

Figure 4.3 | Modification Overview - Year 8 Mine Plan

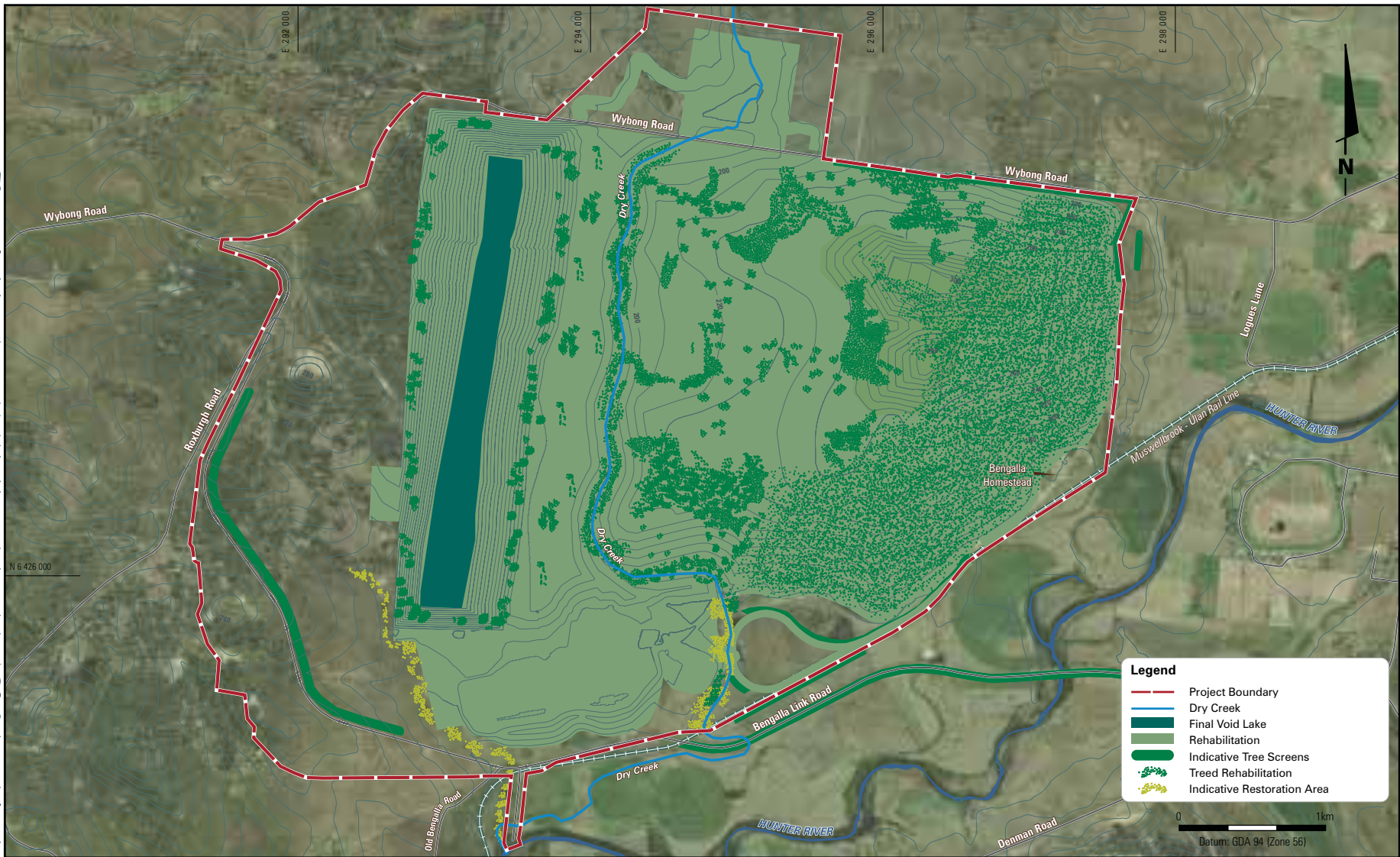


Figure 4.4 | Revised Conceptual Final Landform

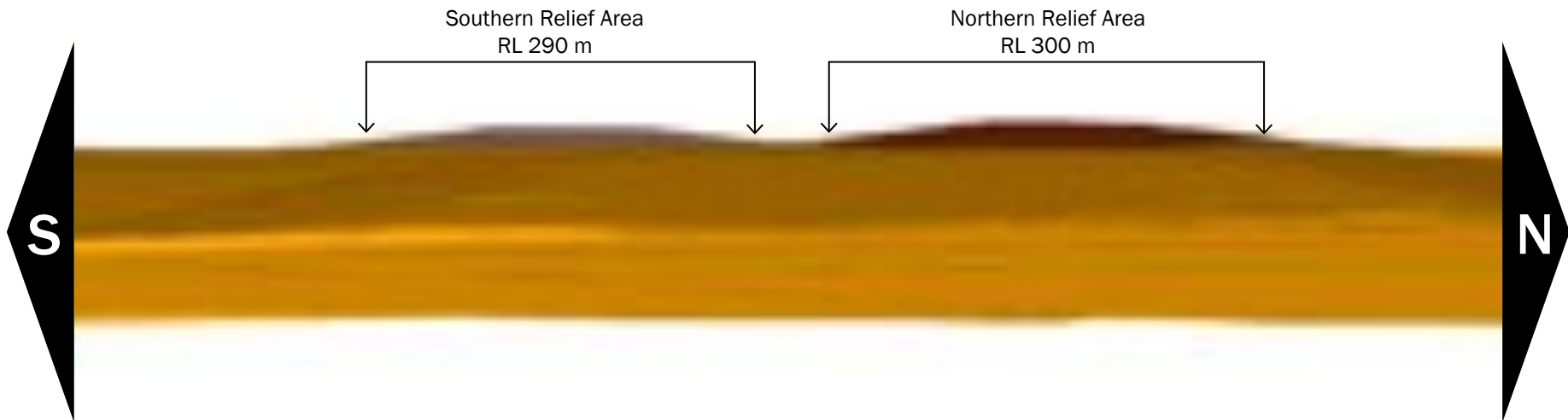


Figure 4.5 | *Elevational profile of Northern and Southern Relief Areas*



Figure 4.6 | *Elevational profile of Northern Relief Area*

5. Visual Sensitivity

5.1 General

The Modification has been assessed from various viewing locations. Visibility to the Modification depends on factors such as topography and vegetation, existing and approved development components of Bengalla especially the OEA, proposed visual impact mitigation measures, existing visual bunds and infrastructure components.

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

5.2 Primary Visual Catchment

The boundary of the Primary Visual Catchment (PVC) for the Modification and various view sectors are illustrated in Figure 5.1 and defined below:

- The Northern View Sector that includes the town of Aberdeen;
- The Eastern View Sector that includes the town of Muswellbrook and adjoining foothills;
- The Southern View Sector that includes the foothills south of the Hunter River Floodplain; and
- The Western View Sector that includes the ridge line of the foothills in the vicinity of Roxburgh Road.

5.3 Viewing Locations – General

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

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

For the purposes of this assessment, a number of sensitive viewing points within the PVC have been selected to illustrate the visual effect using photomontage (refer Section 6).

5.4 Visibility Considerations

5.4.1 Visibility

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

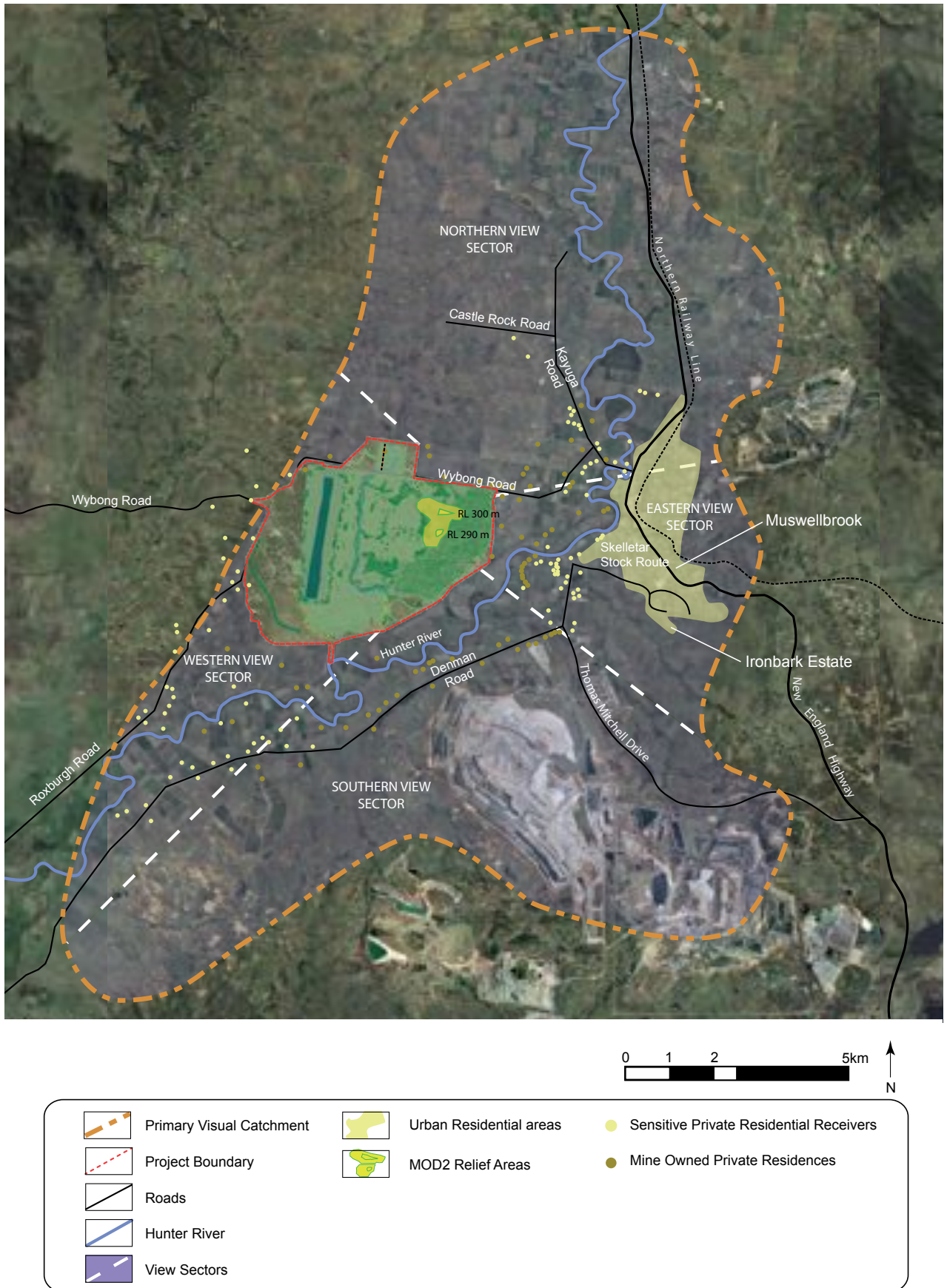


Figure 5.1 | View Sectors and Private Receivers

In relation to the Modification, the influence of vegetation and tree cover at the point of viewing has the potential to screen views to the Modification and approved OEA (refer Figure 5.3). Vegetation close to the approved Project Boundary has limited effect in influencing visibility, (refer Figure 5.4).

In nearby towns, viewing opportunities of the Modification may be limited to the upper profiles as the Relief Areas lie within view zones that are screened by adjoining buildings, gardens and street trees. This screening effect can also be important in relation to individual rural residences where adjoining sheds and/or homestead gardens and trees adjoining gardens and sheds can create foreground screens. This screening effect may be diminished when viewing locations are situated in elevated locations, Figure 5.5.

5.4.2 Land Use Sensitivity

Surrounding the Project Boundary, land use varies which then influences the sensitivity patterns towards the Project. Land use activities include a range of agricultural pursuits, rural residences and urban residential areas, tourism and recreation locations, road and rail corridors, as well as coal mining. These land use features contribute to the visual character of the landscape as well as influence visual sensitivity. (Land uses are discussed in more detail in Section 3 of this report).

In this context, residential areas such as Muswellbrook or rural residences will have sensitivity to larger scale changes to the landscape. As such, these have been assigned a high sensitivity up to 7.5 km away from any visible modification component with a moderate sensitivity resulting for homesteads further away. In the same way, recreation and tourist facilities, as well as tourist roads and highways have been assigned a high sensitivity to up to 2.5 km away. Other significant roads have been assigned a moderate sensitivity up to 2.5 km with minor roads and rural production areas receiving a low sensitivity, (see Figure 2.2).

Visual sensitivity to the Modification remains constant as it is a relatively smaller scale component of the overall Bengalla Mine. The moderate to small scale lateral shifts of the Modification profile has minor effect on the extent of visual sensitivity in the view catchment. The actual visual impact relates to the overlay of visual effect of the Modification over time. This is a variable factor due to the approved rehabilitation regime. This is discussed further in Section 6: Visual Effect.

5.5 Northern View Sector – Visibility and Visual Sensitivity

The Northern View Sector includes a number of sensitive receivers in the form of rural residences along Wybong, Kayuga, and St. Heliers roads and other minor roads off these roads as well as the New England Highway and Aberdeen.

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

The Northern Sector contains parts of:

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

5.5.1 Hunter River Floodplain

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

The residences are usually associated with rural lots. While the lots have low sensitivity, the residences

have high sensitivity to any potential views to the proposed Modification areas.

Views for any residence that is orientated toward Bengalla would be onto the north-eastern and eastern faces of the Modification and the approved rehabilitated OEA. Visibility to other approved Project elements remains minimal.

Residences with views would have a high sensitivity. The Modifications do not alter the visibility to other approved Project elements. For those residences with views to the approved OEA, the Modified OEA relief areas will be visible above the approved finished levels. Those that are screened from the Modification and approved Project have been ascribed a low sensitivity due to lack of visibility.

5.5.2 Foothills

There are a limited number of residences in the foothills. Most are screened by the adjoining topography to the west of Kayuga Road. Closer residences adjacent to Wybong Road are owned by BMC or Coal & Allied. These residences have views onto the rehabilitated northern and eastern faces of the new Relief Area and the approved OEA.

5.5.3 Aberdeen

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

Views from the town are over the existing rehabilitated OEA and views onto proposed Modification are negligible.

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

5.5.4 Roads

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

Again, despite distance to the Project Boundary, elements of the Main OEA Modification will be visible while heading south. Views are limited to the rehabilitated eastern and northern faces of the elevated Relief Areas with the Northern Relief Area being more visible.

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

5.6 Eastern View Sector – Visibility and Visual Sensitivity

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

Visibility to the existing approved mining operations and the Northern and Southern Relief areas is high. This is due to the town's western orientation and position of the relief areas overlaying the approved OEA. Eastern Sector visibility largely focuses on the eastern part of the OEA modification and approved OEA that has been rehabilitated.

5.6.1 Hunter River Floodplain and Foothills

This VCU contains parts of the New England Highway, some minor roads including Wybong, Kayuga,

McCullys Gap, and St Heliers Roads. These roads support rural residences.

The residences in the vicinity of Racecourse Road are the closest to the Modification in the VCU (approximately from 2.5 km). However, the more distant residences (approximately from 6.0 km) at the new Ironbark Ridge Estate have both a more critical angle of view and an elevated location. While the houses in this locality are part of Muswellbrook, the visual relationship of these areas differs from the majority of Muswellbrook. Racecourse Road to Bengalla experience views similar to the rest of the floodplain, whereas Ironbark Ridge Estate experience elevated views similar to the foothills.

The residences at Racecourse Road and rural residences on the floodplain will have a high sensitivity depending on the extent of visibility to the Modification. Visibility to the new Relief Areas from this sector is high. Views will be restricted to the east and south-east faces of the new Relief Areas which will be in a progressively rehabilitated state above the approved 270 m OEA level.

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

The Racecourse itself is also ascribed a high sensitivity as it is a recreation area. Views to the OEA Modification would include the eastern and south-eastern faces of the new Relief Areas visible above the existing approved rehabilitated OEA. Viewing locations are on the eastern edge of the track, looking west. Figure 5.8 shows the view from the track.

Residences and recreation uses in this location are given a high sensitivity rating due to visibility of the OEA Modification.

The OEA Modification will not be visible from Bengalla Homestead, therefore no visual impacts are anticipated to occur.

Muswellbrook

On the basis of land use, residences in Muswellbrook are generally assessed as having moderate to high sensitivity depending on the viewing distance to the OEA Modification.

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

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

Residences along and around Ironbark Road will have some visibility to the Northern and Southern Relief Areas as foreground vegetation is limited. These residences are less than 7.5 km from the OEA Modification. The elevation of this area also places viewing locations above topographic and vegetation screening resulting in high sensitivity levels.

Residences in North Muswellbrook would generally have high sensitivity because of visibility to the Modification.

5.6.2 Roads

There will be views to the OEA Modification from the New England Highway as it enters Muswellbrook from the south-east. Views from this location (refer Figure 5.7 and Figure 6.1) are further than 2.5 km from the OEA Modification in this view sector resulting in high to moderate sensitivity. Denman Road within

the sector is also further than 2.5 km and will have limited views from the western part of the road in the sector, creating a moderate sensitivity.

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

Local roads will have a low sensitivity. Denman Road will have a moderate sensitivity with limited views.

5.7 Southern View Sector – Visibility and Visual Sensitivity

5.7.1 Hunter River Floodplain & Southern Foothills

The VCU contains a number of view locations. Denman Road and parts of Thomas Mitchell Drive and Edderton Road occur within this sector. The sector contains residences toward the western end of Denman Road and the historic homesteads of 'Edinglassie' and 'Rous Lench' over 2.5 km to the south of the OEA Modification.

The most sensitive view locations in the Southern Foothills VCU include a limited number of residences, (refer Figure 5.1), approximately 6.5 km away from the Modification, on the south-western edge of the view sector. These areas and similar areas with open views to the approved Project will be highly sensitive up to distances of 7.5 km. Views to the OEA Modification from these areas will be limited due to the orientation and distances however sensitivity is also high.

Locations at greater distances, a moderate sensitivity will be experienced.

5.7.2 Pukara Estate

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

There are views towards the OEA Modification from the entrance to the estate on Denman Road, if travelling from the west (refer Figure 5.9 - view from Denman Road).

These views are over 7.5 km away from the Main OEA south-west edge. Views onto the approved Project and the OEA Modification will see a subtle increase in the height of the Southern Relief Area. In the broader landscape context and viewing distance from the Modification, this change will be minor.

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

5.7.3 Edinglassie and Rous Lench

These homesteads are located on Denman Road approximately 3.8 km from the southern face of the Southern Relief Area. These homesteads would have some views to the OEA Modification but not from primary view zones around the main homesteads. 'Edinglassie' main view zone is to the south and 'Rous Lench' is to the east. These homesteads would have high impact, but screening as identified in the Bengalla Historic Heritage Management Plan 2015 mitigates views to it (subject to HVEC approval).

The Main OEA will shield views to Homestead Access.

Sensitivity levels for the homesteads would be moderate to high depending on individual levels of screening that may limit visibility, as the homesteads are less than 7.5 km from the Modifications.

5.7.4 Denman Road Rural Residential

The properties along Denman Road within this sector not owned by the mining companies are approximately

4.5 km away from the approved Project Boundary and approximately 7 km from the south-western face of the OEA Modification.

As these properties are primarily on the edge of the Hunter River Floodplain, the landform is flat and open, allowing long views towards the Modification. Properties oriented north-east have direct views; these views can only be moderated by screening elements at the point of viewing. The majority of properties already have dense foreground vegetation around the residences and this may limit views to the Modification.

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

5.7.5 Roads

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

Driving north on Thomas Mitchell Drive, the intersection with Denman Road affords views of the OEA Modification from the south-east at a distance of approximately 3.4 km resulting in low sensitivity. Beyond this to the south, the road is screened from views to the OEA Modification by roadside vegetation.

Edderton Road will also have views to the southern face of the OEA Modification approximately 5.4 km distance at its intersection with Denman Road. It will have a low sensitivity due to usage.

Denman Road will have a high sensitivity up to 2.5 km and a moderate sensitivity up to 7.5 km, after which sensitivity would reduce to low. This increased level of sensitivity is due to the road supporting numerous residences and Pukara (refer Section 5.7.2).

Denman Road is more than 2.5 km away from the Modification and orientated generally parallel to the westward progression of the OEA; it therefore has a moderate sensitivity. The sensitivity for other local roads is moderate to low.

5.8 Western View Sector – Visibility and Visual Sensitivity

The potential view locations within the Western View Sector are associated with Roxburgh Road and parts of Wybong and Denman Roads and the rural residences along them.

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

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

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

Roxburgh Road will be approximately 10 km away from the OEA Modification. This will result in a low sensitivity. Wybong Road and Bengalla Link Road will have moderate sensitivity up to 2.5 km away from the Modification and low beyond that.

Denman Road in the sector will be further than 2.5 km away. There will be views from the road travelling east, specifically from elevated areas west of Pukara Estate. There will also be views from the road within the floodplain areas.

The following Table 5.1 identifies how sensitivity from roads within the sector is modified by distance from

the visible Modification element.

Table 5.1 | Visual sensitivity of roads in view sector

Visibility	<2.5 km from visible Modification element	2.5 to 7.5 km from visible Modification element	7.5 to 12.5 km from visible Modification element	>12.5 km from visible Modification element.
Road				
Denman Road	High Sensitivity	Moderate Sensitivity	Low Sensitivity	Very Low Sensitivity
Bengalla Link Road	Moderate Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Wybong Road				
Roxburgh Road	Moderate / Low Sensitivity	Low Sensitivity	Very Low Sensitivity	Very Low Sensitivity

The higher sensitivity of Denman Road is due to the tourism based activities along its route in the vicinity of the Modification.

5.8.2 Rural Residences in the Western View Sector

Roxburgh Road

There are several rural residences along Roxburgh Road. Most are screened from the Modification by topography and vegetation, (refer Figure 5.1).

The exception is the Receiver 158 as shown on Figure 3.2. This Coal & Allied acquired residence currently has views to the active face of the approved OEA. The OEA Modification will increase the final height of the OEA. From the distance of approximately 5.5 km and in the broader landscape context, the difference will be a minor percentage of overall viewshed. It will be progressively rehabilitated as per the consent conditions and will be visually contiguous with the approved OEA.

Other residences along Roxburgh Road in elevated positions have potential views in an easterly and south-easterly direction towards the OEA Modification. The distances will be consistent over the life of the mine. The elevation of the OEA Modification will increase from the approved OEA. These residences will have similar view context to Receptor 158 in that the increase will be a minor percentage of overall viewshed. In some locations, the intervening topography and vegetation will inhibit views to the OEA Modification.

A limited number of houses along the lower part of Roxburgh Road will have high visibility and high sensitivity if there is strong visual orientation and exposure to the OEA Modification.

For all rural residences, views to the Homestead Access will be inhibited by intervening ridgelines and visual mitigation tree planting along Wybong Road west of the active mine face and pit.

Denman Road

Residences on Denman Road, especially the elevated Receiver 93 (refer Figure 3.2) could have views to the Modification. They are approximately 11 km from the OEA Modification giving them moderate sensitivity to that view. Not all residences are orientated to or have open views to the OEA Modification.

Sensitivity to the Modification would generally be low due to a lack of visibility. Some lots at the lower end of Roxburgh Road and Denman Road with high visibility resulting in high sensitivity.

5.8.3 Denman

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

5.9 Homestead Access

Visibility and sensitivity to this Modification element is confined to the Western View Sector. Views to this area on north side of Wybong Road are limited to a short sections of the road heading east, with the main active face of OEA and mine pit adjacent and dominating the view to the south. View location is within 2.5 km of the Homestead Access. The road has low visual sensitivity and view is experienced for very short time frames whilst driving by. The view also includes the approved Project to the south which, due to scale and high levels of visual effect, dominate this view.

5.10 Changes to Visibility/Sensitivity Created by the Modification

The visibility and sensitivity to the Modification varies within the sectors. The Northern Sector is dominated by the approved (but inactive) Mount Pleasant Project creating low sensitivity based on land use.

The Eastern View Sector contains the high sensitivity towns of Aberdeen and Muswellbrook. Aberdeen is screened by foothills within the Mount Pleasant Project. Parts of Muswellbrook will have views to the OEA Modification. A small elevated section of South Muswellbrook including the new Ironbark Ridge Estate will have views onto the OEA Modification and will continue to have views onto small parts of the southern edge of the mine extraction area and the rehabilitated OEA to the west. These views will best capture the modified north-south OEA profile created by the Northern and Southern Relief Areas. Those areas with views will continue to have a high sensitivity.

The Southern View Sector is dominated by Denman Road. Some residences along Denman Road will continue to have views to the southern edges of the extraction area and Main OEA. They will also have views onto the Southern Relief Area in east-west profile, creating moderate to high sensitivity for residences and moderate sensitivity for Denman Road.

There are limited sensitive receivers within the most exposed Western View Sector. Some residences will have high visual exposure and sensitivity. Roads within the sector have varying sensitivity based on distance and usage type. Significantly, views of the Modification for the Western View Sector will be higher in elevation than the current view but scale will remain small due to distances.



Figure 5.2 | View of main OEA from East
The existing OEA is broad flat topped landform providing screening to mine activity.



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



Figure 5.4 | Tree cover at site
Tree plantings alongside project elements, while achieving landscape pattern outcomes, lack the size to screen large scale elements such as an OEA.



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



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

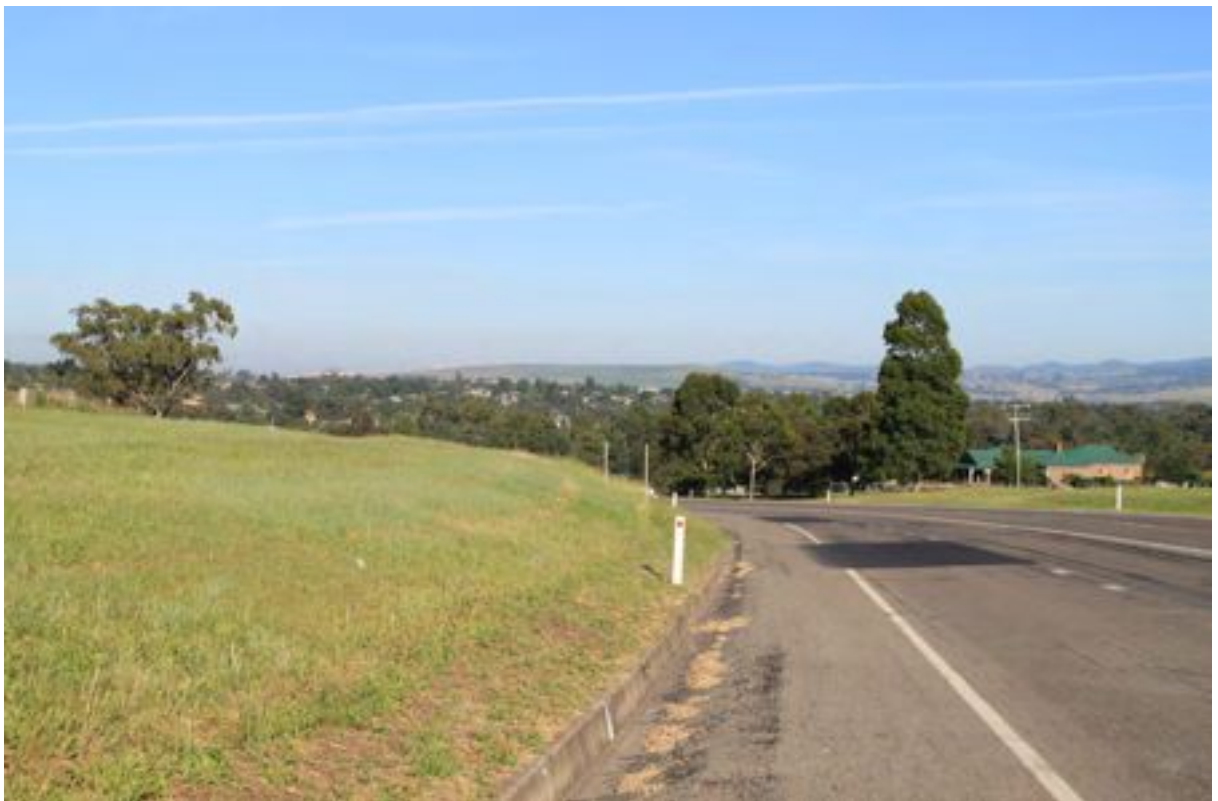


Figure 5.7 | View from the east
Views are onto the outer rehabilitated face of the existing OEA.



Figure 5.8 | View from the Racecourse Road

Views are onto the outer rehabilitated face of the existing approved OEA.



Figure 5.9 | View from the south-west
Views are onto the south-eastern and south-western faces of the existing OEA.



Figure 5.10 | View from the south-west
Views are onto the active face of the existing approved OEA.

6. Visual Effects

6.1 Introduction

The visual effects represent the visual interaction between the Modification and the visual setting within which it located and seen.

The visual effect of the Modification will vary as seen from different locations around Bengalla. The visual effects were considered from a number of potential viewing locations in the Northern, Eastern, Southern and Western Sectors and have also been assessed through photomontage development. These viewpoints are representative of worst case scenario views of the Modification that will be obtained from those selected viewpoints as illustrated in Figure 6.1. Visual effects are determined using methodology referred to in Table 2.1 – Visual Effects.

6.2 Northern View Sector

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

The visual effect on the eastern part of the Northern View Sector is generally unchanged as views are predominantly onto the existing rehabilitated OEA. Changes to the east-west profile as viewed from the north-east of the Sector relate to the Modification Northern Relief Area which increases the finished height to 300 m. This heightened profile ridges to the west, then is shaped to meet the approved OEA contours at RL 270 m. There will be minor views onto the northern edge of the pre-rehabilitation Northern Relief Area.

There are limited views to the Homestead Access.

The visual effect of the Modification on the Northern Sector will consist of Type 2 pre-rehabilitated faces of the Relief Areas as viewed from the from the north-eastern and increasingly the northern part of the sector. Following rehabilitation, this will be reduced to a low Type 1 visual effect. The Modified OEA relief modelling, which results in a finished, more natural topography, will lower visual effects by improving visual integration.

Visual effects will be low across the sector. In addition, land within this sector is primarily owned by mining operations with sensitive receptors in the north-west on Wybong Road, screened by the ridge in the vicinity of Roxburgh Road.

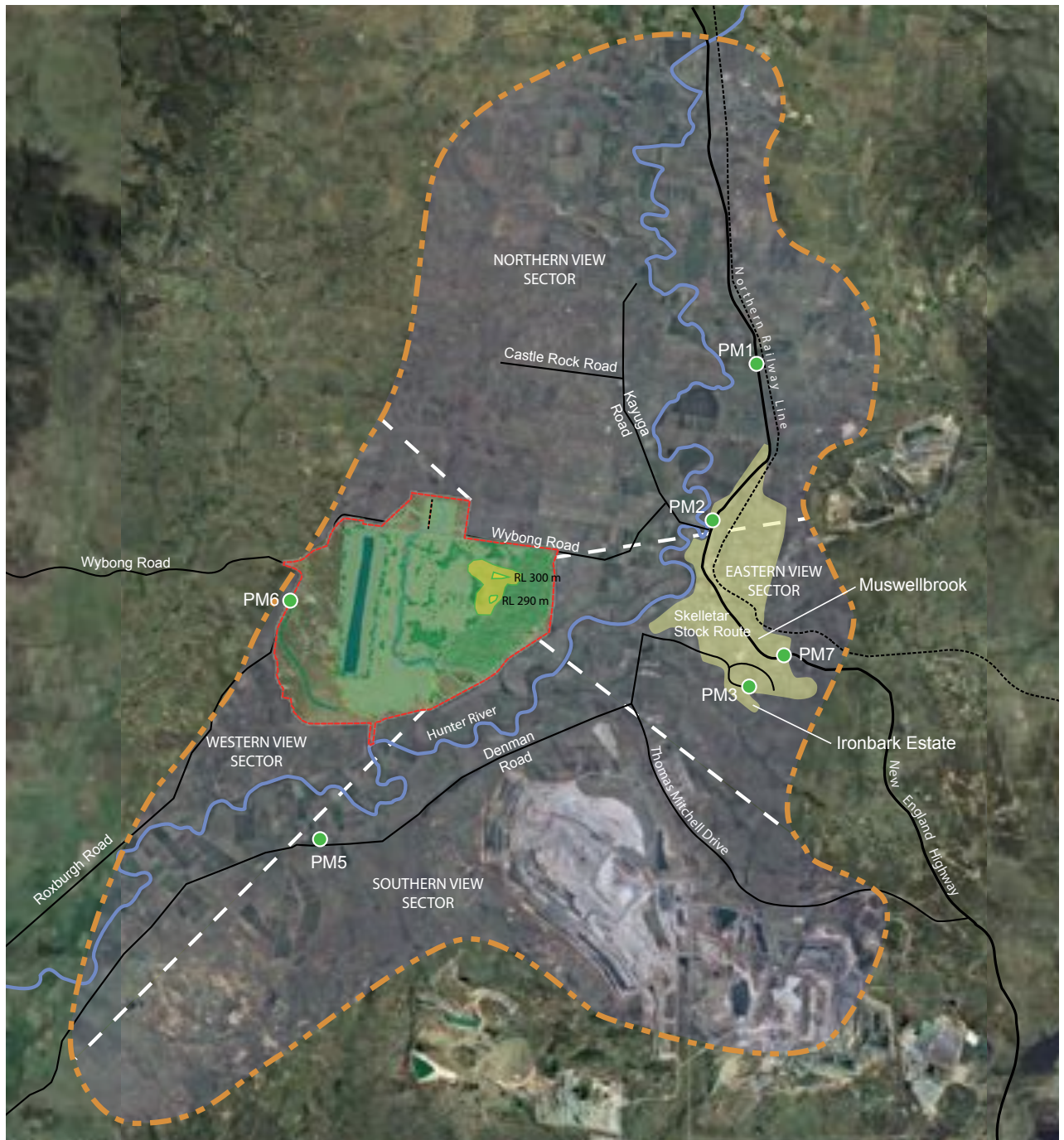
Photomontage location within the Northern Sector:

- New England Highway North (PM1)

PM1 - Photomontage New England Highway North

As seen from Figure 6.2a, the existing view contains small portions of the OEA north-eastern face that are still active. This view illustrates the broad regular flat profile of the finished approved OEA profile.

By approximately Year 4 the Northern and Southern Relief Areas have been developed creating a slightly higher more undulating profile as viewed from this location. The Modified OEA slopes gently to the west. Much of the visible OEA has been rehabilitated, with early stage rehabilitation evident as lighter contrasting areas on the western extent of northern face. The approved profile is superimposed over modified profile to highlight the Modification profile.



	Primary Visual Catchment		Urban Residential areas	Photomontage Locations	
	Project Boundary		MOD2 Relief Areas		PM1 New England Highway North
	Roads				PM2 View Place
	Hunter River				PM3 Ironbark Road
	View Sectors				PM5 Denman Road
					PM6 Roxburgh Road
					PM7 New England Highway

Figure 6.1 | Photomontage Locations

By approximately Year 8, Figure 6.2c illustrates the advance of rehabilitation tree planting to the Modification Relief Areas and established grassing to the previously lighter areas of low Type 3 on north-west face.

Final Conceptual Landform

Year 24, Figure 6.2d illustrates the final landform and established woodland to lower slopes and the two Relief Areas with negligible to low Type 3 visual effect. They appear visually well integrated with the overall rehabilitation pattern and density of the approved Main OEA.

The Relief Areas create subtle modulation to the overall OEA profile improving visual integration with the surrounding topography.

6.3 Eastern View Sector

The Eastern View Sector contains the most sensitive land uses and is dominated by the township of Muswellbrook. The rural lands adjoining Bengalla support a number of rural residences along Kayuga Road.

This sector has the most critical view locations and is representative of the greatest population, therefore contains the most relevant photomontage points. These viewpoints and photomontages provide a reference point for assessing sensitive views in edge areas of adjacent sectors.

The visual effect of the Modification will have varying visibility from the east, as some elements (Homestead Access) are screened by the approved OEA. All the visual effect will be generated by the Northern and Southern Relief Areas, which will be viewed in profile from north to south from sensitive viewpoints within Muswellbrook.

Photomontage locations within the Eastern Sector include:

- View Place (PM2);
- New England Highway (PM7); and
- Ironbark Estate (PM3).

PM2 - Photomontage View Place

As seen from View Place, Figure 6.3a the existing view contains a moderate portion of the approved rehabilitated OEA eastern face with the broad flat approved profile. Active areas of pre-rehabilitated OEA face remain visible as higher contrasting patches on upper right (northern extent) and left (southern extent). Tree planting has commenced on eastern face.

By approximately Year 4, Figure 6.3b illustrates the profile modulation created by the Northern Relief Area across the presenting eastern aspect of the OEA and the minor increase in vertical profile. Approved OEA profile is superimposed over the modified profile for comparison. Rehabilitation of Modification is established with tree planting on lower face becoming more visible.

By approximately Year 8, Figure 6.3c shows the tree planting extending to the Modification Relief Areas. All visible face is now rehabilitated with grass and woodland planting. The minor increase in elevation in Relief Areas can be seen.

Final Conceptual Landform

By approximately Year 24, Figure 6.3d illustrates the final landform and established woodland on the lower slopes and the two Relief Areas. The Relief Areas appear visually moderately integrated with the overall rehabilitation pattern and density of approved Main OEA. The Relief Areas create subtle modulation to overall OEA profile improving visual integration with surrounding topography.



Figure 6.2a | Location 1 - NEW ENGLAND HIGHWAY NORTH - Existing view (2012)

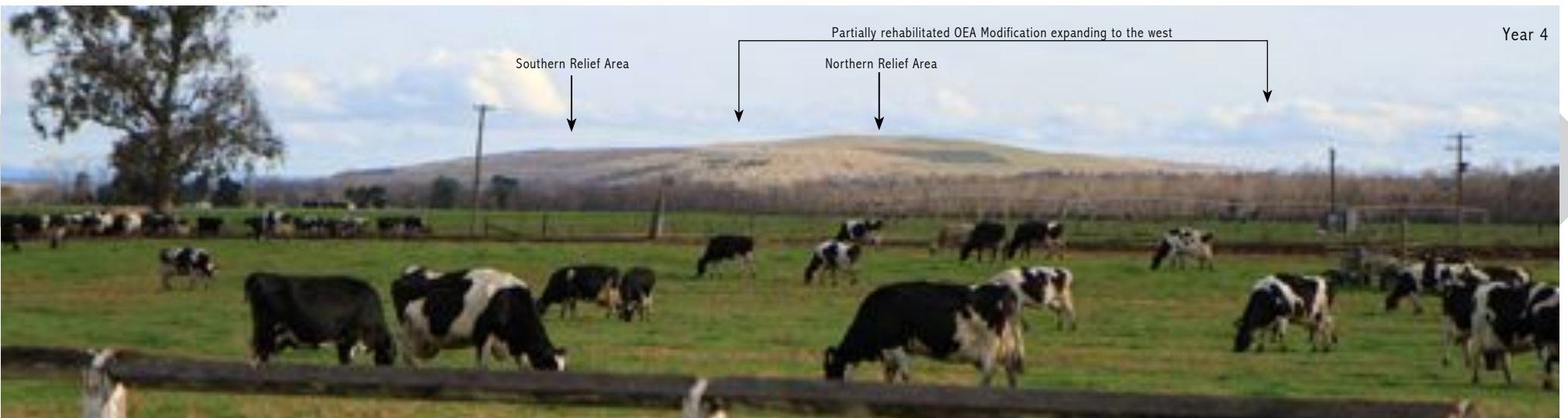


Figure 6.2b | Location 1 - NEW ENGLAND HIGHWAY NORTH - Proposed Year 4 view



Figure 6.2c | Location 1 - NEW ENGLAND HIGHWAY NORTH - Proposed Year 8 view



Figure 6.2d | Location 1 - NEW ENGLAND HIGHWAY NORTH - Final Conceptual Landform and rehabilitation



Figure 6.3a | Location 2 - VIEW PLACE - Existing view (2012)



Figure 6.3b | Location 2 - VIEW PLACE - Proposed Year 4 view



Figure 6.3c | Location 2 - VIEW PLACE - Proposed Year 8 view



Figure 6.3d | Location 2 - VIEW PLACE - Final Conceptual Landform and rehabilitation

PM7 - Photomontage New England Highway

As seen from Figure 6.4a, the existing view contains a moderate portion of the approved rehabilitated OEA eastern face including the drainage structure above the township and intervening trees. This face illustrates the progressive rehabilitation to the approved OEA.

By approximately Year 4 the Northern and Southern Relief Areas over the approved OEA begin to take shape through active overburden emplacement. The new undulating profile begins to emerge and rehabilitation is visible on the lower parts of the new Relief Areas (refer Figure 6.4b). Some areas of higher contrasting pre-rehabilitation areas are visible in the active zone. The resulting visual effect is a low Type 3.

By approximately Year 8, the undulating profile becomes more defined as the two Relief Areas reach their finished design heights (refer Figure 6.4c). The northern and southern shoulders are consistent with the approved OEA. The eastern face as seen from the highway is rehabilitated with grass cover with trees planted to the lower slopes of the approved OEA. Visual effect is a low Type 3 as the Relief Areas are visually integrated by rehabilitation and relief profiling.

Final Conceptual Landform

The final landform and profile of the Modified OEA is more consistent with adjacent topographic features. The broad flat topped profile of the approved OEA has been improved by the development of the two Relief Areas.

Dense woodland rehabilitation as per the development consent commitment is well established over the entire eastern face including the Northern and Southern Relief Areas. There is a low Type 3 level of visual integration with the surrounding landscape textures and vegetation patterning on approved OEA .

PM3 Photomontage Ironbark Estate

The image used for this existing view is a 2012 view of the approved Project. The photomontage from Ironbark Road (refer Figure 6.5a) shows the active formation of the existing southern faces of the OEA, with mining activities toward the west visible above the OEA. Rehabilitation to northern and eastern faces can be seen with high contrasting areas indicating active emplacement.

By approximately Year 4 the Northern and Southern Relief Areas on top of the approved OEA take shape through active overburden emplacement. The new undulating profile emerges and rehabilitation is visible on the lower parts of the new Relief Areas (refer Figure 6.5b). Some areas of higher contrasting pre-rehabilitation areas are visible in the active zone. No active mining is visible to the west of the new Relief Areas. Some areas of higher contrasting pre-rehabilitation areas are visible in the active zone. The resulting visual effect ranges from moderate Type 2 to a low Type 3.

By approximately Year 8, the undulating profile becomes more defined as the two Relief Areas reach their finished design heights (refer Figure 6.5c). The northern and southern shoulders are consistent with the approved OEA. The eastern face as seen from the highway is rehabilitated with grass cover, with trees planted to lower slopes of the approved OEA. Visual effect is a moderate Type 3 as the Relief Areas are visually well integrated by rehabilitation and relief profiling.

The southern edge of the approved infrastructure area can be seen as a high contrast band of disturbed landscape beyond the southern slope of Main OEA.

Final Conceptual Landform

The final landform and profile of the Modified OEA is more consistent with adjacent topographic features. The broad flat topped profile of the approved OEA has been improved by the development of the two Relief Areas.

Dense woodland rehabilitation as per the development consent commitment is well established over the entire eastern face including the Northern and Southern Relief Areas. There is a moderate level of visual integration with the surrounding landscape textures and vegetation patterning.



Figure 6.4a | Location 7 - NEW ENGLAND HIGHWAY - Existing view



Figure 6.4b | Location 7 - NEW ENGLAND HIGHWAY - Proposed Year 4 view



Figure 6.4c | Location 7 - NEW ENGLAND HIGHWAY - Proposed Year 8 view



Figure 6.4d | Location 7 - NEW ENGLAND HIGHWAY - Final conceptual landform and rehabilitation

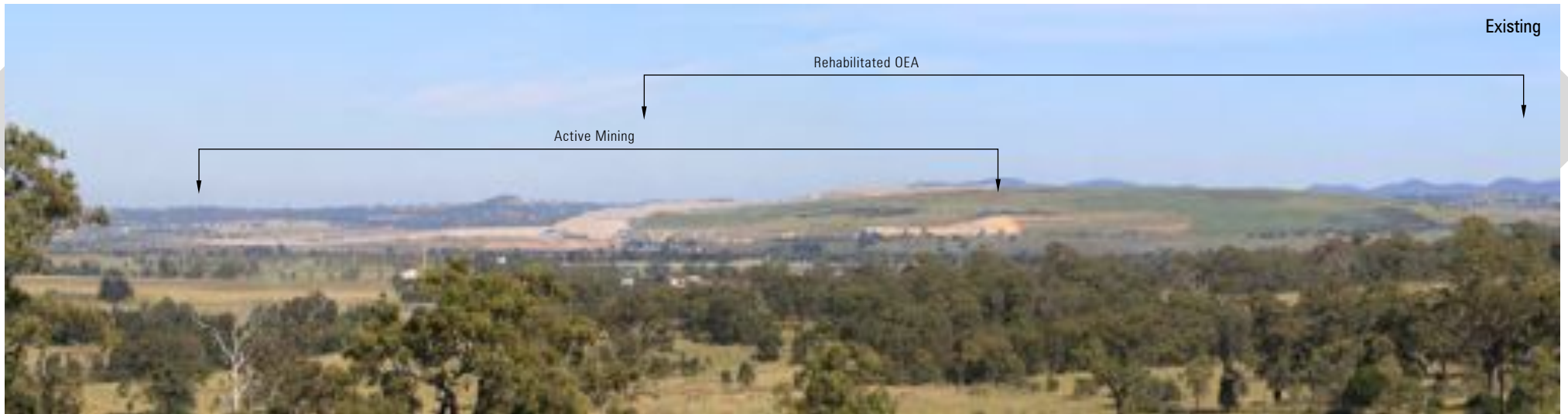


Figure 6.5a | Location 3 - IRONBARK ROAD - Existing view (2012)

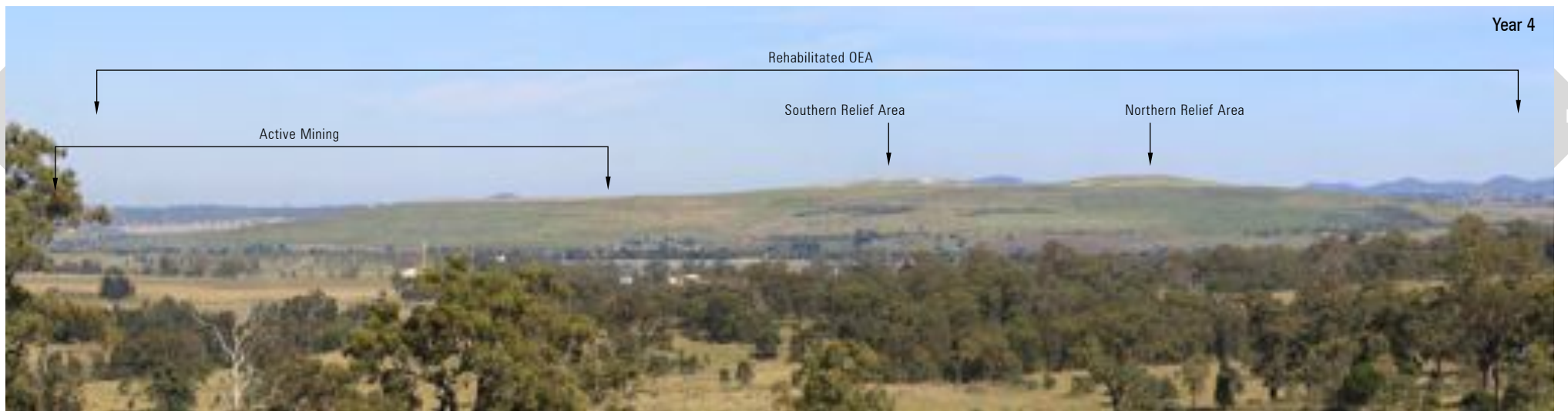


Figure 6.5b | Location 3 - IRONBARK ROAD - Proposed Year 4 view

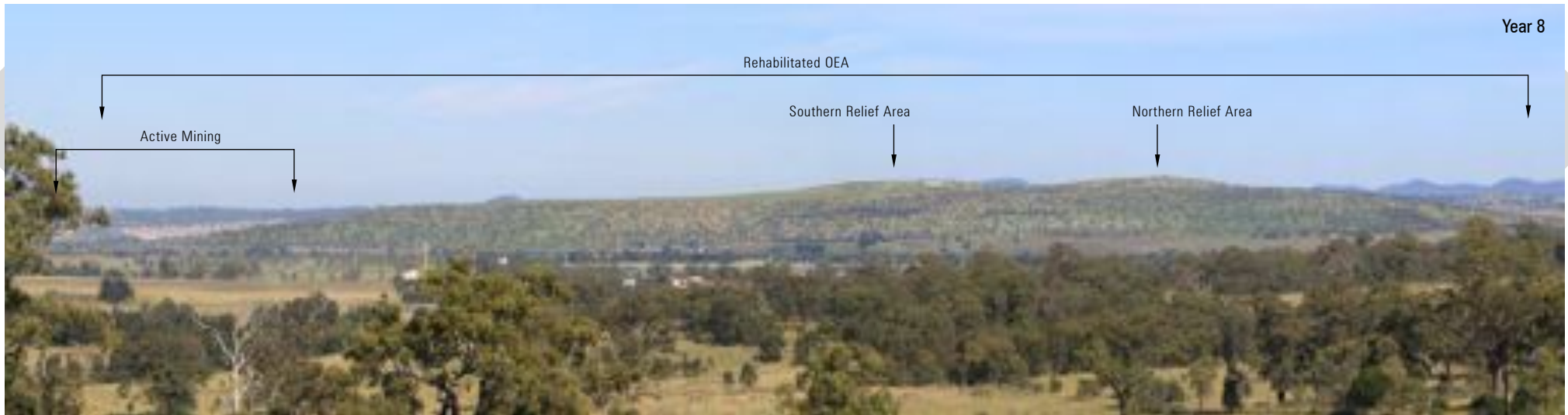


Figure 6.5c | Location 3 - IRONBARK ROAD - Proposed Year 8 view



Figure 6.5d | Location 3 - IRONBARK ROAD - Final conceptual landform and rehabilitation

Modification visual effects will have varying visibility from the east, as some elements (Homestead Access) are screened by the Main OEA. All the low visual effects will be generated by the Northern and Southern Relief Areas when viewed from the east from sensitive viewpoints within Muswellbrook and from southern parts of this sector. The proportion of view that the proposed Northern and Southern Relief Areas occupies between years 4 – 24 is minimal and would create a moderate to low visual effect.

6.4 Southern View Sector

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

The visual effects on the Southern View Sector vary. In the eastern portions of the sector the views are onto the south face of the Southern Relief Area during construction creating a moderate to low Type 2 visual effect (refer to methodology Table 2.1). This view of the Southern Relief Area will progressively become rehabilitated to low Type 3 visual effects as discussed in Table 2.3 and as illustrated by Figure 6.6d.

The visual effects of the Modification on the Southern View Sector are illustrated in photomontage form from PM5 - Denman Road (refer Figure 6.1).

Photomontage location within the Southern Sector:

- Denman Road (PM5);

PM5 Photomontage Denman Road

Figure 6.6a illustrates the existing view from Denman Road adjacent to the Pukara Olives Estate. There are views from this location onto existing operations. There are glimpses of views to the distant ranges to the north on either side of the Main OEA.

By approximately Year 4 the Southern Relief Area profile is visible above the approved Main OEA with areas of rehabilitation already lowering the visual contrast and visual effect of the upper slopes, active face. The southern edge has good rehabilitation coverage. Visual effect levels are moderate to low Type 2. Views to the ranges beyond are limited to beyond the southern edge (Figure 6.6b).

By approximately Year 8 view illustrates the advancing rehabilitated Southern Relief Area profile. The finished height has subtle undulation on southern shoulder to accommodate the increased emplacement. Rehabilitation is well established with reduced areas of active OEA on western face. Visual effect levels are moderate Type 3 (Figure 6.6c).

Final Conceptual Landform

As time progresses and final conceptual landform is achieved, this visual effect is further decreased as views onto the active face are screened by intervening ridges and rehabilitated areas of the Southern Relief Area and Main OEA increase and visually dominate the pre-rehabilitation areas (Figure 6.6d).

Visual effect at this stage will be low Type 3 due to improved visual integration with surrounding topography. Woodland rehabilitation as per the development consent commitment is well established over the Modification and approved OEA. There is a moderate level of visual integration with the surrounding landscape textures and vegetation patterning.

Modification visual effects will have varying visibility from the south, as some locations are screened by local topography and vegetation. All the low visual effects will be generated by the Northern and Southern Relief Areas when viewed from the south from sensitive viewpoints along Denman Road. The proportion



Figure 6.6a | Location 5 - DENMAN ROAD - Existing view (2012)



Figure 6.6b | Location 5 - DENMAN ROAD - Proposed Year 4 view

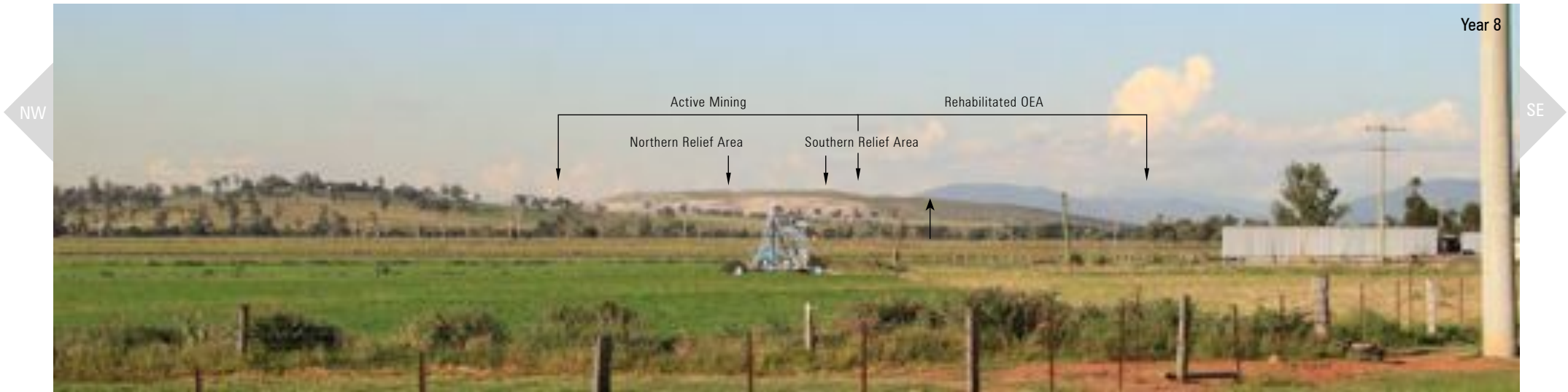


Figure 6.6c | Location 5 - DENMAN ROAD - Proposed Year 8 view

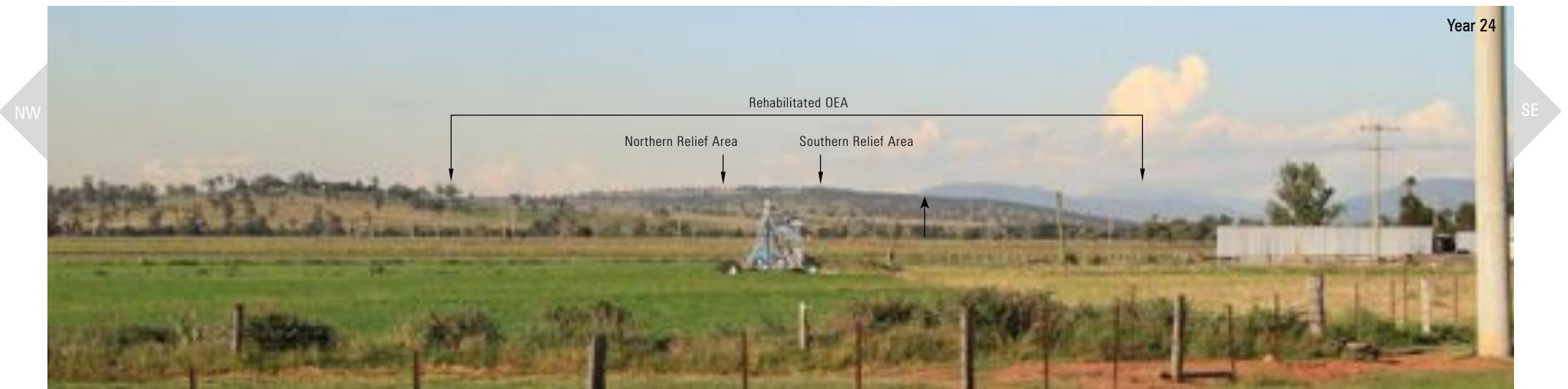


Figure 6.6d | Location 5 - DENMAN ROAD - Final conceptual landform and rehabilitation

of view that the proposed Northern and Southern Relief Areas occupies between years 8 – 24 is minimal and would create a moderate to low visual effect.

6.5 Western View Sector

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

The low Type 2 visual effects created during construction of the Relief Areas will be viewed from west by residences and users of the elevated parts of Roxburgh Road. Following rehabilitation this will reduce to low Type 3 with improved visual integration and reduced levels of visual contrast.

It can be extrapolated, that views along the river floodplain will be similar to those experienced at Denman Road. Those with broad open views to the east will experience low levels of Type 2 visual effect dependent upon distance from the view and orientation of the houses and intervening vegetation. There may be views onto the south-western and western face of the Modified OEA visible above the existing OEA. Visual effect levels will be from low Type 2 during active construction but will reduce to low Type 3 following rehabilitation.

There will be limited visibility to the Modification from the west. The Homestead Access is screened by topographic features, the approved Main OEA, visual mitigation bunds and tree planting along Bengalla Link Road. All low visual effects will be generated by the Northern and Southern Relief Areas which will be viewed from the west from sensitive viewpoints along Denman Road. The proportion of view occupied by the proposed Northern and Southern Relief Areas between years 8 – 24 is minimal, resulting in a moderate to low visual effect.

Photomontage location within the Western Sector:

- Roxburgh Road (PM6);

PM6 Photomontage Roxburgh Road

The view from Roxburgh Road, Figure 6.7a, to the west of the Modification, is currently onto the active face of the OEA. This view will continue throughout the proposed mining period. The progression of the mining activity toward the west will result in minor westward expansion of the Modification. The active face and the rehabilitated OEA over time will alter in position over the same period.

The approximate Year 4 view in Figure 6.7b illustrates the advancing active face with partial rehabilitation established along upper ridge line. The Northern and Southern Relief areas can be seen creating undulations to the north-south profile; this profile has minor increase in elevation against approved finished elevation. This results in a minor reduction of views to the distant range at one narrow view angle over the relief areas. There is a low Type 2 visual effect (similar to surrounding areas) created during the Modification construction period.

The approximate Year 8 view sees rehabilitation established on Northern Relief Area reducing visual effect to a low Type 3. The minor elevation change associated with the two Relief Areas contributes to the subtle profile undulation. Active face continues to expand westward.

Final Conceptual Landform

By year 24, rehabilitation of the Relief Areas is complete and well integrated with surrounding OEA rehabilitation. The overall visual effect is of a gently undulating hill similar to that in the middle view background and surrounding undisturbed landscapes resulting in a low Type 3 visual effect.



Figure 6.7a | Location 6 - ROXBURGH ROAD - Existing view (2012)

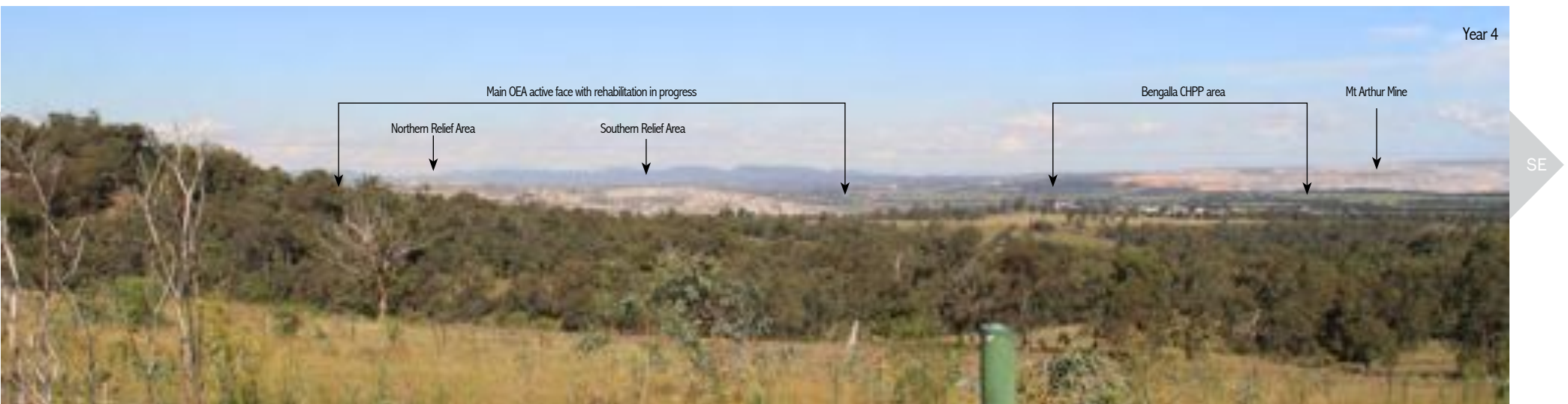


Figure 6.7b | Location 6 - ROXBURGH ROAD - Proposed Year 4 view

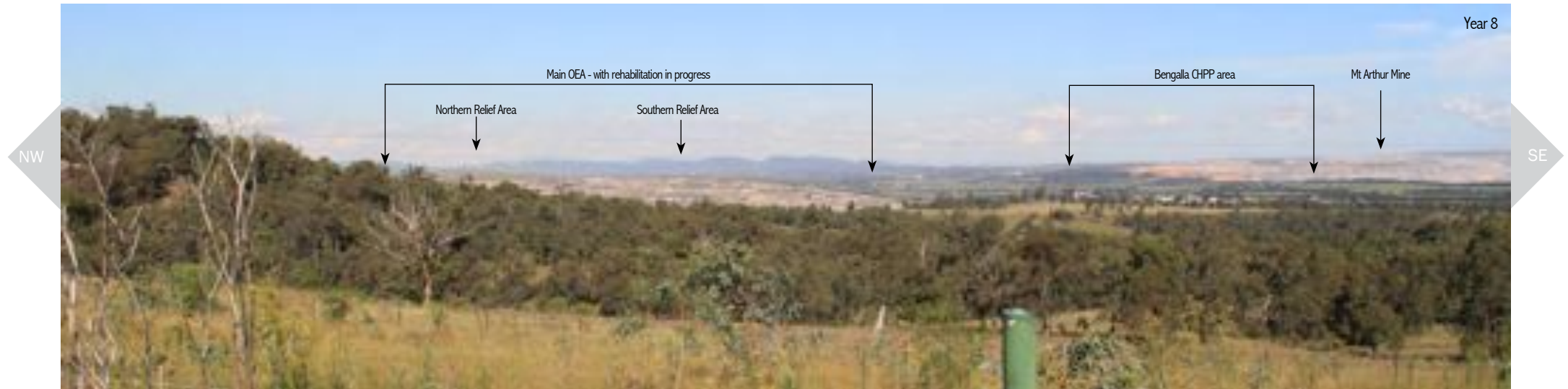


Figure 6.7c | Location 6 - ROXBURGH ROAD - Proposed Year 8 view

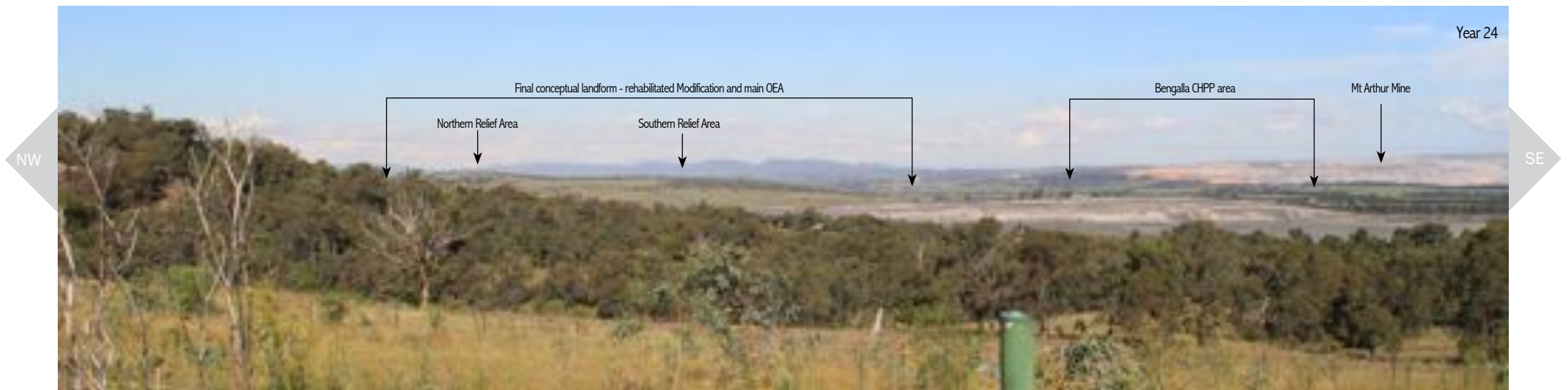


Figure 6.7d | Location 6 - ROXBURGH ROAD - Final conceptual landform and rehabilitation

6.6 Visual Effect Summary

The visual effects of the Modification vary. The OEA Modification elements will create the highest visual effect when viewed from the east. From this sector views will be onto the rehabilitated Northern and Southern Relief Areas. During construction there will be a Type 2 (Table 2.1) visual effect and depending on proximity, will be moderate to low. Following rehabilitation, this will reduce to Type 3 low level visual effect from most view locations.

The finished elevations of the two Relief Areas will be marginally higher (290m and 300m compared to approved (270m) with better overall integration with existing setting. The proportion of the primary view occupied by these two Relief Areas is minimal and would create a moderate to low visual effect. There will be very minor reduction of views to distant ranges east of Muswellbrook within narrow view angles from Roxburgh Road in the sparsely populated Western View Sector.

The visual effects of the Homestead Access when viewed from the north, east will be low. Visual effects from the south and west will be moderate to low. Topographic features and vegetation limit views onto these low elevation elements. The exception is the north-west corner as seen from Wybong Road.

The visual effects of the Modification are generally moderate to low for some viewing locations in the north, eastern, western and south-western view sectors.

7. Visual Impacts

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

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

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

7.1 Towns

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

Muswellbrook

Many parts of Muswellbrook will have direct views onto the rehabilitated eastern face of the Northern and Southern Relief Areas.

A small number of areas on the New England Highway heading west, in South Muswellbrook south of Calgaroo Avenue and including parts of Ironbark Estate will have more direct views onto the Northern and Southern Relief Areas. Such areas have a high sensitivity.

The visual effects for areas with views would be low due to the minimal area of view occupied by the OEA Modification within the existing visual setting of rehabilitated OEA and adjacent mines.

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

There will not be additional visual impacts on most of Muswellbrook and low impacts on those areas that have limited views to the Modification. The long term outcome is a more visually integrated landform of a gently undulating hill, consistent with surrounding rural areas.

The other Modification elements will be unsighted from the town due to the screening provided by the approved OEA and will not generate additional visual impacts.

Aberdeen

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

Denman

Most of the town is approximately 18 km from any Modification element and unsighted to the Modification.

Views to the more elevated Southern Relief Area (elevation 290 m) may be available but will be reduced in overall scale to the approved OEA. At a distance of greater than 12.5 km, the visual sensitivity is low.

The visual effect created by the exposed overburden is lessened, and the Modification occupies a minimal

part of the total view. Visual effect levels and sensitivity of the Modification are low at this distance. This creates a low and imperceptible visual impact at Denman.

7.2 Rural Residences

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

Northern View Sector

There are varying levels of impact on rural residences in this sector as the Modification is largely screened from view.

Residences in this sector, (many are mine owned), are screened from views to the Homestead Access by the approved Main OEA and existing topography. There will be views onto the northern and north-eastern faces of the Northern Relief Area.

Any visual impacts on rural residences that have views in the Northern View Sector would be low.

Eastern View Sector

There will be limited views onto the north-eastern and eastern faces of the Northern and Southern Relief Areas, limited by the slope angle of existing OEA face. Although sensitivity is potentially high the visual effects are moderate to low over the life of the visible Modification elements resulting in a moderate to low visual impact to those rural residences with views.

This sector contains the historic Bengalla Homestead. There are no views to the Modification from the Homestead secondary and tertiary views to the north and west. Homestead primary view receives no additional visual impacts.

Southern View Sector

The significant rural residences in this sector are south of the Modification, generally along Denman Road with adjoining lots largely owned by Mt Arthur Coal. These residences would continue to have a high sensitivity if they have views to the Modification elements. Residences in the south-east of the sector will have views onto the southern face of the advancing Southern Relief Area, but views would be dominated by the rehabilitated Main OEA areas and visual effects would be moderate to low.

Residences in the south-west in the vicinity of Pukara would have more open views onto the active face of the advancing Southern Relief Area. This view is similar to that of the existing approved OEA but higher and is smaller in overall scale. The rehabilitated areas of the Main OEA will dominate this view, progressively lessening visual effects of the Modification.

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

This sector contains the historic homesteads of 'Edinglassie' and 'Rous Lench'. Both homesteads are owned by HVEC. These residences would have potential views to the Modification and have high sensitivity, however potential views are mitigated in accordance with the Bengalla Historic Heritage Management Plan 2015 (subject to HVEC approval).

Western View Sector

Levels of impact to residences will be unchanged by the Modification. The pre-rehabilitated face will be at a higher elevation from 270 m to 290 m (Southern Relief Area) and 300 m (Northern Relief Area). The view will be onto the active face of the Relief Areas from approximately Year 4 to approximately Year 8. In terms of percentage of overall view zone, the increase in height creates a limited change to the visual effect, which is similar to that of the existing approved Main OEA. There will be a very minor reduction in views to distant ranges within narrow viewing angle from a very limited number of viewing locations on Roxburgh Road.

Visual sensitivity will remain high so that impacts will be moderate to high for residences with open views onto the Modification.

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

7.3 Roads & Rail

The roads and rail in the locality are:

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

Minor Roads

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

New England Highway

The OEA Modification will be visible from two locations on the New England Highway: from just north of Muswellbrook travelling south, and for a short period travelling north into Muswellbrook from the south-east, as illustrated in Figure 6.4.

From north of Muswellbrook, the views are for the greater part on to the approved rehabilitated OEA with the Northern Relief Area visible above it at a higher elevation. Areas further west continue to be screened by topography north of Wybong Road. The sensitivity at these distances is generally moderate creating a low visual impact.

From south of Muswellbrook, the New England Highway would have moderate sensitivity. The Northern and Southern Relief Areas will create moderate visual effects above the approved Main OEA from approximately Year 4 to approximately Year 8 from the illustrated view location. They will be similar to those of the approved OEA resulting in a moderate visual impact where there are views to the OEA Modification.

The Homestead Access is screened from this view by the approved OEA.

Denman Road

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

From the east, impact is potentially experienced in South Muswellbrook with the views onto the Northern

and Southern Relief Areas. From the south, impact is experienced generally between Thomas Mitchell Drive and Edderton Road, and to the west from Edderton Road.

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

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

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

7.4 Tourist Localities

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

There are potential views from Pukara Estate; such views are screened by olive trees from the sensitive tourist centre/coffee shop. The visual sensitivity at this location would be high, but views to the active face are screened except from the working northern and eastern edges of the orchard. Those locations with views would have a low sensitivity and high visual effect. The visual impact from tourist areas within Pukara Estate would be low while from outer edges this could be high; it is assumed that tourists are not taken to these vulnerable view locations.

In terms of impact on other tourism venues, the visual effects will remain high for areas such as the Muswellbrook Racecourse and surrounding training facilities, which will view the Northern and Southern Relief Areas.

The Modification is generally not visible from the sensitive thoroughbred horse studs south of the Golden Highway.

7.5 Cumulative Visual Impact

The Modification will not add significantly to the cumulative visual impact created by open cut mining in the locality.

High visual effects created by the active new Relief Areas will be lesser in extent to the approved Main OEA. The Main OEA with new Relief Areas will remain visually dominant; the greater part of any view will be of established rehabilitation to the eastern face with varying stages of new rehabilitation to the smaller scaled Relief Areas above.

The Northern and Southern Relief Areas result in an improved visual effect with improved integration and a more natural appearance than the approved flat profile Main OEA.

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

In the context of the Modification's visual catchment, the visual impact is decreased for sensitive receptors in north-eastern areas, e.g. Aberdeen, south-eastern areas, e.g. Racecourse Road and eastern areas e.g. Muswellbrook, as the new OEA profile created by the Modification Relief Areas decreases overall visual effect of the visually dominant OEA.

Any visual effect due to the active emplacement of the two Relief Areas will be of a similar character to

that currently experienced within the catchment. Rehabilitation of the OEA Modification in the east takes place as active mining moves west. Visual effect of the Modification to the west is of a similar character but lesser overall scale to that currently experienced. There are a limited number of sensitive receptors in this location on Roxburgh Road who have views to Mt Arthur Coal and parts of the existing approved Project.

To other areas the visual effect will be insignificantly increased as the overall elevation of the active face of the Relief Areas increases in elevation from 270 m to maximums of 300 m and 290m. The modified profile created by the Relief Areas will result in a better visual integration of this element into the landscape.

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

In terms of sequential visual experiences, the Modification as well as the approved Project and all mines in the locality, would be seen when travelling along Wybong Road and Denman Road and to varying degrees from lesser roads. In this context the overall effect of the Modification would be less than is currently experienced by the existing approved Project. The reason is due to a general lowering of visual effect and improved visual integration compared to the existing approved OEA.

7.6 Visual Impact in context of Regional Plans

In the context of the NSW Strategic Regional Land Use Plan – Upper Hunter and the local Land Use Development Strategy (Coal Mine Land Use Component) September 2012, the Modification does not impact significantly on strategic tourist locations over and above that of the existing approved mine. Rather in general, the Modification improves the outcomes of mining on sensitive eastern areas including Muswellbrook and Aberdeen as well as the New England Highway.

The visual effect and impact on Denman Road and western view areas will remain similar to existing impacts. Although the Modification will be higher in elevation when viewed from Pukara Estate Olive Grove, the visual impact on this facility is low due to screening of the Modification from most areas within the grove, including the cafe/shop and driveway by the grove of trees itself and intervening topography. The exception to this is the outer edge of the grove that is not screened by adjacent olive trees.

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

7.7 Lighting Impacts

7.7.1 Introduction

The visual effect of lighting to areas surrounding the Modification will remain similar to that experienced as part of the current approved operation.

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

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

7.7.2 Direct Light Effects

The only locations that will have direct line of sight to night lighting are elevated locations such as Roxburgh Road that overviews any screening topography and vegetation. This is consistent with existing approved conditions at Bengalla from these locations.

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

7.7.3 Diffuse Light Effects

At the Modification, 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 Modification and approved Project. Again, other mines including Mt Arthur and Drayton contribute to this diffuse lighting effect.

7.8 Visual Impact Summary

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

- Scale of the new Relief Areas in relation to the overall existing Main OEA and surrounding mining activities is minor
- Visual effects during construction and rehabilitation are consistent with existing approved Project elements
- Visual effects will lessen following rehabilitation
- Final landform of modified OEA though higher, the Northern Relief Area (300 m) and Southern Relief Area (290 m) at its eastern extent but has improved visual integration with surrounding landscape elements presenting a more undulating natural profile
- Other Modification elements being screened by the approved and rehabilitated eastern and southern OEA areas and other topographic features during construction.

Views from the west are onto the active face of the new Relief Areas until final landform is achieved and rehabilitation is established.

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

8. Mitigation

Mitigation measures in relation to reducing visual impact relevant to the Modification are consistent with those for the existing approved mine plan with no additional measures required. The approved measures will provide sufficient mitigation outcomes for the Modification's low visual impacts. BMC will continue to implement all rehabilitation activities in accordance with the approved Bengalla Rehabilitation Management Plan (as Modified) and Bengalla Mining Operations Plan (BMC, 2015) (as Modified) which will be updated pending approval of this Modification. Relevant to this Modification, the following on site rehabilitation and visual screening treatments will continue to be maintained:

- The implementation of dense woody vegetation across the eastern face of the Main OEA exposed to Muswellbrook and Denman Road;
- Early, progressive establishment and rehabilitation of the outer faces of the Main OEA, particularly the southern slopes adjacent to the Muswellbrook-Ulan Rail Line;
- Maintenance of existing tree planting areas; and
- Design drainage to vary with the topographic form of the Main OEA and avoid straight line drop downs where reasonable and feasible.

The progressive rehabilitation of the Main OEA is the most significant element in relation to visual effects and impacts on the surrounding landscape. The progressive rehabilitation will decrease the visual contrast of the operation relevant to the existing landscape. In addition to rehabilitation strategies that emulate patterns, shapes, line and colour of the existing landscape. The approved Main OEA will continue to be rehabilitated to achieve the existing requirement of high density woody vegetation on the eastern face of the Main OEA exposed to Muswellbrook and Denman Road.

Schedule 3, Condition 37 of SSD-5170 requires development of additional visual impact mitigation plans for listed receivers located within the western and southern view sectors that may have views of Bengalla. This assessment will identify receivers that are likely to have significant views of the development and recommend site specific mitigation measures that could be implemented to reduce visual impacts. The visual assessment will also provide consideration of this Modification should it be approved.

9. Conclusion

The key feature of this Modification at Bengalla is the alteration to the maximum approved height of the Main OEA in two distinct Relief Areas. This will change the visible profile of finished OEA from sensitive locations to the north, east and to the south. The modified undulating profile created by the new relief areas improves overall visual integration with the existing landscape features surrounding the Bengalla Mine.

The approved Main OEA is large in scale with a broad flat profile and elevations up to 270 m. It will visually dominate overall views from the east, north-east and south-east; the Relief Areas will contribute an additional 30 m and 20 m in separate areas to the overall height. The modification Relief Areas will improve the appearance of the finished OEA profile from most sensitive receivers to the north-east, east and south-east.

The Northern View Sector includes Aberdeen, the New England Highway and rural residences. Distance and topography limit the levels of visual effect at receptors.

Visual impacts of the Modification from the Northern View Sector have been determined to be low.

The Eastern View Sector includes Muswellbrook, the New England Highway and rural residences. The visual effects for areas with views to the Modification would be low due to the minimal area of view occupied by the Modification Relief Areas within the existing visual setting.

The Eastern View Sector will not experience any additional visual impacts to existing approvals with overall impact being low due to improved visual effect of a more natural looking finished final landform.

The Southern View Sector includes rural residences, tourist destinations and Denman Road. Distance from Denman township limits visual effects to negligible. A combination of restricted views and moderate to low visual effects would create moderate to low visual impacts to residences in the south-east of the sector and low in the south-western part of the sector.

From the south, there will be no significant change to the levels of visual impact to the receptors in this view sector.

The Western View Sector includes rural residences and Roxburgh Road. The visual effect of the western side of the Modification will decrease over time as the Relief Areas are progressively rehabilitated. By approximately Year 15, finished profiles will be achieved with the visual effect improved by the improved visual integration with the existing setting.

Views to the Homestead Access are limited and minor in relation to overall scale of mine disturbance and is consistent with existing approved mine activities.

Visual character resulting from Modification of the Main OEA will be an improvement from the broad flat topped profile of approved OEA. The increase in final design height will maintain the visual skyline dominance of the rehabilitated OEA to the east. The active face of the modified OEA will be continue to be in a framework of rehabilitated landscape, consistent with the approved OEA.

The development consent commitment to achieve high density woody vegetation on the eastern face will provide moderate levels of visual integration as a visual outcome as dense woodland vegetation contrasts with surrounding vegetation patterns which reflect more open woodland.

The visual impact of the Modification will decrease overall impact levels as the Visual Relief Areas maintain screening of the active Bengalla Mine from sensitive receivers in the east as well as reduce visual effect of the final OEA landform by improving the visual integration with surrounding landforms.

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