Chapter 25

Landscape and Visual Amenity

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25. LANDSCAPE AND VISUAL AMENITY

25.1 Introduction

This chapter assesses the impacts on landscape character, visual amenity and lighting requirements from the Byerwen Project (the project). Where required mitigation measures for impacts are presented. The chapter is based on a Landscape and Visual Assessment Technical Report which has been prepared by Envisage Consulting Pty Ltd (**Appendix 25**) and addresses the requirements of the project's Terms of Reference (ToR) related to landscape and visual amenity.

25.2 Methodology of Assessment

25.2.1 General

The project location, landscape character assessment areas (landscape units), visual amenity assessment viewpoints and photomontage locations are shown on **Figure 25-1**.

The methodology for assessing potential visual impacts is based on guidelines including: Environmental Impact Assessment Guidance Note – Guidelines for Landscape Character and Visual Impact Assessment (NSW Roads and Traffic Authority, 2009), Visual Landscape Planning in Western Australia (Western Australian Planning Commission, 2007) and the United Kingdom's Guidelines for Landscape and Visual Impact Assessment (The Landscape Institute and Institute of Environmental Management and Assessment, 2002). The full assessment methodology is detailed in **Appendix 25**.

25.2.2 Definition of the Assessment Areas for the Project

- **Landscape character assessment area** – is the project area under mining lease applications (MLAs) 10355, 10356, 10357, 70434, 70435 and 70436.
- **Visual amenity assessment area** – an approximate 5 km radius of the outer boundary of the project area including the sensitive receptors (e.g. occupied dwellings) and other viewpoints (e.g. roads or other publically accessible places) therein. The area used for the lighting impact assessment covers approximately the same area as the visual amenity assessment area.

25.2.3 Assessment of Impact Level

A matrix defining the relationship between 'sensitivity' and 'magnitude of change', and the resulting 'impact level' ranking is provided as **Table 25-1**.

Table 25-1 Sensitivity and Magnitude of Change

Potential impact level		Magnitude of change			
		Very high	**High**	**Moderate**	**Low or insignificant**
Sensitivity	**Very high**	Very High Impact	Very High Impact	High Impact	Moderate Impact
	High	Very High Impact	High Impact	Moderate Impact	Moderate Impact
	Moderate	High Impact	High Impact	Moderate Impact	Low Impact
	Low or insignificant	High Impact	Moderate Impact	Low Impact	Insignificant Impact

25.2.4 Landscape Character Impact Assessment Methodology

The landscape character assessment area was divided into three landscape units based on features such as land use, vegetation cover and landform. For each unit, the following assessment method has been used:

- description of the existing landscape character (scenic quality and 'visual sensitivity' of the landscape
- description of the magnitude of visual changes to the landscape resulting from the project
- assessment of impact, taking into account the visual sensitivity and magnitude of visual change to each landscape unit.

25.2.4.1 Definition of 'Visual Sensitivity' (Related to Landscape Character)

The sensitivity of different landscape characters in regional areas can be defined by considering aspects such as naturalness and uniqueness. The more disturbed or common a landscape is, generally the less it is valued, and the less 'visually sensitive' it is. The assessment is based on an indication of potential impact through combining 'sensitivity' and 'magnitude of change' rankings as shown in **Table 25-1**.

Based on the general landscape character of the project area and its surroundings, sensitivity rankings for the landscape character of the project area are defined as:

- **Insignificant** – containing predominantly industrial or mine infrastructure
- **Low** – general, widespread rural landscape with low to moderate levels of native vegetation, and no identified special landscape features or interesting topographic features
- **Moderate** – rural land with a high amount of vegetation or undisturbed bushland with attractive landscape features such as main watercourses or interesting topographic features.
- **High** – natural areas valued for conservation such as those with substantial natural vegetation, those with waterbodies and landscapes with varied and interesting topography, also cultural landscapes highly valued by the general community such as attractive rural settings, some town settings and heritage landscapes.

- **Very High** - dramatic natural landscapes such as those likely to be protected as World Heritage Areas or National Parks, although such protection is not essential. Highly valued, iconic cultural landscapes may also be included.

25.2.4.2 Definition of 'Magnitude of Visual Change' (Related to Landscape Character)

For each of the landscape units, the magnitude of the potential visual change was identified, with this 'magnitude of visual change' given one of five possible rankings:

- **Insignificant** – minor scale of landform change and vegetation removal, existing urban/infrastructure present
- **Low** – moderate scale of landform change and minor vegetation removal, existing urban/infrastructure present
- **Moderate** – moderate scale of landform change and/or vegetation removal, minor watercourses possibly affected and existing urban/infrastructure possibly present on immediate site or seen in wider landscape
- **High** - large scale of landform change and/or vegetation removal, minor watercourses possibly affected and no substantial urban/infrastructure present on immediate site, yet possibly seen in wider landscape
- **Very high** – significant scale of landform change and major vegetation removal, major watercourses possibly affected, no existing urban/infrastructure present on immediate site nor seen in wider landscape.

25.2.5 Visual Amenity Impact Assessment Methodology

The visual amenity assessment examines potential changes to viewpoints from surrounding properties, roads and any other sensitive receptors, based on an indication of potential impact through combining 'visual sensitivity' and 'magnitude of visual change' rankings as shown in **Table 25-1**.

The assessment describes the predicted changes in views that would occur during the life of the project where relevant to a particular viewpoint.

25.2.5.1 Definition of 'Visual Sensitivity' (Related to Visual Amenity)

Visual sensitivity related to visual amenity specifically defines the likely visual sensitivity of particular viewpoints that may be affected. Viewpoints are generally more sensitive the closer they are and the clearer the view of any changes. Also, the numbers of viewers affected is considered (such as views from roads with high traffic volumes) and whether viewers are permanent (such as residential viewers) or transient (such as roads).

Potential visual sensitivity has been defined for those sensitive receptors and viewpoints that would be within 5km of the project in terms of the following general rankings, with professional judgement also contributing to chosen rankings:

- **Insignificant** – residential (sensitive receptor) viewpoints within 5 km with no or very limited potential for views or non-residential viewpoints over 2 km away with low numbers of viewers and with no or very limited potential for views
- **Low** - residential (sensitive receptor) viewpoints between 2-5 km away with potential for some limited views of the project; viewpoints between 2-5 km away with low numbers of viewers (such as arterial roadways) with potential for some limited views of project; and viewpoints within 1 km

away viewed by low numbers of public and/or transient viewers (such as local public roadways) with potential for some views of the project

- **Moderate** – residential (sensitive receptor) viewpoints between 1-2 km away, with potential for some limited views of project; residential (sensitive receptor) viewpoints between 2-5 km away with potential for some extensive views of project; viewpoints within 1-2 km away viewed by high numbers of public and/or transient viewers (such as highways) or arterial roadways within 1 km with low numbers of public and/or transient viewers, with potential for some wide views of project
- **High** – residential (sensitive receptor) viewpoints between 1 – 2 km away with potential extensive views of mine infrastructure; and viewpoints within 1-2 km away viewed by high numbers of public and/or transient viewers (such as arterial roadways or highways)
- **Very high** – residential (sensitive receptor) viewpoints within 1 km with potential extensive views of mine infrastructure; and viewpoints within 1 km away viewed by high numbers of public and/or transient viewers (such as highways).

25.2.5.2 Definition of 'Magnitude of Visual Change' (Related to Visual Amenity)

For each of the identified sensitive receptors and other potential viewpoints, the magnitude of the potential visual change was identified. 'Magnitude of visual change' is determined by one of five possible rankings:

- **Insignificant** – minor scale of change, not significantly different in scale or type to existing views and/or landscape character
- **Low** – low to moderate scale of change, not significantly different in scale or type to existing views and/or landscape character
- **Moderate** – moderate visual change to views as a result of landscape change and construction of mine infrastructure, where previously there was no mine or other infrastructure
- **High** - high visual change to views as a result of landscape change and construction of mine infrastructure (such as vegetation removal and landform modification), where previously there was no mine infrastructure
- **Very high** – significant visual change to views as a result of substantial landscape change (such as extensive vegetation removal and major landform changes) and close proximity to the mine or associated infrastructure.

25.2.6 Viewshed

The viewshed broadly predicts areas from which the highest point/elevation of the combined mine activities would be wholly or partially seen (refer to **Figure 25-2**). However, the viewshed does not take into consideration vegetation screening or other structures that may potentially block views. The viewshed was created using GIS software, with the viewshed calculation accomplished through geoprocessing existing topography (contours 2-10 m), digital elevation model (DEM) and mine plans files containing elevation information.

Any sensitive receptors or viewpoints that fall within the mapped viewshed imply that there is potential for some part of the project to be seen from that location.

The viewshed depicts a worst case scenario, with the assessment in this chapter providing a more site specific analysis of each viewpoint.

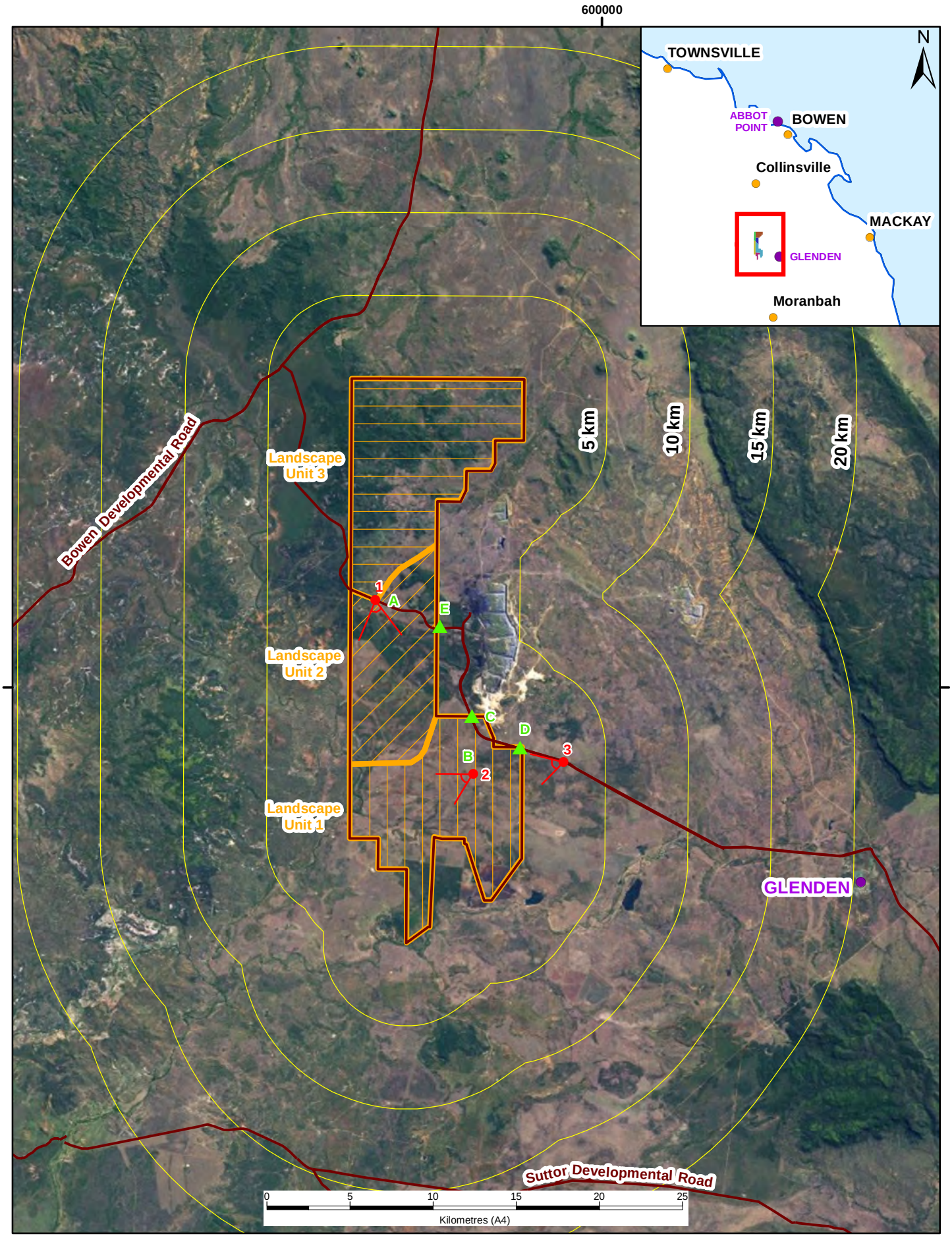
25.2.7 Photomontages

A number of photomontages (i.e. simulations of the project on photographs of the existing project area) from surrounding key viewpoints have been prepared to illustrate the impact of the project. The locations of the photomontages are indicated on **Figure 25-1**, and the photomontages provided as **Figure 25-3** to **Figure 25-14**. These cover:

- Viewpoint 1: Collinsville–Elphinstone Road (from the Goonyella to Abbot Point (GAP) railway bridge)
- Viewpoint 2: Wollombi Road
- Viewpoint 3: Collinsville–Elphinstone Road (south east of Wollombi Road).

The photomontages illustrate four versions of the same viewpoint:

- the existing view
- an outline of the approximate maximum visual envelope during the mine operation phase (i.e. worst-case scenario)
- likely final look without rehabilitation
- likely final look following rehabilitation.



Legend

- Project Area
- Distance from Project
- Main Road
- Assessed Viewpoints
- Landscape Unit 1
- Landscape Unit 2
- Landscape Unit 3
- Photomontage Points

Landscape Units, Assessment Viewpoints & Photomontage Points	QCOAL GROUP
Figure 25-1	**Byerwen Coal Project**
Date: *5/02/2013*	**Author:** Shahram.Nasiri
	Map Scale: 1:300,000
Revision: R1	**Coordinate System:** GDA 1994 MGA Zone 55
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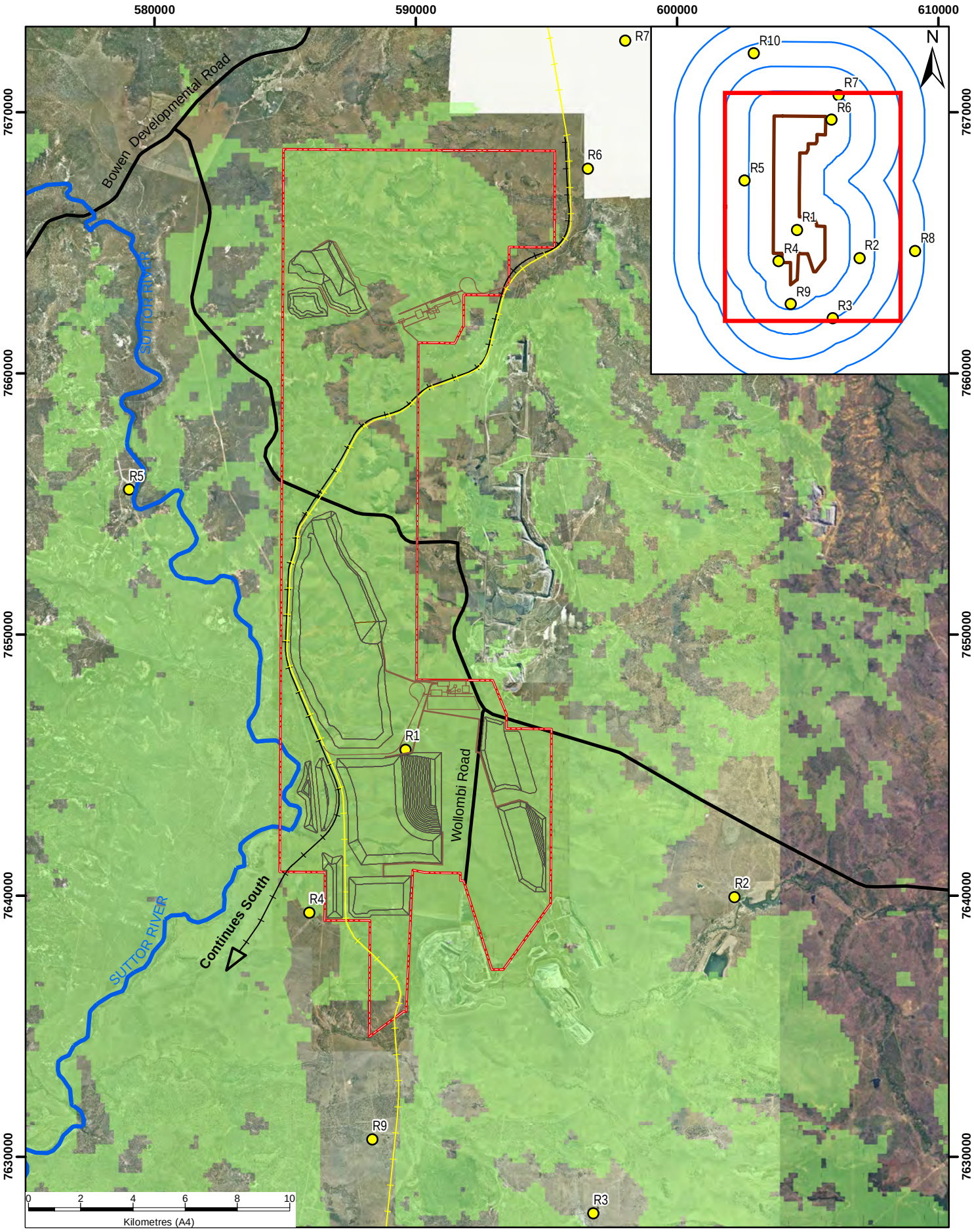

Legend

- Project Area
- Waste Rock Dumps and Pits
- Mine Infrastructure
- GAP Rail Line
- Alpha Coal Project Rail Line
- Formed Roads
- Sensitive Receptors
- Project Viewshed Area

Viewshed Analysis	QCOAL GROUP
Figure 25-2	**Byerwen Coal Project**
Date: *5/02/2013*	**Author:** Shahram.Nasiri
	Map Scale: 1:190,000
Revision: R1	**Coordinate System:** GDA 1994 MGA Zone 55
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25.3 Existing Visual Environment

25.3.1 Context

25.3.1.1 General

The project area lies within the northern Bowen Basin in Central Queensland which has approximately 34 operational coal mines extracting over 100 million tonnes annually. The nearest towns to the project are Collinsville (55 km to the north) and Glenden (20 km to the east). The landscape surrounding the project area is largely used for pastoral agriculture such as beef cattle.

25.3.1.2 Landform and Land Use

The project area and surrounding area is gentle to moderately undulating, becoming hilly in places. Within the project area, the northern part is the most hilly, with the centre hilly but less dramatic, and the southern part relatively flat. There has been historic clearing of the project site, largely to support low intensity cattle grazing.

25.3.1.3 Vegetation

Various vegetation communities exist across the project area, with further information provided in the **Chapter 18** (Terrestrial Ecology) of the EIS. Land clearance and habitat loss associated with the establishment of open cut pits and supporting infrastructure will result in the loss of approximately 2,400 ha of remnant native vegetation from within the footprint.

Loss of vegetation is considered as part of the landscape character and visual amenity assessment.

25.3.1.4 Watercourses and Catchments

The project area is located in the Burdekin River catchment. The northern and most of the central sections of the project area are within the Bowen sub-catchment and are drained by, Kangaroo Creek and tributaries, which forms part of the Rosella Creek sub-catchment. The southern section of the project area is within the Suttor sub-catchment and is drained by the Suttor River and its tributaries. Catchments and watercourses are further described in **Chapter 15** (Surface Water).

25.3.1.5 Landmarks

There are no significant landmarks identified within the general vicinity of the project.

25.3.1.6 Cultural Heritage

Indigenous and historical cultural heritage are described in **Chapter 28** and **Chapter 29** respectively.

25.3.2 Landscape Character Assessment Area – Existing Conditions

The landscape character assessment area has been categorised into three landscape units for the purposes of this assessment (refer **Figure 25-1**).

Each Landscape Unit has been rated according to its 'visual sensitivity', as defined in **Section 25.2.4**.

25.3.2.1 Landscape Unit 1: Southern Flat Rural Landscape

Landscape Unit 1 covers the southern part of the project area and is characterised by a flat to gently undulating landform. There is generally little vegetation cover apart from scattered individual trees, with some limited denser pockets of vegetation. Typical images of this landscape type are shown in **Photos 25-1**.

The scenic quality of this landscape is fairly low. It is widespread landscape type for the local area, and does not have any particularly special qualities.

The flat nature of the landform means that generally there are no vantage points that allow any elevated views over the surrounding area. In some places distant hills can be seen, and in the very south the waste rock dumps of Xstrata's Suttor Creek and Wollombi coal mine located at the end of Wollombi Road are part of the backdrop, leading to a decreased scenic quality (refer **Photos 25-2**).

This landscape type has been assessed as having a low visual sensitivity.

Photos 25-1 Landscape Unit 1 – Southern Flat Rural Landscape

Photos 25-2 Xstrata's Suttor Creek Mine (includes Suttor Creek and Wollombi Pits) from Wollombi Road

25.3.2.2 Landscape Unit 2: Central Moderately Hilly, Forested/Rural Landscape

Landscape unit 2 covers the central part of the project area. The landform transitions from the flatter southern landscape to the hillier northern landscape. There is a mix of forested areas interspersed with grazing pasture.

The presence of hills means that in some parts views are quite limited and enclosed by the topography, yet in other parts where the landform contains flatter areas some more distant views are possible. Typical images of this landscape type are shown in **Photos 25-3**.

The scenic quality of this landscape type is low, as it is a widespread and common landscape without any notable topographic features or any particularly special qualities. This landscape type has been assessed as having a low visual sensitivity.

Photos 25-3 Landscape Unit 2 – Central Moderately Hilly, Forested/Rural Landscape

25.3.2.3 Landscape Unit 3: Northern Hilly Forested/Rural Landscape

Landscape unit 3 covers the northern part of the project area, where the landform becomes hilly and is mostly forested. The eastern end of a local ridge extends across the north-western corner, with a series of low hills present across the remaining north-eastern corner. These higher areas are forested.

Between the higher areas are flatter, pastoral valleys that support cattle, and intermittent watercourses that have formed deep gullies.

The strong presence of hills means views are limited and enclosed by the topography in the lower areas, with distant views possible from vantage points on the hills and ridges. Typical images of this landscape type are shown in **Photos 25-4**.

The scenic quality of this landscape type is moderate, as although it is relatively widespread and common, the presence of taller vegetation and hilly parts means that it could be considered to be a more interesting landscape than the other units of the project area. This landscape type has been assessed as having a moderate visual sensitivity.

Photos 25-4 Landscape Unit 3 – Northern Hilly Forested/Rural Landscape

25.3.3 Visual Amenity Assessment – Sensitive Receptors and Viewpoints

25.3.3.1 Identification of Potential Sensitive Receptors

All potential sensitive receptors (permanent residents and other potentially sensitive land use viewers) in the vicinity of the project area are identified in **Figure 25-1** and **Figure 25-2** and **Table 25-2**.

The shaded area in **Figure 25-2** represents the approximate area potentially seen by sensitive receptors (not taking into account elements such as vegetation and buildings that could obscure views). **Table 25-2** defines whether additional assessment is needed based on the status of the sensitive receptor, the potential for any parts of the project to be seen by the receptor and the distance of the receptor from the project.

Sensitive receptors situated 5 km or more from the project area are assumed to be outside the area for which visual change can reasonably be considered to be of significant concern. In such cases no additional assessment has been undertaken. No occupied houses within 5 km are within the area of the project's visibility. Therefore no further assessment has been undertaken for any sensitive receptors.

Table 25-2 Sensitive Receptors - Visual Amenity Assessment

Sensitive receptors	Description	Potential for views of parts of project	Need for further assessment
R 1- Suttor North Homestead	Unoccupied house on property owned by proponent	Not relevant	No
R 2 - Suttor Creek Homestead	House 7 km from project site boundary with no visibility	No	No
R 3 - Lancewood Homestead	House 10 km from project area boundary	No	No
R 4 - Wollombi homestead	House unoccupied	Not relevant	No
R 5 – Cerito Homestead	House approximately 6 km from nearest project area boundary with no visibility.	Of no concern due to distance	No
R 6 - Byerwen Homestead	House approximately 1.3 km from nearest project area boundary, but over 9 km from nearest active mine area with no visibility	No	No
R 7 - Weetalaba Homestead	House approximately 5 km from nearest project area boundary with no visibility	No	No
R 8 - Glendon Homestead	House approximately 13 km from nearest project area boundary	Of no concern due to distance	No
R 9	Two sheds, no house	Not relevant	No
R10 Figtree Homestead	House approximately 13 km from nearest project area boundary	Of no concern due to distance	No

25.3.4 Other Potential Viewpoints of the Project

Other potential viewpoints of the project have also been assessed up to a distance of 5 km. Four other potential viewpoints have been identified, with all located on surrounding public roads.

25.3.4.1 Assessed Viewpoint A: Collinsville–Elphinstone Road (from the GAP Railway Bridge)

Collinsville-Elphinstone Road is a state-controlled road that connects Glenden and areas further south to the Bowen Developmental Road which leads to Collinsville in the north.

The visual sensitivity of this viewpoint is moderate as it is in an elevated position along a public roadway that crosses the central part of the project area, yet supports only a low level of regional and local traffic. From this location there is potential for quite clear views towards the central part of the mine, particularly when travelling south.

25.3.4.2 Assessed Viewpoint B: Wollombi Road

Wollombi Road is a local, unsealed road that essentially provides general vehicle access to Suttor Creek Pit and Wollombi Pit (which are both situated on the Suttor Creek ML 4761). Wollombi Road traverses

across the southern part of the project area. It has very low levels of traffic, and therefore any changes to views as a result of the project would be of low to insignificant sensitivity.

25.3.4.3 Assessed Viewpoint C: Collinsville–Elphinstone Road (North of Wollombi Road Junction)

On the southern side of the intersection of Collinsville-Elphinstone Road and Wollombi Road there is an overpass providing access for mine traffic between Xstrata's Suttor Creek and Wollombi mines and their main Newlands mine. Just north of that intersection, Collinsville–Elphinstone Road travels within the project area boundary, allowing close views (<1 km) of the existing landscape and potential views of the project, leading to this viewpoint being of moderate visual sensitivity. The main potential viewers would be those travelling south, with the overpass blocking all but very close views for those travelling north.

25.3.4.4 Assessed Viewpoint D: Collinsville–Elphinstone Road (South-East of Wollombi Road Junction)

South-east of the intersection with Wollombi Road, Collinsville-Elphinstone Road travels along the project site boundary, allowing close views of the project area and potential views of the southern part of the project. This viewpoint has been assessed as potentially being of high visual sensitivity where the road is immediately alongside the project area.

The reduced scenic quality due to current views of extensive waste rock dumps at Newlands mine immediately to the north and Suttor Creek and Wollombi mines further off to the south has reduced the visual sensitivity for this public viewpoint. Its close proximity (<1 km) to Collinsville-Elphinstone Road means that its visual sensitivity is moderate.

25.3.4.5 Assessed Viewpoint E: Collinsville–Elphinstone Road (where Infrastructure Corridor Crosses)

The proposed central infrastructure corridor crosses Collinsville-Elphinstone Road along the road to the south east of the existing railway bridge (Viewpoint A). At this location there would be close views of the infrastructure corridor, although those views would be limited to a small section of that road. This viewpoint is of moderate visual sensitivity where the road is immediately alongside the project area.

25.4 Description of the Project

25.4.1 Main Components Relevant to Visual Impact Assessment

The project description is provided in **Chapter 6** (Construction), **Chapter 7** (Operations) and **Chapter 8** (Water Management). Rehabilitation and decommissioning is described in **Chapter 10**.

The components of the project most relevant to landscape and visual impact assessment are:

- waste rock dumps and open pits
- ROM and product coal stockpiles
- CHPPs and MIAs
- train loading facilities
- infrastructure corridors
- roads
- lighting of various work areas and infrastructure.

The location of waste rock dumps and final voids at the end of project operations is shown in **Figure 25-2**. The final landform of waste rock dumps will be up to a maximum of 60m above the natural ground level.

The southern and northern ROM pads near each CHPP facility will be used for ROM coal stockpiling, and be approximately 300 m by 250 m (7.5 ha) with coal stockpiles approximately 10 m high.

Product conveyors will deliver product coal from the southern and northern CHPPs to nearby product coal stockpiles. The southern and northern product coal stockpiles will be approximately 20 m high and approximately 5 ha and 3 ha respectively.

Two CHPPs will stand approximately 30 m high and will have an overhead crane, concrete floor, be a free-standing steel structure, and be fully lit for continuous 24 hour operations.

There will be two MIAs, adjacent to the respective CHPPs. The southern MIA will be established in the initial construction stages and the northern MIA will be established at approximately Year 15. Both MIA footprints are approximately 250 m by 250 m (6.2 ha).

Co-disposal dams will be constructed at each of the CHPPs. The southern co-disposal dam will be approximately 2,000 m by 500 m and the northern approximately 300 m by 300 m. Both dams will be approximately 10 m in height.

There will be two train loading facilities (TLFs), located adjacent to the CHPPs each with its own rail loop linking to the GAP rail line. The southern rail spur and rail loop will be approximately 7 km in length, and the northern rail spur and rail loop will be approximately 4 km in length. A train loading bin will be positioned above each rail line. The train loading bin structure will be approximately 20 m high.

There are two infrastructure corridors within the project tenements:

- The southern infrastructure corridor (400 m total width) comprises:
  - southern TLF (rail line and rail loop)
  - drainage diversions to divert water flowing between West Pit 1 and South Pit 1
  - raw water supply
  - power lines.

Depending on an evaluation of security requirements, the infrastructure corridor may be fenced along both sides.

- The central infrastructure corridor (100 m total width) connects the southern CHPP and MIA to the northern CHPP and MIA and contains:
  - road for light and heavy mine site vehicles
  - power lines
  - raw water supply pipeline
  - communications
  - a bridge over both Collinsville-Elphinstone Road and the GAP rail line and proposed Alpha Coal Project rail line.

The main parts of the mine that would be lit at night, seven days a week, would be:

- MIAs and CHPPs
- active mine pits (by vehicles and equipment)
- haul and access roads (by vehicles and equipment).

There will be two site access roads which connect the Collinsville-Elphinstone Road to the southern and northern CHPP along a road within in the central infrastructure corridor. The main gate will be along the site access road from the intersection with Collinsville-Elphinstone Road.

25.4.2 Clearing and Rehabilitation

Rehabilitation and decommissioning are described in **Chapter 10**. Progressive rehabilitation will create a landform that is stable, self sustaining and with land use capabilities and/or suitabilities as determined in the Rehabilitation Management Plan. Following decommission of mine infrastructure and rehabilitation, the post mine land use is likely to be grazing.

25.4.3 Final Landform

The final landform is described in **Chapter 10**. In the southern tenement area, there will be three residual voids (part of West Pit 3, South Pit 1 and East Pit 2) and rehabilitated waste rock dumps (associated with West Pit 1, 2 and 3, South Pit 1 and 2 and East Pit 1 and 2) that would remain at the conclusion of mining and in perpetuity. In the northern tenement a void and rehabilitated waste rock dump would remain as part of the North Pit.

The residual voids will be benched on all sides apart from the former high walls. The voids would not be visible from outside the project site.

The final above ground-level landforms of waste rock dumps would be up to a maximum of 60m above the existing natural surface, with the longest being some 5km long (former West Pit 3). The waste rock dumps will typically be rehabilitated with low vegetation such as grasses and shrubs.

25.5 Impact Assessment

The impact assessment addresses the three relevant types of impact, as defined in the ToR:

- impact to landscape character of the site and the surrounding area
- impact on the visual amenity of particular panoramas and outlooks (identified here as sensitive receptors (R1-R10) and other viewpoints)
- impact in terms of night-time lighting.

The assessment focuses on the impact from the main landform changing features such as waste rock dumps and open pits, and the highest structures during the life of the mine (such as the CHPPs and train loading facilities).

The assessment describes the predicted changes in landscape character and views that would occur during the life of the project and combines visual sensitivity with magnitude of impact to provide an impact assessment ranking.

25.5.1 Landscape Character

The landscape character impact assessment is based on the landscape units (described in **Section 25.2.4**), in the context of 'visual sensitivity' and 'magnitude of visual change'. Using **Table 25-1** which defines the relationship between 'sensitivity' and 'magnitude of change', the resulting landscape character 'impact level' rankings are shown in **Table 25-3**.

Landscape units 1 and 2 would experience the greatest landscape and landform change due to the extent of mining activity in these areas. Landscape unit 3 would experience far less landscape and landform change as there is less project activity across a larger area.

Table 25-3 Landscape Character Impact Assessment Summary Table

Landscape unit	Magnitude of visual change		Sensitivity (refer section 25.2.4)	Level of impact	
	During operations	End of mine life (following successful rehabilitation)		During operations	End of mine life
1	High	Moderate	Low	Moderate	Low
2	High	High (becoming moderate over time)	Low	Moderate	Low
3	High (mining area) Low (other areas)	Moderate (mining area) Low (other areas)	Moderate	High (mining area) Low (other areas)	Moderate (mining area) Low (other areas)

During operation of the mine the landscape character impact level would be moderate for most of the project area, with a high impact associated with the North Pit. The impact would be reduced in the longer term by mitigation measures that include both revegetation and landform rehabilitation works. Hence, the residual landscape character impact at the end of the mine would be low across most of the project area, with a smaller area of moderate impact associated with the disturbed area of the former North Pit due to the higher sensitivity on this landscape unit.

25.5.1.1 Landscape Unit 1

Substantial landform change would occur during operation primarily due to:

- East Pit 1 (years 26-40) and East Pit 2 (years 31-46)
- South Pit 1 (years 6-46) and South Pit 2 (years 6-30)
- out of pit waste rock dumps to the west of all of the above four pits (up to 60m high)
- re-location of some existing drainage paths to form a drainage and infrastructure corridor north of South Pit 1 and a drainage diversion between South Pit 1 and 2.

Other elements involving landscape change, but minimal landform change would be the:

- southern MIA located near the intersection of Collinsville-Elphinstone Road and Wollombi Road, with the largest structure being a CHPP (30 m high), with product stockpiles (approximately 20 m high) covering an area of some 5 hectares (ha)
- southern train loading facility (with a rail line, rail loop and train loading bin approximately 20m high) near the MIA.
- southern co-disposal dam (10 m height).

Substantial landform change would remain across this landscape unit at the end of the mine primarily due to residual landforms from the former East and South Pits, including:

- final void in East Pit 2 approximately 2 km long at its longest side, and 100 m below ground level
- waste rock dump in East Pit 2 to a height of up to 60 m above the surrounding ground level, covering an area of some 3 km long by 1 km wide
- final void in South Pit 1 approximately 3 km long by 1.8 km wide and 300 m deep

- waste rock dump in South Pit 1 to a height of up to 60 m above the surrounding ground level, covering some 4 km by a variable width of 2-3 km
- five other waste rock dumps that would remain with all having an approximate final height of up to 60 m above the natural ground level, the largest being in East 1 and South Pit 2
- drainage diversions.

25.5.1.2 Landscape Unit 2

Substantial landform change would occur across this landscape unit during operation of the mine primarily due to:

- West Pit 1 (years 1-15), West Pit 2 (years 11-25) and West Pit 3 (years 21-46)
- an extensive waste rock dump associated with West Pit 1, 2 and 3 (60 m high).

The central infrastructure corridor (100 m total width) connects the southern CHPP and MIA to the northern CHPP and MIA through part of this unit. It includes a bridge over Collinsville-Elphinstone Road. There would be clearing of up to 100 m to create this corridor, thus leading to a substantial loss of vegetation and a visible, cleared swathe.

Substantial landform change would exist across this landscape unit at the end of mine operation primarily due to residual change from the former West Pits, including:

- a long linear final void 5 km long and 200 m deep
- a waste rock dump to a height of approximately 60 m above the surrounding ground level, covering an area of some 8 km by 5 km
- drainage diversion.

25.5.1.3 Landscape Unit 3

Landscape character and landform change to this landscape unit during operation of the mine would be far more limited than other landscape units and include:

- North Pit 1 (years 16-30).
- a waste rock dump to the west of North Pit 1 (up to 60 m high).

Other elements involving landscape change, but minimal landform change would be:

- the northern MIA located east of North Pit 1, with the largest structure being a CHPP (30 m high), with product stockpiles (approximately 20 m high) covering an area of some 3 ha
- the northern train loading facility (with a train loading bin approximately 20 m high) near the MIA
- a small co-disposal dam near the MIA.

The central infrastructure corridor (100 m total width) connects the southern CHPP and MIA to the northern CHPP and MIA through part of this unit. It includes a bridge over the GAP rail line and proposed Alpha Coal Project rail line. There would be clearing of up to 100 m to create this corridor, thus leading to a substantial loss of vegetation and a visible, cleared swathe.

Landscape character and landform change to this landscape unit at the end of the mine would be more limited than the other units, and due to:

- A final void some 2 km long, 800 m wide and approximately 200 m deep
- Two waste rock dumps covering an area of approximately 2.5 km by 2 km

25.5.2 Visual Amenity

As described in **Section 25.3.3** and **Table 25-2** there are no identified sensitive receptors within a 5 km radius of the project and within the viewshed, as there are no occupied houses within this zone. Therefore the detailed visual amenity assessment has been limited to the five public viewpoints from surrounding roads within 5 km of project activities. The locations of the main identified viewpoints and the photomontages are indicated in **Figure 25-1**.

A summary of the assessment of impacts to visual amenity from the five public viewpoint is provided in **Table 25-4**. Overall the visual amenity impact to any viewpoint in the long term would be no greater than a low to moderate impact following rehabilitation measures. Although the project would cause substantial visual change, the potential level of impact is notably tempered by its location in a rural area that is quite remote and with a low, sparse population. There are also low traffic volumes on the main road through the area. The Collinsville-Elphinstone Road has approximately 1,100 vehicles per day and provides the only opportunity for public views apart from the local Wollombi Road.

Table 25-4 Visual Amenity Impact Summary Table

Viewpoint	Magnitude of visual change		Sensitivity (refer section 25.2.5)	Level of impact	
	During operations	End of mine life (following successful rehabilitation).		During operations	End of mine life
Viewpoint A: Collinsville-Elphinstone Road (from the railway bridge)	Low (except for the last few years where it would be moderate)	Low	Moderate	Low (except for the last few years where it would be moderate)	Low
Viewpoint B: Wollombi Road	Moderate	Low	Insignificant	Low	Insignificant
Viewpoint C: Collinsville-Elphinstone Road (north of Wollombi Road)	Moderate	Insignificant	Moderate	Moderate	Insignificant
Viewpoint D: Collinsville-Elphinstone Road (south East of Wollombi Road)	Moderate	Low	Moderate	Moderate	Low
Viewpoint E: Collinsville-Elphinstone Road (central infrastructure corridor)	Low	Low/ Insignificant	Moderate	Moderate	Low/ Insignificant

Viewpoints C and D can be mitigated further through retention of existing vegetated buffers. Screening of viewpoint A (from the railway bridge at Collinsville-Elphinstone Road) is not possible due to the elevation of that viewpoint. However, the impact on this viewpoint would be low following rehabilitation.

25.5.2.1 Assessed Viewpoint A: Collinsville-Elphinstone Road (from the Railway Bridge)

Photomontage location 1 provides the view from the Collinsville-Elphinstone Road railway bridge. **Figure 25-3, Figure 25-4, Figure 25-5** and **Figure 25-6** show the following respectively:

- the existing view
- an outline of the approximate maximum visual envelope during the mine operation phase (i.e. worst-case scenario).
- likely final look without rehabilitation
- likely final look following rehabilitation.

From this location there is potential for quite clear views of the central part of the mine, particularly when travelling south. The extent of visual impact to this viewpoint would increase over time as the West Pit areas and associated waste rock dumps (with ongoing rehabilitation) move closer. At Year 25 these waste rock dumps would be approximately 4 km away. During the final stages of mining, the waste rock dumps will be about 1 km away.

Figure 25-3 Photomontage 1 a Collinsville-Elphinstone Road (from Railway Bridge) Existing View

Figure 25-4 Photomontage 1 b Collinsville-Elphinstone Road (from Railway Bridge) Worst Case Scenario Visual Envelope

Figure 25-5 Photomontage 1 c Collinsville-Elphinstone Road (from Railway Bridge) Worst Case Scenario Unrehabilitated

Figure 25-6 Photomontage 1 d Collinsville-Elphinstone Road (from Railway Bridge) Worst Case Scenario Rehabilitated

25.5.2.2 Assessed Viewpoint B: Wollombi Road

This viewpoint has been assessed as having insignificant visual sensitivity and low to insignificant visual impacts over the project life. Never-the-less this viewpoint is located between different project mine pits and respective views that would be seen from Wollombi Road have been illustrated in **Figure 25-7, Figure 25-8, Figure 25-9** and **Figure 25-10** (photomontage location 2).

25.5.2.3 Assessed Viewpoint C: Collinsville-Elphinstone Road (North of Wollombi Road)

Potentially close views of the MIA would be possible from the Collinsville-Elphinstone Road where parts of the MIA (e.g. administration buildings) are as close as 100 m, particularly if there was any loss to the existing vegetation buffer. The CHPP, which would be approximately 30 m high, is about 1 km away. There are currently some trees of up to 10 m high along the road boundary at this location, which would screen some of the MIA, assuming that these trees are retained.

The visual impact during mining operations would be moderate, assuming retention of an adequate vegetation buffer at least 25 m wide along Collinsville-Elphinstone Road.

Following decommissioning, removal of the MIA, CHPP and other infrastructure, would result in no views of the mine infrastructure with distant views towards the rehabilitated waste rock dumps obscured. The visual impact at the end of the mine would therefore be insignificant.

25.5.2.4 Assessed Viewpoint D: Collinsville-Elphinstone Road (South East of Wollombi Road)

Photomontage location 3 (refer **Figure 25-11, Figure 25-12, Figure 25-13** and **Figure 25-14)** illustrates the general viewpoint from Collinsville-Elphinstone Road to the east of the project. The photomontage location is at a greater distance than where the nearest waste rock dumps would be the closest to the road. The nearest waste rock dumps are approximately 3.7 km away.

The worst case visual impacts would begin from approximately Year 25 when the waste rock dumps from East Pit 1 would be approximately 500 m from the road. Impacts would decline following successful rehabilitation of the waste rock dump.

Figure 25-7 Photomontage 2 a Wollombi Road Existing View

Figure 25-8 Photomontage 2 b Wollombi Road Worst Case Scenario Visual Envelope

Figure 25-9 Photomontage 2 c Wollombi Road Worst Case Scenario Unrehabilitated

Figure 25-10 Photomontage 2 d Wollombi Road Worst Case Scenario Rehabilitated

Figure 25-11 Photomontage 3 a Collinsville-Elphinstone Road (South East of Wollombi Road) Existing View

Figure 25-12 Photomontage 3 b Collinsville-Elphinstone Road (South East of Wollombi Road) Worst Case Scenario Visual Envelope

Figure 25-13 Photomontage 3 c Collinsville-Elphinstone Road (South East of Wollombi Road) Worst Case Scenario Unrehabilitated

Figure 25-14 Photomontage 3 d Collinsville-Elphinstone Road (South East of Wollombi Road) Worst Case Scenario Rehabilitated

25.5.2.5 Assessed Viewpoint E: Collinsville-Elphinstone Road (Central Infrastructure Corridor)

At this location there would be close views of a proposed bridge over the Collinsville-Elphinstone Road and for some distance along the corridor, where a swathe of some 100 m will be cleared of vegetation.

Visual impacts will be moderate during the mine life, with this lessening further over time due to familiarity with the changes. Visual impacts would be reduced to insignificant at the end of the mine assuming decommissioning of infrastructure in the corridor and rehabilitation of areas close to Collinsville-Elphinstone Road.

25.5.3 Lighting Impacts

The existing night-time visual environment of this region is one already affected by mines.

For the project, lighting will be designed to ensure any impact to surrounding viewpoints is minimised. However, it is anticipated that all viewpoints within a 5km radius of the active mine area, even where direct views are not possible, will notice a sky glow. There are no sensitive receptors of any concern (i.e. private, occupied houses) within this 5km area, although beyond this distance it may still be possible to see a sky glow.

It is anticipated that at some locations along the Collinsville-Elphinstone Road lights would be seen, particularly those of the southern MIA and CHPP, which would be located approximately 1km from that road.

Impacts of lighting on sensitive ecological receptors are described in **Chapter 18**.

25.6 Mitigation Measures

Mitigation measures that will occur during the life of the project, and at its closure include:

- progressive rehabilitation of disturbed mine areas
- decommissioning of infrastructure at the end of operations and rehabilitation of disturbed areas
- lighting designed to ensure any impact to surrounding sensitive receptors and roads would be minimised.

These measures reduce the potential visual impact to the landscape character and surrounding viewpoints and ensure that where practical vegetation is restored, disturbed watercourses are rehabilitated and the final waste rock piles are left in a stable and vegetated condition.

Mitigation to address the specific visual impact to viewpoints C and D during operations and at mine closure includes:

- Retention where practicable of a vegetated buffer of at least 25m wide at the following places:
  - North of the Wollombi Road intersection with Collinsville-Elphinstone Road until at least 250m past the MIA (i.e. viewpoint C).
  - South of Wollombi Road where project activities at East Pit 1 are directly alongside Collinsville-Elphinstone Road (i.e. viewpoint D).

It is not feasible to establish any screen planting or mounding to screen the views of the mine that would be possible from the railway bridge along Collinsville-Elphinstone Road (i.e. assessed viewpoint A). Rehabilitation will occur along the central infrastructure corridor (i.e. as seen from viewpoint E).

25.7 Residual Effects

The final look of the mine site at the conclusion of the rehabilitation phase would be of a substantially altered landform. In the south, there will be three final voids and rehabilitated waste rock dumps associated with East Pit 1 and 2, South Pit 1 and 2 and West Pit 1, 2 and 3 at the conclusion of mining and in perpetuity. In the north a final void and rehabilitated waste rock dump would remain.

The voids will be benched on all sides apart from the former high walls. The voids would not be visible from outside the project area.

The final above ground-level landforms of waste rock dumps would be up to 60m above the existing natural surface, with the longest being some 5 km long (associated with the West Pits complex). All would be rehabilitated with low vegetation such as grasses and shrubs. The existing local topography across the site includes knolls and hills of up to 330-350 m AHD, particularly through the central part of the site in the vicinity of the West Pits complex. Therefore the proposed maximum height of 60 m for these final landforms would give an overall final height of approximately 350 m AHD, which is a level that would not significantly tower over the surrounding landscape.

However, these final landforms would be substantially different in form in terms of shapes that would not reflect the natural topography. These large elevated areas would cover substantial surface areas and have relatively steep side slopes and flatter broad upper areas.

Infrastructure will generally be removed, depending upon post-mining land uses and the specific infrastructure type considered. Rehabilitation and revegetation will be progressive throughout the life of the mine, with final rehabilitation and revegetation of disturbed areas conducted as part of mine closure.

25.8 Conclusion

Mining activities, particularly waste rock dumps, will result in high magnitude of change to the landscape character of the project area. Other mining activities, such as mine infrastructure will have a low to moderate magnitude change to landscape character. Following progressive and final rehabilitation of waste rock dumps, and decommissioning of infrastructure, the magnitude of change will be moderate to low. However the visual sensitivity of the landscape is low in the southern area, where the majority of project activities occur, and moderate in the northern area. The project is in a remote, rural location with existing mining activities and a low, dispersed population. Therefore the level of impact to landscape character of the project area and surrounds at the end of mine life is low in the southern area and moderate in the northern area.

There will be no occupied residences within 5 km of project activities with views of project activities. Therefore there would be insignificant visual amenity impacts to sensitive receptors surrounding the project area.

There are expected be some visual amenity impacts to public viewpoints along Collinsville-Elphinstone Road, which traverses the project area near the southern MIA, East Pit 1 and West Pit 3. However there are low traffic volumes on this road and existing vegetation will be retained as a screen to the MIA. There would be a low to moderate level of impact to these viewpoints during operations and insignificant to low impact following decommissioning and rehabilitation.

The existing night-time visual environment of this region is one already affected by mines. Lighting will be designed to ensure any impact to surrounding viewpoints would be minimised. However, there are a number of components of the mine that would be lit at night such as the MIA and CHPP. It is anticipated that all viewpoints within a 5 km radius of the active mine area, even where direct views are not possible, will notice a sky glow. There are no sensitive receptors of any concern (i.e. private, occupied houses) within this 5 km area. It is anticipated that at some locations along the Collinsville-Elphinstone

Road lights would be seen, particularly those of the MIA and CHPP in the southern tenement, which would be located 1 km from that road and relatively brightly lit. Retention of vegetation buffers will contribute to further screening this lighting and reducing the impact.