North will be increased to an average height of RL 360 m. Additional crests on the OEAs have been incorporated to a maximum height of RL 375 m in two locations as a result of design workshops with mine planners and visual impact specialists in order to improve visual amenity and result in a less engineered appearance of the final landform. An out-of-pit OEA is to be established in the south west of the operation, above the approved MAU development area.

These OEA's are the major visual components visible outside of the EA Boundary. McDonalds and Belmont Pits (within Bayswater No. 3 operational area) OEA's are complete and fully rehabilitated, all but eliminating their visual effect on western viewpoints. The Mt Arthur North eastern and inner OEAs are visible to northern and eastern viewpoints including Muswellbrook, the New England Highway and Denman Road.

4.4.2 Drayton Sub-lease / Bayswater No. 2

Overburden emplacement will continue within the Bayswater No. 2 and Drayton sub-lease area as part of the Project, where additional overburden material will be placed in locations to the north and south of an existing water storage area between 2018 and 2022. The OEA will be rehabilitated into grassland and forest / woodland cover.

4.4.3 Bayswater No. 3

The existing rehabilitated Bayswater No. 3 OEA will have additional overburden added to it between 2016 and 2022. This will increase its size and elevation over and above that of the existing OEA. The OEA will be rehabilitated into grassland with forest / woodland components.

4.4.4 Mt Arthur North

The eastern and inner OEAs will merge to become one large emplacement area to the north of the major haul road and there will be one minor emplacement area to the south. The northern face of Maclean's Hill will be preserved, with additional overburden being placed behind the first crest of the hill to an elevation of 365 m. The OEA will be rehabilitated into grassland and forest / woodland cover. Rehabilitation will be undertaken progressively, with minimal exposed slopes at any time. Experience gained through the initial construction of the visual bund will be built upon to minimise visual impact throughout the establishment of the higher emplacement area.

4.4.5 Visual Effect

The OEAs are the major visual component of the Project. Overburden removal and emplacement will create new earth forms that will contrast to existing mined landforms, whilst emulating them in part.

The OEAs have three major visual components. The first is the outer edge that is rehabilitated in 'lifts', the second is the active dumping face generally opposite the rehabilitated face, with the third area, the main body of the OEA, between the two.

The proposed out-of-pit OEA will create strong form in the landscape, and will initially also have a strong colour contrast with the surrounding landscape. This contrast and high visual effect level will be reduced to moderate / low when initial rehabilitation is completed, and this will further decrease when tree cover becomes established.

Existing operations and mine planning have taken the visual elements of the Project into account, and highly visual areas will be progressively rehabilitated where possible in order to minimise impact.

This is achieved through the construction of external bunds or 'lifts', generally in the order of 5-10 m as a first off operation. The outer face of this 'lift' is then rehabilitated and further dumping is carried out behind and screened from external view. In this way the visual effect on external view locations is limited.

4.5 Edderton Road

The northern section of Edderton Road is proposed to be realigned, to one of two alternative alignments being assessed as part of the Project. The road realignment will involve cut and fill operations to create the roadway at appropriate horizontal and vertical alignment. Road batters will be re-vegetated once established. Normal road finish and signage will be carried out to RTA standards.

The realigned roadway will create a new line in the landscape. However, this will be similar to that which it will replace. Another consideration is the loss of privacy and night lighting effects. These effects will be considered in terms of the route selection and through landscape treatment of the roadway.

The visual effect of the Edderton Road realignment is considered to be moderate and will become low following landscape treatment.

4.6 Infrastructure

The Project includes CHPP upgrades within the existing CHPP disturbance footprint, and the construction of a second rail load out facility and associated conveyor system on the existing rail loop.

These elements will borrow visual character from the existing facilities and will be located in close proximity to them. Current locations of these elements are not visually prominent to sensitive viewing locations.

The visual effect of these elements is highly localized and as it borrows scale and character from existing elements in the locality, visual effect levels will be low.

5. VISUAL EFFECTS

5.1 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 determination of the character of the visual effect also gives direction to the mitigation strategies (see section 8 of this report) to decrease visual effect levels and hence impact levels of the Project.

An important part of a consideration of visual effects is the ongoing rehabilitation strategies of the OEAs. The implementation of 10 m 'lifts' on the outer face of OEAs enables speedy rehabilitation of sensitive and visually exposed areas to enable the greater volume of overburden emplacement to occur out of sight of sensitive receptors.

The visual effect of the Project will vary as seen from various locations around Mt Arthur Coal. To illustrate these effects on view locations around the EA Boundary, views were considered from the northern, eastern, southern and western sectors around Mt Arthur Coal. The visual effects were considered from a number of potential viewing locations and have also been assessed through photomontage development, as described below. These viewpoints are representative of the worst case scenario views that will be obtained of the Project from the various sectors.

5.2 Northern Sector (Roxburgh Road)

Roxburgh Road is one of the few locations that views Mt Arthur Coal's operations from an elevated location (see Figure 5.1a). More significantly, the view is into the active mining area and the active face of the OEA. From this location, Bengalla Mine operations are also clearly visible.

The Project increases the elevation and overall bulk of the OEA as seen from this location. More significant is the colour contrast between the active face of the OEA and the surrounding landscape. This active face cannot be restored until the end of the mine life and will continue to create strong contrast to the existing landscape as well as the skyline, as seen from this location.

The visual effects of the Project are illustrated on Figures 5.1b, 5.1c and 5.1d for Years 2011, 2016 and 2022 respectively.

Figure 5.1e illustrates the comparison between the Project and the existing mine plan from the Mt Arthur North EIS Year 15 as seen from this location. It can be seen from Roxburgh Road that there is an increase in elevation of the OEA in the northern part of the active pit, with elevations in the southern part being much as per the approved mine plan for MAN. It can be seen that the outline of the approved operation is illustrated in part by a squiggly line. This line represents the approved western edge of the mining pit as seen from this northern location, in the Mt Arthur North EIS.

The visual effect of Mt Arthur Coal is currently high at this location and will remain high as a result of the Project and throughout the life of the Project.

5.3 Northern Sector (Racecourse Road)

The view from this location is onto the northern and eastern faces of the OEA (see Figure 5.2a) which is approximately 4 km wide.

The existing view illustrates that the OEA to the east of Macleans Hill is at the same elevation as the hill itself (Figure 5.2a). The visual effect of the OEA is very much reduced by its status of being rehabilitated to grassland. Views to part of Mount Arthur are still available.

Under the Project, the OEA increases in elevation and by 2011, views to Mount Arthur are lost, as illustrated in Figure 5.2b. The development of the OEA between 2011 and 2016 will result in active mining areas being almost completely screened from this location, as illustrated on Figure 5.2c. Figure 5.2d illustrates the same view in the year 2022 and shows that there is little difference from 2016, except for increased tree growth in that period.

The OEA, before rehabilitation, will create strong colour contrast and a high visual effect. However, this contrast is minimised with grass and tree plantings. This effect can be managed by minimising exposure to working areas behind rehabilitated landform areas to create moderate visual effects. The scale, shape and form of the OEA as it joins Macleans Hill emulate existing hillsides and reduce the visual effect levels to low.

The long view to Mount Arthur from this location is lost as a result of the Project; however such loss often results from everyday occurrences where there is a change to immediate foreground conditions such as a neighbour's garden planting or the erection of a new building on an adjoining property.

Figure 5.2e illustrates the comparison between the Project and the existing mine plan from the Mt Arthur North EIS Year 15 as seen from Racecourse Road. There is an increase in the elevation and bulk of the OEA as proposed when compared to that in the Mt Arthur North EIS approved mine plan.

The new OEA and its interaction with Macleans Hill will create a new background element as seen from Racecourse Road. Once the OEA is completely rehabilitated and showing signs of tree maturity across the slopes, it will be an attractive backdrop to the racecourse, creating stronger visual enclosure in the southern sector of the Racecourse Road locality.

The visual effect of Mt Arthur Coal is currently low at this location due to the progressive rehabilitation of the outer edge of the OEA. The visual effect of the Project at this location will be moderate to high until rehabilitation and tree plantings are achieved. The high level of visual effect will be reduced if progressive rehabilitation of the outer face of the OEA facing Racecourse Road can be progressively rehabilitated in a similar manner to the eastern face of this OEA.

This will be achieved by minimising exposure to active mining areas behind progressively rehabilitated 'lifts' to create moderate visual effects.

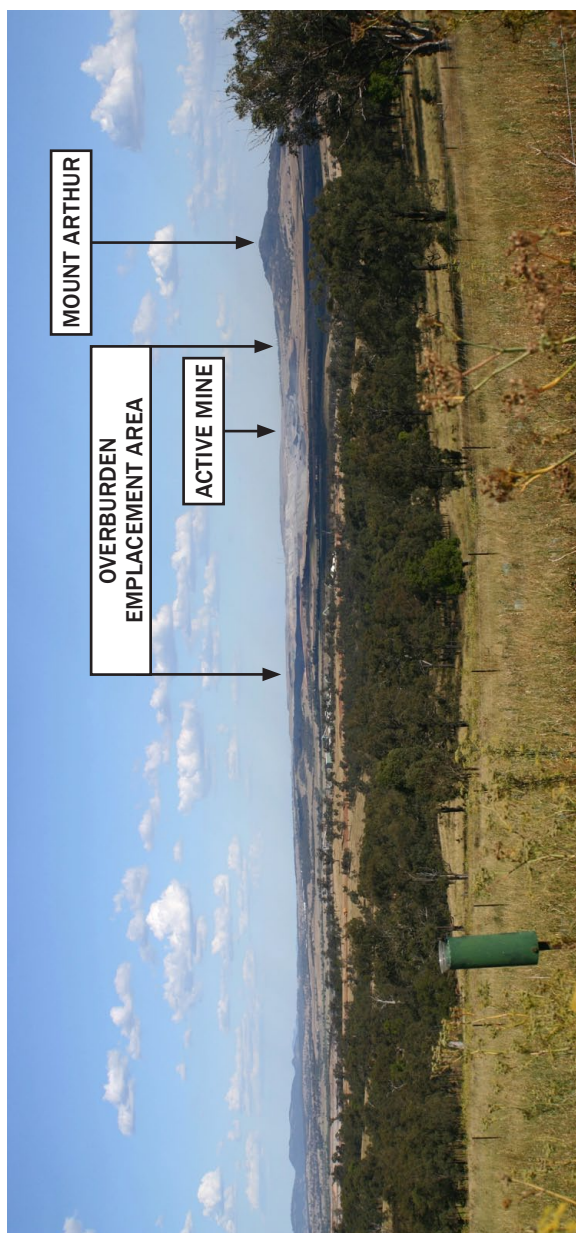


Figure 5.1a | Image of existing view from Roxburgh Road

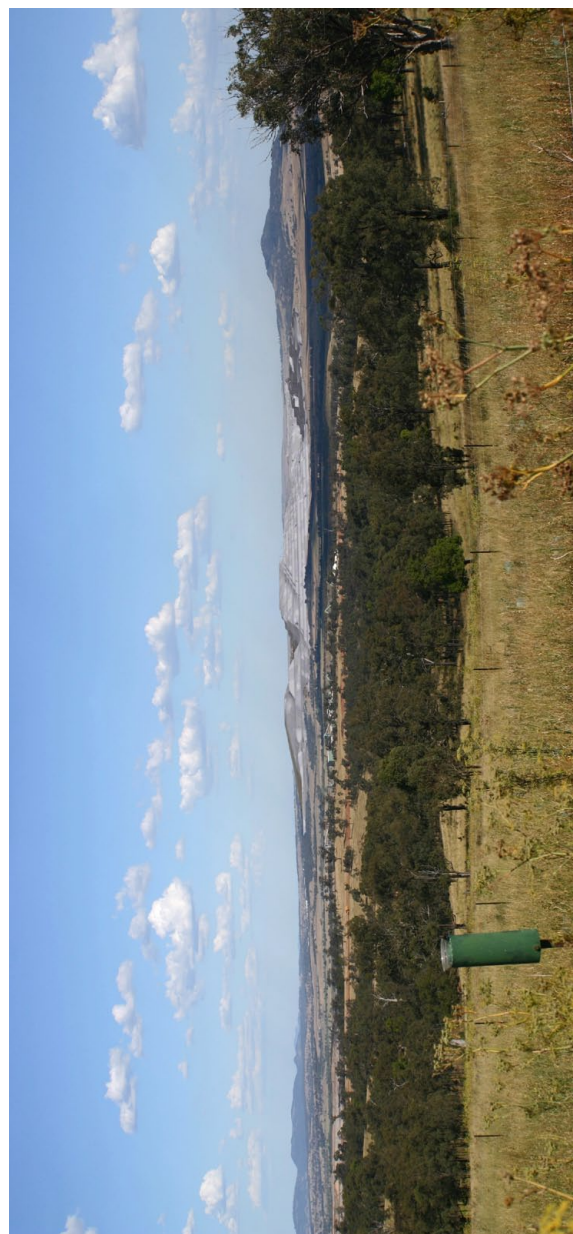


Figure 5.1b | Photomontage image of view from Roxburgh Road at year 2011

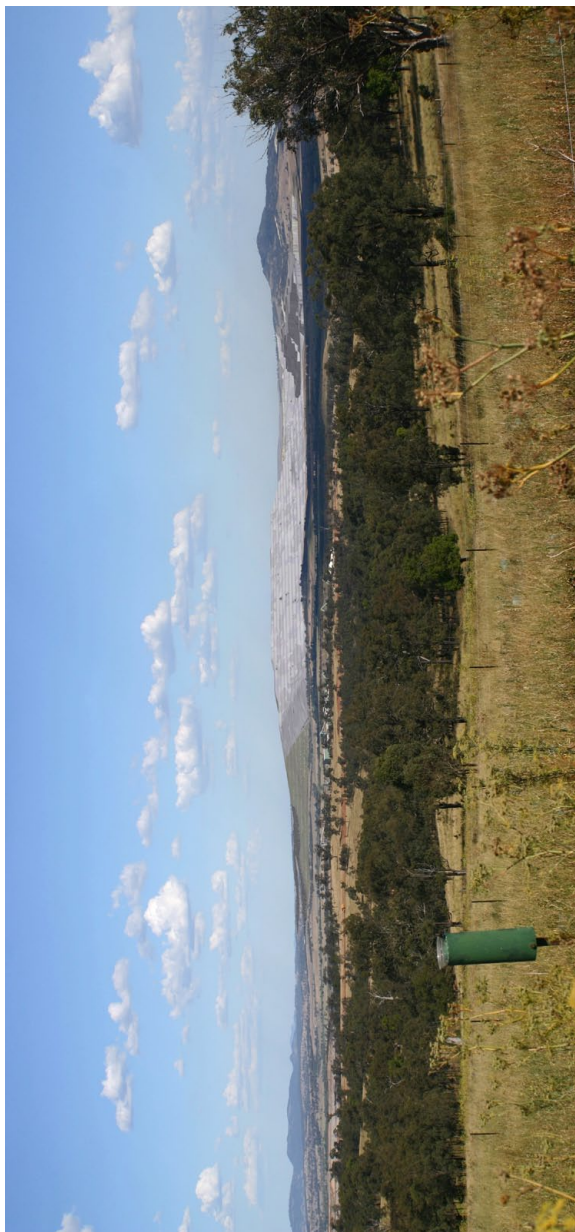


Figure 5.1c | Photomontage image of view from Roxburgh Road at year 2016

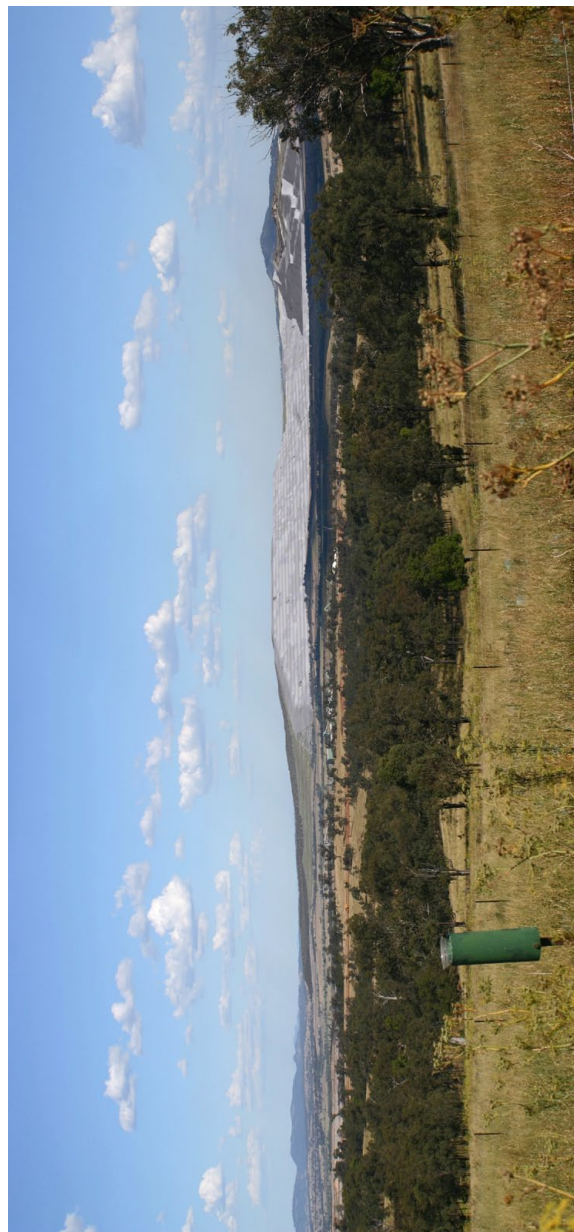


Figure 5.1d | Photomontage image of view from Roxburgh Road at year 2022

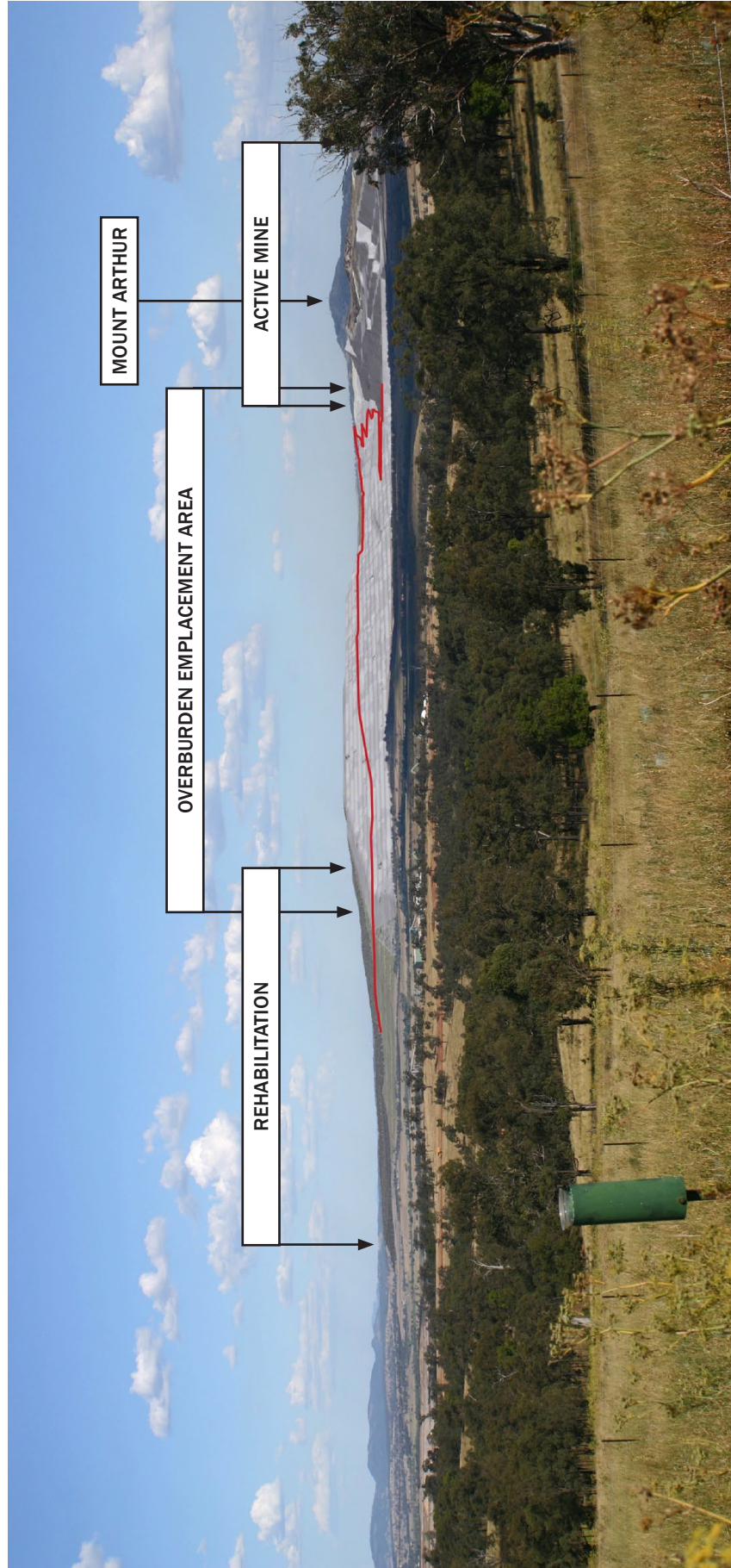


Figure 5.1e | Photomontage image of comparison between Project and Approved Plans
The final landforms for the OEA for the Project have been created and can be compared with the OEA currently approved
Red line shows approved mine plan



Figure 5.2a | Image of existing view from Racecourse Road

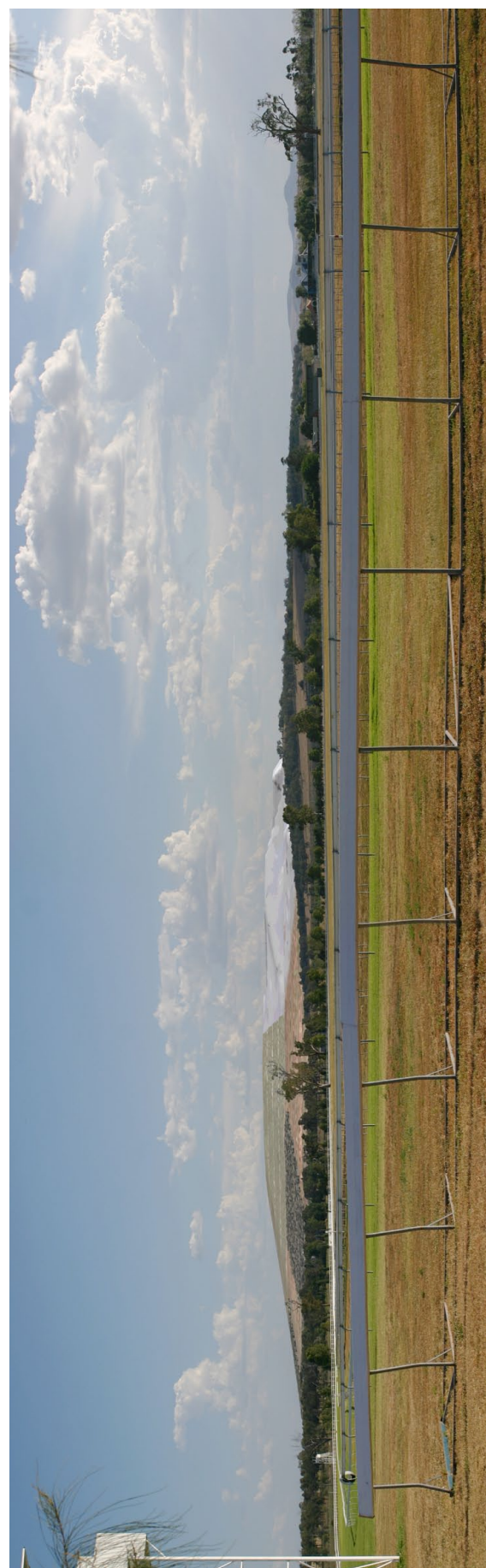


Figure 5.2b | Photomontage image of view from Racecourse Road at year 2011



Figure 5.2c | Photomontage image of view from Racecourse Road at year 2016

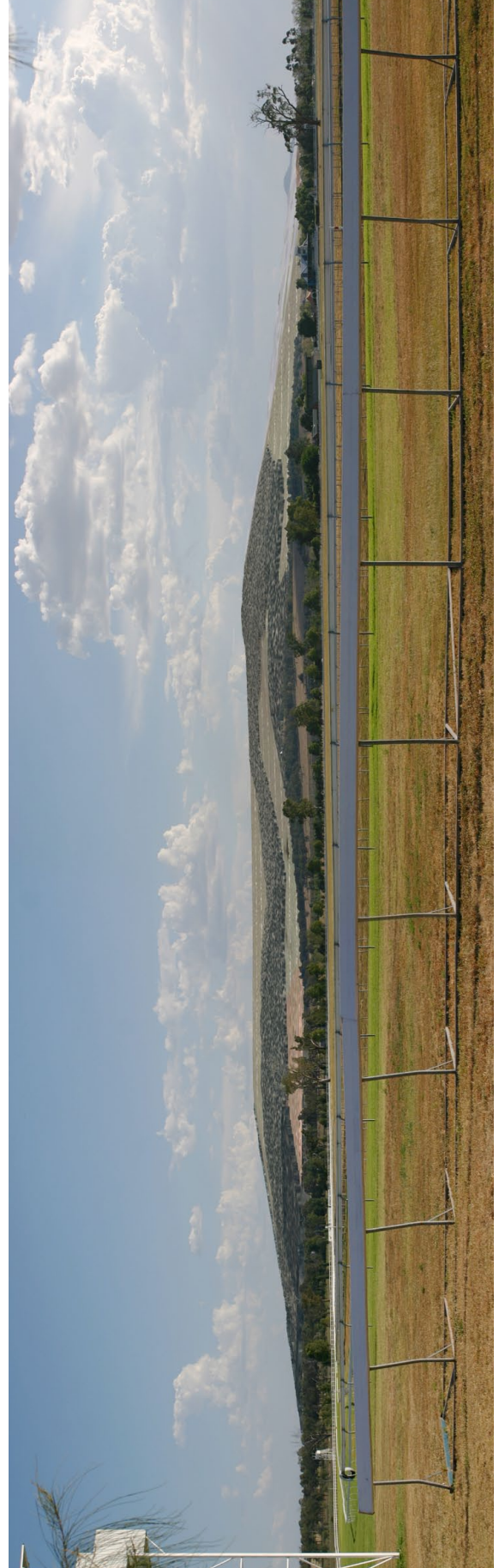


Figure 5.2d | Photomontage image of view from Racecourse Road at year 2022



Figure 5.2e | Photomontage image at Racecourse Road comparing Project to approved mine plan
Red line shows approved mine plan

5.4 Northern Sector (South Muswellbrook)

Views from this location are on to the eastern edge of Mt Arthur Coal. Specifically, as can be seen in Figure 5.3a, the view is onto Mount Arthur to the south (left of picture) and to Macleans Hill directly over the Energy Australia substation to the north (right of picture). In between these two locations is the rehabilitated OEA / visual bund already established as part of Mt Arthur North.

The rehabilitated OEA / visual bund illustrates the high level of contrast reduction and visual integration that can successfully be achieved at Mt Arthur Coal, even without more articulation of landform and vegetation patterns that is introduced by tree planting. Views to distant mountains are available as part of the existing visual setting, see Figure 5.3a, however there are only small glimpses to the tops of distant mountains from this location, with views to Mount Arthur preserved.

Figure 5.3b illustrates the progressive increase in the development of the OEA, with active mining areas in the northern section of the OEA in 2011. By 2016 the eastern edge of the OEA is complete as shown in Figure 5.3c, with only additional planting occurring on the OEA by the year 2022 (see Figure 5.4d). The view to Mount Arthur is maintained, with views to the tops of distant hills now screened by OEA development as part of the Project (see figures 5.3b, c & d).

Figure 5.3e illustrates the comparison between the Project and the existing mine plan from the Mt Arthur North EIS Year 15 as seen from South Muswellbrook. There is an increase in the elevation and bulk of the OEA as proposed when compared to that in the Mt Arthur North EIS approved mine plan. The larger and shaped OEA does, however, create a visual feature that when successfully rehabilitated will be a positive element in the landscape.

The visual effect at this location is currently low due to total screening of active mining areas behind the rehabilitated outer face of the OEA. The visual effect created by the Project will be high if exposed work areas are more than 2.5% of the PVZ as seen from any viewpoint. This will generally be avoided by the progressive construction and rehabilitation of the external face of the OEA by way of 5–10 m ‘lifts’. These external rehabilitated faces will screen operations in the OEA, progressively until the ultimate elevation is reached in 2016.

The visual effect of the OEA will be further reduced to low when rehabilitation is complete in 2016. Up until then there will be progressive rehabilitation, as well as rehabilitated grassed areas also being planted with large belts of trees.

This will minimise exposure to active mining areas behind progressively rehabilitated ‘lifts’ to create moderate visual effects.

The loss of view to the tops of distant mountains does occur but this loss is not considered significant in proportion to the total view, over and above that which occurs as a result of the approved mine plan.

5.5 Northern Sector (Ironbark Ridge Estate)

The view from this location is similar in aspect to the view from South Muswellbrook. However, the view is more elevated than South Muswellbrook and gives some views to Mount Ogilvie and some more distant hills west of Denman over the top of Macleans Hill. Existing mining operations at Mt Arthur Coal are visible in the South Pit adjacent to Mount Arthur as well as to the north of the OEA, see Figure 5.4a.

By 2011, major sections of the northern part of the OEA are complete, with exposed works in the southern section still in progress, Figure 5.4b. By 2016, all work on the eastern faces of the OEA will be complete, with significant planting in place as shown in Figure 5.4c. By 2022, all planting is complete, with only the slopes adjacent to the major haul road remaining untreated (see Figure 5.4d).

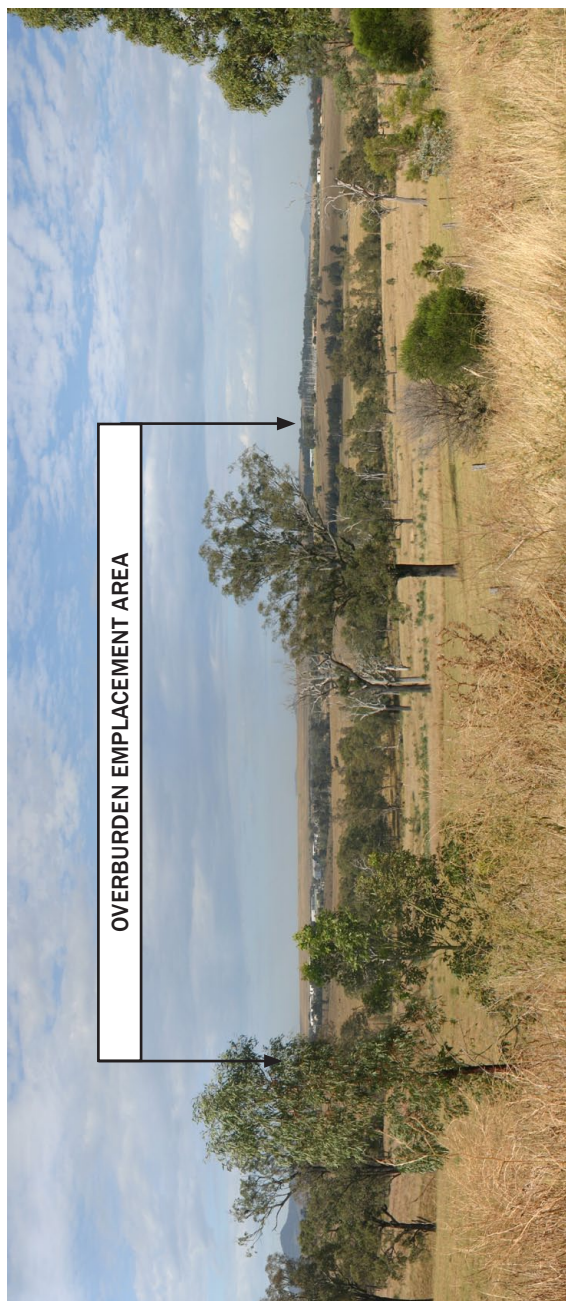


Figure 5.3a | Image of existing view from South Muswellbrook

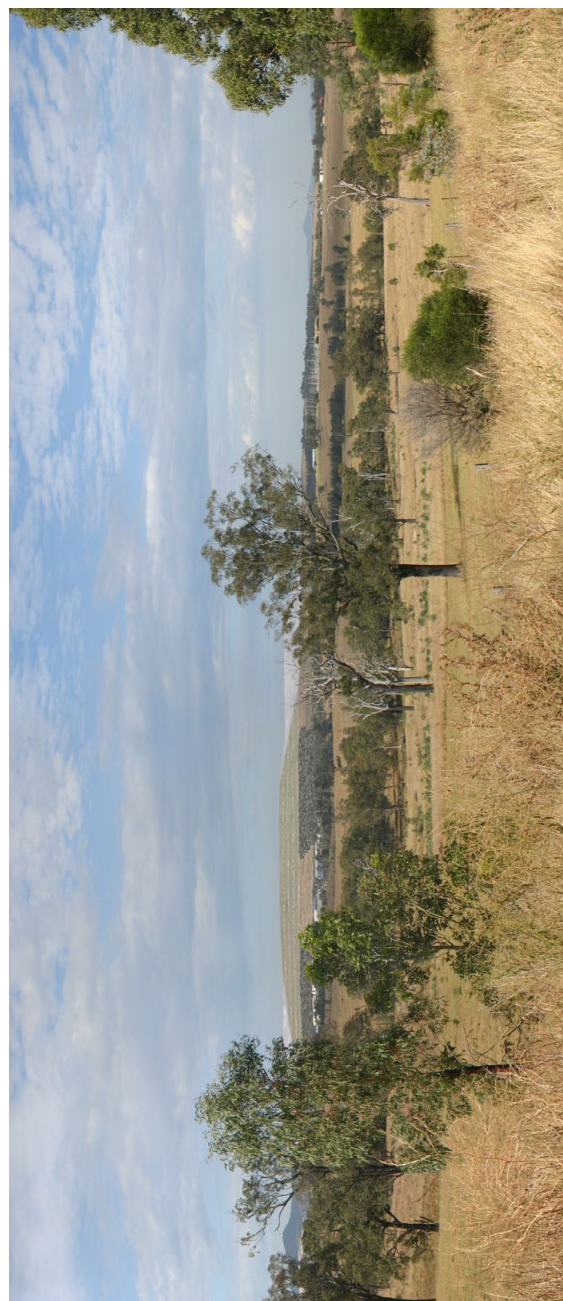


Figure 5.3b | Photomontage image of view from South Muswellbrook at year 2011

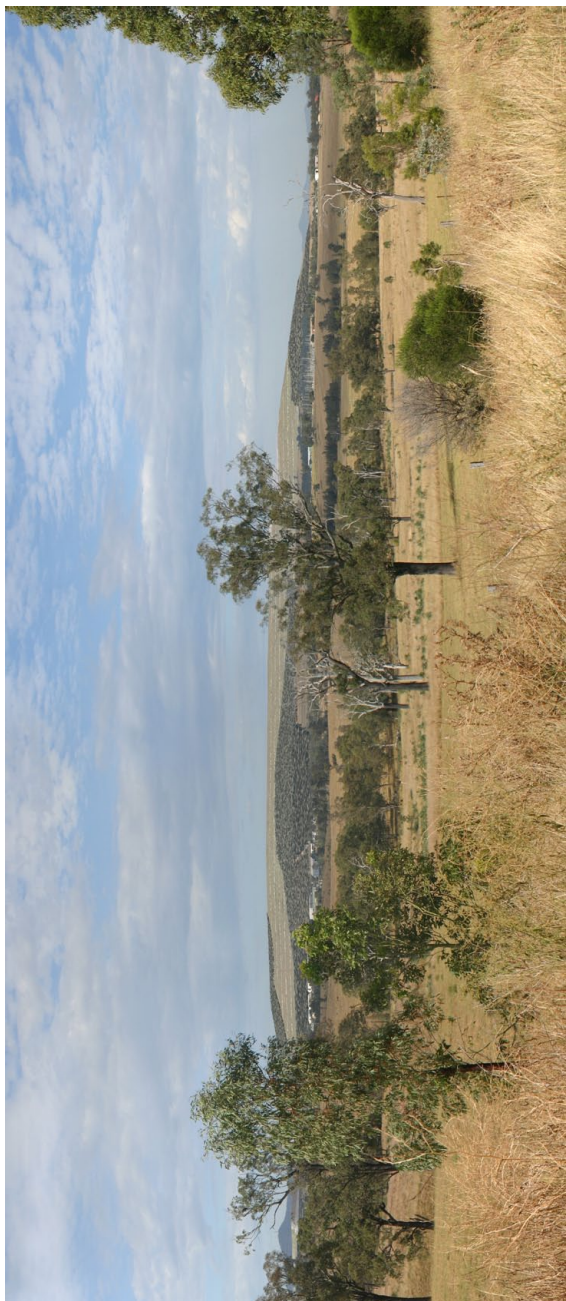


Figure 5.3c | Photomontage image of view from South Muswellbrook at year 2016

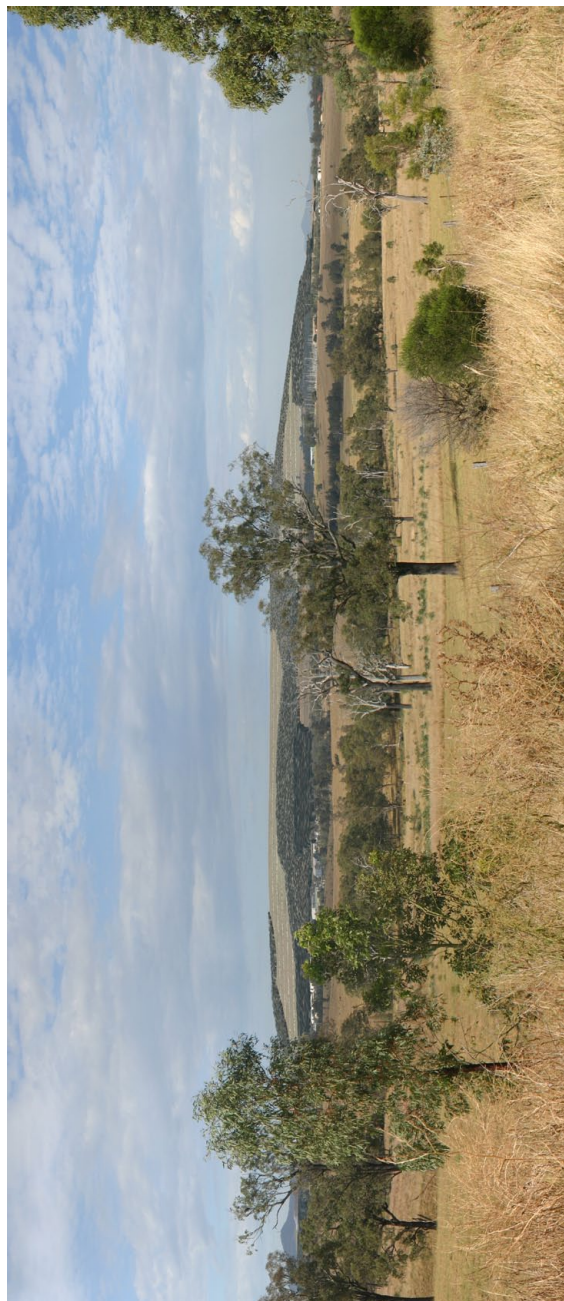


Figure 5.3d | Photomontage image of view from South Muswellbrook at year 2022

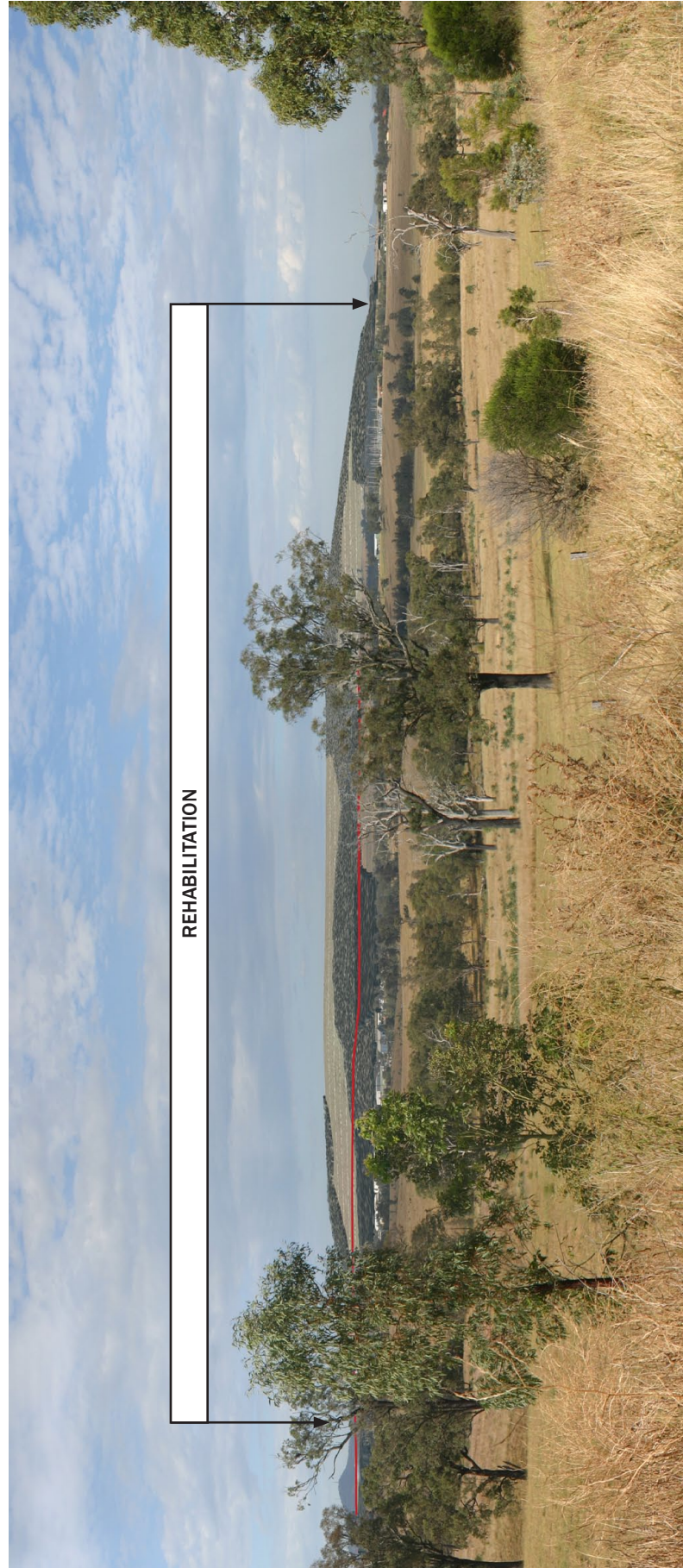


Figure 5.3e | Photomontage image at South Muswellbrook comparing Project to approved mine plan
Red line shows approved mine plan

Figure 5.4e illustrates the comparison between the Project and the existing mine plan as seen from this location. The finished OEA and plantings emulate existing landscape patterns. The longer distant views to Mount Ogilvie are lost behind the OEA for the Project. However, views to Mount Arthur are maintained at generally the same levels as per the existing approvals.

When compared to the OEA of the existing MAN approval that was approximately the same elevation as Macleans Hill, it can be seen that there is an increase in the scale in the OEA for the Project. Although larger in scale, the increased design of OEA form and planting patterns for the Project has created a substantial shaped hill that replaces the previously flat topped OEA. As with the South Muswellbrook assessment location, the proposed OEA for the Project, when rehabilitated, will create an attractive landform and vegetation pattern that emulates the surrounding landscapes.

The visual effect of Mt Arthur Coal from this location is currently moderate to low. The visual effect of the Project will initially be high if significant areas of un-rehabilitated or active mining areas are visible until 2016. This effect will be managed by minimising exposure to active mining areas behind progressively rehabilitated 'lifts' to create moderate visual effects. The long term visual effect is reduced to low when rehabilitation is completed from 2016.

5.6 Southern Sector (Golden Highway / Saddlers Creek)

The main visual effects from this location are on to the out-of-pit OEA to the west of Mount Arthur and in the location of the currently rehabilitated OEA associated with the Bayswater No. 3 Mine (see Figure 5.5a). This location becomes the main area for placement of overburden from approximately 2015 until rehabilitation is completed in 2022. Again, progressive rehabilitation of the outer edges of 'lifts' will lessen the visual effects of the OEA.

No visual effect occurs at this location in 2011 as overburden emplacement at the out of pit OEA has not commenced (see Figure 5.5b). Overburden emplacement in this location begins in approximately 2015 with a small exposed overburden emplacement face being evident at this viewing point by 2016, as shown in Figure 5.5c. By 2022, the OEA in this location will be complete with rehabilitation and tree plantings also implemented (Figure 5.5d).

The current mine plan is illustrated in Figure 5.5a. In this photograph the completed and rehabilitated OEA is seen at the foot of Mount Arthur. It should be noted that the rehabilitated OEA is well integrated with the surrounding landscape and has very little contrast to it, not easily being recognised as being an OEA at all. This creates a low visual effect and is indicative of the standard of visual impact reduction that is possible and will be achieved in OEA rehabilitation for the Project.

The OEA does however eliminate views to the lower parts of Mount Arthur, along the Saddlers Creek riparian corridor from this viewing location. This view is seen from the Golden Highway at a low elevation. Views to Mount Arthur can be gained with less interference at more elevated hillside locations along the road.

The visual effect of Mt Arthur Coal at this location is currently low. The visual effect of the Project at this location is moderate to high until rehabilitation is completed between 2016 and 2022, when the contrast is reduced and the resultant visual effect is low.

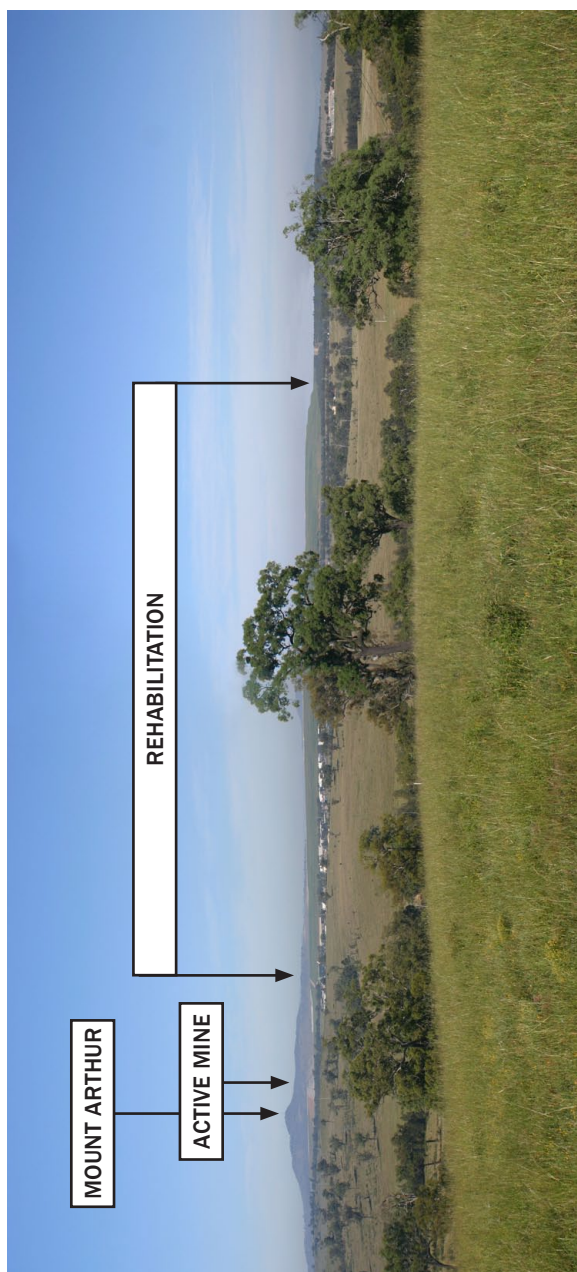


Figure 5.4a | Image of existing view from Iron Bark Ridge Estate

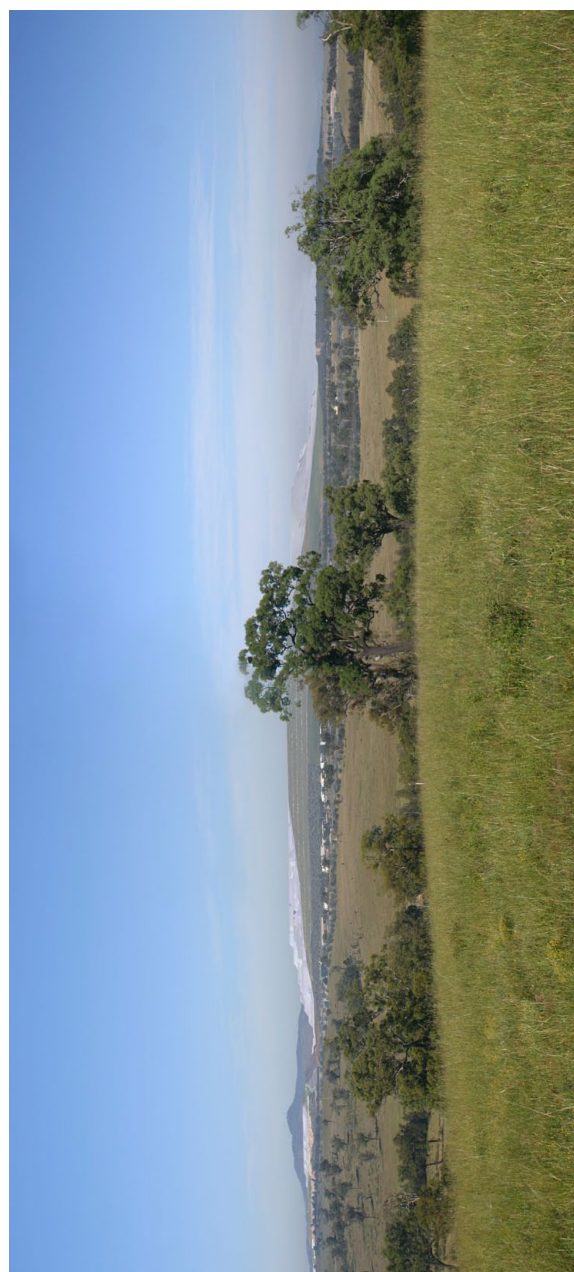


Figure 5.4b | Photomontage image of view from Iron Bark Ridge Estate at year 2011

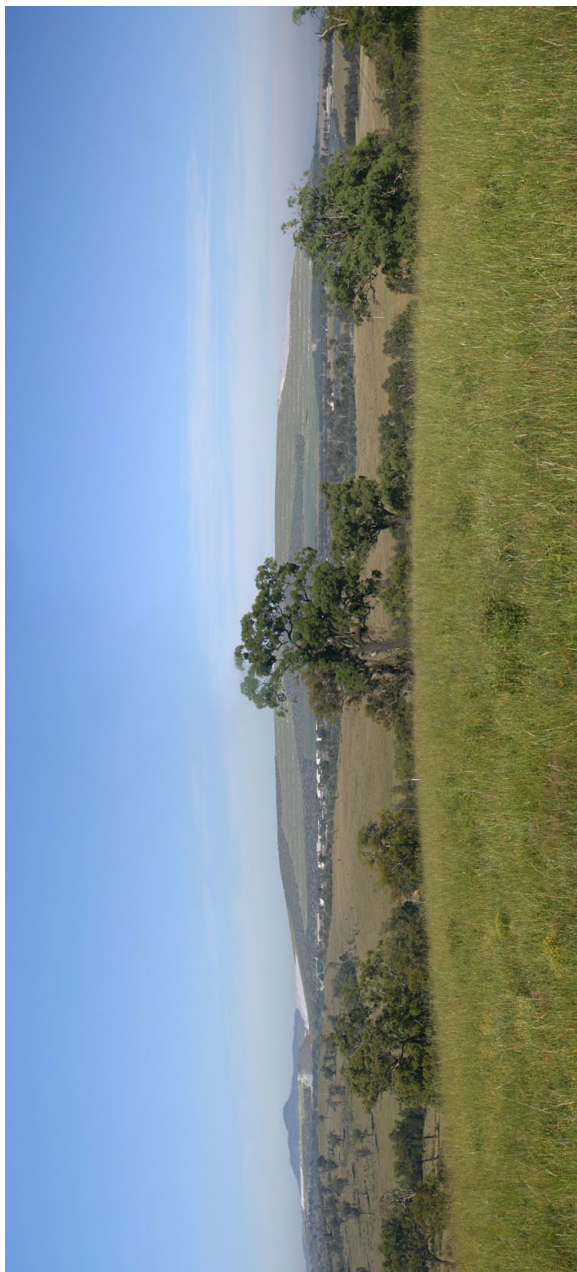


Figure 5.4c | Photomontage image of view from Iron Bark Ridge Estate at year 2016

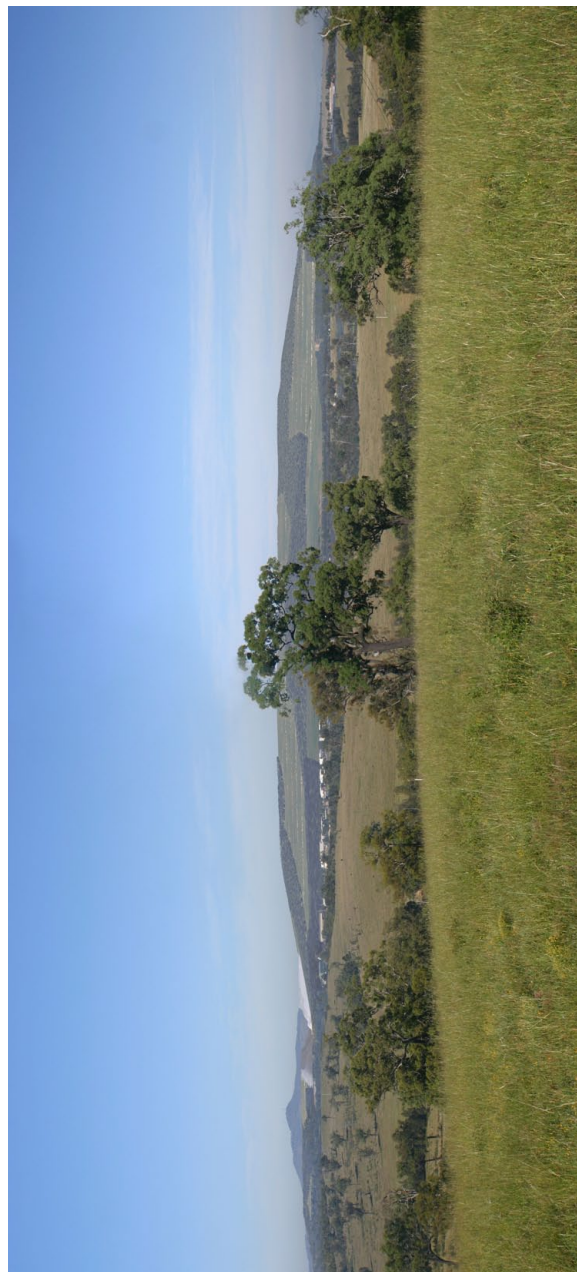


Figure 5.4d | Photomontage image of view from Iron Bark Ridge Estate at year 2022



Figure 5.4e | Photomontage image at Ironbark Ridge Estate comparing Project to approved mine plan
Red line shows approved mine plan

5.7 Western Sector (Roxburgh Vineyard)

The view from this location is towards the current active mining operation as seen in Figure 5.6a. Under the approved mine plan, this exposure will increase with greater views to the active face of the OEA up to the year 2022. The Project will increase the extent of overburden emplacement in this location, and this is evident in 2011 and 2016, see Figures 5.6b & c. In year 2022, the OEA remains in an un-rehabilitated state (see Figure 5.6d).

Figure 5.6e illustrates the comparison between the Project and the existing approved mine plan as seen from this location. There is an increase in the area of active mining face of the northern pit that is in view from Roxburgh Vineyard. Previous 'slivers' of view that were available over the foreground ridge line are replaced by an element that becomes a significant hill feature that, in an un-rehabilitated state, contrasts strongly with the surrounding landscape.

Mt Arthur Coal currently has a high visual effect from this location. The Project will continue to have a high visual effect as seen from this location. However, the visual effects are similar to those of the approved operation but larger in scale.

The visual effect of the Project at this location is not reduced during the life of the Project, remaining high. Off site treatment at the points of viewing will be required at this location to reduce these effects.

5.8 Western Sector (Denman Road)

The visual effect of the mining operations at this location are similar to that experienced at Roxburgh Vineyard in that views are towards the active face of the OEA. Current views from Denman Road are onto the existing active mining face of Mt Arthur Coal, as shown on Figure 5.7a.

The view onto the active face from this location increases during the subsequent years of the Project (2011, 2016 and 2022), as illustrated on Figures 5.7b, c & d. However, views from this location are limited to the northern end of the OEA.

Figure 5.7e, illustrates the comparison between the Project and the existing approved mine plan as seen from this location. There is an increase in the scale and elevation of the active face of the OEA for the Project as seen from Denman Road. There is some loss of view to the distant mountain ranges that form the eastern edge of the Hunter River Catchment in this part of the Hunter Valley.

Mt Arthur Coal currently has a high visual effect from this location. High contrasts in colour and landform have low visual integration with the existing landscape setting. A high visual effect due to the Project will continue at this location, remaining high throughout the life of the Project. The visual effects, however, are similar to those of the approved operation but larger in scale. Mitigation measures implemented at the point of viewing will be required to reduce visual effect.

5.9 Western Sector (Denman Township)

The operations at Mt Arthur Coal are currently not visible from Denman, as illustrated on Figure 5.8a. Denman is located approximately 15 km to the south west of Mt Arthur Coal. As part of the existing approved mine plan, part of the northern OEA would have become visible over a distant spur adjacent to Mt Arthur Coal, however the viewing distance minimises the visual effect.

The Project increases the size of the OEA and therefore increases its visibility as seen from Denman. However, this increase does not occur at year 2011, as shown on Figures 5.8b. By year 2016, the OEA comes into view and increases in size by year 2022 (see Figures 5.8c & d).



Figure 5.5a | Image of existing view from the Golden Highway / Saddlers Creek

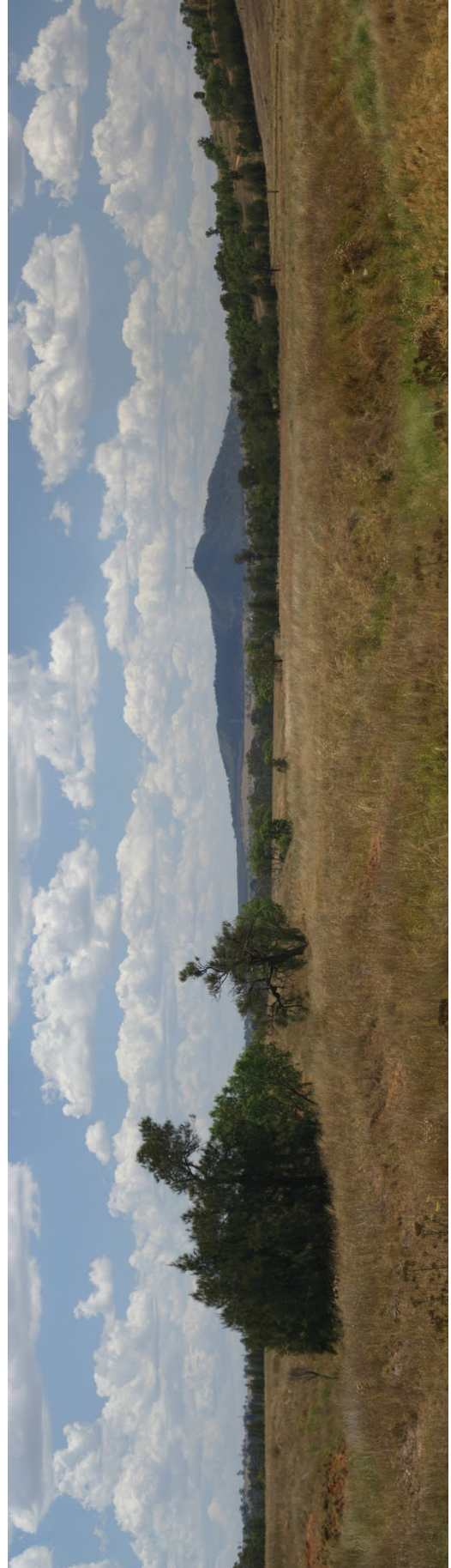


Figure 5.5b | Photomontage image of view from the Golden Highway / Saddlers Creek at year 2011

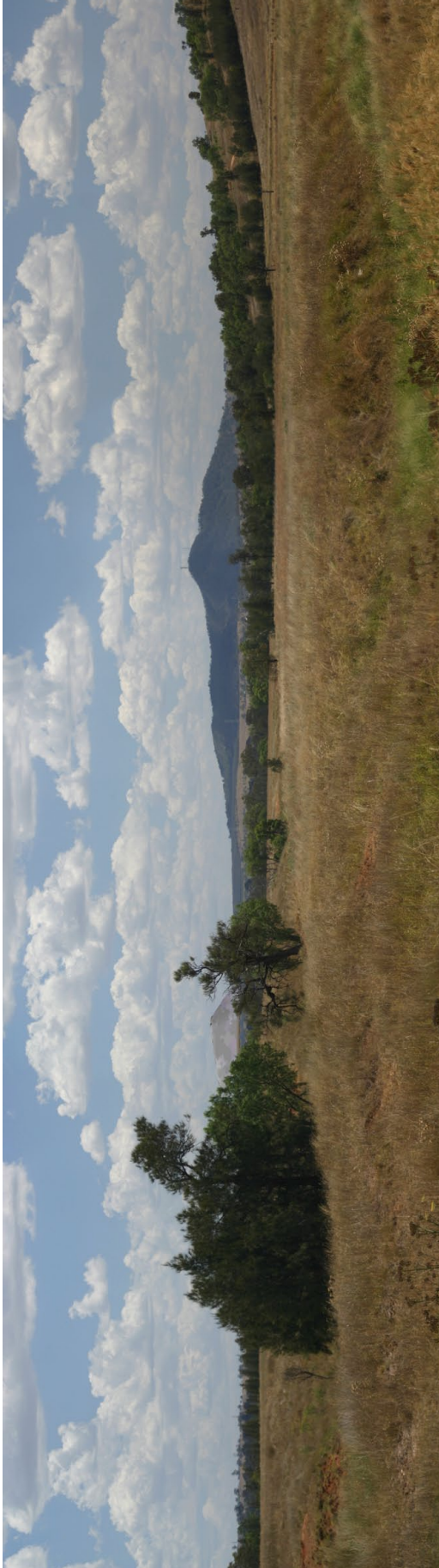


Figure 5.5c | Photomontage image of view from the Golden Highway / Saddlers Creek at year 2016

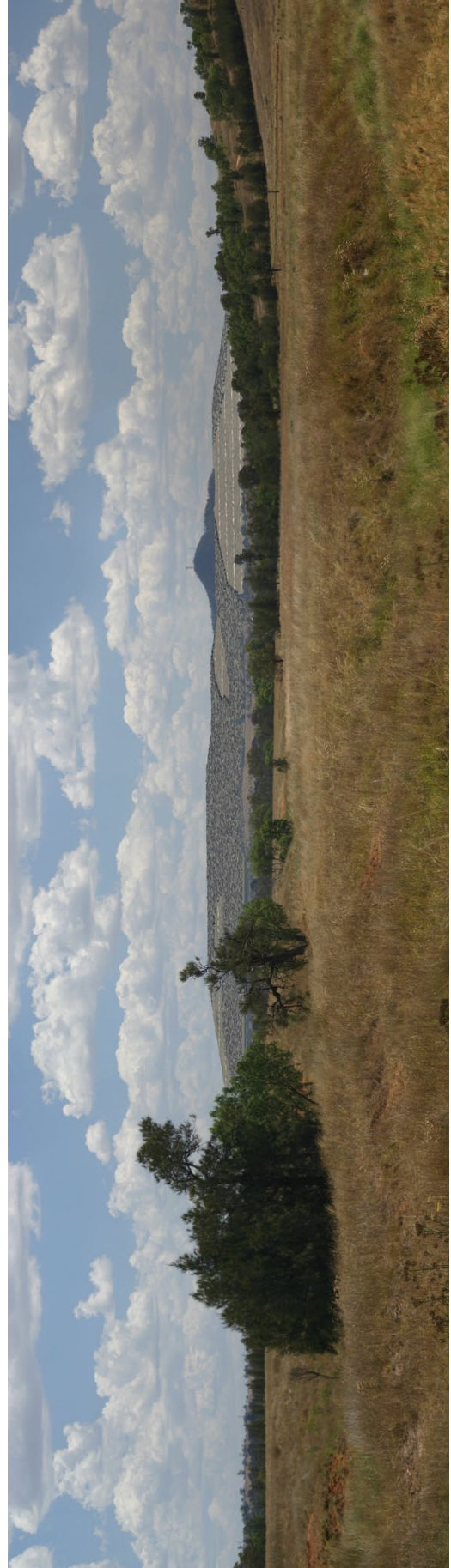


Figure 5.5d | Photomontage image of view from the Golden Highway / Saddlers Creek at year 2022

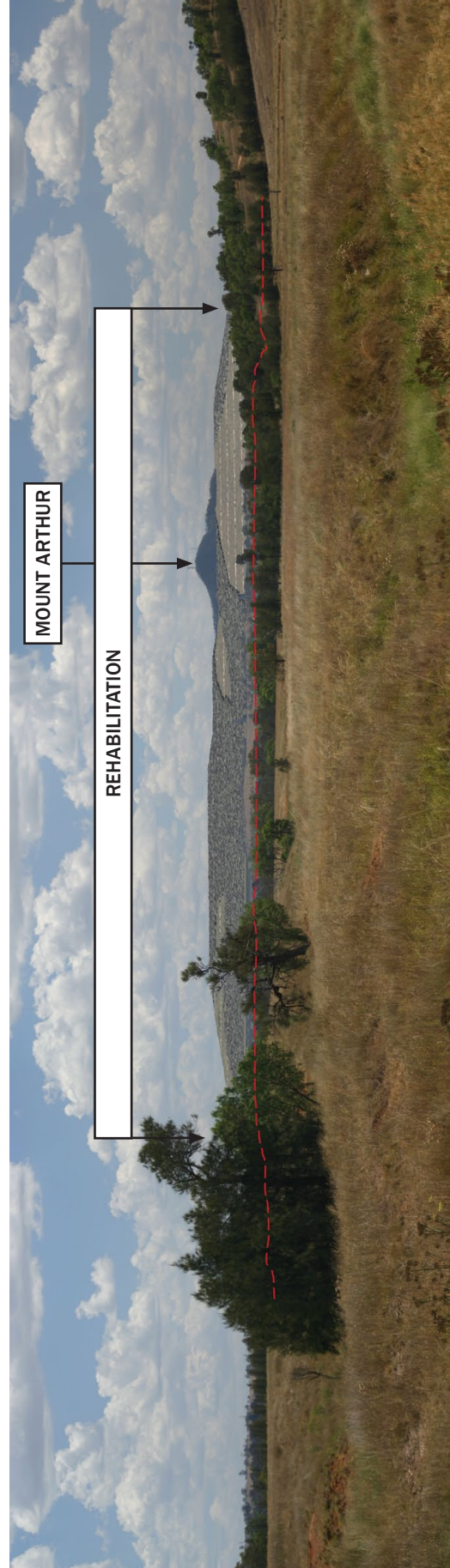


Figure 5.5e | Photomontage image of view from the Golden Highway / Saddlers Creek comparing Project to approved mine plan
Red line shows approved mine plan

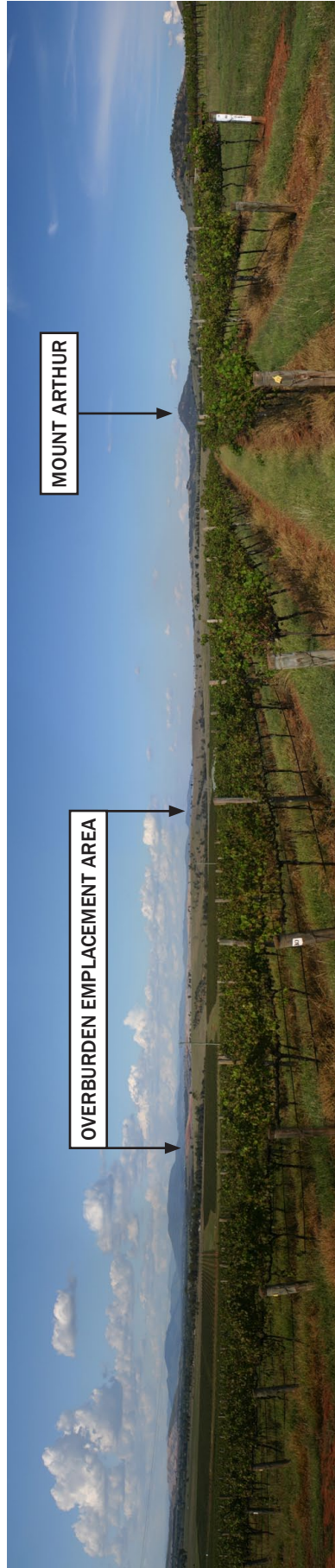


Figure 5.6a | Image of existing view from Roxburgh Vineyard

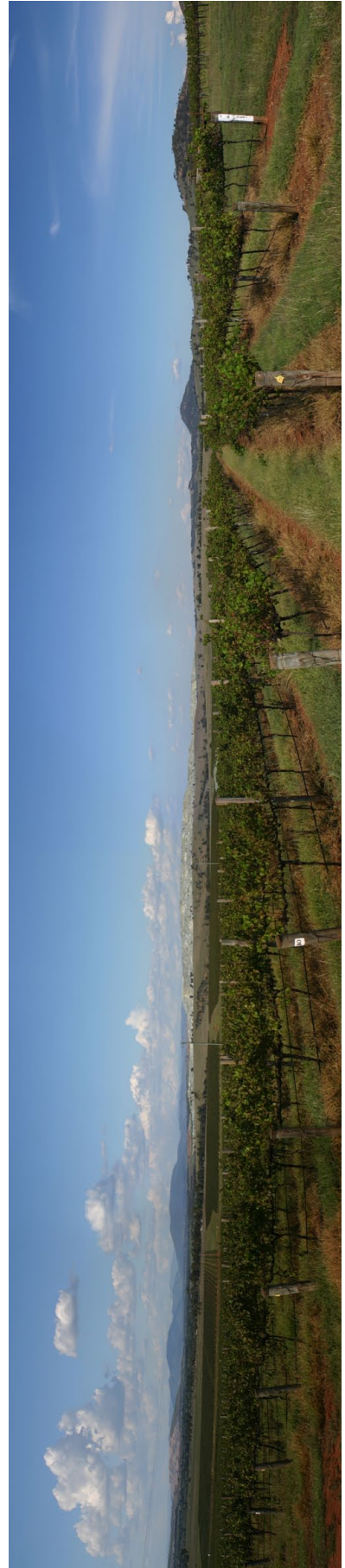


Figure 5.6b | Photomontage image of view from Roxburgh Vineyard at year 2011

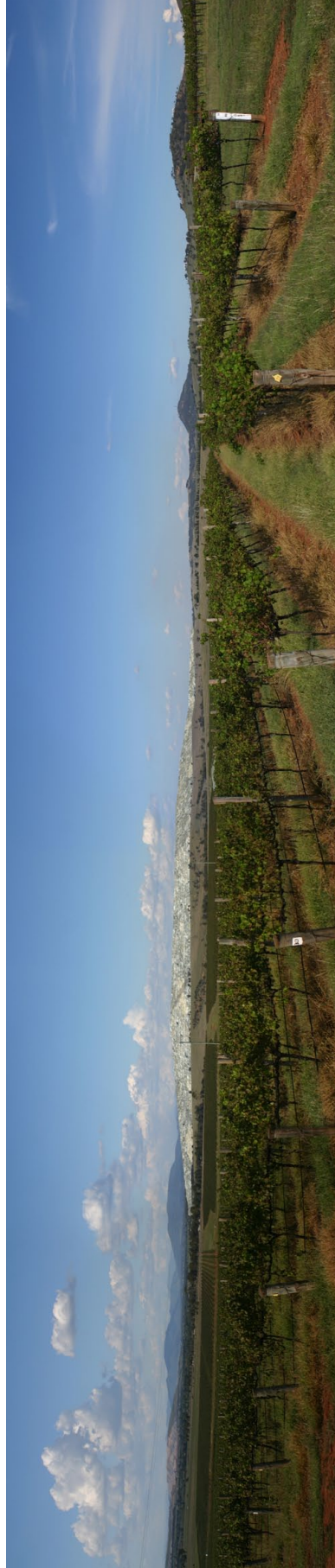


Figure 5.6c | Photomontage image of view from Roxburgh Vineyard at year 2016

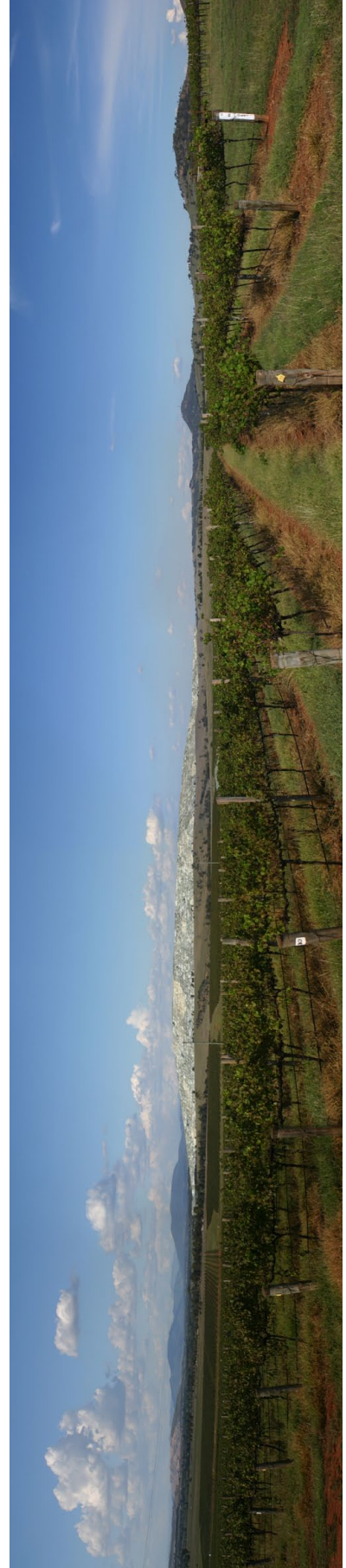


Figure 5.6d | Photomontage image of view from Roxburgh Vineyard at year 2022



Figure 5.6e | Photomontage image at Roxburgh Vineyard comparing Project to approved mine plan
Red line shows approved mine plan

Although the active face of the OEA is visible, views are also available to Bengalla Mine. At this distance, over 15 km, the pale colours of the exposed overburden have a weaker contrast to the existing landscape than those viewed from closer locations.

High contrast in colour and landform that would have low visual integration with the existing landscape setting is markedly reduced by distance. In the same way, colour contrast is reduced by distance. Further, at this distance the amount of landscape and view affected by the OEA is very small.

The original mine plan as approved is not visible from Denman so a comparison to it was not possible from this location.

Mt Arthur Coal currently has a low visual effect from this location. The visual effect of the Project at this location will remain low, primarily reduced by the significant viewing distance of over 15 km.

5.10 Visual Effect Summary

A review of the Project mine plans, photography and the photomontages illustrate that the visual effects of the Project are for the greater part created by OEAs. This visual effect is created by the new landform that is introduced and the associated shapes, lines and colour.

However it must be noted that the visual characteristics of the Project, especially that represented by the OEA are visual elements that are already seen in the landscape as part of the approved Mt Arthur Coal operations and other existing approved mine plans in the locality, especially those of Bengalla Mine.

The visual effect of the OEA is dependent on of the condition it is in. There are four key conditions, as shown on Figure 5.9 and Figure 5.10, including:

- Condition 1 - raw overburden that has strong colour and form contrast to the existing landscape, creating a high visual effect;
- Condition 2 - once the overburden is shaped to create the final landform, this, to varying degrees, removes form contrast reducing visual effect towards moderate;
- Condition 3 - grass planting stabilises the landform and restores colour values therefore reducing contrast with the landscape that is dominated by grassland. This reduces visual effect to moderate / low; and
- Condition 4 - reintroduces tree cover that re-establishes the patterns of the landscape and assists in reducing the regular form of OEA in the landscape. This reduces visual effect to low.

In terms of the above, it can be seen that the visual effect on the northern, eastern and southern sectors (as described above in Sections 5.2 - 5.8) is reduced to low relatively quickly with progressive rehabilitation of outer slopes. However, western locations and elevated locations such as Roxburgh Road, at least up to 6 km away, will retain a high visual effect created by the colour and form contrast of the active face of the OEA. Any reduction of the resultant impact of this type of visual effect must be carried out at the point of viewing.

The range of western sites heavily impacted in this way are limited to the area that extends from Roxburgh Vineyard to parts of Denman Road, and parts of Roxburgh Road.



Figure 5.7a | Image of existing view from Denman Road

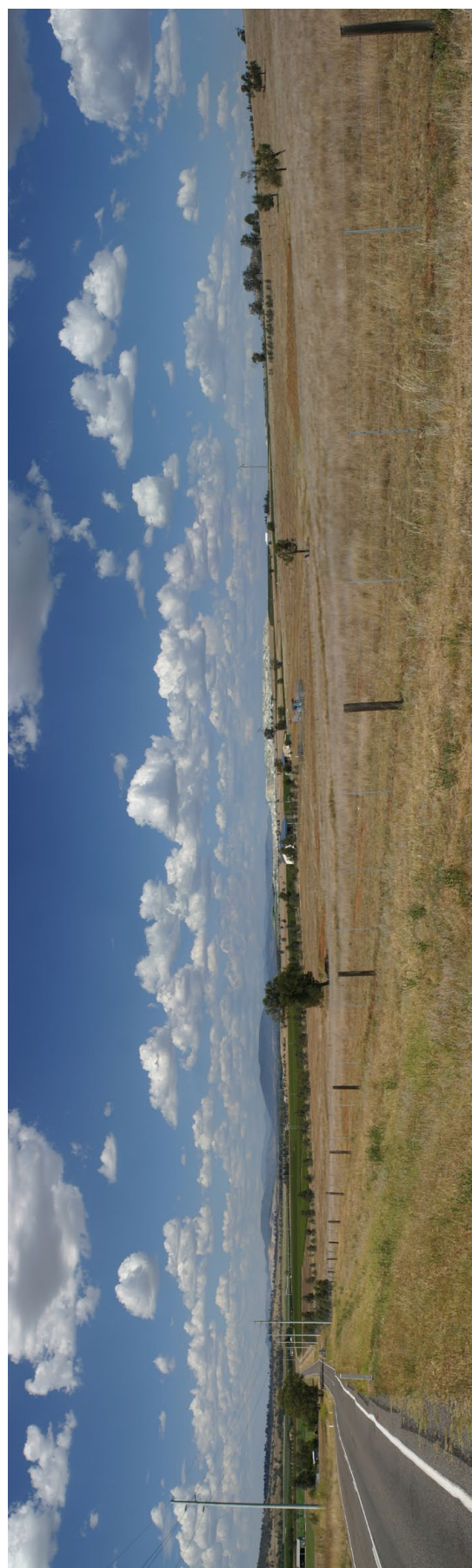


Figure 5.7b | Photomontage image of view from Denman Road at year 2011

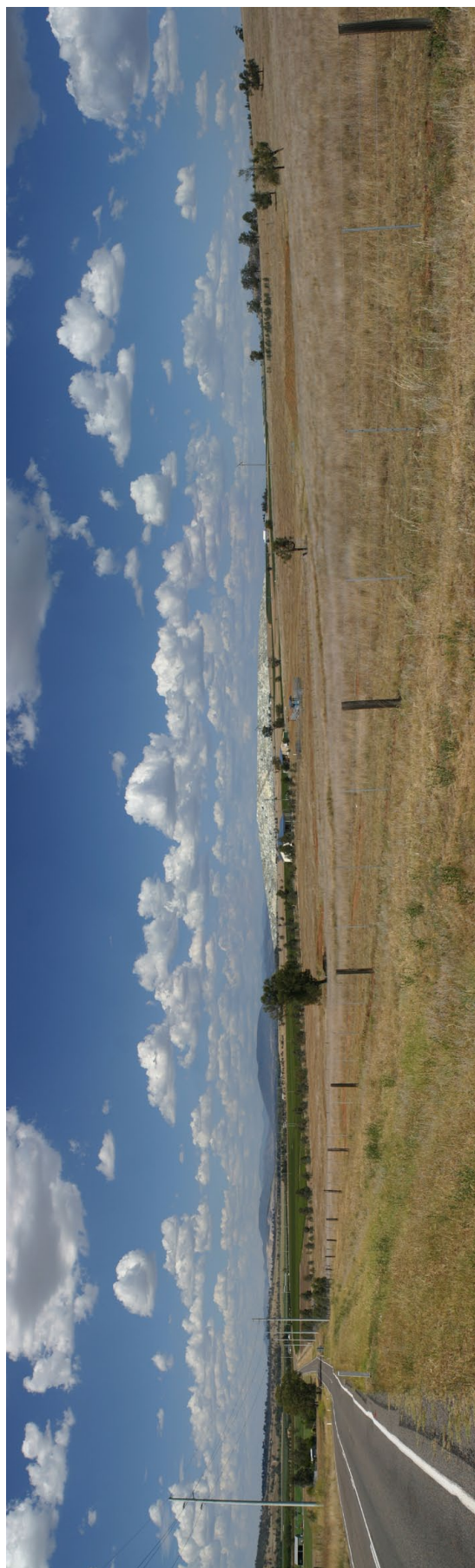


Figure 5.7c | Photomontage image of view from Denman Road at year 2016

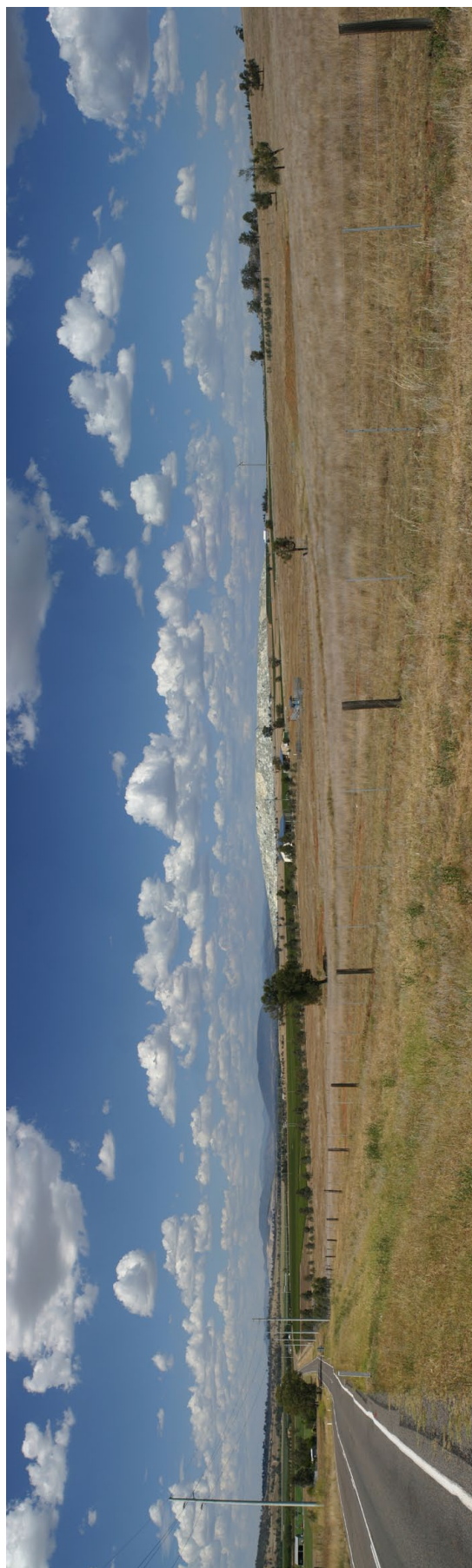


Figure 5.7d | Photomontage image of view from Denman Road at year 2022

MOUNT ARTHUR

OVERBURDEN EMPLACEMENT AREA



Figure 5.7e | Photomontage image at Denman Road comparing Project to approved mine plan
Red line shows approved mine plan

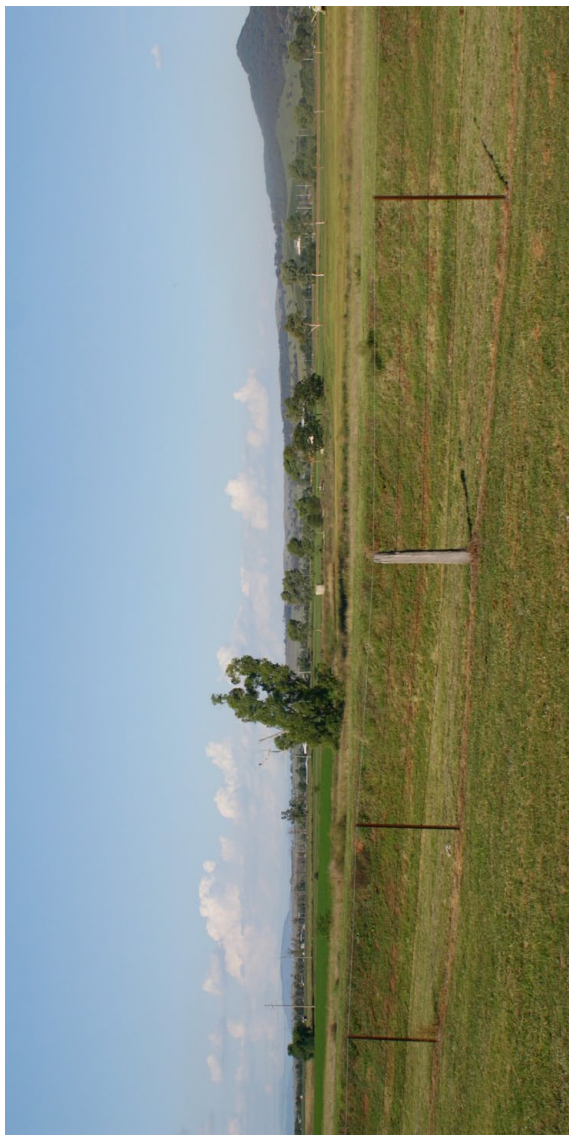


Figure 5.8a | Photomontage image of existing view from Denman township

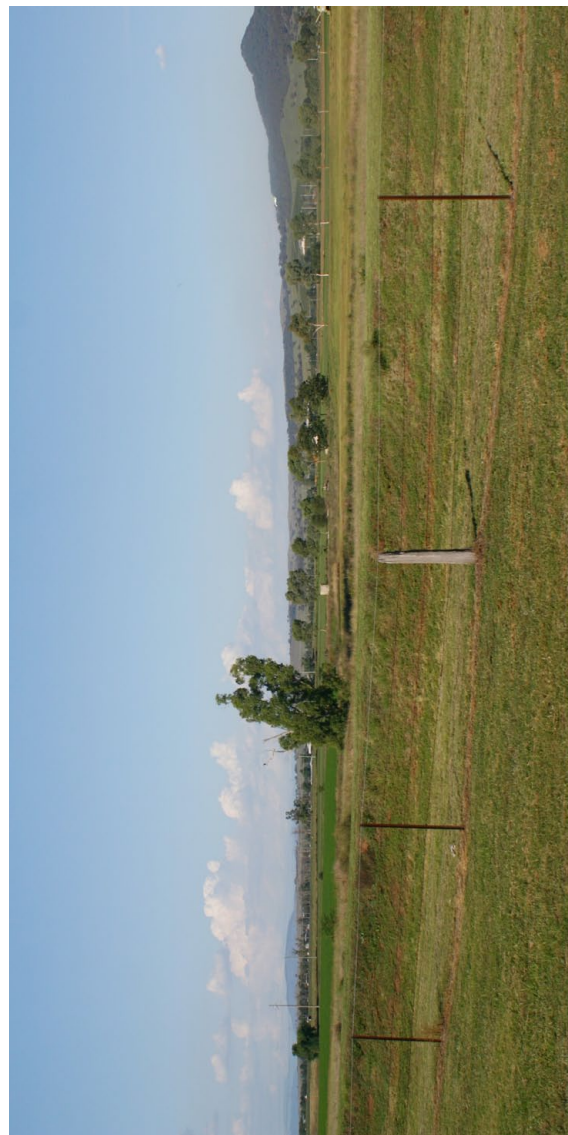


Figure 5.8b | Photomontage image of view from Denman township at year 2011

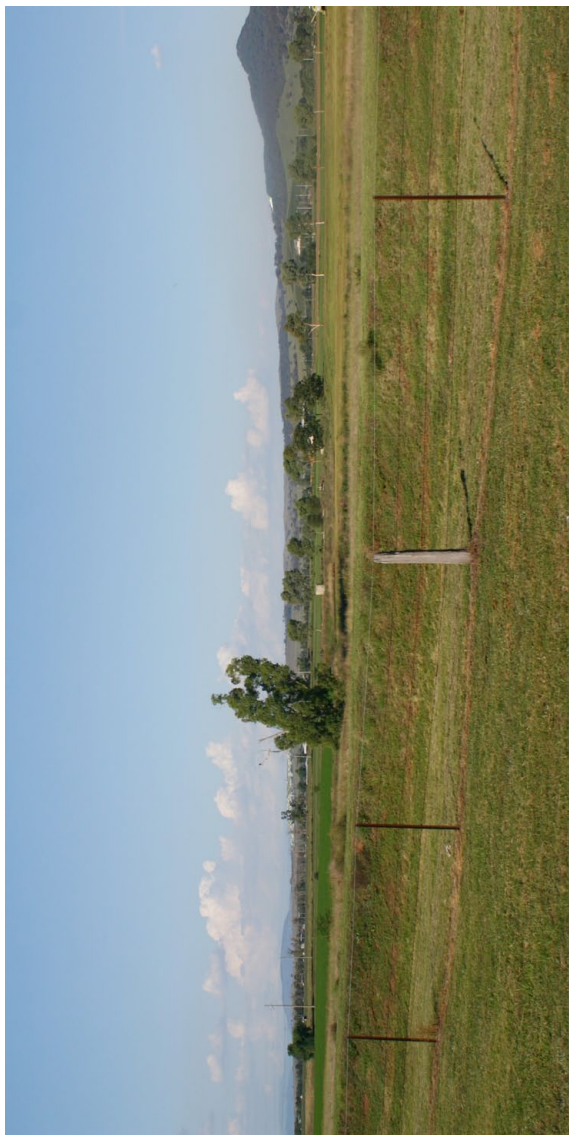


Figure 5.8c | Photomontage image of view from Denman township at year 2016

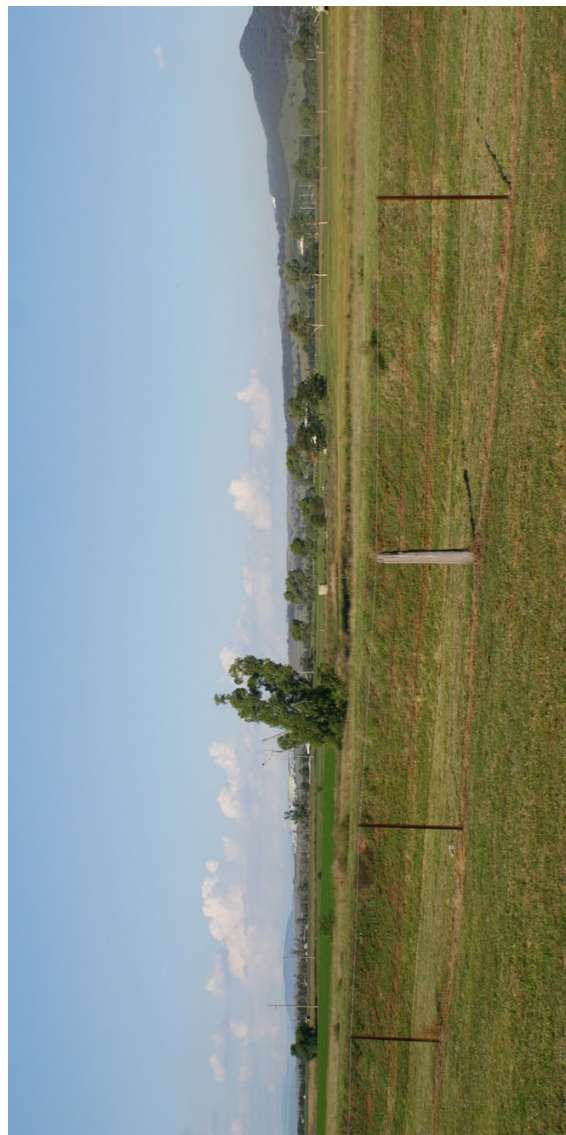


Figure 5.8d | Photomontage image of view from Denman township at year 2022



Figure 5.9 | Visual Effect of the OEAs
Rehabilitation progressively decreases visual effect levels.



Figure 5.10 | Rehabilitated OEAs
Rehabilitated OEAs such as these east of Mount Arthur blend in with the landscape and have a low visual effect.

6. VISIBILITY AND VISUAL SENSITIVITY

6.1 General

This section of the report evaluates the visibility of the various elements of the Project from locations around the EA Boundary. Visibility will vary depending on topography and to a lesser extent vegetation.

The sensitivity of the various areas that have views will depend on the land use of that area. Land use areas or activities that utilise the view (e.g. residences, recreation areas, etc) will have a high sensitivity. Conversely, areas such as rural lands will have a low sensitivity.

The determination of visibility and sensitivity give direction to mitigation strategies (see section 8 of this report) by defining areas that require screening to the Project.

6.2 Primary Visual Concern

The area of primary visual concern includes localities that are potentially most affected visually by the Project. It will include viewing locations that have potential views to the Project based on topography and vegetation. The area of primary visual concern was defined by computer analysis as well as field assessment and an understanding of topography and vegetation as screening elements as well as using distance as a guide.

The boundaries to the area of primary visual concern for the Project are identified below and shown in Figure 6.1, being defined as follows:

- To the west, the mountain ranges behind Denman;
- To the north, hills and ranges in the vicinity of Wybong Road and Muswellbrook;
- To the east, hills to the east of Mt Arthur Coal; and
- To the south, rolling hills to the south of Mt Arthur Coal and the mountain ranges to the south of the Golden Highway.

6.3 Significant Ridgelines

In addition to the ridges and spurs that define the area of primary visual concern, there are significant ridges, spurs and topographic features within this area that further limit potential views to the Project. These topographic features, although gentle and often not prominent, are important insofar as their influence on the visibility of operations associated with the Project. Many of these ridges will screen or assist in screening various parts of the operations from adjoining areas.

The significant ridgelines and their relevance to views from different directions are illustrated in Figure 6.1.

6.4 Significant Vegetation Areas

Tree cover is important in providing potential screening to the Project components. It is especially significant when the Project is close to the viewing locations as shown in Figure 6.2.

Not all vegetation is illustrated on Figure 6.1. Rather this illustrates significant native vegetation. It does not include cultural plantings and small residual tree areas that may create foreground vegetation that is significant in reducing views to the Project. In the same way, vegetation around residences has not been defined, even though such vegetation could greatly assist in screening views to the Project.

6.5 Viewing Locations - General

There is a range of potentially sensitive viewing locations around Mt Arthur Coal. These include towns, rural residences, roads and tourist facilities / recreation areas. To assist in understanding the visibility of the Project from critical viewpoints such as homesteads, a ZVI Map was prepared, see Figure 6.3. The ZVI takes into consideration both topography and to a lesser extent vegetation in defining likely seen areas for the Project.

A determination of visibility was completed from this mapping, and ground-truthed at public locations through field investigations.

6.5.1 Towns

The towns in the vicinity of Mt Arthur Coal are Muswellbrook, Aberdeen, Denman and Jerrys Plains.

6.5.2 Roads and Railways

The major roads in the locality are the New England and Golden Highway, Denman Road as well as the Main Northern Railway Line. Other roads of local significance include Wybong Road, Roxburgh Road, Edderton Road and Thomas Mitchell Drive.

6.5.3 Tourist / Recreation Areas

The main tourist activity areas in addition to roads and towns used by tourists and residents alike are the Roxburgh and Arrowfield Vineyards, the Pukara Estate Olive Grove and the township of Denman.

6.5.4 Commercial Areas

The visual setting of the Upper Hunter River is significant to visitors to Horse Studs and Vineyards. In this way the Roxburgh Vineyard and the Coolmore and Woodlands Studs are significant.

6.5.5 Rural Residences

Rural residences are located throughout and abounding the local area within the area of PVC. The homesteads are often located on hills and take advantage of views in various directions. Those residences that have views of the Project will have a high visual sensitivity that is only lowered if mine activities are located well into the background and minimised by viewing distance.



Figure 6.1 | Primary Visual Catchment

The primary view zone is an area that contains most of the critical locations that have views to Mt Arthur Coal Exploration Area. It is possible for locations outside this area to have views to the EA but these would be less critical.

LEGEND

..... Ridges and spurs
 --- Mt Arthur Coal Mining and Exploration Lease

← Most critical view lines
 --- Primary Visual Catchment

0 2 4km
 Views blocked
 major view corridor to Mt Arthur Coal Exploration Area



Figure 6.2 | Screening Vegetation

6.6 Visibility Considerations

6.6.1 Visibility

The visibility of the Project based on the most extensive development in the year 2022 and the screening effect of topography and major vegetation areas is illustrated in Figure 6.3. This ZVI map does not take into account screening effects at viewing points. In this context it can be seen that Figure 6.3 illustrates a high degree of visibility of Mt Arthur Coal from North Muswellbrook, where this is generally not the case due to the viewing distance.

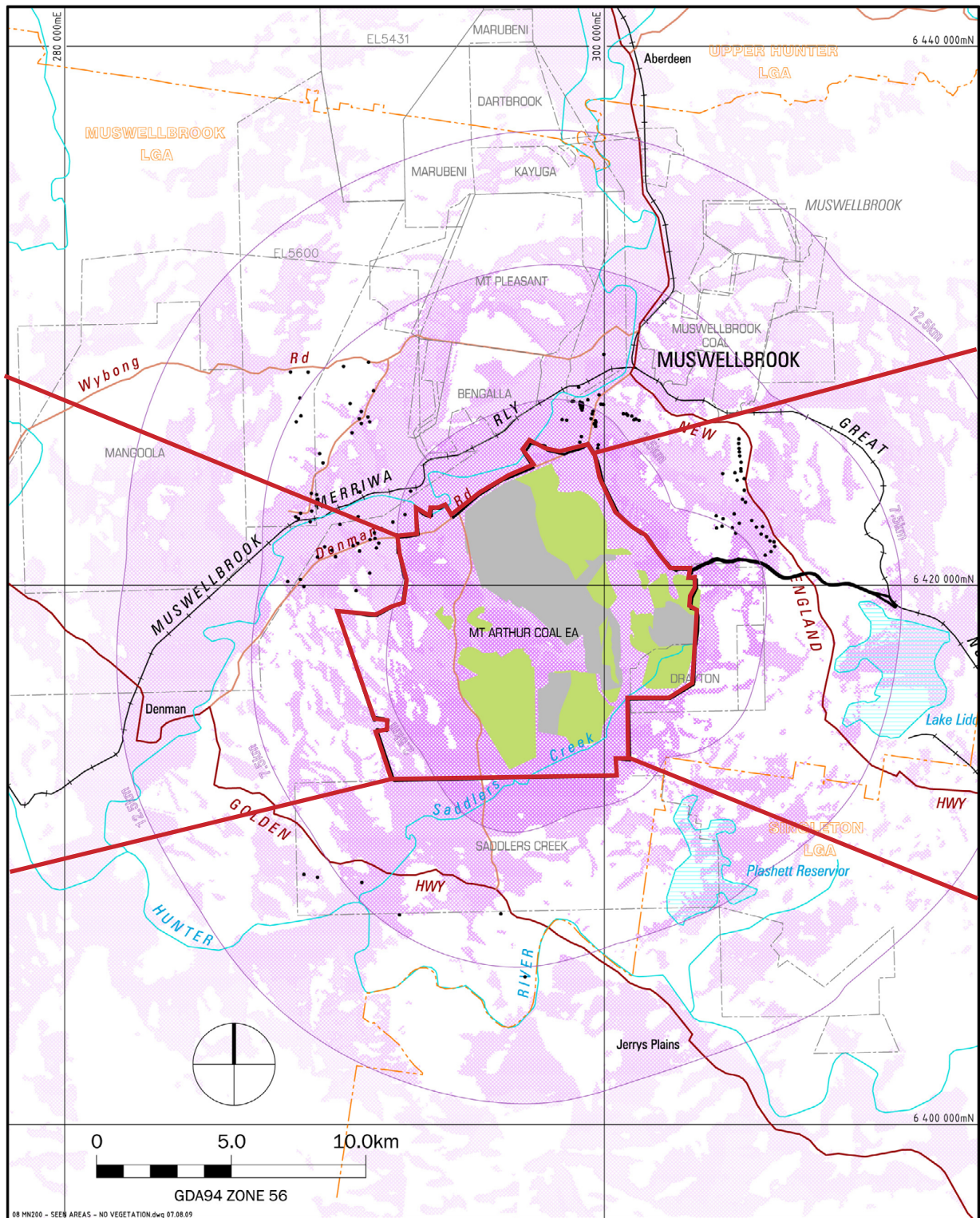
Factors influencing visibility vary around the EA Boundary creating different visibility patterns to the Project. Generally the occurrence of topographic and vegetation elements close to the point of viewing are more influential in limiting visibility than elements of similar scale close to the Mt Arthur Coal's operational areas. In relation to vegetation, tree cover at the point of viewing has the potential to screen views to Mt Arthur Coal operational areas. Vegetation close to Mt Arthur Coal has limited effect in influencing visibility.

In towns and villages, viewing opportunities may be limited to the outer edges of towns with subsequent areas being screened by adjoining buildings, gardens and street trees. This screening effect can also be important in relation to individual rural homesteads where adjoining sheds and / or homestead gardens and trees adjoining gardens and sheds can create foreground screens.

6.6.2 Visual Sensitivity

Land use features around the EA Boundary vary creating varied sensitivity patterns. Land use features around the EA Boundary 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. In addition to these land use features contributing to the visual character of the landscape, they also influence visual sensitivity.

In this context, residential areas such as Muswellbrook or homesteads will have a high sensitivity to major change to the landscape 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 will have 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.



LEGEND

- Sensitive Receptor
- Project Footprint - Active Mining
- Project Footprint - Rehabilitated
- EA Boundary - Mt Arthur Coal
- - - Lease Boundary - Others
- Roads - major
- Roads - minor
- Railway
- Drainage

SEEN AREAS

- < 2.5km - zone of highest visual perception, perception of detail but not necessarily the whole EA
- 2.5 to 7.5km - zone of high appreciation of overall activity within the EA
- 7.5 to 12.5km - zone where overall appreciation of activity may be mitigated in part by intervening topography and increased influence of distance and diurnal effects
- > 12.5km - zone where perception of active areas decreases as compared to adjacent undisturbed or rehabilitated areas. Increasing capacity for intervening topography and or vegetation to partially or fully screen mine elements from view

Modelled Seen Areas shown on this map should be used as an indicative guide only due to inherent modelling accuracy limitations. Vegetation screening effects have not been modelled.

Figure 6.3 | Zones of Visual Influence

6.7 Visibility and Visual Sensitivity of the Northern Sector

Immediately to the north of Mt Arthur Coal is the Hunter River Floodplain that is adjoined by the rolling hills of the northern Foothills. This sector contains the township of Muswellbrook and Aberdeen as well as rural homesteads in the northern hills. The sector also supports parts of the New England Highway, the Main Northern Railway and Denman Road, as well as significant local roads including Wybong Road. The new Ironbark Ridge Estate is also located in this sector.

The view shed of this sector is more clearly illustrated in Figure 6.4.

6.7.1 Muswellbrook

Muswellbrook is the closest and largest town in the locality and is generally situated to the north east of Mt Arthur Coal. The potential viewpoints within the town are from 3-7 km away (see Figure 6.5). Parts of the town have potential visibility to Mt Arthur Coal based on topography alone, however a combination of houses and other buildings as well as garden and street vegetation ensures that views are generally screened from most urban areas.

The notable exceptions to this screening are the western edges of both South Muswellbrook and elevated areas north of the golf course. Both these edges have westerly aspects and are elevated over adjoining rural land or open space. These areas look onto the eastern face of the OEA adjacent to Thomas Mitchell Drive.

Houses with open views will have a high visual sensitivity. Some homes have glimpses between other houses and vegetation that limit the sensitivity. Most homes in Muswellbrook have no views of the Project.

6.7.2 Ironbark Ridge Estate

This estate is currently being developed and is located adjacent to South Muswellbrook on a westerly aspect slope. As with South Muswellbrook, the Ironbark Ridge Estate has views onto the outer face of the eastern and southern OEA. Being more elevated, the views from the top of the slope include Mount Arthur and the tops of distant hills. The views from mid slopes and lower slopes tend to have views screened by the existing OEA.

Views from this locality include views to the existing and proposed OEA, so will have a high visual sensitivity.

6.7.3 Aberdeen

The township of Aberdeen is located some 15 km to the north of Mt Arthur Coal. Parts of the town are located on a hill with some residential areas occurring on the southern slopes. Many of these residences have primary view orientation over valley views to the south across the Hunter Valley Floodplain to Mt Arthur Coal. Also in this view are the CHPP of Dartbrook Mine and the OEA of Bengalla Mine.

However at this distance of 15 km, sensitivity and visual perception of activities at Mt Arthur Coal are greatly reduced and a low visual sensitivity results.

6.7.4 Rural Homesteads

Homesteads in this sector are located in the northern Foothills in the vicinity of Bengalla Mine and Kayuga village to the west of the Hunter River, with a limited number located adjacent to the New England Highway. Most rural homesteads are shielded from views of the Project by the hills immediately north of the Hunter River Floodplain in the vicinity of Bengalla Mine. These hills restrict views to the homesteads south of Wybong Road and to homesteads along the New England Highway north of Muswellbrook.

Homesteads north of Muswellbrook are generally not orientated toward Mt Arthur Coal, but rather to adjoining roads. Further they do not generally have elevated views, and should they have such views, they would include Bengalla Mine.

These residences are generally not orientated toward Mt Arthur Coal and for the greater part are further than 7.5 km away, reducing sensitivity levels to moderate / low.

Homesteads in the foothills south of Wybong Road, especially along Roxburgh Road have potential views based on topography alone, see Figure 6.5. However open forest in this location could screen views from homesteads in this location. Views from this location are elevated and look over Mt Arthur Coal.

Homesteads in this sector that have views will have a high visual sensitivity, if Mt Arthur Coal is in view.

6.7.5 New England Highway

Views from the New England Highway relate to the journey south and potentially extend from north of Aberdeen and then for the greater part of the journey into Muswellbrook (see Figure 6.4). Small pockets of roadside vegetation and / or buildings immediately adjacent to the points of viewing, screen views of the Project for most of the journey, as is also the case in Muswellbrook.

At the distances the views are experienced from (over 15 km to 7 km), the diversity of view and perception of detail is such that Mt Arthur Coal is a small part of a view and visual sensitivity, especially from a fast moving car, is reduced.

Visual Sensitivity from highway locations in this sector is low.

6.7.6 Great Northern Railway

The railway runs parallel to the New England Highway and will have similar view characteristics except for the mitigating factor of limited forward vision that may restrict views to Mt Arthur Coal.

If visible, the views from the railway will have low visual sensitivity.

6.7.7 Denman Road

Denman Road in this sector is the road experiencing the highest visual exposure in the eastern-western journey. The views in the western journey are limited to a small section of road between Racecourse Road and Thomas Mitchell Drive.

Past this point, Denman Road is immediately to the north of Mt Arthur Coal and existing vegetation planting on Mt Arthur Coal creates a visual screen to most operational areas on Mt Arthur Coal.

In the journey east there may be some views through the established screen to operational areas.

Within this sector Mt Arthur Coal is in the immediate foreground of Denman Road and views will have a high visual sensitivity in both directions at this close range to Mt Arthur Coal.

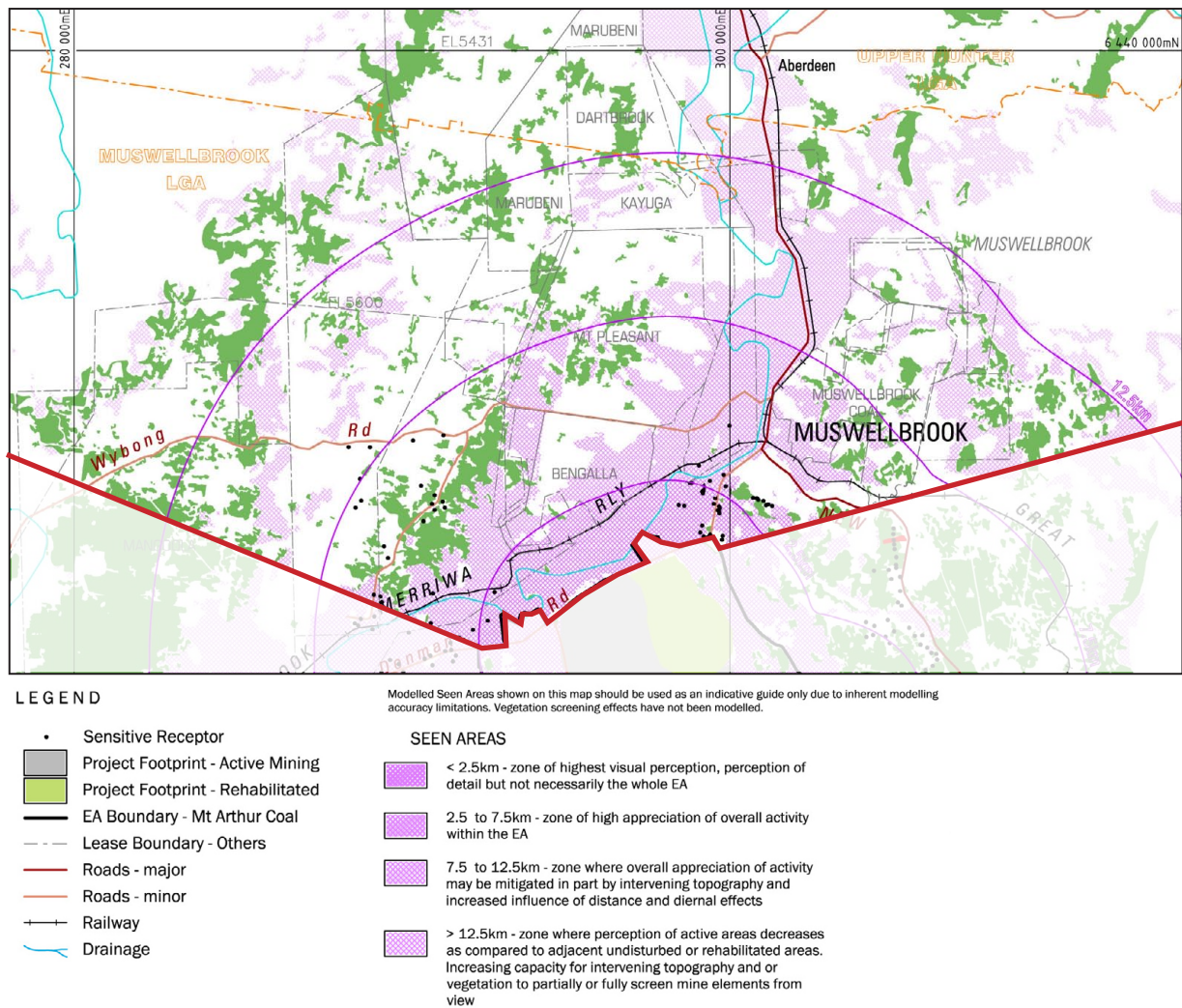


Figure 6.4 | ZVI Northern Sector



Figure 6.5 | View from the North

6.8 Eastern Sector

The eastern sector is dominated by foothills and rural lands. The sector supports part of the Main Northern Railway, the New England Highway as well as scattered rural homesteads east of the highway and a small area of rural residential development adjacent to the intersection of the highway and Thomas Mitchell Drive. As can be seen from Figure 6.6, the areas that have visual exposure to Mt Arthur Coal are generally west of the highway. To the east of the highway, only distant elevated locations have views to the Project. These areas do not support sensitive receptors and are relatively distant from Mt Arthur Coal.

6.8.1 Main Northern Railway

There are limited view opportunities from the railway close to Muswellbrook. Views are limited and will be similar to those experienced from the highway. Views to Mt Arthur Coal are generally screened by woodland and open forest in this locality.

Visual sensitivity is moderate to low but views of the Project are very limited and will be seen in a wide and changing spectrum of views.

6.8.2 New England Highway

The views from the highway are limited by topography and adjoining vegetation. There is one location with views to elevated parts of Mt Arthur Coal seen over adjoining vegetation west of the highway (see Figure 6.6 & 6.7).

The sensitivity of this location is moderate but is very limited in extent and time duration.

6.8.3 Rural Residential Areas

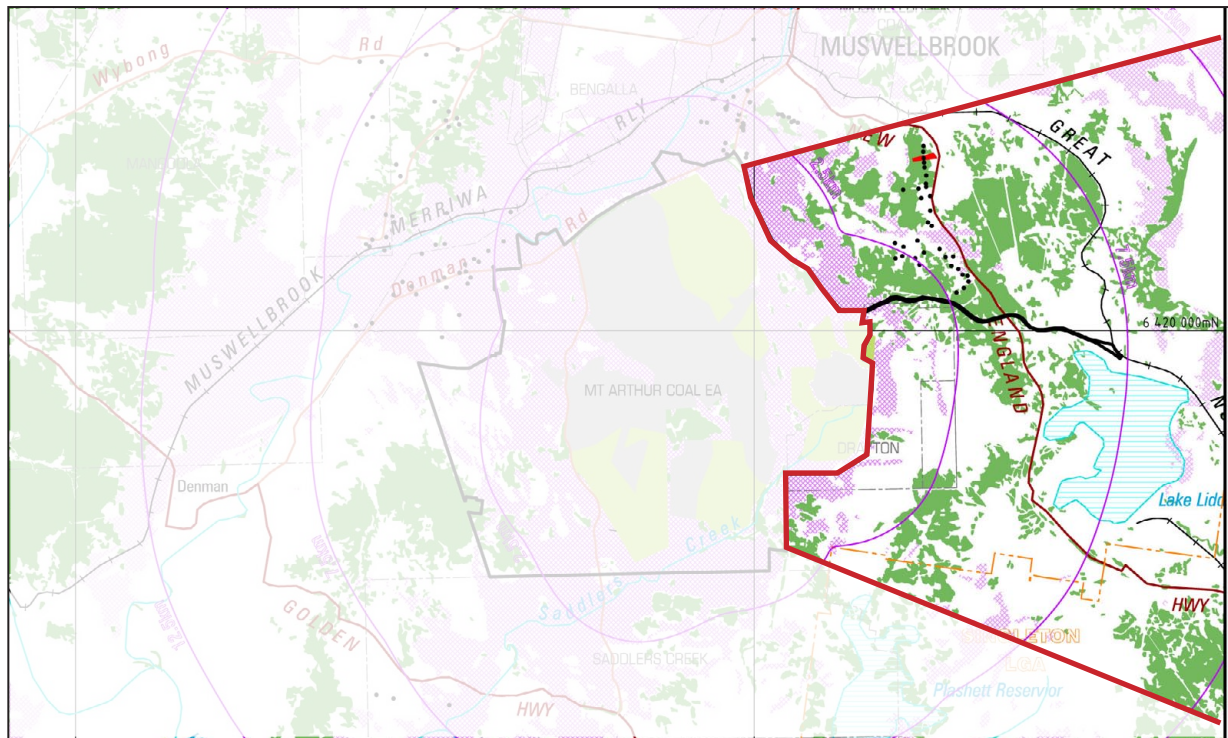
Views of the Project from the residences in this location are limited. Visual orientation of homesteads is generally towards the adjoining roadways or other elements on the property. This coupled with the screening effect of woodland and open forest in this location minimise views towards Mt Arthur Coal (see Figure 6.6 & 6.7).

As can be seen from the ZVI illustrated in Figure 6.6, houses are not within seen areas of Mt Arthur Coal.

Potentially this area has high visual sensitivity, but the lack of view reduces this sensitivity to low. Any views from this location would be highly sensitive.

6.8.4 Lake Liddell

This area has some recreational usage but has limited views to the EA Boundary (see Figure 6.6 & 6.8).



LEGEND

- Sensitive Receptor
- Project Footprint - Active Mining
- Project Footprint - Rehabilitated
- EA Boundary - Mt Arthur Coal
- Lease Boundary - Others
- Roads - major
- Roads - minor
- ++ Railway
- Drainage

Modelled Seen Areas shown on this map should be used as an indicative guide only due to inherent modelling accuracy limitations. Vegetation screening effects have not been modelled.

SEEN AREAS

- < 2.5km - zone of highest visual perception, perception of detail but not necessarily the whole EA
- 2.5 to 7.5km - zone of high appreciation of overall activity within the EA
- 7.5 to 12.5km - zone where overall appreciation of activity may be mitigated in part by intervening topography and increased influence of distance and diurnal effects
- > 12.5km - zone where perception of active areas decreases as compared to adjacent undisturbed or rehabilitated areas. Increasing capacity for intervening topography and or vegetation to partially or fully screen mine elements from view

Figure 6.6 | ZVI Eastern Sector



Figure 6.7 | View from the East



Figure 6.8 | *View from the East
From Lake Liddell.*

6.9 Southern Sector

The southern sector (see Figure 6.9) contains parts of the Hunter River Floodplain, Foothills and Surrounding Ranges VCUs. The sector supports a number of sensitive land uses that include: part of the Golden Highway, the village of Jerrys Plains, horse studs (Woodlands and Coolmore) and supporting homesteads, show areas, etc, as well as a winery with a high tourist activity level (Arrowfield Wines).

Immediately south of Mt Arthur Coal there are a range of foothills that are predominantly cleared but form a significant visual barrier to Mt Arthur Coal. Most of the seen areas are associated with the Saddlers Creek catchment, with the creek valley giving views to Mt Arthur Coal.

The hills between Saddlers Creek and the Hunter River to the south act as a visual buffer to many of the sensitive areas adjacent to the Golden Highway along the Hunter River in this location.

6.9.1 Golden Highway

Views from the Golden Highway are limited to the eastern and western extremities of the highway in this sector (Figure 6.8). Views in the east are gained as one travels north, descending from the hills down to the Hunter Floodplain (Figure 6.10a) and again in the west in hills adjacent to Saddlers Creek (Figure 6.10b) and from the flats adjacent to the creek itself.

Views are generally limited in extent and time and are from distances greater than 3 km, creating moderate to low visual sensitivities.

6.9.2 Jerrys Plains

The village of Jerrys Plain is screened from views of the Project by the adjoining hills north of the Hunter River.

The area has low visual sensitivity reflecting lack of visibility.

6.9.3 Horse Stud Areas

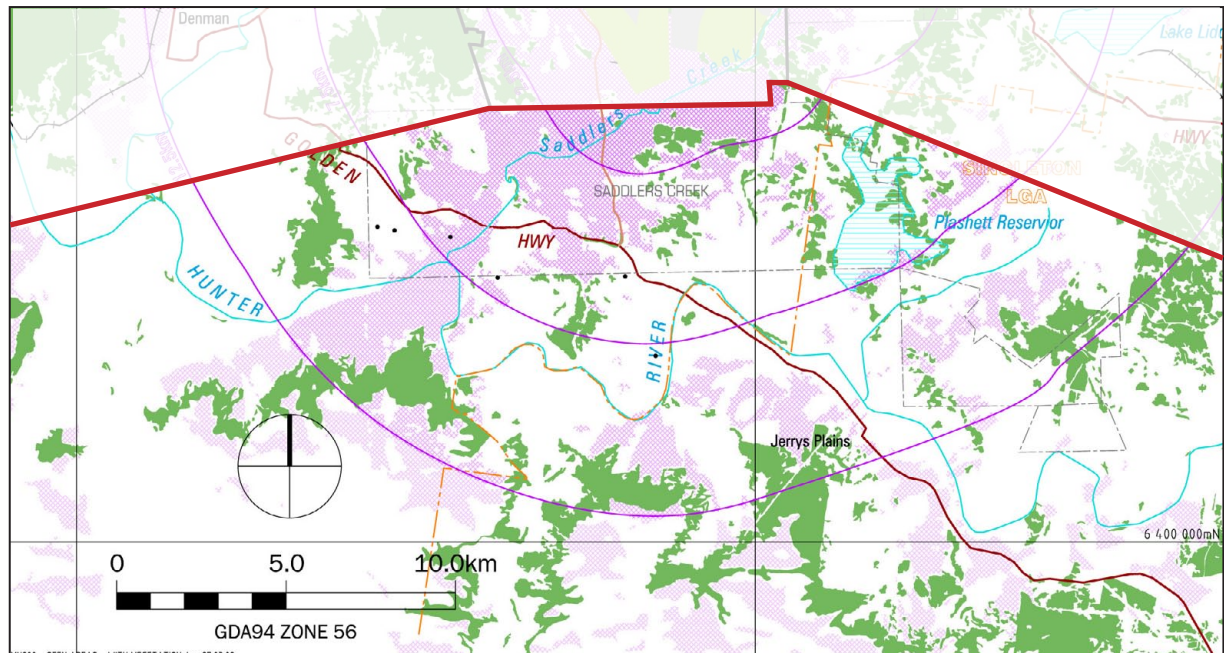
The horse studs are located on the southern side of the Hunter River and the Golden Highway in this ZVI sector. These facilities have a number of elements that are visually significant and include the main office and reception buildings, show paddocks, other visitor areas as well as a number of residences for staff (Figure 6.9). The latter are often located on higher ground in foothills immediately adjacent to the Floodplains. While most facilities are on lower elevation flats and are unsighted, some residences at the horse studs are in elevated locations and may have some views to Mt Arthur Coal over intervening hills.

If sensitive locations like a residence, or a visitor / client viewing area, has views to Mt Arthur Coal they will have a high visual sensitivity. Most sensitive areas however, are unsighted.

6.9.4 Arrowfield Vineyard

This vineyard has a high tourist and visitor usage associated with wine tasting, events and the vineyard restaurant.

This area is unsighted to the Project (Figure 6.9).



LEGEND

- Sensitive Receptor
- Project Footprint - Active Mining
- Project Footprint - Rehabilitated
- EA Boundary - Mt Arthur Coal
- - - Lease Boundary - Others
- Roads - major
- Roads - minor
- Railway
- Drainage

Modelled Seen Areas shown on this map should be used as an indicative guide only due to inherent modelling accuracy limitations. Vegetation screening effects have not been modelled.

SEEN AREAS

- < 2.5km - zone of highest visual perception, perception of detail but not necessarily the whole EA
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- 7.5 to 12.5km - zone where overall appreciation of activity may be mitigated in part by intervening topography and increased influence of distance and diurnal effects
- > 12.5km - zone where perception of active areas decreases as compared to adjacent undisturbed or rehabilitated areas. Increasing capacity for intervening topography and or vegetation to partially or fully screen mine elements from view

Figure 6.9 | ZVI Southern Sector

Figure 6.10a | View from the South
From the Golden Highway.



Figure 6.10b | View from the West
Rehabilitated OEA to the west of Mount Arthur is not discernable and has a very low visual effect and impact.

6.10 Western Sector

The Hunter River Floodplain creates the western view corridor that incorporates lands on the floodplain and adjoining foothills to the west and south of the river. This sector includes Denman, rural residences, Denman Road and parts of the Golden Highway (Figure 6.11). It also includes Roxburgh Vineyard and Pukara Estate Olive Grove.

6.10.1 Denman

The village of Denman is located approximately 12 km away from Bayswater No. 3 and 15 km away from the Mt Arthur North pit. The Bayswater mining area is unseen from Denman, being screened by the spurs running north from Mount Ogilvie. The same spurs lose elevation further north making views to the northern parts of Mt Arthur Coal possible, in the vicinity of the Mt Arthur North Pit. The active face of the OEA is visible.

Views from the village of Denman are not extensive and are generally limited to parts of the eastern edge of the town (Figure 6.11). Even here the flood levy and vegetation adjoining the river and creek in this locality often restrict long distant views.

However there may be views from the more elevated western semi-rural areas to the west of Denman including residences on Grey Gum Road and Bell Street.

At this distance and with many localized restrictions on viewing, the visual sensitivity is generally low.

6.10.2 Rural Residences

Rural residences occur on Denman Road, Annandale Row, Mangoola Road, the Golden Highway north of Denman and Pine Ridge Row off the Golden Highway (Figure 6.11).

Residences on Denman Road, Annandale Row and Mangoola Road are essentially on the Hunter River Floodplain, potentially giving these residences a view to the north pit of Mt Arthur Coal. However, houses in this situation will not be strongly orientated to a distant view due to the topography not allowing for distant views. Further, localized trees in gardens or adjoining roadways will often restrict views. Houses on Denman Road, 7 km west of Edderton Road, will have stronger view exposure.

Houses on Denman Road, approximately 7 km west of Edderton Road, may have views and will have a high visual sensitivity.

The more distant houses on Annandale Row and Mangoola Road will have a moderate visual sensitivity.

The more distant residences to the west and north of Denman will have a low visual sensitivity due to the distance to Mt Arthur Coal and reduced perception of operations as seen from this distance.

6.10.3 Denman Road

Denman Road in this sector is of significance in relation to the eastern journey from Denman to Muswellbrook. Views are screened up until a northern spur of Mount Ogilvie is crossed (Figure 6.12). Past this feature, views are constant up until Edderton Road. Views are often in the PVZ of a drivers view along the road, making the active face of the OEA prominent in a view.

Denman Road will experience high to medium visual sensitivity depending on distance.

6.10.4 Roxburgh Vineyard

This location continues to be visited by 'commercial' tourists. They differ from general tourists in that they are generally overseas wine merchants that are familiar with the wines produced at the Roxburgh Vineyard and complete a site visit in that context.

The landscape setting is important to the vineyard and mine elements may be considered to be detrimental to that experience. Although the significance of this type of activity has changed it still remains important.

Views from this location are open onto the active face of the OEA. The active face of the approved OEA is currently in view.

The views from Roxburgh Vineyard will have a high visual sensitivity.

6.10.5 Pukara Estate Olive Grove

This olive grove has been in production for over five years. It is established as a tourist destination.

Tourist activities are mostly confined to tasting rooms, associated selling centres and adjoining outside patio areas. 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 down plantation rows and at entry points into the estate, if travelling from the west.

Views from the estate will have a high visual sensitivity.

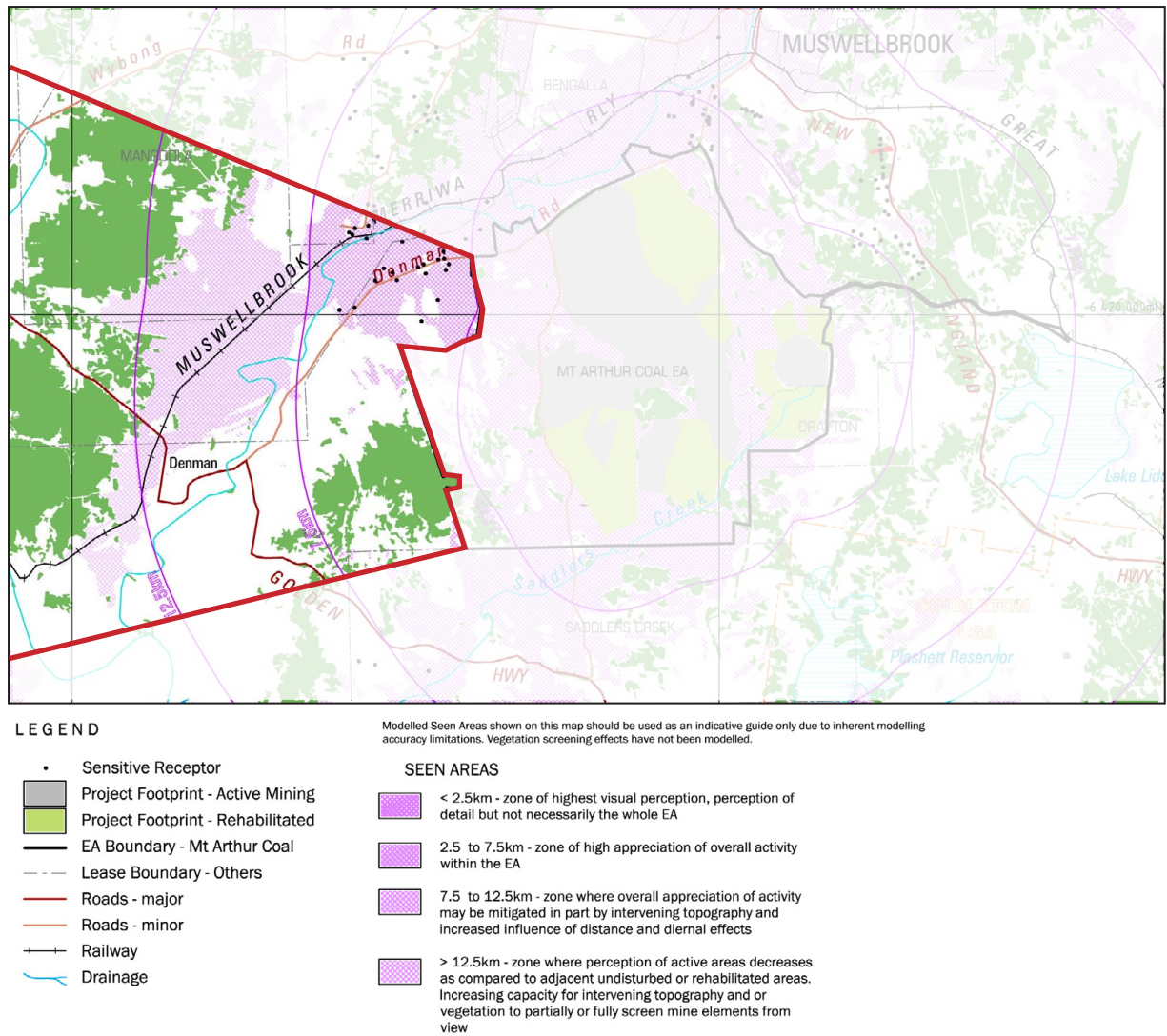


Figure 6.11 | ZVI Western Sector



Figure 6.12 | View from the West Along Denman Road.

6.11 Changes to Visibility Created by Project

The Project increases the elevation of the currently approved OEA at Mt Arthur Coal. In addition to this, on the sensitive eastern edge of Mt Arthur Coal, the approved South Pit Extension will also have an OEA that will be a southern extension of the central emplacement to the east of Mount Arthur.

The other major visual component will be the OEA to the west of Mount Arthur over the rehabilitated OEA associated with Bayswater No. 3. The OEAs associated with Saddlers Pit to the south of Mount Arthur also have some influence, prior to them being screened by the OEA emplacement at Bayswater No. 3.

The increase in visibility is best illustrated by defining seen areas for the various mine plans for the Project. The visibility due to approved mining operations in the area, including Bengalla Mine is illustrated in Figure 3.2. This can be considered as the existing condition.

The visibility resulting from the Project creates a difference in the seen area between the Project and that currently approved. The increase in seen area is due to the increase in height of the existing OEA, the construction of a new out-of-pit OEA to the west of the Bayswater No. 3 site and to a lesser extent, the placement of overburden at the Drayton sub-lease area and Bayswater No. 2 locations as well as any additional areas with visibility to the South Pit Extension.

Analysis of the differences in the seen areas shows that most of the increase occurs in floodplains or in more elevated hills and mountains. In the case of the floodplain locations, the open foreground created by the floodplain makes any increase in height of OEA elements increase the spread of the views in these open areas.

In the case of hills and mountains, it is the elevation of viewing locations that enables views over intervening features. An increase in OEA elevations means that slightly lower elevations will have views to the upper elevations of the OEA.

A further analysis illustrates that although there is an increase in the seen areas, generally it does not include sensitive residential receptors. The reasons for this are that both the floodplain and elevated areas are not the locations that residences are generally positioned, due to flooding and steep topographic constraints. This is not to say that there are no sensitive receptors in these seen area locations.

7. VISUAL IMPACT ASSESSMENT

This section defines the visual impact that is experienced from various view locations around the EA Boundary. The visual impact levels are a final determinant for mitigation strategies outlined in Section 8.

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 (receptors) around Mt Arthur Coal, 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 Mt Arthur Coal. This is based on visibility and distance.

7.1.1 Muswellbrook

Most parts of Muswellbrook are unsighted and experience no visual impact. A limited number of areas in Muswellbrook have glimpses of parts of Mt Arthur Coal but due to the limited view and small visual effect, the impact on these areas is low.

The visual impact on small parts of South and North Muswellbrook, generally on the edges of the urban areas that have extensive views over the eastern face of the OEA will experience a range of impacts. During construction of the outer face of the OEA, high impacts could occur if there are large areas of un-rehabilitated OEA areas visible to a view. However if this effect can be localized into small areas of less than 2.5% of the PVZ, then the visual effect will be reduced to moderate with a corresponding reduction in impact level.

Impacts on North and South Muswellbrook will reduce to moderate / low when rehabilitation with grassland is completed in approximately 2016 and to low when tree planting and landscape patterns are established in the period to 2022.

Racecourse Road differs to some degree from other parts of Muswellbrook discussed above, in so far as it has a lower elevation. As a result of this, views will be screened by the new Project OEA with its elevation of 365 m.

The significance of that loss is reduced by the general lack of strong visual focus to Mount Arthur from this location and the generally weak presentation of Mount Arthur to this location especially in the context of the existing approved mine plan.

7.1.2 Aberdeen

The visual impacts of the Project on Aberdeen are low. The distance of the town from Mt Arthur Coal creates low to moderate sensitivity. Visual effects at this distance on to the rehabilitated edge of the OEA create low impact levels.

7.1.3 Denman

The visual impact on this town is low. Most of the town is unsighted to Mt Arthur Coal, however the western edge does have views on to the northern part of the active face of the OEA.

However at a distance of greater than 12 km, the visual effect of colour contrast created by the exposed overburden is lessened, and the Project occupies only a small part of the PVZ and the total view. Visual effect levels of the Project are low at this distance; visual sensitivity is generally low and to the south, moderate. This creates a low visual impact level at Denman.

7.1.4 Jerrys Plains

This location is screened from view by adjoining hills to the north of the village. As a result, there is no visual impact on Jerrys Plains.

7.2 Rural Residences

Rural residences are located throughout the local setting within the area of PVZ. The residences are for the greater part located within the Foothills VCU and take advantage of views in various directions.

7.2.1 Northern Sector

In this sector many rural residences are to the north of Wybong Road. These residences are either unsighted, are visually orientated away from Mt Arthur Coal or are further than 7.5 km away. These factors, coupled with a low visual effect created by views onto the rehabilitated face of the OEA minimises the visual impact on these residences.

Ironbark Ridge Estate is a proposed rural residential area adjacent to South Muswellbrook, and the first stage of this is currently being developed. View characteristics from the more elevated blocks of the Ironbark Ridge Estate are similar to South Muswellbrook, with lower blocks not having a view to Mount Arthur. In this context, impacts will vary from high to moderate in the first instance depending on what area of OEA is exposed at any one time. If this can be kept below 2.5% of the PVZ, a moderate impact will result until rehabilitation is complete, at which time impacts will reduce to low.

South of Wybong Road, there are two areas requiring assessment, houses along Roxburgh Road and some houses along Denman Road.

Roxburgh Road will be exposed to the active face of the OEA and have views into the active mining areas. This creates high visual effects that will not reduce during the Project. This will create a sustained high visual impact on this location unless mitigation strategies at the point of viewing are completed.

Houses on Denman Road have similar exposure to Roxburgh Road but are not elevated and do not have views into the active mining areas of Mt Arthur Coal. However the impacts of the Project will remain high as seen from this location.

7.2.2 Eastern Sector

In the eastern sector the Antiene subdivision is bounded by the New England Highway on the east and Thomas Mitchell Drive on the south.

The Antiene subdivision is generally screened by existing vegetation within and adjacent to the properties in that location.

Residences east of the highway are generally more distant than 7.5 km with limited visibility to Mt Arthur Coal. Views from any elevated residence to Mt Arthur Coal in this location are likely to be limited and impacts will be low.

7.2.3 Southern Sector

The significant rural residences in this sector are south of the Hunter River and the Golden Highway and located in elevated foothills. However, they are generally low in the foothills and screened from views to Mt Arthur Coal.

The exception is in the vicinity of Saddlers Creek where a limited number of residences adjacent to the Golden Highway and Bureen Road could have views onto the OEA west of Mount Arthur as well as some parts of the OEA to the north of Mount Arthur. These houses could experience high to moderate impacts until rehabilitation is complete. Such locations are best mitigated by at the viewing point by the establishment of screening treatments, depending on their orientation.

Outside this area, impacts are likely to be moderate until rehabilitation reduces the impact from moderate to low. Impacts in this location will generally be limited to a six year period from 2016 – 2022.

7.2.4 Western Sector

The range of hills associated with Mount Ogilvie create a major visual block to western views. Only some residences along Denman Road have views towards Mt Arthur Coal. Many residences in this location do not have strong visual orientation towards Mt Arthur Coal, however any such views will be onto the active face of the OEA.

In this context, visual effect is high and will remain high. This, along with a high visual sensitivity will create a high impact on houses with a strong orientation towards Mt Arthur Coal. Otherwise impacts will generally be low.

7.3 Roads and Rail

The roads and rail in the locality are:

- The New England Highway;
- Golden Highway;
- Denman Road;
- Roxburgh Road; and the
- Main Northern Railway.

Mt Arthur Coal is visible from a number of minor roads in the locality. These include Roxburgh Road, Wybong Road, Thomas Mitchell Drive and Edderton Road. Views from most of these roads will experience high visual effects but the moderate to low sensitivity levels reduce impacts. The most significant views from minor roads are from Roxburgh Road where moderate impacts are experienced, reflecting the high visual effect of Mt Arthur Coal as seen from this roadway.

7.3.1 New England Highway

The greatest potential visual impact on this road occurs north of Muswellbrook on the journey south. Views across the Hunter River Floodplain are onto the rehabilitated face of the OEA.

Viewed from this distance, the OEA is a small percentage of a total view and areas of pre rehabilitation landscape are even smaller, reducing visual effect levels to low. Similarly, visual sensitivity is moderate to low north of Muswellbrook. Considered together, these factors create moderate to low impacts, with low impacts occurring after rehabilitation.

South of Muswellbrook there is one location where the top of the OEA is seen over tree canopies on the western side of the highway. However this will be a very small part of a total view and will be at distances greater 3 km, thereby creating low impacts.

7.3.2 Golden Highway

The Golden Highway is generally screened from views to Mt Arthur Coal. Exceptions are to the south of Jerrys Plains, significantly in the vicinity of Saddlers Creek and to the north of Denman.

South of Jerrys Plains, views are glimpsed to the top of OEA at a distance generally greater than 10 km. At this distance impacts will be low due to moderate to low sensitivity levels and low visual effect levels.

At Saddlers Creek along the Golden Highway, the main views are from a hill located a few kilometres to the west of the Edderton Road intersection, travelling in both directions and in the vicinity of Saddlers Creek itself, travelling east. In this situation, visual effect levels will be moderate to high with moderate sensitivity creating temporarily high impacts if the exposed OEA is greater than 2.5% of the primary view. However, this high impact level will be temporary until rehabilitation is established.

North of Denman there are distant glimpses of Mt Arthur Coal across the Hunter River Floodplain. This location will experience the same visual effects as Denman but with reduced sensitivity. Visual impacts on the road in this location will be low.

7.3.3 Denman Road

This road experiences visual impact to the east and west of Mt Arthur Coal.

From the east, impact is experienced from the Denman Road intersection with Racecourse Road to Thomas Mitchell Drive, with the view focused on the outer edge of the OEA. From these close distances the visual effect will be moderate to high depending on progressive rehabilitation. Impacts will therefore be high initially reducing to moderate and then to low following rehabilitation. Past this viewpoint, views are screened by roadside plantings previously created by Mt Arthur Coal.

Viewed from the west, the visual effect is currently high and will remain high as views are onto the active face of the OEA. This will create a high impact west to Ogilvie Hill spur. This impact can only be reduced by roadside screening adjacent to sensitive viewing locations along the road.

7.3.4 Main Northern Railway

The greatest visibility of Mt Arthur Coal from the railway is north of Muswellbrook for trains moving south. Visibility characteristics are similar to those of the adjacent New England Highway. Sensitivity at this distance is moderate and visual effects will be moderate to low creating moderate to low impact levels.

7.3.5 Roxburgh Road

This road has the most open views to the Project. Views from parts of this road are from an elevated location over the active mine working areas and will create a high visual effect. It is relevant to state that this location already experiences a high visual effect resulting from visual exposure to both Bengalla Mine and Mt Arthur Coal's current mining operations. However, sensitivities at these distances for minor rural roads are considered to generally be low. This creates a moderate visual impact.

7.4 Tourist Localities

The Hunter Valley generally has a high tourist usage level. In this locality Denman, Denman Road, the Golden Highway, and Jerrys Plains are significant tourist locations. Within this broader fabric, are located special locations such as Arrowfield Winery and Pukara Estate Olive Grove. Also significant in relation to commercial tourism visits is Roxburgh Vineyard.

Arrowfield Vineyard is unsighted due to hills adjoining the vineyard. Views at the Pukara Estate Olive Grove are likely to decrease with the maturing of the olive trees on the site. However, Roxburgh Vineyard retains open views onto the active face of the OEA. This will create high visual effects, and viewed from high sensitivity areas, will create a high impact. This impact level requires treatment at point of viewing as visual effect levels of the OEA active face will not reduce during the Project.

7.5 Visual Impact Summary

The visual impacts associated with the Project are created for the greater part by the out of pit OEA. Significant impacts are of three broad types as discussed below. The first is created by views onto the outer face of OEA. The second is onto the active face of the OEA and the third is created by view loss to distant mountains created by the OEA.

7.5.1 View Onto Outer Face of OEA

Where views are onto the outer face of OEA, impacts will be dynamic. Initial impacts may be high depending on the extent of unconsolidated OEA as a percentage of the PVZ and the view as a whole. This impact will however, be reduced to moderate and low as rehabilitation takes place and matures, first with grass and then tree cover.

Further to a sequential reduction in impact levels as rehabilitation progresses, impacts will be experienced over the same timeframe as the existing Mt Arthur Coal approvals, albeit that the eastern and inner emplacements will have increased scale.

While the Project will result in the increased scale and bulk of the OEA, design of landform and planting has created a more natural hill-like feature when compared to the lower, flatter, more engineered appearance of the existing OEA that is part of the approved Mt Arthur Coal mine plan.

All northern and eastern viewing locations including Muswellbrook, Aberdeen, Ironbark Ridge Estate, the New England Highway, parts of Denman Road and the Main Northern Railway Line as well as rural residences in this sector will experience this sequence of impacts and impact reductions.

7.5.2 View Onto Active Face of OEA

In this context where views are onto the existing active face of the OEA, visual effect levels cannot be reduced on site and have to be achieved by reducing visibility and sensitivity at the points of viewing outside the EA Boundary.

In response to sensitive view locations, landscape strategies need to be developed in response to specific viewing criteria at each viewing location. Successful treatment of such view locations will reduce sensitivity and visual impacts.

The sites that require consideration to reduce high visual impact levels are Roxburgh Vineyard, some residences on Roxburgh Road and parts of Denman Road as well as parts of Denman Road itself, with possible consideration of areas within the Pukara Estate Olive Grove.

7.5.3 View Loss

View loss to distant hills including Mount Arthur is considered an impact, but not a significant one. Major elevated areas that have views to Mount Arthur will retain such views. Other lower areas that had potential views to Mount Arthur and other features have (under existing approvals) had this view reduced. Similar visual effects to this are experienced regularly, say with garden or street plantings or building in several parts of Muswellbrook, albeit by elements not of the scale of the OEAs associated with the Project.

The most significant viewing location at which this impact occurs at is Racecourse Road although other viewpoints at relatively low elevations will be similarly affected.

7.5.4 Summary

High visual impacts will be experienced to the north west and west in locations which have a view onto the active face of the OEA. However, these impacts are similar in character and significance to existing approved impacts and will occur over the same time period. In this way impact levels have not changed albeit that the scale of the OEAs have. These locations include Denman Road residences, Roxburgh Vineyard and potentially the Pukara Estate Olive Grove as well as residences in the elevated locations on Roxburgh Road.

High impacts may also be experienced in the first instance by locations to the north and north east, based on the degree to which the development of the OEA is exposed to eastern views before 'lifts' and rehabilitation reduces visual effect levels and impacts. These locations include Racecourse Road and parts of South Muswellbrook, the Ironbark Ridge Estate and North Muswellbrook as well as parts of Denman Road and the more distant New England Highway.

High impacts may also be experienced for a six year period (2016-2022) in areas including the Saddlers Creek locality in the vicinity of the Golden Highway that have views to the out of pit OEA that will be constructed to the west of Mount Arthur. However, impact levels will be managed to reduce visual effects by progressive rehabilitation of sensitive outer face areas of OEAs as well as at viewing point locations reducing impact levels to low / moderate.

7.6 Lighting Impacts

7.6.1 Introduction

The visual effect of lighting surrounding the EA Boundary will vary. It will be influenced by the locality of operations on-site, 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.

7.6.2 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. However locations such as this are considerably distant being over 6 km away from the EA Boundary which mitigates the effect. Such lighting is currently experienced at these locations.

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

7.6.3 Diffuse Light Effects

At Mt Arthur Coal, 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.

Due to the proximity of the viewing zone, this glow will not create a significant visual impact. Further, the influence of surrounding mining operations and associated lighting activities will reduce the visual impact of diffuse light associated with the Project. The diffuse night lighting effect of the Project would be similar to that which is currently experienced and would include illumination created by Bengalla Mine, Drayton Mine, Muswellbrook township and Mt Arthur Coal.

7.6.4 Night Lighting Impact Level

The visual effect of lighting associated with the Project will be at a similar level to that currently approved and experienced. The Project also has the same timeframe to which diffuse and direct lighting effects would be experienced, however the level of impact from both direct and diffuse light effects is not considered significant.

8. VISUAL MITIGATION AND MANAGEMENT

8.1 General

This section of the report outlines visual mitigation strategies that are a complement to ongoing mitigation that are part of existing mining operations at Mt Arthur Coal.

Mitigation measures in relation to reducing visual impact can be categorised as:

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

On site treatments involve rehabilitation of landforms and land cover, while viewer location treatments involve a range of treatments to screen views, filter views and or reorientate primary views.

On site treatments include:

- Previously completed landform design of the eastern and inner OEA;
- Retention of the northern face of Macleans Hill;
- Visual and ecological planting patterns of indigenous trees to achieve landscape patterns that emulate in part existing mixes of tree and grass cover in the surrounding landscape;
- Minimising exposure of work areas to sensitive receptors; and
- Preparing an internal landscape plan for rehabilitation areas.

At Viewer Location Treatments include:

- Landscape designs and plantings for affected rural and urban residences. This will require an appropriately qualified person to visit properties considered to be affected and with the resident develop a landscape plan to screen or filter views to the Project;
- Landscape plans being developed in consultation with Roxburgh Vineyard to ensure appropriate screening of the Project from sites visited by commercial tourists;
- Completing a detailed site inspection of the Pukara Estate Olive Grove to ascertain the need for visual treatment in that location; and
- Carrying out a detailed assessment of Denman Road east of the Ogilvie Hill spur to define areas that would benefit from roadside planting. Any such plantings would have to be in keeping with Roads and Traffic Authority requirements for use of 'frangible' plants within road reserves. Larger tree belts may be planted in adjoining properties with owner consent.

8.2 On Site Treatments

On site treatments are aimed at reducing the visual effect created by the Project. Reduction in contrast and lack of visual integration is created by the form, shape and line of the OEA as well as the colour contrast of the pre rehabilitation overburden within the existing OEA.

There is no requirement to carry out treatments on other infrastructure elements such as the CHPP and additional loading facilities and conveyors required for the Project except for them to be constructed to existing standards implementing normal landscape stabilisation strategies and colouring of built elements to conform to those already in place at Mt Arthur Coal.

8.2.1 Landform Design of the OEAs

As part of the mine plan development for the Project, final landforms were considered in terms of creating more natural landforms. It was possible in that context to create some modulation with gully-like indentations close to Macleans Hill and adjacent to the main haul road. Similarly the typical flat top of the OEA was avoided by the creation of minor landforms on top of the OEA.

Such considerations provided a good basis for the modelling of vegetation patterns to collectively emulate existing landscapes of the locality.

8.2.2 Retention of the Northern Face of Macleans Hill

To assist in creating landscape diversity, the eastern face of Macleans Hill will be preserved for the Project. Additional visual and ecological patterning of rehabilitation areas will work in with the existing landscape areas for Mt Arthur Coal to create the final landscape pattern for this area.

Visual and ecological planting patterns of indigenous trees will be used for the Project to achieve landscape patterns that emulate existing mixes of tree and grass cover.

Extensive plantings have been designed for the Project by the landscape architect working with Cumberland Ecology. The plantings emulate the visual patterns of the locality whilst also strengthening the ecological values of vegetation communities in the area.

In addition to the patterning of open grassland with treed areas on the steeper slopes of the OEA, slopes below the OEA have often been completely revegetated and connected to other existing areas in the locality.

Detail of the species mix to be used for rehabilitation of the OEA will initially be determined by Cumberland Ecology to achieve visual harmony with the colour and textures of the existing landscape surrounding Mt Arthur Coal, and may change over time with results from rehabilitation monitoring.

8.2.3 Minimise Exposure of Work Areas to Sensitive Receptors

As is currently the practice, the outer edge of the OEA will be progressively developed as soon as is practical and rehabilitated with grassland and subsequent tree plantings.

Minimisation of views to work areas may also involve limiting the extent of any primary view to less than 2.5% to ensure that the greater part of a view is not affected by active mine operations and exposed earth that will strongly contrast with the existing landscape.

8.2.4 Prepare an Internal Landscape Plan for Rehabilitation Areas

A landscape plan should be prepared for internal management use that will illustrate vegetation areas to be planted on OEA for the Project and the species to be used. Plantings on the OEA should be dominated by larger trees and taller shrubs that are indigenous to the area and can contribute visually to the planting pattern created. Planting on slopes of the OEA will be responsive to ecological requirements and will pick up and drainage structures that occur on the outer faces of the OEAs.

The landscape plan should also include planting details such as tree spacing, planting and fertilising details. The plan should also include a maintenance schedule that will make provision for fertilising rehabilitation areas as well as providing a replacement strategy.

The landscape plan may be part of the rehabilitation / biodiversity plan, however such plans must ensure that visual outcomes are also achieved.

8.3 Off Site Treatments

Off site treatment will be required where on site treatments cannot achieve a meaningful reduction in visual effect levels. Landscape treatments will focus on planting schemes to reduce visibility but may also involve planting or other works established to create elements that enhance local landscape settings without necessarily fully removing views to Mt Arthur Coal.

8.3.1 Affected Residences

An appropriately qualified person will prepare a guideline for the management of affected residences to cover treatments for primary and secondary view areas to various standards depending on extent of visibility and its sensitivity.

Affected residences experiencing high visual impacts should be identified by site inspection from a qualified person. Affected properties should be inspected by a qualified landscape architect to define the nature of views at each location and the extent to which they are affected by the Project.

Concept plans will be prepared for affected residences in keeping with the management guidelines, using native and exotic plant material that is adapted to the environment of the locality for approval by the residents.

8.3.2 Racecourse Road

Racecourse Road area will have views to the OEA in the vicinity of Macleans Hill and views to Mount Arthur will be reduced by the Project.

Screening to the locality may also be enhanced by strategic street tree planting in some locations.



Figure 8.1 | *Rehabilitated OEA*

8.3.3 Roxburgh Vineyard

A Landscape Management Plan will be developed in consultation with Roxburgh Vineyard to ensure that appropriate screening of operations is provided from sites visited by commercial tourists. To some extent this will require information on visitation trip planning and may also involve offset plantings where such plantings cannot achieve meaningful visual mitigation outcomes.

Further, in relation to Roxburgh Vineyard, there may be a need to carry out landscape design and vegetation plantings adjacent to the Edderton Road realignment option chosen for the Project to achieve screening between the road and the vineyard.

8.3.4 Pukara Estate Olive Grove

A detailed analysis of visitor use patterns and views from outdoor use areas will be completed to define areas of likely view. This will allow the preparation of landscape plans and / or visitation strategies to screen views to active work areas at Mt Arthur Coal, as agreed with the relevant landowners.

8.3.5 Denman Road

A detailed assessment of Denman Road (east of Mount Ogilvie Spur) will be undertaken to define areas that would benefit from roadside plantings. Any such plantings would have to be in keeping with RTA requirements for use of 'frangible' plants within road reserves. Larger tree belts may be planted in adjoining properties with owner consent to provide additional screening.

8.4 Lighting Treatments

Lighting impacts will be kept to the minimum necessary for operational and safety needs and all lighting will continue to be conducted in accordance with Mt Arthur Coal's ISO 14001 certified Environmental Management System (EMS). Where possible, lights will be utilised at the lowest effective level and directed away from incoming views. All lighting will be directed to the ground and work areas and avoid being cast skyward or over long distances. Staff will continue to be trained in the management of night time lighting, as is currently practised.

Light management strategies include limiting night work, where possible, in areas that are exposed to direct view along Thomas Mitchell Drive and Denman Road and / or orientating direct light away from these viewing locations. Light management will also include the foreground tree planting on Denman Road to reduce the direct line of sight into the operational areas.

9. CONCLUSION

The visual impacts associated with the Project will create varied visual impacts around Mt Arthur Coal. These impacts must be considered in the context that they will occur within the same timeframe and be of similar visual character as those experienced under the existing approved mine plan. Further, these visual effects and impacts will also be experienced in the context of other existing mines that occur as part of the Mine Areas VCU.

Visual impacts will depend on the significance of the visual effect created for the greater part by the existing OEA that will be increased to accommodate extra overburden generated by the increased extraction rates sought for the Project. The existing eastern and inner OEA will be combined for the Project and expanded in bulk and elevation from 240 m to a maximum of 375 m, with additional material being placed on the existing OEA at Bayswater No. 3 sites. This landform will be less 'engineered' when compared to the existing OEA. Landform configuration was considered in the design phase to assist in reducing visual impacts.

The Project will increase seen areas due to the increased elevation of the OEA however these additional areas are generally not in sensitive locations. Significant view locations remain, for the greater part, the same as for the approved mine plans at Mt Arthur Coal.

The visual effects created by the OEA are of two types. The first is OEA faces that can be progressively rehabilitated. This reduces visual effects and potential impacts within limited time periods with final landforms and planting patterns emulating existing landscape patterns, quickly reducing visual effect and final impact levels to low. This type of effect and impact is experienced by view locations in the north and east. The most significant view location experiencing this effect and impact is the Muswellbrook township.

The second visual effect type is created by views onto the active face of the OEA. This visual effect cannot be reduced and must be treated at or close to the viewing locations themselves. Until visual treatments are achieved at viewing locations, a high visual impact will continue to be experienced. However, implementation of early treatments can eliminate the experience of visual impact altogether. The most significant view locations experiencing this type of impact are properties on Denman Road and Roxburgh Road.

The visual impact of loss of view is limited and any such loss considered as having any level of significance should be dealt with in terms of off site landscape treatments at the specific location. Such impacts have to be considered in the context that such view loss is often experienced by changes on adjoining property such as tree planting or building.

The Project will create visual impacts beyond those experienced in terms of the current approved mine plans at Mt Arthur Coal. However these impacts will be reduced over the life of the Project and will occur within the same timeframe as the existing approvals for Mt Arthur Coal. Further, the larger landforms and plantings to be carried out will create landscape elements that are more in keeping with the existing landscape than that of the currently approved mine plan.

The rehabilitated Project will create a new, but different landscape that is in character with its existing setting. The success of the visual integration of existing OEAs at Mt Arthur Coal, e.g. Bayswater No. 3 to the west of Mount Arthur, is testimony on the ability to reduce contrast and maximize integration by treatment of landform and revegetation. Finally, this will be achieved in the same timeframes as current mining operations at Mt Arthur Coal under existing planning approvals.