



Appendix K

Visual Impact Assessment



Drayton Mine Extension EA
for Anglo Coal (Drayton Management) Pty Ltd



visual impact assessment study

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1.0 INTRODUCTION

Anglo Coal (Drayton Management) Pty Ltd operates Drayton Mine (Drayton) which is located approximately 13 km south of Muswellbrook and approximately 120 km north-west of Newcastle in New South Wales (Project Area).

The Project Area is located on Thomas Mitchell Drive, west of the New England Highway, north-west of Liddell and Bayswater Power Stations, east of Mt Arthur Coal (MAC) and south-west of the rural-residential area referred to as Antiene.

Hansen Bailey (HB) has been commissioned by Drayton to prepare an Environmental Assessment (EA) to accompany a Part 3A Project Application under the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Drayton Mine Extension (the Project). Specifically, the Project includes:

- an extension of the mine life from 2010 to 2017;
- an extension of mining footprint to uncover additional coal reserves within the current Mining leases. All mining activity will remain South of Thomas Mitchell Drive;
- an increase in maximum Run-of-Mine (ROM) coal production up to 8 Million tonnes per annum (Mtpa);
- an upgrade of the existing stockpile reclamation system and existing Coal Handling Plant (CHP); and
- modifications to Drayton's power reticulation and water management systems.

This report addresses the visual impacts associated with the Project.

This visual impact assessment does not address the visual impacts of the existing mine development as this was considered and approved under the 2002 Development Consent. However this visual impact assessment does assess the cumulative impact of the Project with the existing operation and surrounding visual setting.

2.0 ASSESSMENT METHODOLOGY

2.1 VISUAL SENSITIVITY

Visual sensitivity is a measure of how critically a change to the existing landscape is viewed by people from different land use areas in the vicinity of the Project (see **Figure 2.1**).

Residences generally have a higher visual sensitivity than other land uses including industrial, agricultural or transport corridors, as the surrounding landscape may be used as part of a leisure experience and subject to over extended viewing periods. However, the sensitivity of individual residences may range from high to low, depending on the following factors:

- The screening effects of any intervening topography, buildings or vegetation. Residences with well screened views of the Project have a lower sensitivity than those with open views;
- The viewing distance from the residence to visible areas of the Project. The longer the viewing distances, the lower the sensitivity; and
- The use of the view. Residences with active visual orientation towards the Project (i.e. those with areas such as living rooms, verandas etc. orientated towards it) have a higher sensitivity than those that are not orientated towards the Project and do not make use of the views toward it.

Land Use	Visual Sensitivity Levels				
	Nearest visible Mine Area less than 1km away	Nearest visible Mine Area between 1-2.5 km away	Nearest visible Mine Area between 2.5-6 km away	Nearest visible Mine Area between 6-10 km away	Nearest visible Mine Area more than 10 km away
Urban & Rural Houses & Immediate Surrounds	High Sensitivity	High Sensitivity	High Sensitivity	Moderate Sensitivity	Moderate/ Low Sensitivity
Designated Recreation Reserves, lake, lake edge	High Sensitivity	High Sensitivity	Moderate Sensitivity	Moderate Sensitivity	Moderate/Low Sensitivity
Rural Residential lands	High Sensitivity	High Sensitivity	Moderate Sensitivity	Moderate Sensitivity	Low Sensitivity
Designated tourist Road, New England Highway, Main Northern Railway	High Sensitivity	Moderate Sensitivity	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
Other Rural Roads: Balmoral, Hassall, Pamger and Roxburgh	Moderate Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Industrial Roads, Thomas Mitchell Drive	Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Broad acre rural and forest production lands	Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity

Figure 2.1: Visual sensitivity levels

2.2 VISUAL EFFECT

Visual effect is a measure of the level of visual contrast and integration of the Project with the existing visual environment (see **Figure 2.2**). The magnitude of the visual effect is determined by a balanced consideration of the following:

- Screening by topography and vegetation at, or adjacent to, the proposed visually affected area;
- The level of contrast and integration (i.e. form, shape, pattern, line, texture and colour) between the Project and the landscape within which it is presently viewed, including the existing mine area;
- The proportion of the view occupied by the visible area of the Project can also be determined

Generally a high visual effect will result if a visible area of the Project has a high visual contrast to the surrounding landscape and occupies a large proportion of the field of view. 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.

The proportion of the total field of view occupied by the Project is best determined by defining what percentage of the primary view zone it occupies. The primary view zone is the area enclosed in an arc created by sight lines from the eye radiating out at angles of 30 degrees around a centre view line. Although this creates a cone of view, a conservative approach is taken and a 'half circle' of view is measured.

The seen area of a primary view zone is the most significant part of a view being in the centre of view. It is surrounded by the secondary view zone that is created by sight lines emanating out at greater angles of at least 60-70 degrees around the centre view line.

Visual Properties of Development		Visual Effect Levels		
Contrast Levels	Visual Integration	High	Moderate	Low
High Development elements do not borrow form, shape, line, colour or texture or scale from existing landscape features and contrast levels are high with existing landscape	Low The development lacks visual integration with other landscape elements	It occupies more than 5% of the primary view zone half cone area or 2.5% for unrestricted full cone area as seen from elevated views	It occupies between 2.5 – 5% of the primary view zone half cone area or 1 - 2.5% for unrestricted full cone area as seen from elevated views	It occupies less than 2.5% of the primary view zone half cone area or 1% if full cone area
Moderate Development elements borrow from some features of the landscape in terms of form, shape, line pattern and or colour and scale, reducing visual contrast with existing setting	Moderate The development has some degree of visual integration reflecting it borrowing from the landscape & dominated by some landscape elements	It occupies more than 10% of the primary view zone half cone area, generally when in a foreground location or 5% of full cone area	It occupies between 10% – 7.5% of the primary view zone half cone area or 5% -3.75% for full cone area	It occupies less than 7.5% or 3.75% for full cone area
Low Development elements borrow extensively from landscape features in terms of form, shape, line, pattern colour and scale minimizing contrast with the existing landscape.	High Visual integration is high as development element borrows from existing landscape and or is dominated by existing landscape elements	The development occupies more than 15% of the primary view zone half cone area or 7.5% for full cone area	The development occupies 12.5-15% of the primary view zone half cone area or 6.25% -7.5% for full cone area	The development occupies less than 12.5% of the primary view zone half cone area or 6.25% for full cone area
Very Low Development elements have similar visual character to surrounding landscape and are indistinguishable from it	Very High Visual integration almost complete as development borrows all characteristics from existing landscape	N/A	N/A	All visual effects are low regardless of percentage of primary view zone affected

Figure 2.2: Visual Effect

2.3 VISUAL IMPACT

The visual impact of the Project require a consideration of both the visual sensitivity of potential view locations, as well as the visual effect of the Project as indicated in **Figure 2.3**. This methodology has been used successfully in the past for major mining projects involving significant and complex visual impacts.

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

Figure 2.3: Visual Impact Assessment Methodology

2.4 MAP ANALYSIS

Review of topographic maps and aerial photography is completed to illustrate the visual screening effects of adjoining hills and ridges. Vegetation is also a key factor associated with visual screening as the dominant height of open forest and woodland cover in the area is 10m. This heightens the screening effect of topography where tree cover occurs.

Figure 5.1 illustrates the topographic elements and vegetation that provide visual screening to the Project.

Visual Screening to East

The critical view areas to the east are the New England Highway and areas around Lake Liddell. The wooded spur immediately to the east of Drayton Mine provides screening to existing works and will provide similar screening to the Project. However, at a limited number of locations on the highway where the elevation of the highway is higher than the Project Area, intervening hills are unable to screen Overburden Emplacement Areas (OEA).

Visual Screening to North

Forested areas to the north of Thomas Mitchell Drive provide important screening to the rural residential areas to the north east of the Project Area. Some woodland/open forest areas south of Thomas Mitchell Drive and in the north eastern part of the Project Area also provide screening to operational areas.

Visual Screens to West

A combination of gentle topography and a minor spur immediately to the north west of the Project provide screening to most areas in this sector. The exception is the elevated area adjacent to Roxburgh Road. However, this viewing zone is over 10km away and the Project will be seen in the context of the existing mine as well as surrounding mines such as MAC and Bengalla.

Visual Screens to the South West

This area includes the sensitive vineyard and horse stud areas in the vicinity of Saddler's Creek. These areas are screened from the Project by spurs radiating from Mount Arthur and the viewing zone is over 10km away from the Project.

2.5 APPLICATION OF STUDY METHOD

There are numerous locations in the vicinity of the Project that will be visually impacted by the Project. For the purposes of the visual impact assessment, a number of sites within the Primary Visual Catchment (PVC) were selected as representative viewing locations (section 5). These sites were selected with reference to field assessment, aerial photography and topographic 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.

Visibility

For a visual impact to be experienced, landscape alterations resulting from the Project need to be visible. Visibility of the Project, from adjoining view locations was determined by viewing into the Project Area from a range of potential view points. This was further assisted by sight line analysis and photomontage.

Visual Sensitivity

The visual sensitivity of various viewing areas was determined by review of aerial photography, plans of the Project 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.

Visual Effect

The major element of the Project which will have a visual effect on surrounding neighbours is the extension and shaping of the OEAs. The construction of support infrastructure may also create visual effects. The visual effect of the OEA will change over the Project life as the OEA landform is developed in line with principles discussed in Section 2.2.

Photomontages of the Project at Year 0, Year 5, Year 10 and Final Landform from representative viewing locations were prepared to illustrate the visual effect of the Project. The assessments from these locations have been structured to display typical, worst case views of the Project from these areas.

Photographs of the Project Area 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 Year 0, Year 5, Year 10 and Final Landform and the surrounding area were developed from digital surface topography and Project 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 Project Area 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.

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

3.0 EXISTING VISUAL SETTINGS

3.1 SITE LOCATION

The Project Area is located in rolling hills approximately 13km south of Muswellbrook. The Project encompasses an extension of mining operations to the north, east and south of existing operations as discussed in section 4.

3.2 PRIMARY VISUAL CATCHMENT

The Primary visual Catchment (PVC) of the Project is for the greater part determined by the visibility of the OEA as defined primarily by topography and shown in **Figure 3.1**. The PVC represents the area within which the majority of critical views of the Project are obtained. There are some views of the Project from beyond the PVC, especially from distant elevated locations. However, the visual impact of the OEA on these distant locations will be reduced by the viewing distance.

The PVC is defined by Mount Arthur in the south west with ridges and spurs extending to the south east and to the south of Bayswater Power Station and Lake Liddell. The eastern edge of Lake Liddell and adjoining Antiene Rd define use areas on the eastern edge of the PVC. North eastern boundaries are defined by hills and spurs to the east of the highway. Northern and western boundaries are similarly defined by low hills and spurs adjacent to little Grasstree Hill and between this hill and Mount Arthur.

3.3 LANDSCAPE SETTING

The landscape and visual setting of the Project Area and its surrounds are generally defined by undulating rural hills. Two major visual features of this landscape are the natural feature of Mount Arthur and the man-made Lake Liddell. The major land use features in the area are open cut coal mining and power generating facilities.

The topographic, vegetation and water features of the various localities coupled with the cultural land use improvements create the range of visual settings that are experienced in this location.

Topography and vegetation are the major determinants of visibility to the Project. They are also the major 'natural' features of the landscape in this locality. However, the rural landscapes they create are subtle in character and are easily dominated by the existing dominant land uses that are superimposed on the natural landscape, namely:

- Open cut mines; and
- Power stations

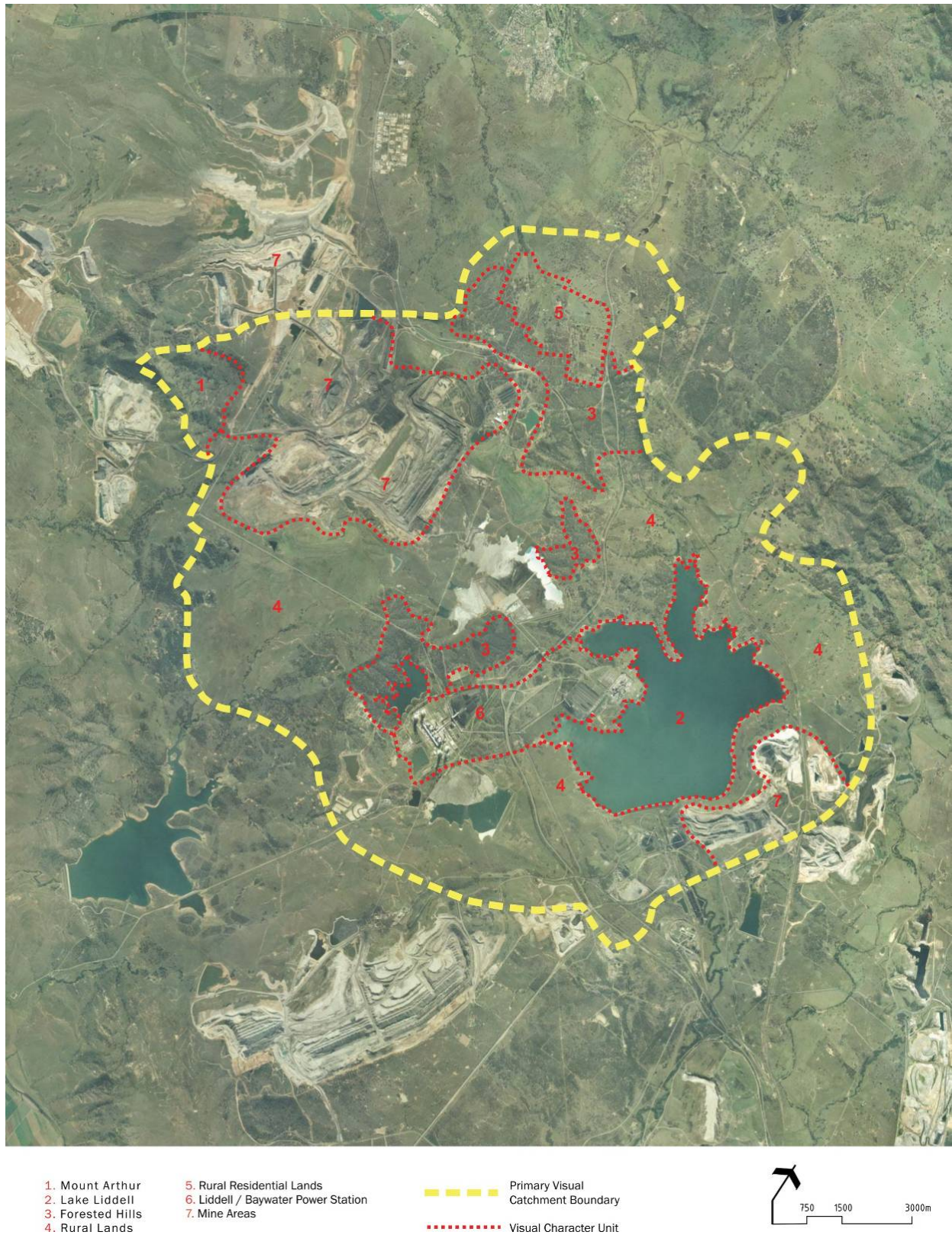


Figure 3.1: Visual Setting

In addition, more localised land use developments also contribute to visual character. These elements include:

- Major Roads;
- Regional Roads;
- Local Roads;
- Railway Line; and
- Transmission lines.

The entire natural and land use features combine to create Visual Character Units that have similar visual features. These combine to create a wide range of visual settings in the locality and the region. The major Visual Character Units include:

- Mount Arthur;
- Lake Liddell;
- Forested Hills;
- Rural Lands;
- Rural Residential Lands;
- Liddell/Bayswater Power Stations; and
- Mine Areas.

3.3.1 MT ARTHUR

Mount Arthur is a major topographic feature of the upper Hunter Region and is visible from many locations (**Figure 3.2**). The steep slopes within the PVC rise from 300m to the peak at 483m. These slopes are for the greater part grass covered with sparse tree cover, increasing in some steeper slope areas. The mountain is often a background feature of many views.

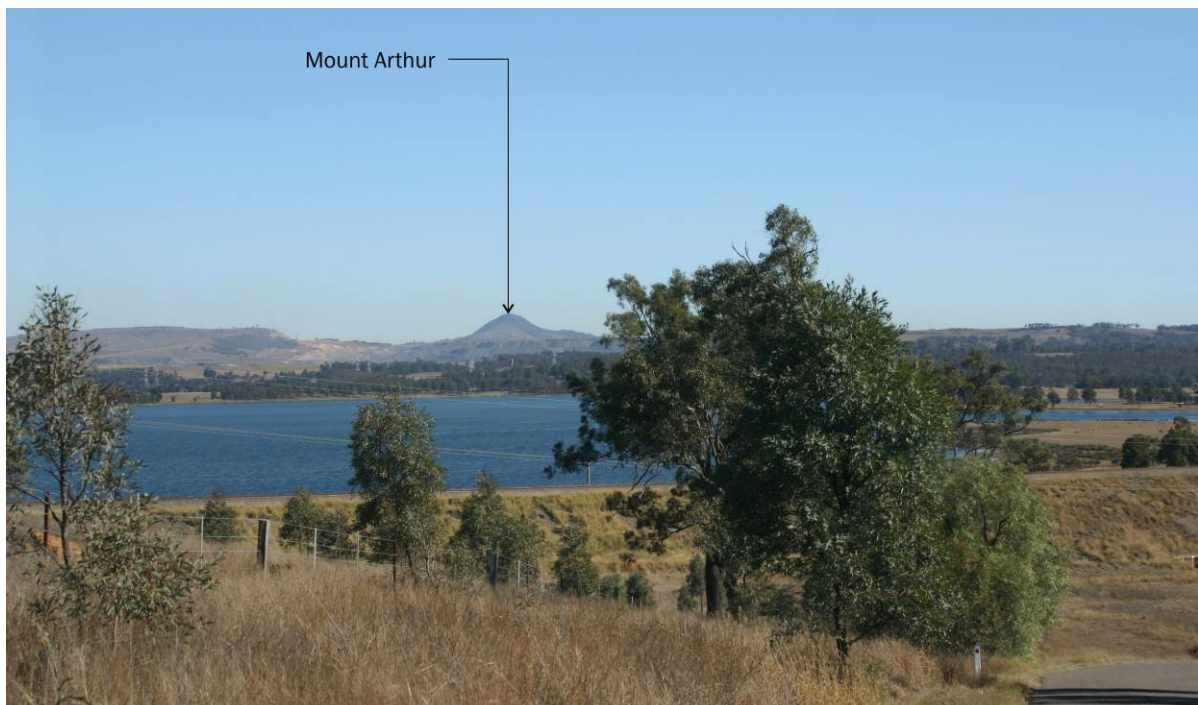


Figure 3.2: Mount Arthur as taken from the Lake Liddell Recreational Reserve

3.3.2 LAKE LIDDELL

This unit includes the waters of Lake Liddell and adjoining foreshore areas. The lake sits in an open landscape that includes views to many other units around it and in the rehabilitated mining areas.

Liddell and Bayswater Power Stations provide a major visual feature of most views from this Unit (**Figure 3.3**).



Figure 3.3. Lake Liddell as taken from the Lake Liddell Recreational Reserve

3.3.3 LIDDELL/BAYSWATER POWER STATIONS

This unit is dominated by the very large scale Power Station elements (**Figure 3.4**), including the water vapour towers and tall chimneys. The Bayswater water coolers are very much a landscape feature of the Upper Hunter as it is viewed from the New England Highway.

Liddell Power Station is hidden for the greater part from highway views, being visible for a short time to views travelling south for a short time.

This visual character unit along with Lake Liddell is a major visual feature of the Upper Hunter Valley as seen from the New England Highway.



Figure 3.4: Power stations surrounding the Project Area, as taken from the Lake Liddell Recreational Reserve

3.3.4 FORESTED LANDS

The Forested Hills are limited in extent, but are significant in their visual screening effects in certain situations. Open dry sclerophyll forest/woodland occurs on undulating lands (**Figure 3.5**), most significantly to the north and east of the Project.

Most significant are forest areas to the north of the Project as these assist in screening the Project and current operations from sensitive rural residential lands as well as from the New England Highway.

3.3.5 RURAL LANDS

Rural lands are characterised by grassland with scattered tree cover on undulating topography (**Figure 3.6**). This is a dominant landscape type in the Upper Hunter Valley.

This visual character unit allows for long distant views due to its openness. It is generally part of most views to the Project forming foreground, middle ground and background components.



Figure 3.5: Forested lands surrounding the Project Area, as taken from Hassall Road



Figure 3.6: Rural lands surrounding the Project Area, as taken from Antiene Road

3.3.6 RURAL RESIDENTIAL AREAS

This area is limited in extent and is located to the north of Thomas Mitchell Drive and to the west of the New England Highway. It is situated on Balmoral, Hassall and Pamger Roads.

Its visual character is predominantly of open rural lands, however, landscape treatments around the more numerous houses, farm buildings, driveways and boundaries give a more intense landscape type (**Figure 3.7**).



Figure 3.7: Rural Residential areas surrounding the Project Area, as taken from Balmoral Road

3.3.7 MT ARTHUR COAL

The existing mine areas of MAC (ie: combined Mount Arthur North and Bayswater) are a significant visual character unit within the PVC (**Figure 3.8**). These areas are characterised by the larger OEA, working faces, and mine infrastructure facilities. However, due to the character of the terrain within the locality as well as mine planning, bunding and screen planting, MAC provides little visibility to external view areas.

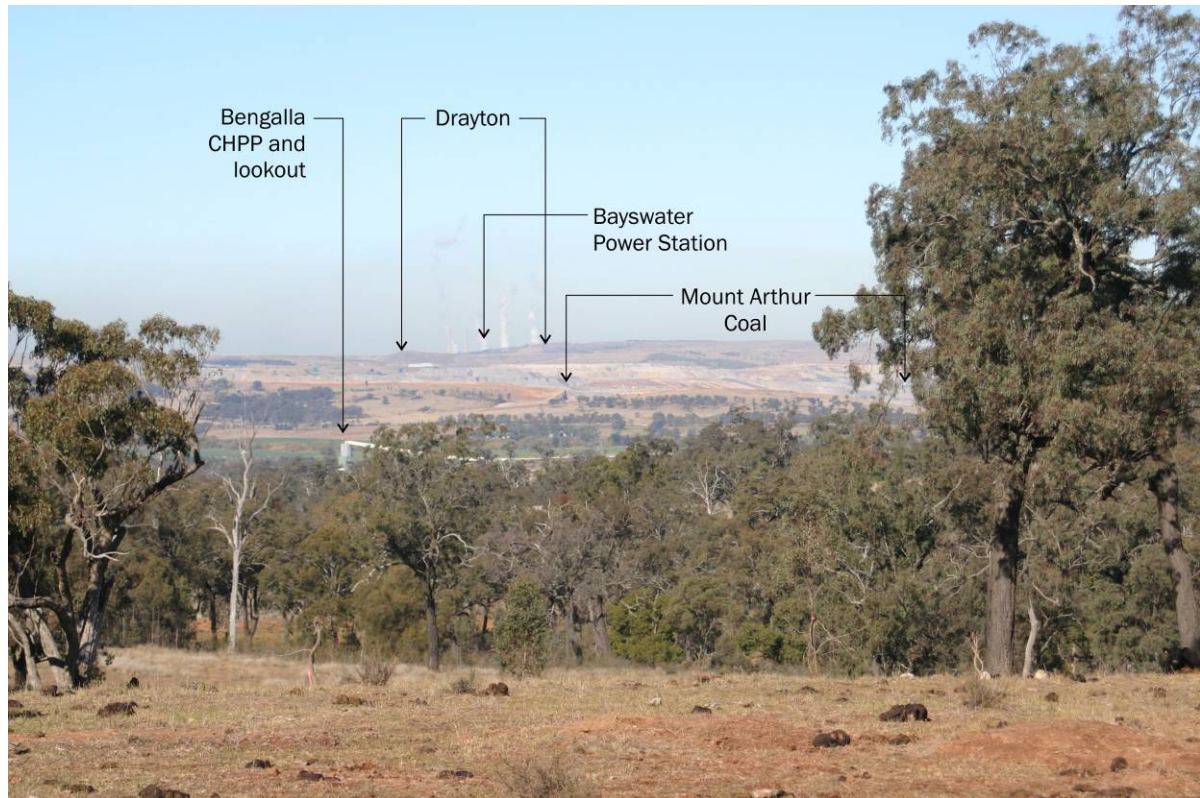


Figure 3.8: Existing mines surrounding the Project Area, as taken from Roxburgh Road

4.0 THE DEVELOPMENT

4.1 GENERAL

The Project, including detailed mine plans, is fully described in the main body of the Hansen Bailey EA (2007). As stated in Section 1.0 of this report, development components associated with the Project that have visual implications include:

- An extension of the mining area and OEAs; and
- Construction of a new ROM and domestic coal stockpile and tailings drying areas.

The proposed extension of the mining and OEAs will have a varying visual effect offsite, however, the minor infrastructure changes will have no effect on external views.

The extension to the existing mining operations will predominantly be to the south of the existing pit, with smaller extensions to the east and north of the existing Pit as illustrated in section 4.0 of the EA.

Mining will continue to be carried out utilising a dragline, excavators, loaders and a fleet of trucks to both uncover and transport coal, and to transport overburden. Additional equipment will be purchased to achieve these tasks.

4.4 DEVELOPMENT COMPONENTS

The visual effect of the Project in relation to external views is created by a number of mining components that occur in sequence. These components are conducted in existing operations and include:

- Vegetation and topsoil stripping;
- Overburden removal and emplacement;
- Mining / active face;
- Restoration grassing of emplacement area;
- Restoration tree planting of emplacement area;
- Roads;
- ROM / coal storage; and
- Retained areas.

Vegetation and Topsoil Stripping

This component involves the removal and stripping of vegetation ahead of advancing mining operations. Subsequently, bare earth is exposed to view.

The potential visual effect of this component is the removal of colour and texture values from the vegetation, which is replaced with the lighter colours of bare earth.

This component will create strong contrast and be visible if in large enough areas and if the cleared area occupies more than 2.5% of a seen area or 5% of a primary view zone.

Overburden Removal and Emplacement

This component will increase the visual effect created by vegetation removal, by introducing lighter earth colours into the landscape. Overburden removal and emplacement will create new earth forms that will contrast to existing mined landforms, whilst emulating them in part.

This component will create a strong visual effect, due to vegetation stripping rather than land form re-creation. While land form re-creation may be considered to have a strong visual effect on site, to off site areas the visual effect of this would be low. This is due to final landforms borrowing shape from existing mining landforms from external viewing locations.

Visual effect from the creation of final OEA may be high before final landforms are shaped and restored. The visual effect will then be reduced to low when final landforms are created. However, due to colour contrast visual effects can retain high visual contrast until re-vegetated.

During periods of high visual contrast a high visual effect will occur if the area is greater than 5% of the Primary View Zone.

Mining / Active Face

The progression of the active mining working face will visually create a flat steep slope. This will contrast strongly with existing landscape colours and form. Unlike the OEAs which are shaped and similar in form to surrounding landforms, the active face is straight, stepped, steep and of a strong colour that contrasts with adjoining landscape colour, forms and shapes.

The active mining face will have a strong contrast in form, shape and colour and have a high visual effect if it occupies more than 2.5% of a seen area or 5% of the primary view zone.

Restoration Grassing of Emplacement Area

The restoration of the emplacement areas with initial grassing will greatly decrease the colour contrast from earth tones to the greens of the grass cover. This green will still contrast with the adjoining forest cover but will gradually emulate the greens/yellows/gold of the surrounding cleared grasslands within the vicinity. The cleared areas will in part also reflect clearing patterns in adjoining areas.

Rehabilitation grassing will reduce visual effects from high to moderate/low depending on viewing angle, distance and whether grass areas are part of the view.

Restoration Tree Planting of Emplacement Area

The eventual enhancement of grassed areas by tree planting areas will reduce visual effect levels to very low as landscape patterns again resemble those of the surrounding rural lands as seen from external views into the site.

Restoration tree planting will further reduce the visual effect of the grass covered restored landforms from a low to very low range.

5.0 VISIBILITY AND VIEWING AREAS

5.1 INTRODUCTION

Areas around the Project were assessed in relation to potential visibility to the Project Area and components of the Project and are illustrated in part in figure 5.1.

Views of the Project Area were assessed from:

- North West – South West Sector (Thomas Mitchell Drive)
- North – North East Sector (Hassall Road)
- East Sector (Antiene Road)
- East – South East Sector (Lake Liddell)
- South – South West Sector (New England Highway)
- North – West Sector (Roxburgh Road)

From these sites, photography of potential views was taken. Selected photography was used for photomontage assessment.

North West – South West Sector (Thomas Mitchell Drive)

Thomas Mitchell Drive defines the northern boundary of the Project Area. However, views to the Project Area are limited by topography and in the north east by topography and vegetation.

Progressing south along Thomas Mitchell Drive from Denman Road, views are dominated by MAC to the west and open rural lands to the east. Views to the Project Area are limited by small ridges and spurs to the north west of the Project Area. It is only on passing these features that limited views to the north western part of the Project Area become visible.

North – North East Sector (Hassall Road)

This sector includes Balmoral, Hassall and Pamger Roads to the north of the Project Area. The houses in this area are generally not orientated to the Project Area and are protected from the Project Area by forested lands that are both north and south of Thomas Mitchell Drive.

East Sector (Antiene Road)

Wooded ridges immediately to the east of the New England highway screen views from the rural areas of Antiene Road. Some of these areas are being considered for future rural residential development, however they have an easterly aspect and do not view towards the Project Area to the west. As such, a photomontage was not developed for the Project.

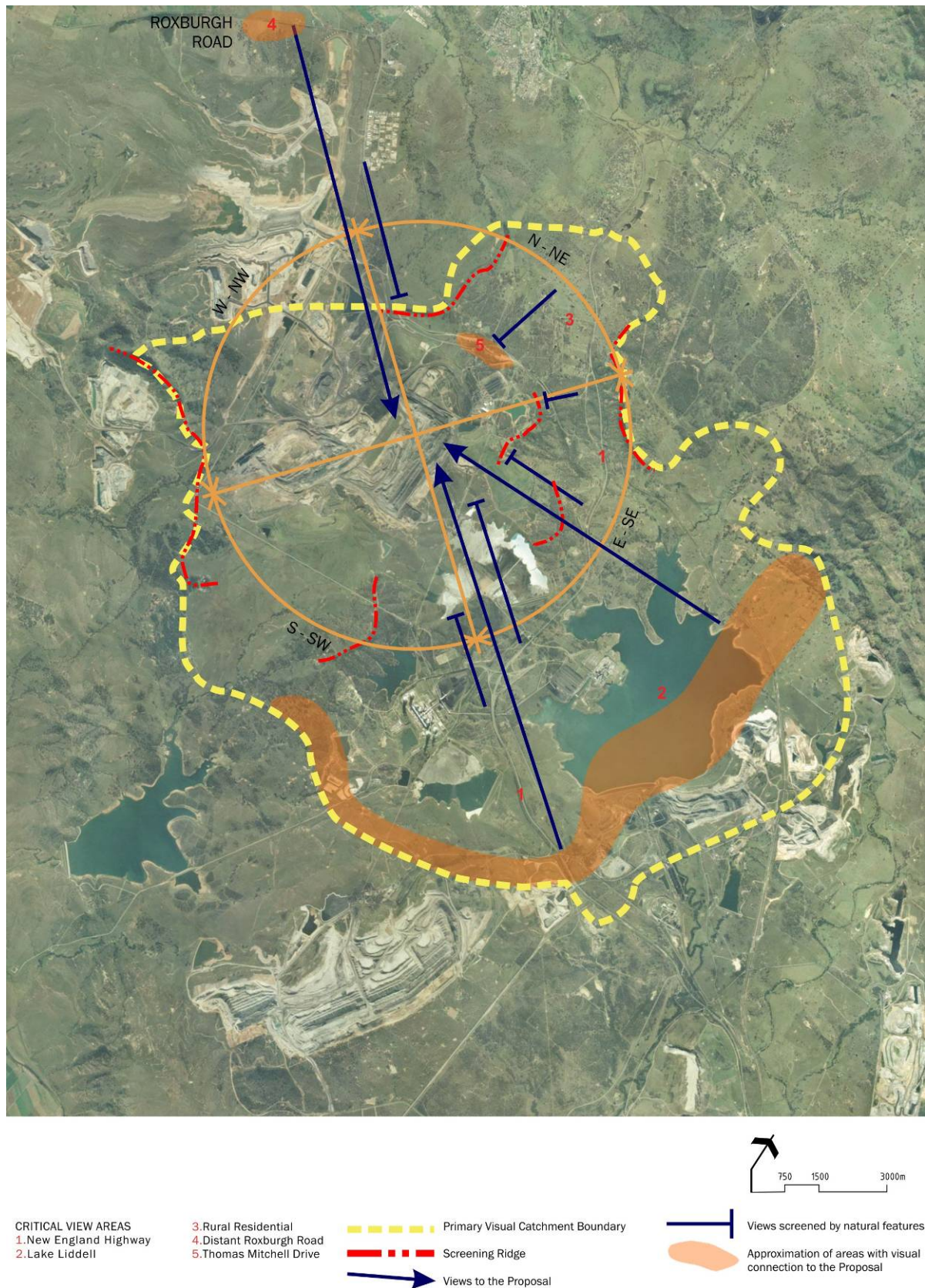


Figure 5.1: Potential visibility to the Project Area

East – South East Sector (Lake Liddell)

The open water areas of Lake Liddell provide the opportunity for long distant views towards the Project Area from eastern foreshore areas and from the lake itself. However the low ridge, wooded areas and vegetation, screen views to the Project Area.

South – South West Sector (New England Highway)

The New England Highway passes to the east of the Project Area. However the highway is situated low in the landscape and is generally screened from the Project Area by higher ground and woodland/dry forest cover to the west of the highway. The exception to this is from a small section of highway to the south of the Bayswater / Liddell Power Stations, where when travelling north, it is possible to view the Project Area over the intervening low ridges and tree cover. However even from this elevated location which is approximately 4.5 km south-west of the Project Area, existing mining operations are not visible.

North – West Sector (Roxburgh Road)

A limited number of houses in the upper part of this road have distant views to the Project Area. From this location, the open cut mine areas of MAC and Bengalla Mine are clearly visible, whilst partial long distance views of the Project Area are available. The Project will be visible from this location but difficult to differentiate from surrounding mining operations.

5.2 SUMMARY

The Project is visible to a limited range of locations around the Project Area. Visibility is dependant on the elevation of Project features, primarily the OEAs, viewing locations and the presence or absence of intervening topography and vegetation.

There is generally good screening topography all around the Project, however the scale of the OEAs tends to dominate these features in such a way that if viewing locations are set back from the screening topography then views over these features are provided of the Project. This is the case with the views from the New England Highway and Lake Liddell.

The critical view areas to the north of the site from rural residential areas are screened by intervening topography and vegetation. In the same way, views from low lying country to the west are similarly screened. It is only from the distant but elevated western hills in the vicinity of Roxburgh Road that partial views are obtained, although mining operations are difficult to distinguish.

The south western and southern sectors of the Project Area are screened from view by the significant ridges and spurs radiating from Mount Arthur.

South east and eastern areas are screened by the spur immediately to the east of the Project Area, but more distant locations can overview this to the elevated OEAs. These locations are few, especially as they relate to sensitive view locations.

6.0 VISUAL IMPACT ASSESSMENT

The visual impact of the Project is dependant on a combined consideration of visual effect and visual sensitivity as shown in **Figure 2.1**. However for a visual impact to occur there has to be visibility of the Project Area. The visibility of the Project from each sector is summarised below based on findings outlined in **Section 5.0** above. This is then considered along with visual effects and sensitivity to define impact levels.

6.1 NORTH WEST – SOUTH WEST SECTOR (Thomas Mitchell Drive)

Visibility

Visibility in this sector is limited to foreground views from Thomas Mitchell Drive. The remainder of the sector is screened by minor ridges and spurs as well as MAC.

The exception to this is the elevated area in the vicinity of Roxburgh Road. From these elevated areas views over the Project Area and the adjoining MAC will be seen.

Visual Effects

The visual effects of the Project on this sector are limited to foreground areas along Thomas Mitchell Drive, when the Project is closest to the road in Year 10. The visual effects of the Project on Thomas Mitchell Drive are illustrated in **Figure 6.1**.

No visual effect will be visible until Year 5 of the Project. From this time until Year 10, the north - west face of the OEAs will be visible. From Year 10 until Final Landform, the OEA rehabilitation work will be completed.

The emplacement face will initially be bare earth fill, creating a high visual effect. This will then be grassed creating a moderate effect that will become low when the re-grassing takes on the seasonal colours of the adjoining grassland. This visual effect will be further reduced to very low when tree and shrub planting establishes the tree/grassland patterns of adjoining areas.

When the Project is seen from distant elevated areas such as Roxburgh Road, the active face and overburden emplacement areas will present as a pattern of various colours that will complement those already existing in the landscape due to the current operations of MAC and Drayton itself. The visual effect of active work areas will be low as they borrow shape, pattern and colour from existing mine operations. In the same way when rehabilitation work is completed, the Project Area will resume the character of the rural landscape creating a very low visual effect.

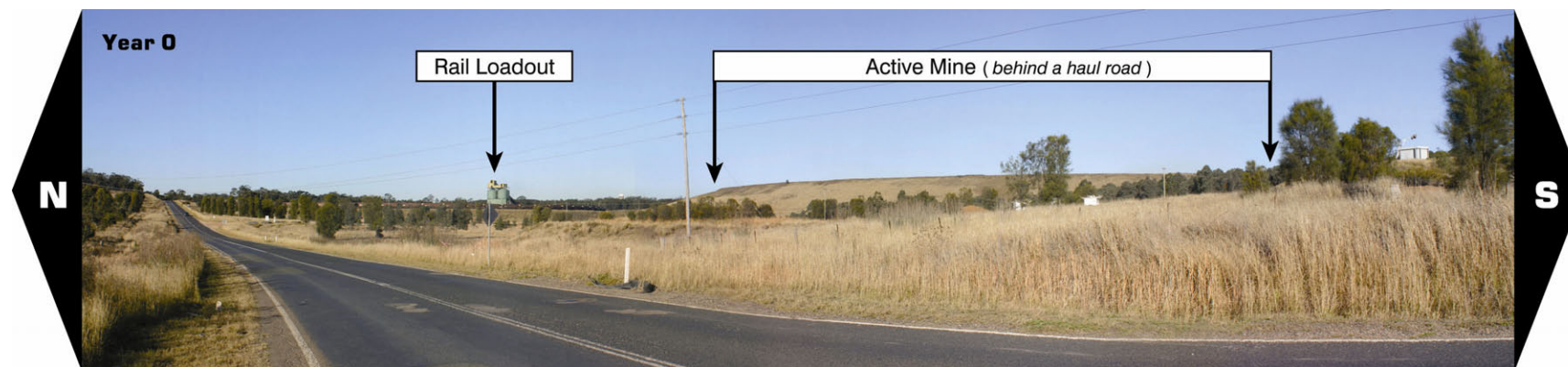


Figure 6.1a: Photomontage - The Project as seen from Thomas Mitchell Drive

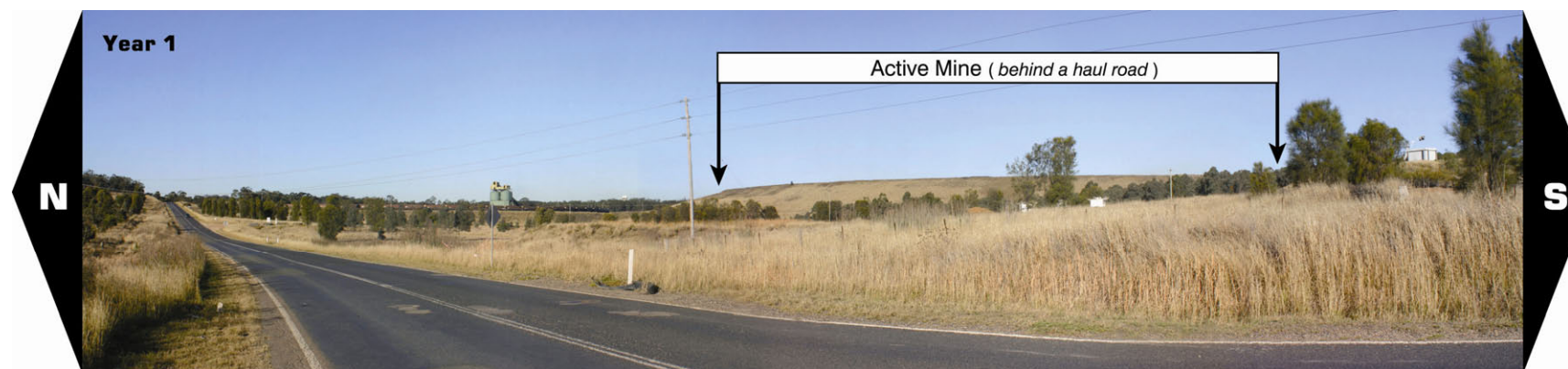


Figure 6.1b: Photomontage - The Project as seen from Thomas Mitchell Drive



Figure 6.1c: Photomontage - The Project as seen from Thomas Mitchell Drive

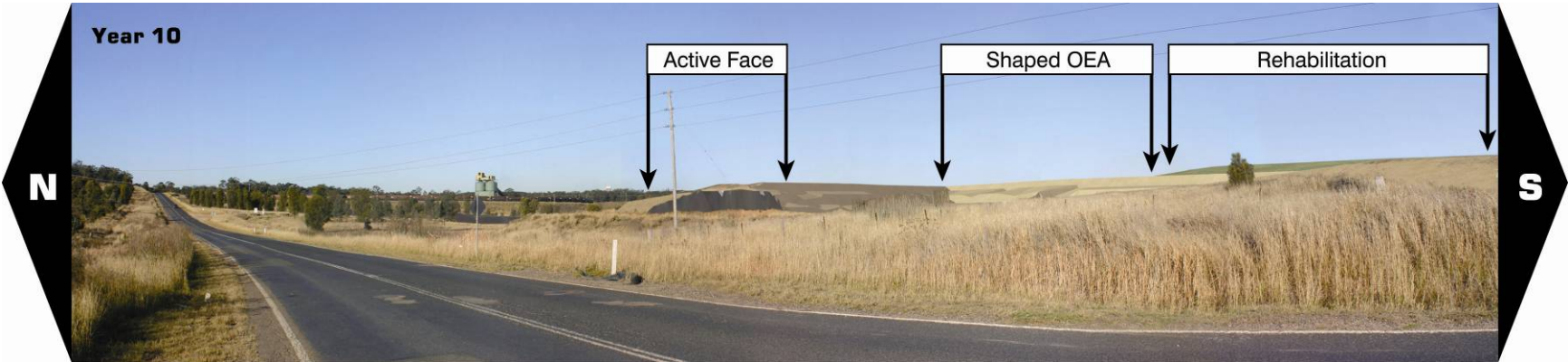




Figure 6.1e: Photomontage - The Project as seen from Thomas Mitchell Drive

Visual Sensitivity

The visual sensitivity of areas within this sector are generally low. Thomas Mitchell Drive is essentially an industrial road and acts as access road to the Project Area and MAC as well as the industrial area on Thomas Mitchell Drive and has low sensitivity.

Rural residences on Roxburgh Road would have a moderate to low sensitivity being some 13 - 15km away from the Project Area.

Visual Impact

There is initially no visual impact associated with the Project on Thomas Mitchell Drive between Project Years 1 and 5. The visual impact during the period Year 5 to Year 10 is moderate to low and impacts would become low to very low once the Final Landform is completed.

The visual impact on Roxburgh Road is low due to moderate sensitivities and low to very low visual effects. This reflects the high visual integration of mine operations with existing operations creating low visual effects and the moderate sensitivity of views due to the background views from this distance (greater than 10km).

In summary there is no significant visual impact from the Project on this sector.

6.2 NORTH -NORTH EAST SECTOR (Hassall Road)

Visibility

While there would be views from elevated rural areas, the critical view areas are lower in the landscape. The critical visual areas in this sector are all but completely screened from views to the Project (**Figure 6.2**).

Visually critical areas in this sector include the rural residential areas of Hassall Road, Balmoral Road, Pamger Drive and the New England Highway. Parts of Thomas Mitchell Drive are also in this sector although this area is not as sensitive as the highway and the rural residential areas.

From the photomontage location taken in Hassall Road, the maximum height the OEA (295m) is still screened by the trees on top of the ridge to the east of the Project Area.

In a similar way the same forested ridge as well as foreground forest and woodland areas screen the New England Highway and Thomas Mitchell Drive within the sector.

Visual Effect

There is no visual effect in this sector due to lack of visibility. If any areas were seen it would only be the very top of the emplacement area that would create initial high effects due to the sliver of earth colour mound that would be visible above the trees, however this would be such a small part of the overall primary view zone that such effects would be reduced to moderate. These effects would very quickly be reduced to low and very low as rehabilitation works are completed.



Figure 6.2a: Photomontage – The project as seen from Rural Residential Areas on Hassall Road



Figure 6.2b: Photomontage – The project as seen from Rural Residential Areas on Hassall Road

Sensitivity

The sensitivity of the rural residential areas at this distance from the Project would be high. However, as long as the Project is not visible the level of sensitivity would be low. Further visual orientation and foreground forest and woodland all contribute to reduce the significance of the Project to these sensitive areas.

Rural areas would have a low sensitivity as does Thomas Mitchell Drive. The highway would have moderate sensitivity at this distance but views to the Project are screened from this linear view location in this sector.

Visual Impact

There is no visual impact of the Project on this sector. The screening effects of the forested ridge to the north east of the Project Area and additional woodland/forest in the foreground of critical view locations ensure the Project will not be visible from this sector.

6.3 EAST - SOUTH EAST SECTOR (Lake Liddell)

The major use areas in this sector are the New England Highway and recreation areas associated with Lake Liddell.

The New England Highway in this sector is located low in the landscape and is screened from the Project by adjoining ridges, spurs and vegetation to the west of the highway. In the same way western parts of Lake Liddell are likely to be screened from the Project.

However the eastern foreshores of Lake Liddell as well as water body areas have open foregrounds across the lake itself. This allows for long distance views to the Project, or more specifically various parts of the OEAs come into view from Year 5 till Year 10.



Figure 6.3a: Photomontage – The project as seen from Lake Liddell



Figure 6.3b: Photomontage – The project as seen from Lake Liddell



Figure 6.3c: Photomontage – The project as seen from Lake Liddell

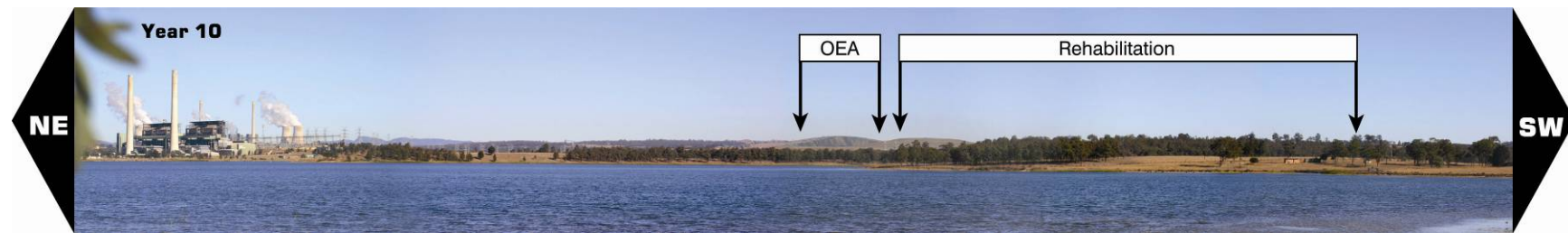


Figure 6.2d: Photomontage – The project as seen from Lake Liddell



Figure 6.3e: Photomontage – The project as seen from Lake Liddell

Visual Effects

The visual effect of the Project on the visual setting of this sector is created by the creation of the OEAs. As these are built up they come into view over small adjoining ridges and spurs to the east of the site. As they are constructed they replace an existing and rehabilitated OEA further to the west in the Project Area.

As the Project OEA borrows shape and form from the existing landscape (the existing emplacement area) visual effects will be moderate before rehabilitation is conducted. When grassing is complete visual effects will be low and become very low when informal tree planting is completed.

Sensitivity

The visual sensitivity of the Lake Liddell area is considered to be moderate, as this distance is 5 - 7km away from the Project Area. The sensitivity of minor roads and rural areas within the sector is low.

Visual Impact

The visual impact on seen areas within this sector are limited to more distant eastern areas that overlook low ridges and spurs to the east of the Project Area. Moderate impacts are experienced by recreation areas around and on Lake Liddell for short periods of time until grassing of newly formed OEAs is completed with low to very low impacts being experienced. Moderate impacts will be experienced for varying periods from Year 1 until Year 10 with the completion of the Final Landform.

There is no visual impact from the Project on the New England Highway in this sector.

6.4 SOUTH EAST SECTOR (New England Highway)

This sector is dominated by rural lands, mining areas and the Bayswater and Liddell Power Stations. The most significant use area in the sector is the New England Highway.

Views to the Project are most prominent from the southern parts of the PVC. These areas are more elevated and have a northerly aspect that affords views to the Project. Areas further north from these elevated areas are at a lower elevation and are more likely to be 'tucked in' beside low woodland covered hills. These hills although minor in form act as foreground visual screens and block views to the Project.

Reflecting this condition, views to the mine from the New England Highway are limited to approximately 500m – 1000m which equates to less than one minute of a road view. Further views to the Project from the highway are only gained on the trip north. The Project would not be visible to highway users travelling south.



Figure 6.4a: Photomontage - The Project as seen from New England Highway

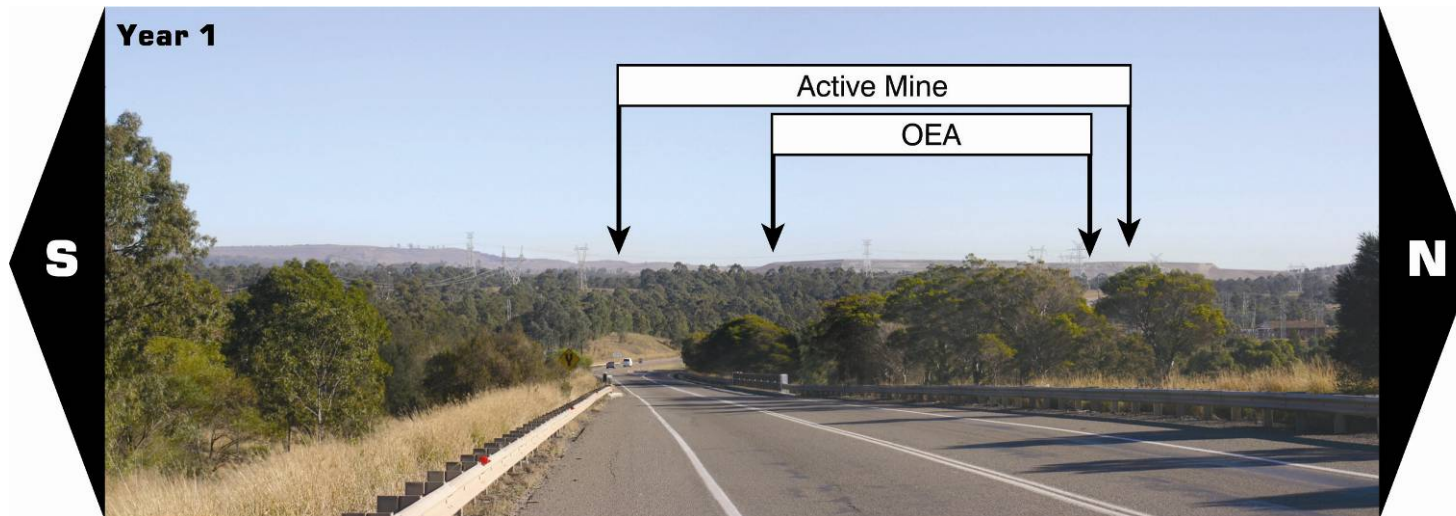


Figure 6.4b: Photomontage - The Project as seen from New England Highway

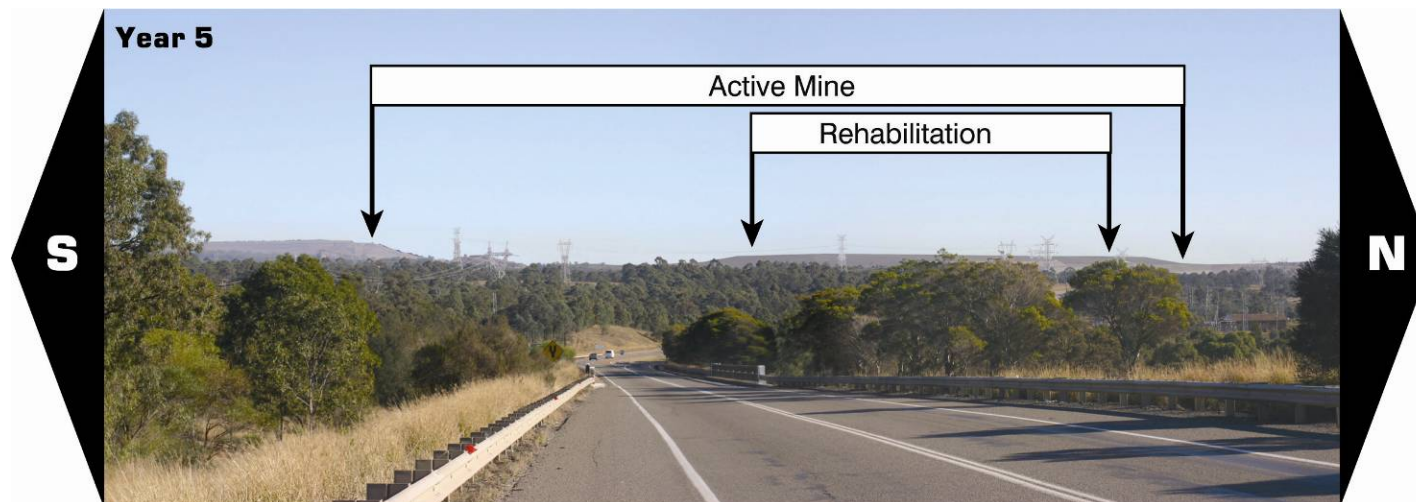


Figure 6.4c: Photomontage - The Project as seen from New England Highway

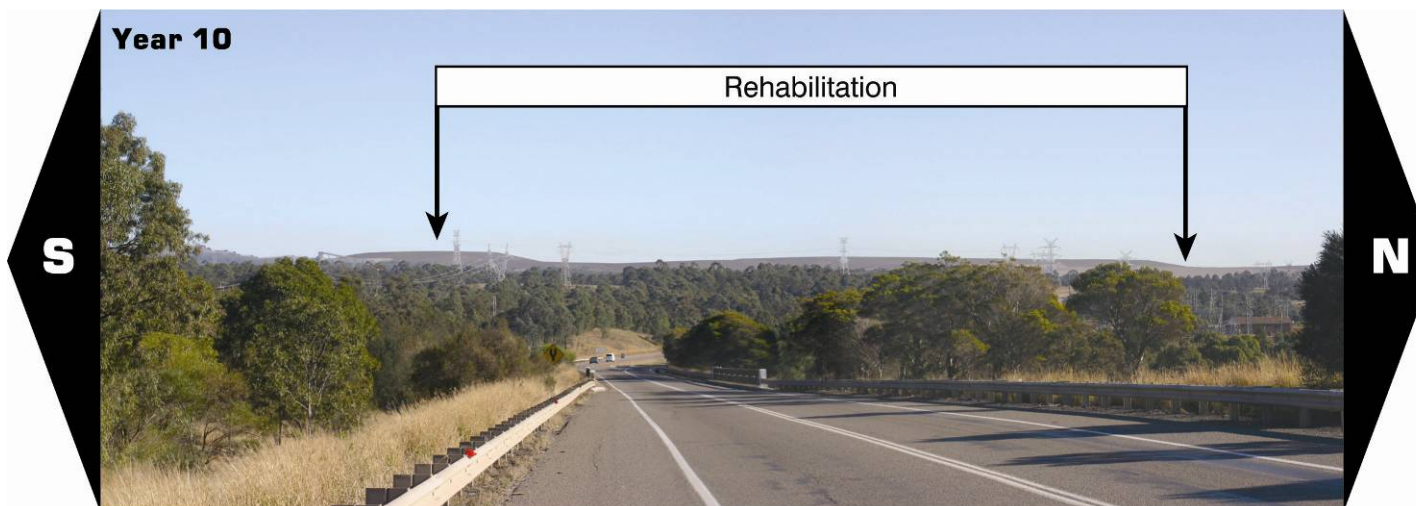


Figure 6.4d: Photomontage - The Project as seen from New England Highway



Figure 6.4e: Photomontage - The Project as seen from New England Highway

Visual Effects

The visual effect on the sector is created by the OEAs. In relation to this sector, visual effects are experienced from Year 1 until Year 10 to varying degrees, with high visual effects being experienced from Year 1 - Year 5. This high visual effect reflects the scale of the OEA, its visual prominence on the skyline and the colour contrast created by the overburden material. This visual effect will reduce to moderate and low when grassing is complete and very low when informal tree planting is carried out.

From Year 5 until Year 10, smaller areas of the view shed are affected by overburden emplacement creating a moderate visual effect that again will reduce to low and very low when rehabilitation works are completed.

Visual Sensitivity

The visual sensitivity of the sector is generally low, reflecting the rural, mining and power generation of the locality. The only land use with higher sensitivity in the sector is the New England Highway, which has moderate to low sensitivities to the Project at this distance, some 5-8km away.

Visual Impacts

The visual impact of the Project on the sector is generally moderate to low. Moderate visual impacts, reflect the low visual sensitivity of the sector even when high visual effects are temporarily created. These impact levels reduce to low and vary when visual effects are reduced to moderate or low.

The visual impact on that part of the New England Highway from which it is seen is high while visual effects of the OEA are high. However this will only occur if large areas of the emplacement are left in an un-rehabilitated state creating large areas of colour contrast. Once visual effects are reduced to moderate or less from Year 5, visual impacts will reduce from high to moderate and lower as rehabilitation occurs.

6.5 LIGHTING IMPACTS

Introduction

The visual effect of lighting surrounding the Project Area 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.

Direct Light Effects

The only locations that would have direct line of sight to night lighting are elevated locations such as Roxburgh Road that overview any screening topography and vegetation. These locations are very distant being over 12 km away from the Project Area which mitigates the effect.

As is currently experienced, any direct night lights in this viewing zone include that of MAC, Bengalla, Liddell and Bayswater Power Stations and the existing Drayton lights.

Diffuse Light Effects

At Drayton, operational areas and machinery night lighting will not be directly visible to most locations due to the screening effect of 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 Area.

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 MAC, Bengalla, Liddell and Bayswater Power Station and by Drayton itself.

Night Light Impact Level

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

Mitigation and Management

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

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

6.6 SUMMARY OF IMPACTS

The visual impacts of the Project on the sectors are generally not considered significant (**Figure 6.5**). Any significant impact will only occur for relatively short periods of time when large areas of OEAs are visible from sensitive locations and until rehabilitation with grass cover is complete.

The visual impact on the western areas through to the north eastern sector is not significant as the Project is not seen from most of these areas. If any areas are visible, then this viewing zone will be influenced by the context of other mining operations thereby creating low impacts.

From the east through to the south west, the overburden areas will be visible and will initially create strong visual effects. However the low visual sensitivity of most of the areas within these sectors creates a low visual impact that will reduce to very low when rehabilitation is complete.

Impacts on individual locations in the sector are moderate due to the distance of the Project from the sensitive locations of the New England Highway and Lake Liddell. These impacts are quickly reduced to low and very low when rehabilitation is complete.

The visual impact associated with lighting from the Project will remain at a similar level to current operations and is considered not to be significant.

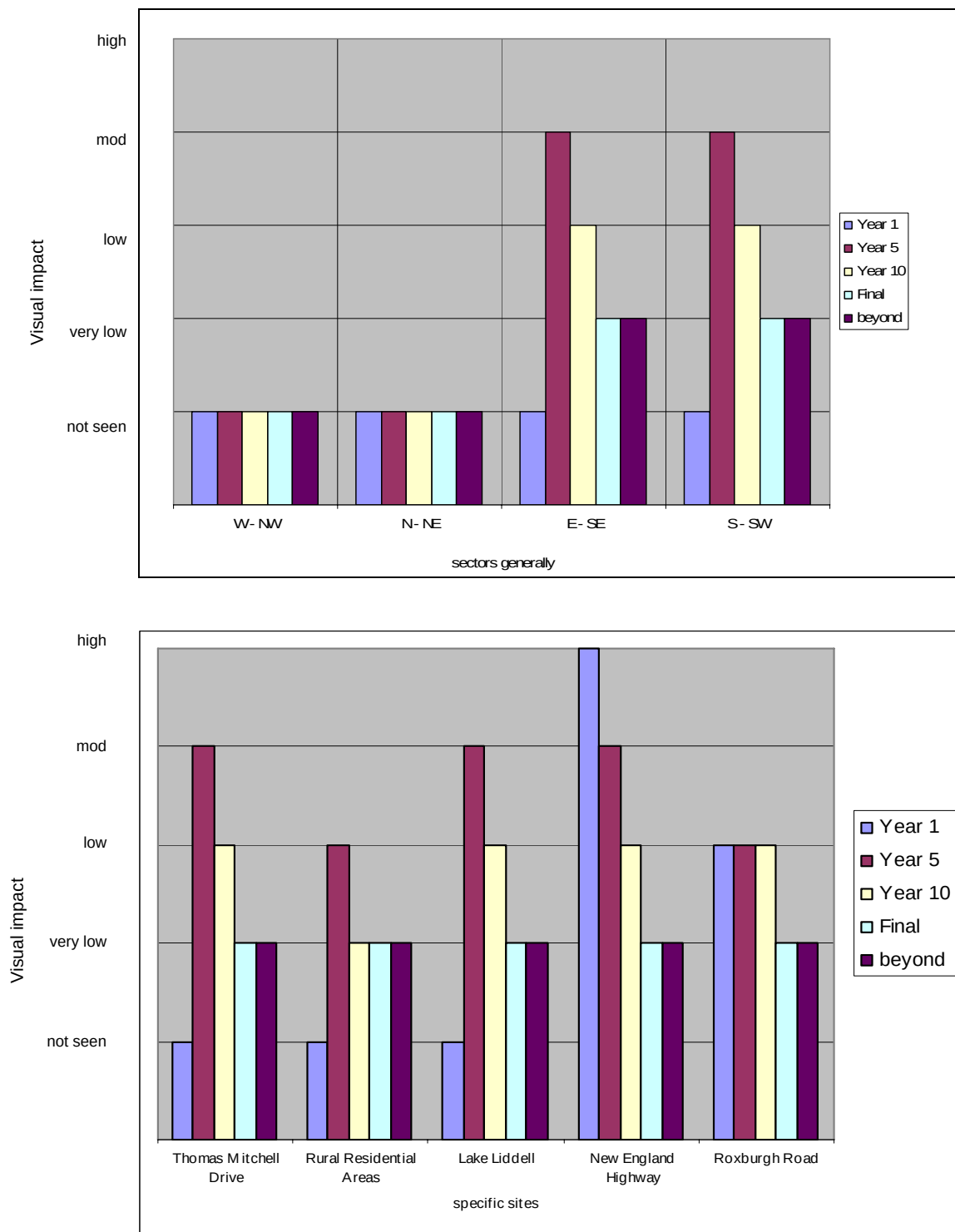


Figure 6.5: Visual impacts at selected years of the Project life

7.0 RECOMMENDATIONS

It is recommended that the normal sequence of overburden emplacement, shaping, rehabilitation and planting of tree species be continued. As currently occurs, expeditious completion of rehabilitation is recommended, with priority given to south easterly and southerly views where practical. Dense tree planting along Thomas Mitchell Drive is recommended in the early development years, to assist reducing impacts from this sector to very low.

The establishment of informal tree stands that reflect the scale and pattern of adjoining tree/grass areas is also important, given the skyline location of the OEA. Completion of this treatment will reduce impacts to very low.

Night lighting should be kept to the minimum level necessary for operational and safety needs. Care should continue to be taken to orientate lighting away from private viewing points and public roads and all night lighting should continue to be directed to the ground and work areas.

8.0 CONCLUSION

A major visual impact mitigating factor is the visual context of the Project which is dominated both within the visual catchment of the Project Area and in the greater region by open cut mine landscapes that include active working faces, unconsolidated overburden areas, rehabilitated overburden areas, mine infrastructure and power generation facilities. The Project is in context with these visual elements.

Even with little reference to this context, the visual impact of the Project is generally low due to limited visibility, low sensitivity of all but a few viewing locations and the speed with which any visual effect can be reduced from high to moderate to low and eventually to very low impacts.