

17 Visual and lighting

17.1 Assessment objectives

The DGRs to assess the visual impacts for the Project are:

Visual – including:

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

17.2 Assessment method

The visual and lighting assessment for the Project has been prepared by EMM (Appendix O) and the results are summarised in this chapter. The assessment considers the views of the Project that may result in visual impacts to private residences and users of public roads in and around the PAA. Measures are identified where necessary to mitigate the impacts of the Project to an acceptable level.

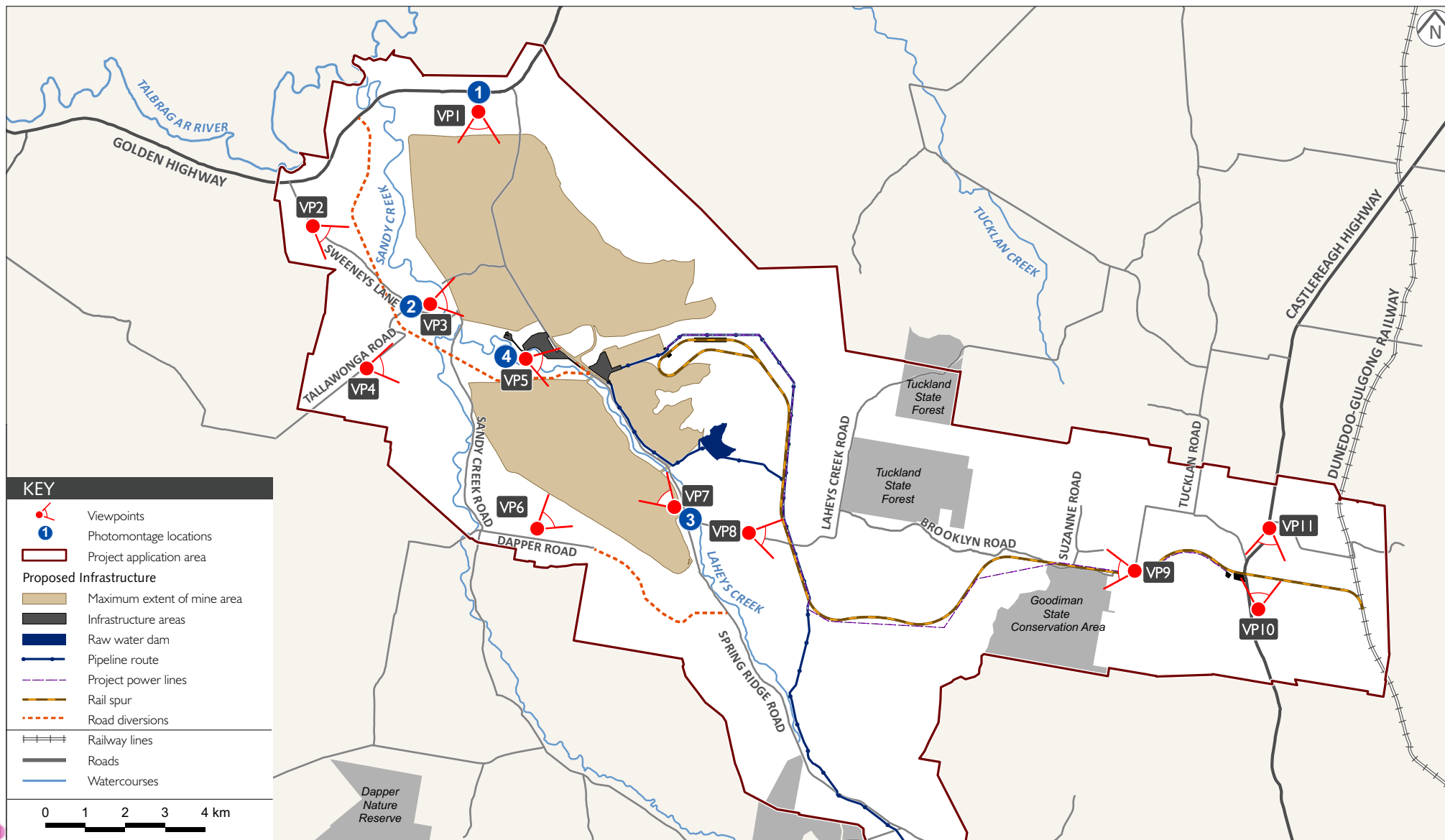
This visual and lighting assessment follows the principles in the *Guidelines for Landscape and Visual Impacts Assessment – Second Edition* (Landscape Institute and Institute of Environmental Management and Assessment 2002).

17.2.1 Desktop analysis

A desktop analysis of the PAA using aerial photographs and topographic maps was used to understand the scale of the Project and the environment in which it will be sited. The analysis was used to determine viewpoints representative of a range of landscape characteristics that the Project is likely to visually impact.

17.2.2 Site survey

A site survey, with a line of sight analysis, was undertaken at each viewpoint in October 2011 to assess the view type, the existing visual characteristics and context for each viewpoint. Following the desktop analysis and site inspection, the locations of key viewpoints were determined. Eleven locations (VP1 to VP11) were selected to represent views to Project elements that residents or visitors will experience. The location of each viewpoint is shown in Figure 17.1. The 11 viewpoints were then analysed to determine the Project's impacts on them. The results of this analysis are outlined in Section 17.5.4.



Viewpoints and Photomontage Locations

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Figure 17.1

17.2.3 Preparation of viewpoint montages

Photomontages were used to place the Project into the existing visual landscape. Four viewpoints were chosen to represent unmitigated visual impacts (ie without measures such as screening vegetation) that will be experienced by viewers at private residences and motorists on the main roads near the Project (see Figure 17.1):

- Golden Highway near Sandy Creek bridge (VP1);
- Tallawonga Road/Sweeneys Lane intersection (VP3);
- Spring Ridge Road (VP5); and
- Spring Ridge Road diversion (VP7).

17.2.4 Assessment of significance

The visual impact of a particular mine element at any given viewpoint will change over time depending on the mine stage. For example, the view from one viewpoint may be to an active mining area with a high visual impact but, a few years later, this same area may be obscured by rehabilitation and the view may be of natural vegetation and similar to the pre-mining landform.

The visual impact at each viewpoint was quantified to determine the significance of unmitigated impacts on private residences or users of public roads in and around the Project, considering the extent and duration of the exposure.

The significance of impacts was assessed according to the *Guidelines for Landscape and Visual Impact Assessment* (Landscape Institute and Institute of Environmental Management and Assessment 2002). Significance was determined by comparing the magnitude of change created to the visual sensitivity of the viewpoint (Table 17.1).

Table 17.1 Evaluation of significance matrix

Magnitude of change	Visual sensitivity		
	High	Moderate	Low
High	Substantial	Moderate/Substantial	Moderate
Medium	Moderate/Substantial	Moderate	Slight/Moderate
Low	Moderate	Slight/Moderate	Slight
Negligible	Slight	Slight/Moderate	Negligible

Key:



Significant



Not significant

17.3 Existing environment

17.3.1 Landform

The landscape in the PAA is characterised by undulating terrain, with broad valleys and low hills. Elevations of approximately 360 m AHD are typical in the north of the PAA around the Golden Highway and in the Sandy Creek Valley. The maximum elevation is about 600 m AHD in the southern part of the PAA, with a high point of 580 m in Tuckland State Forest.

The PAA contains a ridgeline in the east, which extends north and south of the proposed mining areas. The ridge, with an elevation of about 460 m AHD, has rock outcrops of sandstone, conglomerates and siltstones, forming steep cliffs in some locations.

The majority of the PAA has been highly modified by agricultural practices, with most land cleared and replaced with pastures and, to a much lesser extent, crops.

17.3.2 Night lighting

The PAA's rural setting means there is little existing night lighting; the only sources are farmhouses, farm machinery and vehicles on roads.

The majority of the mining area will be in the Warrumbungle LGA. The Siding Springs Observatory is also within the Warrumbungle LGA, about 100 km north of the Project CHPP. The Council uses *Warrumbungle Development Control Plan No.1 – Shire Lighting Control* to protect Siding Spring Observatory so that lighting associated with developments does not lighten the dark skies required for the observatory's operation.

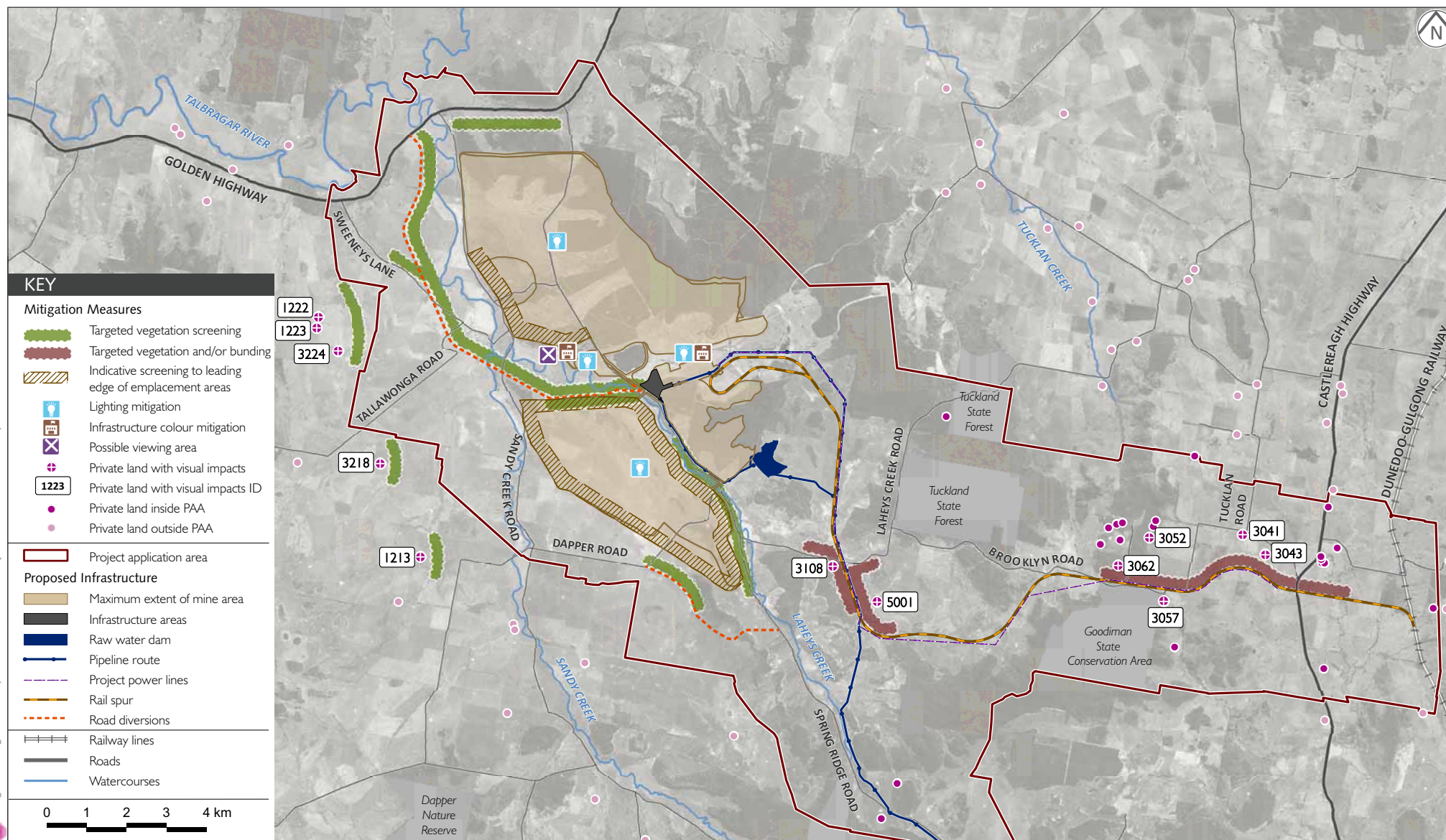
17.4 Environmental management

A landscape management plan and a lighting management plan will be prepared to detail management measures to minimise visual and lighting impacts associated with mining operations and infrastructure. They will develop management measures, including protocols for vegetative screening and lighting structures, as well as review mechanisms so they remain adequate. The main management measures are described below and proposed mitigation strategies are illustrated in Figure 17.2.

17.4.1 Avoidance

A number of design changes in the mine planning were made that have decreased the extent and significance of visual impacts, including:

- the mining area has been reduced and reconfigured to reduce the size of the open cut pits, which has also reduced the required size of the out-of-pit emplacements;
- a proposed 12 km coal conveyor that would have been visible from areas to the north of the PAA, including from the Golden Highway, has been removed;
- the CHPP has been moved to the east of its original location away from Spring Ridge Road; and
- a comprehensive acquisition program, which has bought the majority of residential properties where visual and lighting impacts may be significant.



Mitigation Measures

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Figure 17.2

17.4.2 Mitigation measures

Mitigation measures to minimise the Project's visual impacts of will include the following:

- disturbed areas will be rehabilitated early and progressively (see Appendix F) to minimise the extent of, and views to, the most visually obtrusive elements of the Project. For example, the out-of-pit emplacements that will be visually prominent from roads and other viewpoints to the west will be rehabilitated as soon as possible;
- foreground and mid-ground trees and shrubs will be planted to reduce exposure of viewpoints to the mine operation and infrastructure. Once established, this vegetation will provide a permanent and natural screen to views of the mine from roads and private land holdings;
- vegetative screens will be based on species common to the immediate area. Most will be planted during construction so there is as much time as possible to establish the trees and plants, and so the screening is effective as early as possible;
- amenity agreements will be agreed with owners of private residences that are in line of sight to mining operations or infrastructure where significant visual impacts cannot be mitigated;
- earth mounds will be formed along sections of the rail spur to reduce visual impacts to residences where acquisition or amenity agreements cannot be agreed;
- workings on out-of-pit emplacements benches will be staged so that outer embankments will be created first around the perimeter wherever possible, providing a visual screen while work takes place in the central part of the emplacement;
- visually dominant structures, such as the CHPP and workshops, will be integrated with the surrounding backdrops;
- external colouring or treatment of large structures will be compatible with the structure's surrounds; and
- discussions with local councils and community groups concerning the appropriateness of creating a viewing platform to provide opportunities for the public to view the mine.

17.4.3 Night lighting

The lighting management plan will describe design features for particular buildings, permanent lighting structures or operating equipment. It will be prepared so the Project complies with AS 4282 – Control of Obtrusive Effects of Outdoor Lighting and AS/NZS 1158 – Lighting for Roads and Public Spaces.

A detailed assessment of potential light spill from the Project will be undertaken as part of detailed design. The lighting management plan will contain protocols to ensure compliance with *Warrumbungle Development Control Plan No.1 – Shire Lighting Control* to protect Siding Spring Observatory.

17.5 Impacts

The visual and lighting impacts after the management measures described in Section 17.4 are applied are described below.

Photomontages showing the view towards the future mining area, the view during operations and the view of the final landform are presented in Figures 17.3 to 17.10. These do not show vegetation that will be planted to screen views to the mine.

17.5.1 Out-of-pit emplacements

The out-of-pit (OOP) emplacements will remain visible from some viewpoints throughout the life of the Project, as complete screening is not possible because of their size. The tallest out-of-pit emplacement will be AC-OOP, which will have an average height of 30 m above the existing topography. The mitigation measures will ensure the visual impact of the out-of-pit emplacements will be generally limited to motorists on roads in and around the PAA. As the roads all have relatively low traffic volumes (see Section 12.3), exposure to the emplacements will be limited to a small number of viewers.

CHC has acquired the majority of private residences with visual exposure to out-of-pit emplacements. The visual assessment identified 12 private residences that will have visual impacts from views of mine operations and/ or infrastructure. The location of these properties is illustrated in Figure 17.2. CHC is in the process of acquiring some of these properties. Where acquisition of affected properties is not possible, visual amenity agreements with landowners will mitigate the visual impacts of the out-of-pit emplacements to the satisfaction of the residents.

Rehabilitating the out-of-pit emplacements as soon as possible will minimise the visual impact of these emplacements.

17.5.2 Mine infrastructure

Mine infrastructure, such as the CHPP, will be visible throughout the life of the Project to motorists on the Spring Ridge Road diversion (see Figure 17.9). However, with the proposed colour treatment to Project infrastructure, the impacts will be low.

17.5.3 Night lighting

Lighting associated with the CHPP and mine infrastructure area will remain throughout the life of the Project and be visible to motorists on Spring Ridge Road.

Sky glow from operational machinery, mine infrastructure and associated lighting structures will be present throughout life of the Project. The amount of sky glow will vary depending on factors such as cloud cover and the location of operational mining activities at a given time.

The lighting management plan, which will be prepared in accordance with Development Control Plan No.1, AS 4282 and AS 1158, will manage impacts from lighting associated with the Project to an acceptable level. Ongoing monitoring and audits of lighting associated with the Project will ensure no significant lighting impacts result from the Project.



Photomontage 1 - Existing (Golden Highway near Sandy Creek Bridge)

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Figure 17.3



Photomontage 1 - Year 20 (Golden Highway near Sandy Creek Bridge)

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Figure 17.4



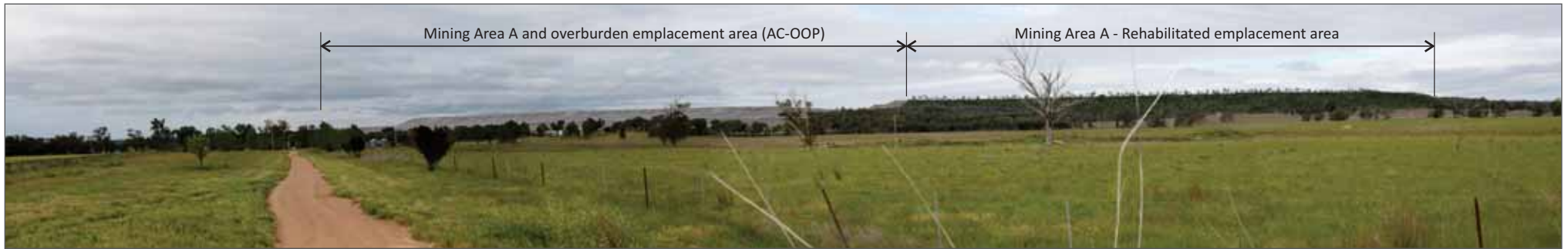
Photomontage 1 - Final Landform (Golden Highway near Sandy Creek Bridge)

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Figure 17.5



EXISTING



YEAR 8



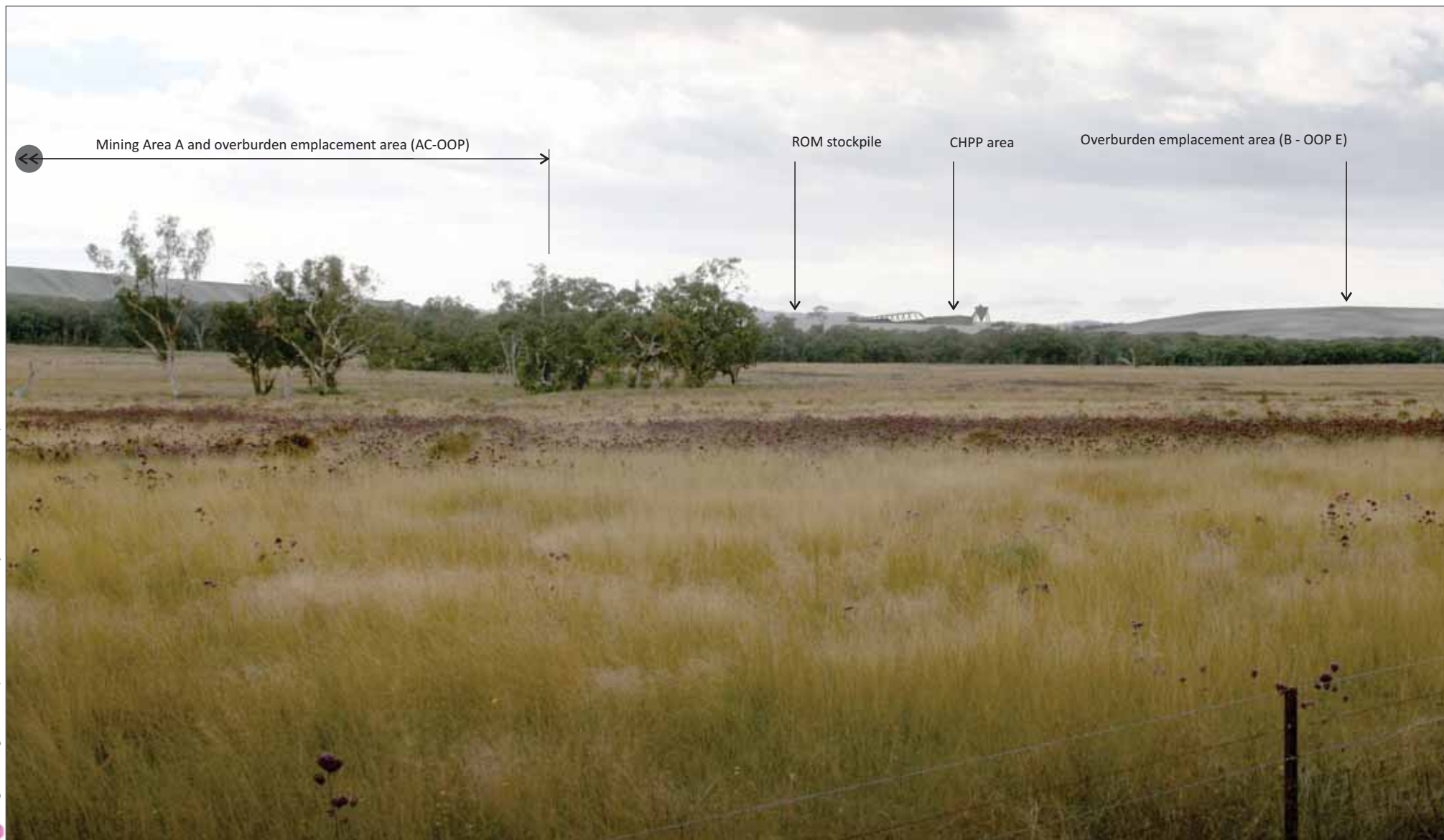
FINAL LANDFORM



Photomontage 4 - Existing (Spring Ridge Road Diversion)

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Figure 17.7



Photomontage 4 - Year 8 (Spring Ridge Road Diversion)

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Figure 17.8



Photomontage 4 - Final Landform (Spring Ridge Road Diversion)

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Figure 17.9



EXISTING



YEAR 20



FINAL LANDFORM

17.5.4 Visual impacts

Visual and lighting impacts will be present from some viewpoints, including private residences, where mitigation is unable to completely screen mine operations, or where amenity agreements are reached but short-term impacts occur until screening takes effect. The proposed mitigation measures with respect to private residences and public roads are presented in Figure 17.2. The significance of impacts during screening establishment and the significance of impacts once the full effect of screening is achieved are described in Table 17.2.

Moderate to slight/moderate impacts are predicted to occur at a number of specific locations around the Project. Vegetation and/or earth bunding screens will be placed to reduce the predicted impacts summarised in Table 17.2 (see Figure 17.2).

Where amenity agreements are reached with private landowners, the impacts described will be short to medium term, until vegetative screening is established. Once an effective visual screen is established, the significance of impacts in these instances will become negligible. The impacts presented in Table 17.2 assume that amenity agreements will be agreed with private landowners where acquisition of those properties does not occur.

17.5.5 Visual outcomes

Without mitigation, overburden emplacement areas, mine infrastructure, mine pits and lighting would be visible from different viewpoints to varying degrees at various stages of the mine life. However, management measures will be incorporated into the Project during construction and operations to minimise its visual impacts on surrounding viewers.

The lighting management plan prepared in accordance with Development Control Plan No.1, AS 4282 and AS 1158, will ensure there will be no significant lighting impacts to Siding Spring Observatory from the Project. With the implementation of the described mitigation measures, the Project will not significantly impact the area's visual amenity.

17.6 Monitoring

CHC will monitor and review visual impacts from operational activities and lighting sources as follows:

- the landscape management plan will require regular inspections of new plantings for visual screening during the first 12 months and replacement of dead plantings; plantings will be inspected every two years after the first 12 months and dead plantings replaced; and
- lighting audits will be made to confirm compliance with LMP and any specific consent conditions, and will identify improvements to lighting structures and use of mobile lighting.

Table 17.2 Visual impacts following implementation of mitigation measures

Area impacted	Impact type	Detail of impact	Magnitude of change	Visual sensitivity	Significance of impacts during screening establishment	Significance of impact upon full effect of screening
VP1 – Golden Highway	Visual – mine operations	Visual impact from Area A from Year 4 until screening is established	Low	Moderate	Slight/Moderate	Negligible
VP2 – Sweeneys Lane	Visual – mine operations	Visual impact from Areas A and C and AC-OOP from Years 1 to 20. Planting will provide intermittent screening once established	Medium	Low	Slight/Moderate	Slight
VP3/ VP4 – Sweeneys Lane/Tallawanga intersection	Visual – mine operations	Visual impact from Area A and C and AC-OOP from Years 1 to 20. Planting will provide intermittent screening once established	Medium	Moderate	Moderate	Slight/ Moderate
Residence 1222	Visual and lighting – mine operations	Visual impacts from to Area A and AC-OOP from Year 1 until screening is established. Progressive rehabilitation of OOPes from Year 8 will further reduce impacts	Low	Moderate	Slight/Moderate	Negligible
Residence 1223	Visual and lighting – mine operations	Visual impacts from Area A from Year 1 until screening is established. Impact will reduce from Year 8 with progressive rehabilitation of AC-OOP	Negligible	Moderate	Slight/Moderate	Negligible
Residence 3224	Visual and lighting – mine operations and infrastructure	Visual impact from Areas A and B and AC-OOP from Year 1, impacts of views to B-OOP E until Year 4 when rehabilitation is established Impacts from to CHPP area until screening is established Night light impacts from operations until screening is established	Low	Moderate	Slight/Moderate	Negligible
Residence 3218	Visual and lighting – mine operations	Visual impact from Areas A and B, AC-OOP and B-OOP W from Years 1 until screening is established	Low	Moderate	Slight/Moderate	Negligible
Residence 1213	Visual and lighting – mine operations	Visual impact of Mining Areas A and B AC-OOP and B-OOP W from Year 1 until screening is established	Moderate	Moderate	Slight/Moderate	Negligible

Table 17.2 Visual impacts following implementation of mitigation measures (Cont'd)

Area impacted	Impact type	Detail of impact	Magnitude of change	Visual sensitivity	Significance of impacts during screening establishment	Significance of impact upon full effect of screening
VP5 – Sandy Creek Road Diversion	Visual – mine operations and infrastructure	Visual impacts from Mining Areas A and B, AC-OOP and B-OOP W Visual impacts from CHPP area and ROM stockpile	Medium	Moderate	Moderate	Moderate
VP6 – Dapper Road	Visual – mine operations	Visual impacts from active mine operations associated with Area B from Year 1 until Dapper Road diversion and screening along Dapper Road is established	Medium	Moderate	Moderate	Negligible
VP7 – Spring Ridge/Sandy Creek Road intersection	Visual – mine operations	Visual impacts from active mine operation associated with Area B from Year 1 until infill screening is established	Medium	Moderate	Moderate	Slight/Moderate
VP8 – Laheys Creek Road (Rail Crossing)	Visual – mine infrastructure	The rail crossing embankment will create a new dominant/permanent visual element in the landscape	Medium	Moderate	Moderate	Slight/Moderate
VP9 – Brooklyn Road	Visual and lighting – mine infrastructure	Visual and lighting impact from train movements near the road	Low	Moderate	Slight/Moderate	Slight
Residences– 3062, 3052, 3057, 3041, 3043	Visual and lighting – mine infrastructure	Visual and lighting impact from train movements near viewpoint. Visual impacts of rail spur embankments.	Low	Moderate	Slight/Moderate	Negligible
VP10 and 11 – Castlereagh Highway	Visual – infrastructure	Visual and lighting impacts from train movements near the road	Low	Moderate	Slight/Moderate	Negligible
Residence 3108	Visual – infrastructure	Visual and lighting impacts from train movements near the residence. Visual impacts of rail spur embankments.	Low	Moderate	Slight/Moderate	Negligible
Residence 5001	Visual – infrastructure	Visual and lighting impacts from train movements near the residence. Visual impacts of rail spur embankments.			Slight/Moderate	Negligible