Visual Impact Assessment Report

Wandoan Coal Project

A report prepared by

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October 2008

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Glossary

Contrast	The degree to which a development component differs visually from its landscape setting
Integration	The degree to which a development component can be blended into the existing landscape without necessarily being screened from view
Screen	The degree to which a development element is unseen due to intervening landscape elements such as topography or vegetation.
Visual Effect	A measure of the visual interaction between a development and the landscape setting within which it is located
Visual Impact	A measure of a joint consideration of both visual sensitivity and visual effect that considered together determine the visual impact of a development
VMU	Visual Management Unit is a landscape area with similar visual characteristics
View Zones	
Primary View Zone	Is the primary view from such locations as a lounge room, front door, verandah or outside entertainment area
Secondary View Zone	Is a view zone of less significance to a homestead but still of some significance such as a view from a driveway or a bedroom
Tertiary View Zone	The least significant view zone around a homestead from utility areas such as work sheds, cloths line, etc
Visual Sensitivity	The degree to which a change to the landscape will be perceived in an adverse way

Executive Summary

The visual assessment outlined in this report considers the visual impact of the Wandoan Coal Project (the Project). The Project is located within Mining Lease Applications (MLAs) 50229, 50230 and 50231, immediately west of the Wandoan township, approximately 65 kilometres (km) north of Miles, in the Dalby Regional Council (former Taroom Shire), Queensland.

Specifically the study defined the visual effect of the 15 open cut mine pits and associated processing infrastructure on the landscape settings of the locality and the projection of this into the regional landscape. The study also evaluates and defined the visual sensitivity of various view locations around the Project to changes in the landscape from the existing environment of the study area, typified by open grazing lands, with historical agricultural land use patterns having resulted in significant clearance of vegetation, to those as are proposed by the mining operations.

The visual assessment determined that while infrastructure elements are of large scale they will not project significantly outside of the MLAs and therefore will not create visual impact.

On the other hand the creation of the various mine pits creates visual change and high visual effects on some immediate surrounding areas. These mining activities will be visible from local sensitive view locations such as the Leichhardt Highway and rural homesteads that are located around the MLAs although it is noted that much of the Project site is generally not visible from the Wandoan Township due to a natural ridgeline between the town and the proposed mining areas.

Initially high visual impacts will result from the combination of high visual effects of the mine pit areas and the high sensitivities of homesteads and the highway. These impact levels will be sustained until landscape rehabilitation is carried out on completion of mining.

Visual and landscape mitigation strategies developed for the Project aim at reducing impact both in the short and long term. Short term strategies are recommended be carried out near to the sensitive points of viewing and will achieve impact reduction while also achieving landscape upgrades in treated areas. Longer term strategies related to landscape management of non mine areas and treatments of mine areas to restore local visual amenity values to close to pre-mining conditions. Strategies are also recommended in relation to community landscapes as a means to assist in 'offsetting' disturbance to landscape values for a 30 year period.

In summary, the Wandoan Coal Project is a major open cut mining operation that will inevitably have high initial visual effects and impacts. However the nature of the operation, with limited overburden removal allows for high quality rehabilitation of landform and land cover. This will result in low visual impacts in the longer term.

Management of visual impacts at the viewer location in relation to sensitive locations will more immediately influence visual impact levels. Landscape treatments will achieve measurable reductions in visual impact in relatively short time frames and achieve lasting landscape outcomes that will enhance the landscape settings of the viewing locations.

1. INTRODUCTION

This report has been prepared by Integral Landscape Architecture and Visual Planning, for Parsons Brinckerhoff (PB) on behalf of the Wandoan Joint Venture. John van Pelt, Managing Director of Integral, is a Registered Landscape Architect and a corporate member of the Australian Institute of Landscape Architects. The practice specialises in landscape architecture and visual planning and has extensive experience in visual assessment of mining operations.

Parsons Brinckerhoff has been commissioned to prepare an Environmental Impact Statement (EIS) for the Project to satisfy the requirements of the *State Development and Public Works Organization Act 1971*. This Visual Assessment Report is a component of that EIS. The objective of this report is to ensure that all visual impacts, direct and indirect, are fully examined and addressed.

The aims of this report are:

- To describe the Site and its local context in respect of landscape character and visual matters.
- To examine the proposed development's potential impact on the landscape and visual amenity of the Site, it's local area and receptors within it.
- Recommend mitigation measures to be taken to mitigate all adverse impacts.

1.1 Project background

The Wandoan Coal Project (the Project) is proposed by the Wandoan Joint Venture. The joint venture partners are made up of Xstrata Coal Queensland Pty Ltd, ICRA RPW Pty Ltd and Sumisho Coal Australia Pty Ltd.

The Project is centered on Mining Lease Applications (MLAs) 50229, 50230 and 50231, located immediately west of the Wandoan township, approximately 65 kilometres (km) north of Miles, in the Dalby Regional Council (former Taroom Shire), Queensland. The Site is situated on the western edge of the Leichhardt Highway (refer Figure 1-1).

The Project will comprise the development of thermal coal resources for export markets and possibly domestic markets with an open-cut mine and related infrastructure. The Wandoan Coal Project covers an area of approximately 32,000 ha. The Project also includes upgrading the Wandoan Town potable water treatment plant; upgrading of the Wandoan Town wastewater treatment plant in Wandoan; and creation of accommodation facilities.

The mining of the coal resources will be developed using a combination of truck, and excavator, dozer and dragline mining equipment, with shovel operations being limited to the Frank Creek Pit. Coal will be mined at a rate of around 30 million tonnes per annum (Mt/a) run of mine (ROM) coal. The coal will be crushed, sized and washed before being transported by rail to ports in the Gladstone area.

Due to the existing condition of the power grid in the area compared to power demands of the Wandoan Coal Project, on-site power generation is being considered as a power supply option. Gas from the nearby Peat-Scotia Gas Line has been identified as a potential fuel source for proposed on-site power generation which may be constructed as part of the Wandoan Coal Project. Conceptual design and alignment of the pipeline has an approximate length of 25 km,

buried to approximately 0.5 to 0.7m depth of cover and constructed through a section trench and backfill method.

1.2 Description of study area

Wandoan is a small town of approximately 350 people, with the Leichhardt Highway passing north-south on the western edge of the township. The location of the township in proximity to the MLAs is shown in Figure 1-1.

The Leichhardt Highway is a two-lane sealed state controlled road, providing a north-south route through central and southern Queensland, linking Goondiwindi (NSW/QLD border) to Rockhampton. Other roads within the study area are narrow two-lane bitumen and/or gravel carriageways.

The terrain throughout is moderately flat with broad based gently sloping hills to elevations of approximately 340m occurring within the eastern extent of the study area. There is a high proportion of open grassland with scattered pockets of remnant woodlands throughout the area. Tree cover is frequent along road reserves throughout.

Agriculture is the predominant land use of the area. Historical land use patterns within the study area have resulted in significant clearance of vegetation. Land use within the MLAs is similarly dominated by agricultural land use with grazing being the dominant agricultural activity in the region.

Many of the rural residences within these agricultural lands will have views to the Project across cropping and grazing lands, as well as open grasslands.

Figure 1-1
Locality Plan

2. METHODOLOGY OF ASSESSMENT

2.1 Relevant legislation and guidelines

The Wandoan Coal Project is subject to assessment under the *State Development and Public Works Organisation Act 1971* (SDPWO Act), *Integrated Planning Act, 1997* (IP Act) and *Environmental Protection Act 1994*, (EP Act). Elements of the mining activities that are located outside of the mining lease areas may constitute assessable development under the IPA for which the Planning Scheme for Taroom Shire may apply

This visual assessment, see Figure 2-1, is part of an overall environmental assessment to meet the requirements of the Coordinator-General's Terms of Reference under the SDPWO Act, IP Act, EP Act and the local Planning Scheme. This was achieved by assessing the visual character of the receiving environments, the visual character of the development, location of sensitive receptors to define visual impacts and as needed develop landscape mitigation strategies.

The interaction of the visual character of the development and the visual character of the receiving environment create the visual effect of the Project. The type of land use of the visual receptors and distances from visual receptors to the various components of the Project defines the visual sensitivity to the Project. When both visual effect and visual sensitivity are considered together the visual impact can be determined, see Figure 2-2.

These impact levels can be reduced by altering either visual effect or visual sensitivity. In the case of the Project, the visual effects are generally greatly reduced following the completion of mining; however this is a long term activity. Visual sensitivity can be reduced as needed, and is further discussed as part of the mitigation measures for the Project.

2.2 How the study was conducted and information obtained

In order to review the visual significance and magnitude of the Project on the landscape, a baseline study was completed to record and analyse the existing character, quality and sensitivity of the landscape and any visual resources in the vicinity of the Project.

In general terms, there were four key stages to the landscape visual assessment study:

Stage 1: Desktop study

A desk study of relevant background reports, other data and mapped information was undertaken to collect data on topography, land-use, landscape and settlement pattern. This allowed the landscape to be divided into homogeneous zones that could be surveyed in the field. An evaluation of aerial photographs allowed for a preliminary assessment of likely sensitive receptors for further field evaluation.

Stage 2: Fieldwork

A comprehensive field study was undertaken and photographic record obtained. The field survey was carried out on the study area, by two visual impact assessment experts to gain a consensus opinion.

Field work was completed to collect visual data relating to landform, land use, vegetation, boundaries and more perceptual aspects like scale, enclosure and visual unity. At the same time

information was collected on the condition of landscape features and elements that contribute to the overall character of the area.

Stage 3: Classification

This stage refined and finalised the desk study and field work output by classifying the landscape into Visual Character Units (VCU). VCUs are broad tracts of landscape that have unity of character. These VCUs represent areas that contain consistent character in terms of topography, vegetation and land use.

Stage 4: Analysis and evaluation

The visual assessment of the Project was completed in two steps. The first step determined visual impact using an assessment method that measures both Visual Effect, see Figure 2.2 and Visual Sensitivity, see Figure 2.3 to determine the Visual Impact, see Figure 2.4, of the Project and develop strategies to mitigate those impacts.

To assist in the appreciation of the visual effects of the Project and its interactions with various landscape settings, a series of photomontage imagery was completed. Twelve viewpoints were chosen to represent views of various parts of the mining operations, including the gas pipeline. These sites are located all around the MLAs with an emphasis on the more sensitive eastern view locations. These montages illustrate the progress of the mine as seen from the various view points through 'snap shots' taken at times when the mine would be highly exposed to the view locations. These snap shots included representation of night lighting.

2.3 Limitations

The assessment of visibility of mine activity areas was limited to general evaluation of topographic maps, aerial photography and field evaluation. It was not possible to accurately predict likely views from a large number of homesteads, but predictive modelling for impact purposes was done. In this way impact levels if mine areas are seen were determined. Photomontage images were used to illustrate likely visual effects and impacts from various sectors around the MLAs.

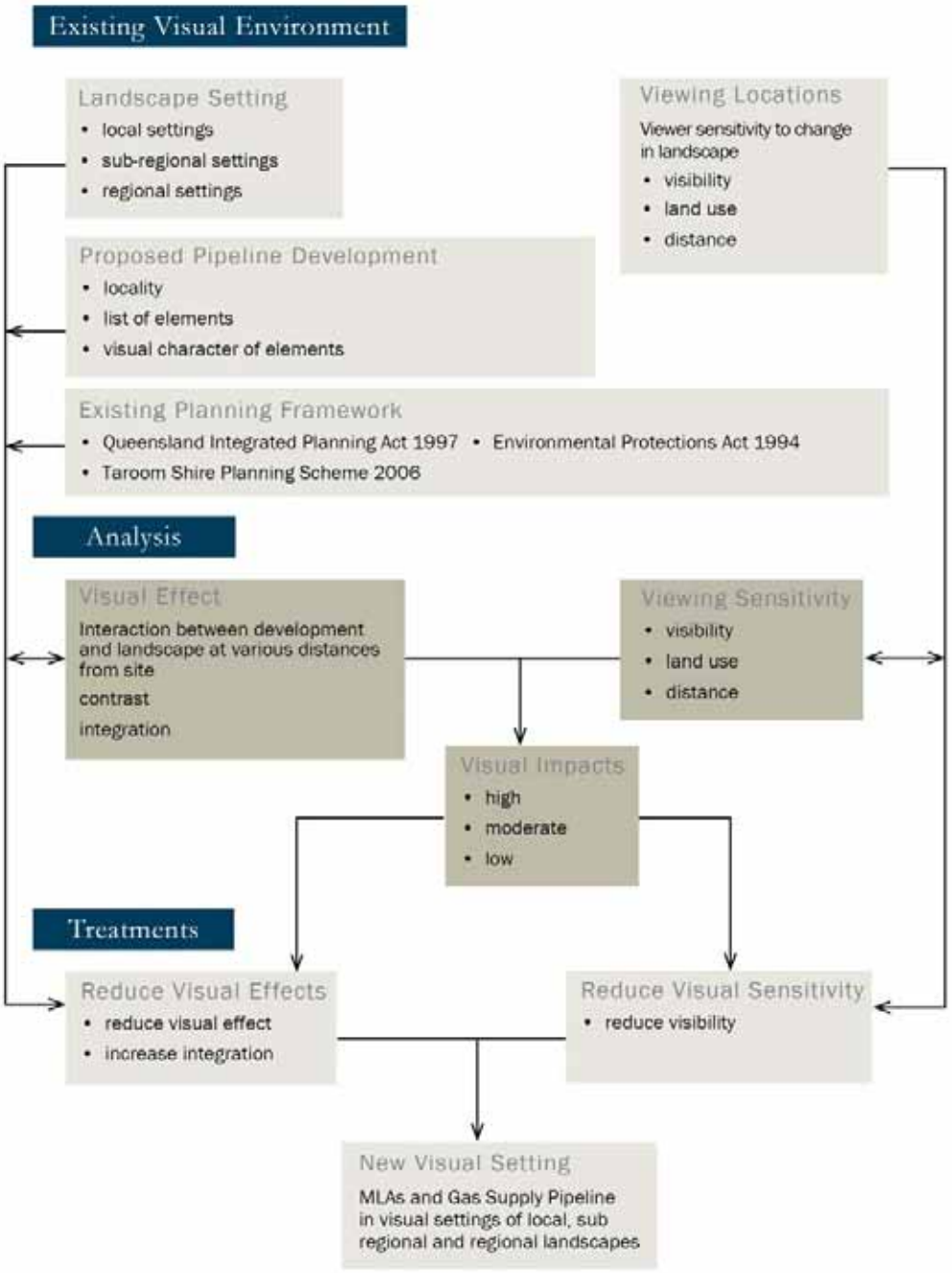


Figure 2-1: *Visual Assessment Methodology.*

Visual Effect	Visual Sensitivity		
	High	Moderate	Low
High	High visual Impact	High/Moderate Visual Impact	Moderate/Low Visual Impact
Moderate	High /Moderate Visual Impact	Moderate Visual Impact	Moderate/Low Visual Impact
Low	Moderate/Low visual Impact	Moderate/Low Visual Impact	Low Visual Impact

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

Figure 2-2: *Visual Impact.*

Land Use	Visual Sensitivity Levels			
	Nearest visible mine elements less than 2.5km away	Nearest visible mine elements between 2.5 - 7.5 km away	Nearest visible mine elements between 7.5 - 12.5km away	Nearest visible mine elements more than 12.5km away
Urban and Rural Houses	High Sensitivity	High/Moderate Sensitivity	Moderate Sensitivity	Low Sensitivity
Designated Picnic Areas, Lookouts and walking rails in recreation reserves, national parks & nature reserves, etc.	High Sensitivity	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
Designated tourist & main roads - Leichhardt Hwy	High Sensitivity	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
Less Utilised Public Lands in national parks, state forests, etc.	Moderate Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Other Main Roads: Jackson Road	Moderate Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Minor Local Roads in Rural Zone	Moderate/Low Sensitivty	Low Sensitivity	Low Sensitivity	Low Sensitivity
Broad acre rural lands	Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity

Figure 2-3: *Visual Sensitivity.*

Visual Properties		Visual Effect Levels		
Contrast Levels with elements in primary view zone	Visual Integration with elements in primary view zone	High Visual Effect	Moderate Visual Effect	Low Visual Effect
High Development elements do not borrow, form, shape, line, colour or texture or scale from existing features of the visual setting and contrast levels are high with existing landscape and or.... open mine pit	Low The development lacks integration with visual setting because of scale totally dominating the ability of site or surrounding features, vegetation and or topographic features to integrate the development.	It occupies more than 5% of the primary view shed half cone area open mine pit	It occupies between 2.5 – 5% of the primary view shed half cone area	It occupies less than 2.5% of the primary view shed half cone area
Moderate Development Elements borrow from some features of the visual setting in terms of form, shape, line pattern and or colour and scale, reducing visual contrast with existing setting and or.... newly resotred pit area	Moderate The development has some degree of visual integration with setting from other features, vegetation and or topography achieve some level of integration	It occupies more than 20% of the primary view shed half cone area, generally when in a foreground location	It occupies between 20-10% of the primary view shed half cone area. restored mine pit	It occupies less than 10%
Low Development Elements borrow extensively from features in visual setting in terms of form, shape, line, pattern colour and scale minimizing contrast with the existing setting and or..... restored landscape pattern	High Visual integration is high due to other features, vegetation and or topography achieving dominance and screening or filtering	The development occupies more than 40% of the primary view shed half cone area.	The development occupies 40-30% of the primary view shed half cone area	The development occupies less than 30% of the primary view shed half cone area restored landscape pattern

Note: The visual effect of the mine pits changes through time with open pits having high contrast and low visual integration creating high impacts at low levels of exposure i.e. 5% to restored pits with restored landscape patterns creating low to very low visual effects.

Figure 2-4: *Visual Effect.*

3. EXISTING ENVIRONMENT

3.1 Introduction

The Mining Lease Application (MLA) areas are located west of Wandoan, extending from near the western edge of the Leichhardt Highway (see Figure 1-1).

The MLAs and surrounds form a large generally open and gently rolling landscape. Topographically, the MLA and surrounding area lies between approximately 220m elevation and 300m elevation. The major visual features of this landscape are the natural features of the Mooyouee Peaks and Mount Lawton and the man-made visual features of the grain silos and telecommunication towers. Long distance views south, to the Mooyouee Peaks and Mount Lawton, are possible from many locations within the area. Also views to the grain silos and towers pinpoint the township of Wandoan.

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

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

3.2 Primary Visual Catchment

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

The PVC is defined by the Mooyouee Peaks and Mount Lawton ridgeline in the south with ridges and spurs extending to the west. Hills and spurs to the east of the Leichhardt Highway, in the vicinity Nathan Road, define the eastern boundaries. Northern boundaries are similarly defined by low hills and spurs adjacent to open grassland of the MLAs, generally in the vicinity of K Road.

3.3 Land Uses

Land use within the MLAs and surrounding area is dominated by agricultural lands. In addition, more localised land use developments also contribute to visual character. These elements include:

- Rural Land
- Wandoan Township
- Roads
- Sensitive Receptors
- Other Elements

3.3.1 Rural Land

The major land use within the Project area and surrounds is agricultural lands that support rural residences. Most of the undulating country has been cleared and consists of unimproved natural pastures and improved pastures used for beef cattle grazing. Some crops are grown within and around the Project area. Many rural areas will have views of the Project.

3.3.2 Wandoan Township

The township of Wandoan is located on the eastern side of the Leichhardt Highway. Residential dwellings on relatively large lots dominate the area, with a small commercial strip in the town centre. Significant features of the town are the disused grain silos, the windmill and the potable water tower. The Project site is generally not visible from the town due to a ridgeline between the town and the proposed mining areas.

3.3.3 Roads

The Leichhardt Highway and Jackson-Wandoan Road are both two-lane sealed state controlled roads. Other roads throughout the area are narrow local two-lane carriageways. The majority of these roads are bitumen sealed with some gravel. These roads provide access to the properties and residences within the Wandoan area.

Roads that travel through the Project lease areas are Jackson-Wandoan Road, Grosmont Road, Bundi Road, Cecils Road, Ryalls Road, Kabunga Road, Booral Road, Peakes Road, Q Road and Paradise Downs Road. The local road network will have to varying degrees views of the Project; however existing roadside vegetation will help to screen the Project.

Sections of Jackson-Wandoan Road, Paradise Downs Road, Q Road, Cecils Road, Ryalls Road, Booral Road, Kabunga Road and Grosmont Road will be temporarily closed throughout the Project life; however road deviations and upgrades will be developed.

3.3.4 Sensitive Receptors

The most sensitive visual receptors with significant views of the Project are:

- Leichhardt Highway;
- Several rural residences throughout the area; and
- Grosmont Primary School.

Leichhardt Highway

The Leichhardt Highway is a major state controlled road providing a north-south route through central and southern Queensland, linking Goondiwindi (NSW/QLD border) to Rockhampton. It is considered to have high visual sensitivity because of the number of travelers that use the road and the close proximity of the road to the Project.

Rural Residences

There are a number of rural residences within the Project site and surrounding locality. These include farm residences and rural residences. Several [as per bullet point above?] of these residences will have views to the Project across open grassland and agricultural land. These

homesteads are sensitive to visual impacts as visual amenity is an important element of residential amenity.

Grosmont Primary School

The Grosmont Primary School is a small one-teacher/principal school. The school is located at the junction of K Road and Grosmont Road. Classrooms and the southern outdoor areas will have views orientated towards the Project. The school residence, east of the school, will also have views of the Project.

3.3.5 Special Elements

Cemetery

The Wandoan Cemetery is located about 5 km north of Wandoan on the Leichhardt Highway. The site is rectangular in shape with the grounds laid out in regular burial sections. The main entrance is situated near the centre of the grounds, adjacent to the western edge of the Highway.

The main entrance to the Project is located approximately 0.5km south of the cemetery. Some elements of the Project will be visible from the cemetery grounds. The cemetery is sensitive to visual impacts as visual amenity contributes to the peaceful atmosphere of a burial ground.

Grain Silos

The Wandoan townscape is dominated by the large grain silos. From several viewing locations within the Project site and its surrounds, the grain silos pinpoint the township of Wandoan. The grain silos are a strong visual feature of many country towns.

In this context the Telstra lattice tower is also a location marker for the town. Although not as robust the tower has significant vertical scale, being 130m tall

3.4 Visual Character of the Landscape

3.4.1 Introduction

Extensive open views across grassland with isolated tree clumps and patches of woodland dominate the visual character of the landscape. The Project site and surrounding area also reflects the long-term agricultural land use.

Networks of tracks, from both sealed and gravel public roads, provide access to homesteads that are distributed throughout the area. Trees and shrubs, including native and exotic, are typically planted around homesteads. Other common structures in the landscape include water tanks, sheds, silos and stockyards.

The Project site and its immediate surrounds of grassland and woodland contribute to a unique olive green and gold landscape character. The dark green vegetation forms a strong visual contrast to the grassland planes or the sky against which they are viewed. This landscape pattern is a major influence on the visual quality of the landscape.

Road reserves throughout the area often include roadside vegetation often as remnant vegetation that provides screening to distant landscapes.

The local and regional landscape is void of visual clutter, for example transmission lines and roadside signage, which creates a landscape with high visual integrity in most locations.

Key characteristics of the local and regional landscape character are:

- Landscape of contrast and variety.
- Open rolling landscape.
- Large scale open landscape with extensive vistas to level horizons and huge sky expanses.
- High proportion of grassland areas.
- Partial woodland cover, often along road reserves.
- Isolated field trees, including feature Bottle Trees
- Varied agricultural land-use including crop and livestock. General agricultural clutter.
- Small clumps of trees are located in some grassland areas.
- Roadside vegetation.
- Riparian areas.
- Homestead vegetation.

3.4.2 Regional Landscape Systems

The Project site and the surrounding area is a typical rural landscape of the region. It includes open grassland, woodland pockets, often along creek and drainage lines, managed farmland, an array of meandering creeks and large homesteads come together to contribute positively to the setting of Wandoan. There are three landscape systems within the existing visual environment. These include:

- Distant Mountain Range
- Undulating Hills
- Riparian Zones

Distant Mountain Range

Mooyouee Peaks and Mount Lawton to the south are a group of elevated hills dominated by naturally vegetated slopes and ridges, see Figure 3.1. These distant mountains generally form the backdrop of the landscape to the south of the Project Site. They are the visual border in which the landscape is contained.

Undulating Hills

The largest system of the landscape are the exposed, open, undulating hills of native grassland or cultivate farmland generally uniform in character, see Figure 3.2, divided by the occasional line of trees associated with riparian zones. Scattered throughout the open undulating hills are pockets of remnant woodland, which creates visual variety to the more uniform character of the grassland and farmland.

Riparian Areas

Riparian vegetation occurs along some sections of creek lines, see Figure 3.3. As the Riparian zones dissect the grassland and undulating hills the vegetation type changes from open scattered trees to dense riparian vegetation.

Figure 3-1: *Mooyouee Peaks and Mount Lawton can be seen in the distant background, creating a visual border to the landscape.*

Figure 3-2: *Gentle undulating hills dominate the landscape.*

Figure 3-3: *Riparian vegetation seen along creek lines provides a strong contrast to the open grassland areas.*

3.4.3 Visual Character Units

The three landscape systems within the Primary Visual Catchment are divided into five Visual Character Units (VCU) on the basis of distinctive and recognisable patterns of elements in the landscape. These Visual Units represent areas that contain consistent landscape character in terms of topography, vegetation and land use. They contain elements or a combination of elements, which create a particular visual character. They are described as areas defined by spatial enclosure and pattern, which are determined by landform and land cover. No one VCU is identified as better as or worse than another. Dividing the landscape into distinct units provides a valuable tool for visual character assessment of large areas, see Figure 3.4.

It is important to note that VCUs are defined at a broad scale. Some VCUs can change in character quite distinctly whilst in others the difference is more subtle. Boundaries have been determined between the VCUs as a single line. However, in reality the change between one VCU and another is not as clear-cut. Often the transition between units is difficult to define as a line, however the VCU descriptions identify the essence of those differences and the boundaries are seen as the changeover point where the characteristics of one unit outweigh those of another unit.

In-field investigation, photographs and aerial photography were analysed to identify the different VCUs within the Project site and surrounding areas.

The primary characteristics of these Landscape Units are summarised below with typical photographs shown.

Local Visual Character Units include:

- Wandoan Township
- Open Grassland
- Crop and Open Farmlands
- Riparian Areas
- Woodland

Wandoan Township

The *Wandoan Township* Visual Character Unit (Figure 3-5) is found in the eastern portion of the Visual Catchment of the Project site and surrounds.

This VCU borders the Leichhardt Highway to the west and extends to the edge of Juandah Creek on the eastern boundary. A small industrial area is located to the south of the town centre. Grassland and woodland border the northern edge of town. The topography is predominantly level land with gentle undulation in the northeast.

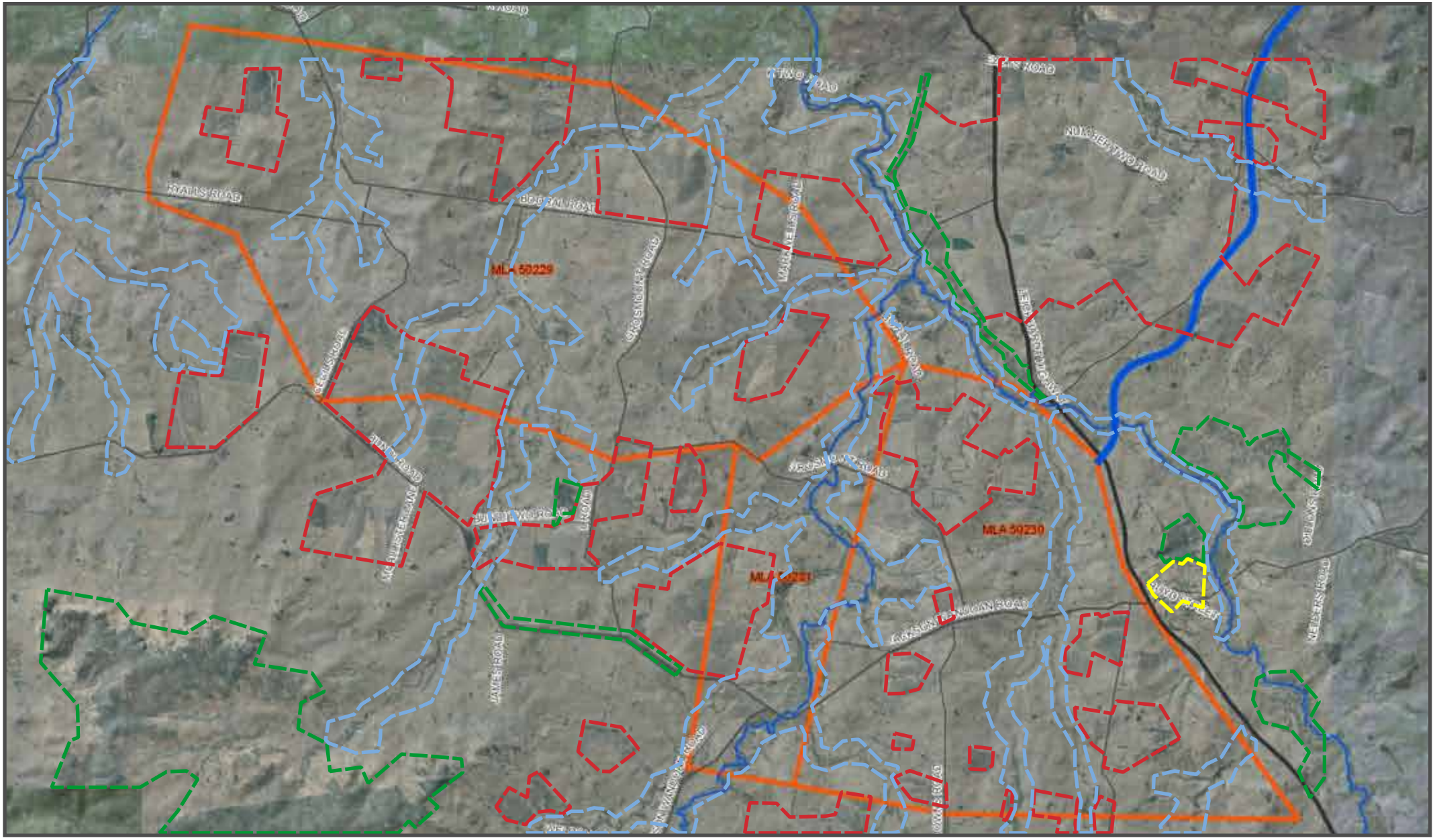
The unit is a formal grouping of landscape and built elements making up the township of Wandoan. Residential dwellings on relatively large lots dominate the area, with a small commercial shopping strip in the town centre. Significant features of the town are the grain silos, the Telstra tower, the windmill and the potable water tower. Another significant feature of the town is the transport corridors of the Leichhardt Highway and the disused Railway Line both of which run along the western edge of town. What about the Telstra tower

A golf course, a public waste disposal site and wastewater treatment ponds occur in this VCU.

Visual Significance

This VCU does not have strong visual links to the MLAs, due to an elevation in topography between the Project site and the township. In addition to topographic screening, there is foreground visual screening in the form of buildings and vegetation in most locations throughout the township.

The mining operations would not be visible from the golf course however the upgrading of the wastewater treatment would be visible. The proposed upgrades will create negligible visual change to the existing infrastructure, so therefore is not visually significant. The public waste disposal site could also have views to the wastewater treatment extension; however the area is not visually sensitive or significant because of its land use.



LEGEND

Landscape Character Units

- Wandoan Township
- Open Grassland
- Open Farmland and Crop
- Riparian
- Wooded Forest
- Wandoan Mine Lease Area

Integral landscape architecture & visual planning

Figure 3-4
Landscape Character Unit Map

Figure 3-5: *The Wandoan Township is a formal grouping of landscape and built elements with the disused grain silos contributing to its landscape character.*

Open Grassland

The *Open Grassland* Visual Character Unit (Figure 3-6) is found in all areas of the Visual Catchment of the Project site and surrounds.

Open Grassland consists of gently to moderately undulating landforms. These naturally vegetated grasslands accommodating limited human activity form a broad corridor across the Project site and surrounding areas. The VCU pattern is sparse and there are few landscape features to interrupt the open, gently sloping landscape. Vegetation is predominantly long grasses with some scattered remnant trees found within this unit. This is a dominant landscape type in the region.

Long views predominate, due to its openness, in this landscape unit with skyline features taking on particular importance. Long distance open views are available across grassland areas from many locations in the Primary Visual Catchment.

The northern and eastern sections of open grassland are part of a broader visual view line to the Mooyouee Peaks and Mount Lawton ridgeline, which borders the southern edge of the Primary Visual Catchment.

Land use in this VCU is largely private use amenity, with some cattle grazing. There are some residences within the VCU that will have visual contact with the Project. This VCU is largely visual from the highway and other local roads when travelling through the landscape. It occupies a number of zones within the PVC.

Visual Significance

This VCU has strong visual links to the Project from several viewing locations. Foreground landscapes within the unit itself will be a significant part of the view that could include parts of the Project.

Figure 3-6: *Open grassland is a dominant landscape type and is generally part of most views in the Visual Catchment of the Project site. This VCU allows for long distant views due to its openness.*

Open Farmland and Crop

The *Open Farmland and Crop* Visual Character Unit (Figure 3-7) is found scattered throughout the Visual Catchment of the Project site and surrounds.

The landscape is predominantly flat with some gently undulating landform. This VCU has an exposed, open rural character with farmland, scattered trees and some remnant tree clumps. There are a number of rural homesteads situated within this VCU, which contribute to the character of the unit. Homestead buildings, including residences and sheds, are a feature of this VCU. In most cases, field sizes are quiet large, creating large-scale mixed crop and grazing. Containing few trees or woodland creates a more expansive, open and somewhat denuded character.

Visual Significance

Generally this VCU has visual links to open grassland and will have strong visual links to the Project. Due to its flatness, long distance open views are available from several road locations running through the unit except where roadside vegetation blocks views. This VCU also has foreground landscapes within the unit itself which will be a significant part of the view that will include parts of the Project.

Figure 3-7: *Open farmland and crop is found throughout the Project site and surrounds. This VCU also allows for long distance views.*

Riparian

The *Riparian* Visual Character Unit (Figure 3-8) is found in primarily two main corridors, running north to south, centrally through the Project site and surrounds. This Visual Character Unit has strong visual links to open grassland and open farmland and crop.

This low lying, relatively level VCU consists of dense mixed vegetation continuing along the Woleebee Creek and Frank Creek corridors. Distinctions are made between the riparian VCU, where the landscape structure of trees form a strong visual element in the landscape, predominantly open agricultural land and open grassland. This VCU presents a linear feature, which emphasises the creek corridor.

Visual Significance

This VCU creates a visual edge to the more open areas adjoining and often assists in screening views at least in part to mine operational areas.

Woodland

The *Woodland* Visual Character Unit (Figure 3-9) is found scattered throughout the Visual Catchment of the Project site and surrounds.

This VCU is more complex than other VCUs described, with tree cover more frequent, providing a degree of enclosure and containment of views. This unit is best described as enclosed woodland and forest with a subtle mosaic of grassland and scrub. Large tracts of Woodland are comparatively scarce within the VCU. The topography is gently sloping and level land.

Visual Significance

Although the wooded forest unit is limited in extent, it is significant in its visual screening effects in certain situations. Most significant are forested areas along the Leichhardt Highway to the north of Wandoan, which assists in screening the Project from travellers moving through the region.

Figure 3-8: *The riparian Visual Character Unit forms a strong visual element in the landscape where open grassland or crop areas meet a defined linear tree patterned edge.*

Figure 3-9: *Woodland throughout the Project site and surrounds is generally limited. Some significant wooded areas exist along roads which will assist in screening the Project development.*

4. DESCRIPTION OF PROPOSED DEVELOPMENT

4.1 Introduction

The Wandoan Coal Project involves the development of a coal mine near the town of Wandoan. The Project will be developed as a 30 million tonne per annum (Mtpa) export thermal coal operation, with a mine life of approximately of 30 years.

The Project is centred on Mining Lease Applications (MLAs) 50229, 50230 and 50231, covering approximately 32,000 hectares (ha). The coal mine will be developed as an open cut mine with up to 15 pits being mined at various times during the 30 year lease period.

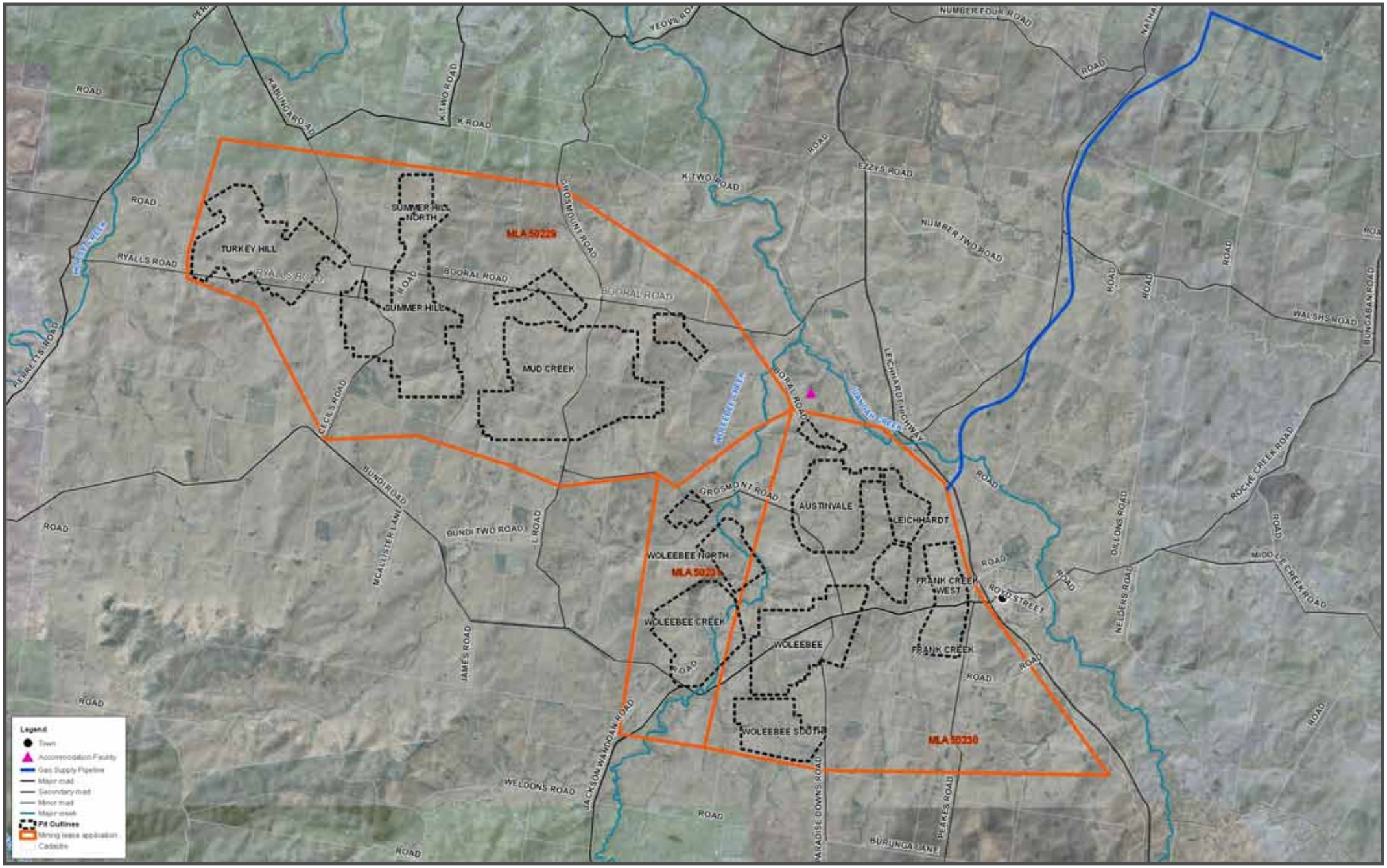
As the mine advances, the excavated areas will be progressively rehabilitated.

The footprint and the gradual development of the mine site are illustrated in Figure 4.1. The development of the mine over a thirty year timeframe will be a continuous process, involving progressive excavation and simultaneous backfilling of the pit areas.

The coal will be crushed, processed and blended on site. The coal resource within the three MLAs is in excess of one billion tonnes, with a low strip ratio of overburden to coal. Coal will be mined using a combination of truck, shovel, excavator, dozer and dragline mining equipment. The coal will be crushed, sized and washed to yield around 70% product coal before being transported by rail to ports in the Gladstone area.

The overall Project is divided into five main visual components:

1. The mining lease application (MLA) areas.
2. Upgrading the Wandoan Town potable water treatment plant, including cooling tower for Wandoan and a pipeline to the mine.
3. Upgrading of the Wandoan Town wastewater treatment plant in Wandoan, including a pipeline from the mine site into Wandoan.
4. Creation of accommodation facilities to house workers during construction and operations of the mine.
5. Proposed gas supply pipeline, supply gas to the gas fired power station within the MLA areas.



0 1 2 3 4 5

Kilometres

Figure 4-1
Mining Schedule & Gas Supply Pipeline Route

4.2 The Wandoan Coal Project

The visual character of the Project in relation to external views is created by a number of mining components. From a visual perspective, the Project has a number of major and minor visual elements as well as a number of support elements of varying visual importance.

Major Visual Elements

- Mine pits
- Vegetation and topsoil stripping
- Overburden removal and emplacement, including draglines
- Coal Extraction
- Rehabilitation
- Mine Infrastructure Area (MIA) including the Coal Handling and Preparation Plant (CHPP)

Minor Visual Elements

- Rail spur
- Main access and haul roads
- Conveyors
- Tailings Dam

Support Elements

- Potable water treatment plant upgrade and pipeline
- Wastewater treatment plant upgrade and pipeline
- Accommodation Facilities
- Gas Pipeline and Gas Fired Power Station

Both the mining operations and the infrastructure upgrades will cause varying levels of visual effect to different viewing locations throughout the different stages of the Project. Of these components, the mining operations are expected to cause the most significant visual effects.

4.2.1 Major Elements

Mining Plan and Pits

The extent of the Project during the 30 years of operation is shown in Figure 4.1. The three MLAs occupy an area of 32,000 ha. There are 15 open pits within the three MLAs that will be operated at different times during the life of the mine.

The eastern limit of the MLAs is defined by the Leichhardt Highway, which is the main link from Wandoan to Miles southbound and Wandoan to Taroom northbound. The township of Wandoan is immediately east of the highway adjacent to the Frank Creek Pit.

The northern limit of the MLAs is located approximately 4km north of Booral Road and approximate 1.5km south of K Road, with the majority of Booral Road inside of the MLA. The western mining limit for the MLAs falls to the east of a small ridge adjacent to Horse Creek.

Visual Significance

Several of the mining pits will be visible or partially visible from a number of viewing locations throughout the area. The mine pits will modify existing landscape values with a range of potential visual effects. These visual effects will change through time and are dependant on how much of the mine areas are seen in a view. Also significant is the stage of the operation. Operations from the removal of land cover, to removal of overburden and coal extraction all have a high visual effect. However any mine areas are restored within two years of coal extraction, this reduces the visual effect levels significantly and limits high effects to a two year operational band in all mine pits.

Vegetation and topsoil stripping

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

Visual Significance

The removal of vegetation and topsoil will create a colour contrast that will be a perceivable difference to the colour and textural values of the surrounding landscape.

Overburden removal

Overburden will be drilled and blasted to achieve the desired fragmentation for removal by dragline, and truck and shovel.

Overburden from the initial strip will be placed on the original ground surface, outside of the limit of excavation. Elevation of the initial strip will vary, and initially be steep sided with slopes of approximately 1:1.5. The overburden from succeeding strips will be utilised to backfill the previously mined strip.

Figure 4.2 shows an indicative cross-section of a pit illustrating the overburden, dragline and rehabilitation process.

Visual Significance

Overburden removal will reinforce the visual change bought about be vegetation removal. It will increase the areas of bare earth and colour contrast to the existing landscape. As well, overburden removal will create new steep sloped earth forms that will contrast to the existing gentle rolling topography of the existing landscape.

The scale of the dragline booms, the shallowness of the pits and low elevations of the overburden strips, mean that the boom will potentially be visible from some distant locations outside the MLAs. This will need to be considered in terms of night light especially as lights on the elevated boom will be visible from areas outside the MLAs.

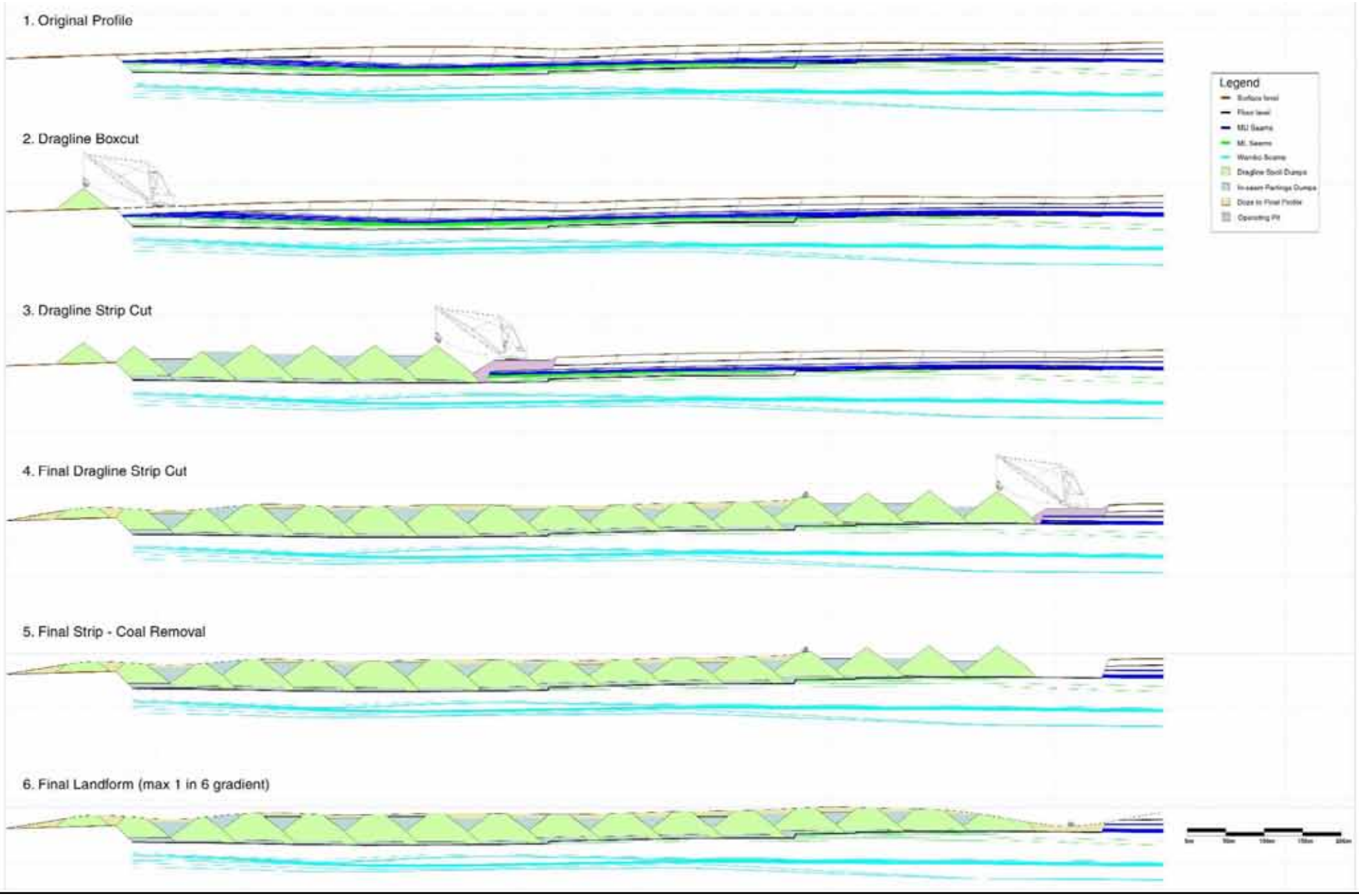


Figure 4-2
Indicative Pit Cross Section

Coal Extraction

The top of the exposed coal seam will be cleaned by dozers. The coal seam will be worked to enable equipment to load the run of mine (ROM) coal into rear dump trucks. Trucks will transport the coal from the mining face to the ROM dumps.

Coal will be transported from the ROM dumps to the Coal Processing Plant, (CPP) via conveyors.

Visual Significance

Coal extraction will introduce a new colour into the landscape that will contrast strongly with both the existing landscape and the lighter colour of the overburden.

Rehabilitation process

Progressive rehabilitation of the landscape will occur during the Wandoan Coal Project.

Overburden spoil will be rehabilitated progressively, commencing within two years of becoming available for rehabilitation. Some shaping of the initial spoils will be carried out to ensure the final landform has a smooth gradient, targeting no greater than 1:6. As the Project progresses, successive strips of spoil will be dozed to give flowing contours in preparation for revegetation. This will consist of re-grassing in the first instance and in some cases subsequent tree planting to re-establish the patterns of the landscape. Appropriate pest management practices (i.e. to control the spread of weeds) are integrated into the rehabilitation process. Further information on these practices is detailed in Chapter 17.

Visual Significance

Appropriately managed rehabilitation of spoil areas with initial grassing will greatly decrease the colour contrast from earth tones to grass tones. Tree planting in these areas will also reduce landscape pattern contrast in mine areas where treed areas existed prior to mining.

The rehabilitation landscapes of the mining operations will restore form and remove mining shapes and line from the landscape. This rehabilitation process is important to achieving high visual integration and low visual contrast between the completed mining operations and the existing landscapes.

Mine Infrastructure Area (MIA) including Coal Processing Plant (CPP)

The MIA and CPP are situated approximately 5 km west of the Leichhardt Highway and immediately east of the Woleebee Creek 1 in 100 year flood level. Two coal product stockpiles, approximately 530m long and 150m wide in total, are located to the north of the MIA as part of the Train Load Out operations for product coal.

Visual Significance

MIA and CPP operations will be 24 hours per day, 7 days per week. Given the distance from the highway, central location within the MLAs, and intervening topographical features to viewpoints, sky lining of the structures will be limited, with the topography providing some visual integration that will reduce the overall visual effect. However, there will be some views by the travelling public from the Leichhardt Highway and Nathan Road, and some views from rural residences.

Given the 24 hour operations, lighting from the operations will be visible at night. Night lighting creates a different visual effect, retaining the scale of the plant.

4.2.2 Minor Visual Elements

While these elements are major components of the Project they are generally considered as minor visual elements due to their limited vertical projection and visibility outside of the site.

Rail Spur

The rail spur will be located in the northern portion of MLA 50230, connecting to the Surat Basin Rail mainline north of Wandoan township.

Train operation will depend on scheduling requirements, potentially operating at any time of the day, seven days a week. Night operations will be required.

Visual Significance

The rail spur has limited vertical projection above natural surface, with the train load out bins being potentially the most visual element.

Main Access and Haul Roads

Access to the Project site will be from the Leichhardt Highway approximately 6 km north from the Wandoan Township. The main access road will be a two-lane bitumen sealed road. Haul roads are proposed across the Project site linking all pits to the ROM dumps and the MIA. It is expected that cut and fill earthworks will be required, but limited in vertical extent.

Visual Significance

Although the road network will be a visual element in the landscape, it is not considered visually significant due to its horizontal dimension and lack of vertical projection out of the MLAs.

Conveyors

An extensive system of conveyors will provide linkage between the western Turkey Hill, Summer Hill and Mud Creek to the MIA. This conveyor is approximately 20km long. A shorter conveyor system of 3km will provide linkage to the MIA from Frank Creek Pit, Leichhardt Pit, Austinvale Pit and Woleebee group of pits.

Visual Significance

Although these elements are a major development element, like roads they have little visual significance due to limited vertical scale with most conveyor sections being less than 3m in elevation above ground level.

Tailings Dams (Tailings Storage Facility)

Three tailings storage facilities (TSF) will exist on the MLAs over the 30 year mining lease of the Project, being a starter facility, conversion of Austinvale North Pit into a TSF in Year 1, and Austinvale Pit from approximately Year 9 onwards.

Visual Significance

From a visual perspective, although covering a sizable land area, the TSFs have significant horizontal dimension only. The TSFs have limited vertical dimension to the height of the facility

walls and consequently do not significantly project into the view sheds. The TSFs are therefore not visually significant.

4.3 Potable water treatment plant upgrade and pipeline

The proposed upgrades to the potable water treatment include an induced draft counter-flow cooling tower. The cooling tower is of a square shape and form approximately 3.1 m by 3.1 m with an elevation of approximately 3.4 m. This element will be co-located with other water supply facilities in the town including the existing town's water tower.

The proposed potable water supply pipeline traverses approximately 9 km of land between MLA 50230 and the potable water treatment plant in Wandoan. The pipeline will be located mostly underground within MLA 50230 boundary, extending beyond the boundary approximately directly opposite the potable water treatment facilities of Bore 1 in Wandoan township.

Visual Significance

The Potable Water Treatment Plant is located on the western edge of the town and adjacent to the highway. Despite its sensitive location, it is small in scale and co-located with other infrastructure. It will create a low visual effect albeit in a visually sensitive location. The pipeline, sensitively located will have minor visual significance during the construction period only.

4.4 Wastewater treatment plant upgrade and pipeline

The existing Wandoan wastewater treatment plant is a series of three aerobic lagoons. Effluent drawn from the top of the Imhoff Tank is discharged to the first of the lagoons for secondary treatment. The effluent then passes into a collection pond at the treatment plant. Effluent is then discharged onto land adjacent to the treatment plant or into a gully which flows to Juandah Creek.

Proposed upgrades to the existing wastewater treatment plant are to install two aerators on a portion of the first lagoon and include an additional two 6 m diameter Imhoff digesters. These digesters will be approximately 90% below ground.

The proposed wastewater pipeline traverses approximately 9 km of land between MLA 50230 and the wastewater treatment plant in Wandoan. The pipeline will be located mostly underground within MLA 50230 boundary, extending beyond the boundary approximately directly opposite Wandoan township, proceeding underground along local roads to the wastewater treatment plant.

Visual Significance

The proposed upgrades to the wastewater treatment plant will create minimal visual change to the existing infrastructure at the plant. The proposed upgrade will therefore have minimal visual significance.

4.5 Accommodation facilities

The proposed accommodation facilities, intended to house workers during construction and operation of the mine, is located north of MLA 50230 with access to the facilities via the Project access road.

The proposed accommodation facilities will be a cluster of single storey buildings. Low building heights will assist in minimising the scale of building mass and bulk in the landscape.

Visual Significance

The accommodation facilities will eventually be obscured from nearby roads due to established roadside vegetation and scattered vegetation in close proximity to the accommodation facilities site. It is considered therefore, that there will be minimal visual overlooking impact.

4.6 Gas supply pipeline and Gas fired power station

4.6.1 Gas Supply Pipeline

Gas from the existing Peat-Scotia Gas Line has been identified as a potential fuel source for proposed on-site power generation. The gas supply pipeline connecting the Wandoan Coal Project site to the nearby Peat-Scotia Gas Line will be approximately 25 km in length. It is proposed that the gas pipeline be co-located with the proposed Surat Basin Rail Line, (SBR) as shown in Figure 4.1.

The gas supply pipeline will generally be located underground with 0.5 - 0.7m of cover and constructed through a section trench and backfill method.

Visual Significance

The gas pipeline location within the SBR easement has potential to further reduce any visual effect that the construction of the pipeline may have on adjoining land use areas. Generally given its below ground location visual effects will be minimal.

Of some minor consideration at a local level is the placement of the *'gas pipeline'* warning signs that are regularly spaced along the line. These elements are approximately 1.5m high and when seen as repetitive elements in a local landscape setting can become a visual element. Another element are the gas pipeline valves that sit above the ground but are generally less than 1.5m high and therefore would only have a small localised visual effect.

4.6.2 Gas Fired Power Station

The proposed gas engine power station will comprise industrial building elements located in the northern section of MLA 50231. These elements include gas fired generators, transformers, radiators, engine stacks, etc. Each engine will have its own stack. The major visual feature of the gas engine power station will be the engine stacks. These engine stacks will have potentially the greatest visual impact as they will create vertical elements in the existing landscape setting. The stacks however have a reasonably low elevation of 21 m and stacks may be grouped together for example 3 stacks at one point.

Visual Significance

Visibility of the gas fired power station will be generally limited due to the existing vegetation surrounding the Wandoan Coal Project site, which will effectively screen views of the station. There is however, the possible exception of some over viewing from distant homesteads situated to the east of the Project site, along the Leichhardt Highway and Nathan Road.

5. POTENTIAL IMPACTS

The Project has the potential to create an adverse visual impact on areas surrounding the Project site, especially on sensitive visual receptors such as homesteads and the Leichhardt Highway.

The visual impact of the Project is determined by evaluating the visual effect of the Project, and the visual sensitivity of receptors from which the Project is visible. The varying levels of impact depend on the various values of visual effect and sensitivity as outlined in Figure 2.2.

5.1 Visibility and Sensitivity

For a visual impact to occur there has to be visibility of the Project area and more specifically the Project components. For areas that have visibility, a sensitivity rating is applied based on land use type and distance from the point of viewing to the MLA areas that are seen as is illustrated in Figure 2.3.

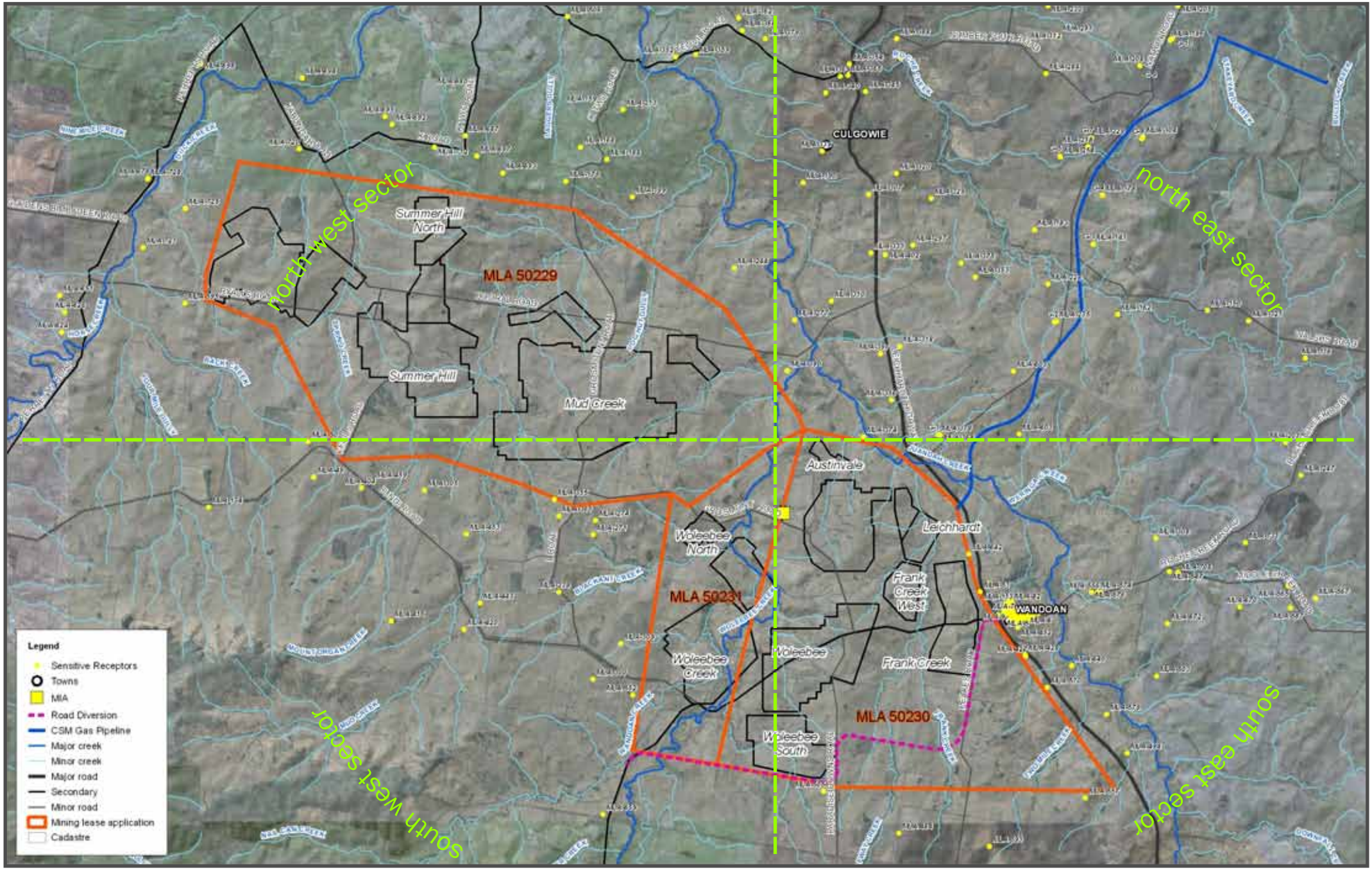
Visibility and sensitivity of the Project was determined by evaluation of maps, aerial photography and field investigations. The Project site and surrounds were divided into four major sectors to determine visibility and sensitivity of the Project. These sectors are north east sector; south east sector, south west sector and North West sector (refer Figure 5-1).

Relevant land use types in the locality of the MLAs include:

- Wandoan
- Rural Residences
- Grosmont School
- Special Places, e.g. cemetery.
- Leichhardt Highway
- State controlled roads of the Jackson Wandoan Road and the Roma Taroom Road.
- Local roads
- Rural lands.

All of these locations have been given a sensitivity rating as illustrated in Figure 2.3. In summary the most sensitive locations are residences, the town, cemetery, and the school. Of lower sensitivity is the highway with local roads with the lowest sensitivity being rural lands.

These sensitivities have been applied to the land use zones and are illustrated in Figure 5.2 and are discussed below in relation to the various sectors around the MLAs.



Integral landscape architecture & visual planning

Figure 5-1
Sensitive Receptors

5.2 Visual Effect

The visual effects of the Project are created by the interaction of the mine development elements with the landscape. The visual character of the existing landscape is described in Section 3 of this report and the visual character of the mine development components is described in Section 4 of this report. The visual effect level of various mine areas is defined according to a consideration of factors outlined in Figure 2.4.

Visual effects are created by those elements that are seen from outside the MLAs. Development elements that have vast horizontal spread and some vertical scale will create a strong visual effect outside the MLAs. The most significant of these are the mine pits and to a lesser extent the mine infrastructure elements such as the MIA and CHPP, the Gas Fired Power Station and the draglines.

As has been discussed in Section 4 of this report, the visual character of the mine pit is created by removal of vegetation including tree and grass cover and the topographic disturbance created by the removal of overburden and subsequent storage prior to rehabilitation.

As vegetation removal and placement of overburden in reject emplacement bunds create strong contrast and have low integration with the existing landscape, if 5 percent of the primary view zone is in such a condition, a high visual effect will occur. This high visual effect will be reduced to moderate when reshaping and initial grassing is complete. Following the maturing of the rehabilitation works that may include tree planting a low visual effect will result as contrast between old pit areas and adjoining landscapes is very much reduced.

It follows that if initial rehabilitation is done expediently following mining, the disturbed areas that have high contrast and low integration will be minimised at any time. The technique of mining used will achieve a high degree of screening to the active pit.

In the direction of mining, views will be across rehabilitated overburden stockpiles, onto views of not yet rehabilitated overburden stockpiles and the dragline. Rehabilitated and unrehabilitated overburden stockpiles will screen to some extent to the active working face. In the opposite direction of mining, the active pit and working face will be screened by the existing landscape with views onto the dragline and the most recently placed strip of overburden, and depending on angle of view, older strips not yet rehabilitated.

Both of these visual effects are different expressions of the same mine pits seen in different directions and will be discussed in relation to views of mine areas as illustrated in the photomontage in Section 5.3 of this report.

The visual effects of the infrastructure elements such as the MIA, CHPP and the gas fired power station have been evaluated through photomontage imaging techniques and it is evident that they cannot be seen from distant north easterly locations on the Highway and Nathan Road. Even if they were seen at these distances they would have a minor and insignificant visual effect.

Lighting at Night

The visual effect of the lighting at night generated by the infrastructure core of the MIA, CHPP, Gas Fired Power Station and train load out area will create a night time glow on moonless nights. Photomontage studies indicated that there will be no direct light from these areas.

There will however, be more direct light spill from the boom lights on draglines, being directly visible from some viewpoints. There will also be lights associated with the excavator and truck operation of predominately parting removal and to lesser extent coal mining and then with truck

movement to the ROM dumps. These effects however is much localised and only occur at isolated and very small locations at any one time and at significant distances from sensitive view locations.

The most sensitive receptors in relation to lighting at night will be surrounding residences, some of which will have direct line of sight to light sources, be they dragline or truck and excavator. In this regard the visual effects are mitigated in part by the fact that while there is direct line of sight, generally people are indoors and so not affected. Also light effects will be affected by house orientation and any intervening elements, be they vegetation or building elements. Such elements would generally occur at the point of viewing.

The visual effect levels of indirect light of the infrastructure area and mine pit areas will be low. However the visual effect of direct light associated with mine pit areas, i.e. drag line, shovel and truck lighting would be moderate and in some cases where houses are within 1-2km and without intervening vegetation could be high.

Photomontage illustrations of night light effects have been illustrated for four locations and are discussed below in Section 5.3.

Photomontage illustration of Visual Effect

Visual effect is illustrated in part by photomontage imagery from various locations. These locations were selected from a ground survey as representative of potential visual impacts from the project. .

The photomontage images have been constructed using conventional camera image and computer 3D modeling techniques as follows:

- Photographs of the MLAs were taken from various locations around the MLAs; see Figure 5.2, to illustrate views from all directions. The co-ordinates and elevation of the locations were recorded.
- A series of 3D models of the terrain and the various mine components were prepared based on the mine schedule and selected Scenario Years.
- A photomontage image was then created based on the photograph location, 3D modelling, suitable colourings and shadings to reflect the site, and the Scenario Year. Each photomontage provides an indicative image of the Project at a particular point in time, within the existing landscape.

Often because of distance, it is difficult to see mine elements in detail without artificially magnifying the images. To assist with illustrating where mine components are, a simple *'red rendition'* of mine components is overlaid on the photographs to illustrate where mine components are.

Typically in each photomontage set for each viewpoint, the following factors are illustrated.

- Image A: The existing visual setting or the view as it is seen from the camera position
- Image B: For the first of the most critical years, for example Year 5 or 20, when mining is most visible, a "red rendition" of the mine operations that are visible to the camera position are illustrated over Image A.
- Image C: illustrates what the mining operations covered in Image B would look like in reality in terms of vegetation removal, excavation, overburden emplacement and rehabilitation.

- Image D: repeats the strategy implemented in Image B but for a later significant year say Year 10 or Year 30.
- Image E: repeats the illustration of what mining operations would look like in Image D as per Image C for an earlier year.

These photomontage sets were completed for nine locations around the MLAs. Night shot illustrations were completed for four locations surrounding the MLAs. These four locations were selected on the basis of proximity and representation to sensitive receptors from potential lighting impacts. Three further locations were selected to illustrate the gas supply pipeline.

The photomontages images are illustrated and discussed below in Section 5.3.

Figure 5.11 a-i best illustrate the sequence of operations. While other photomontages also illustrate this, the distance from the viewing point to the operations often minimises the appreciation of detail. This figure series illustrates the process of rehabilitation of landscape values from large unformed overburden stockpiles to reshaped landforms and re-establishment of land cover of grass and in the longer term tree and shrub cover.

5.3 Visual impact

The visual impact created by the mine developments within the MLAs is created by the mine pits and how they are perceived from various viewing locations around the MLAs. It is determined by considering visibility and sensitivity of viewing locations and the visual effect of the operations as seen from those locations. The visual impact of the various mining operations is considered in the following sections in terms of the various viewing sectors around the MLAs.

5.3.1 Visual Impacts on North East Sector

The north east sector is defined to the south by an east west line passing through the intersection of Nathan Road and the Leichhardt Highway. The western boundary is defined by a north south line passing though the vertical extension of where the three MLAs meet, see figure 5.1. The sector contains elevated lands that afford views into the MLAs and mine operational areas. There are also views to the gas supply pipeline that are located in this sector.

Visibility and Visual Sensitivity

The Leichhardt Highway travels north-south through this sector. This sector also contains local roads and a limited number of rural residences scattered on both sides of the highway and along Nathan Road and Number Four Road.

In this sector there are some elevated lands that overview the MLAs. Sensitive use areas that will have views to the site from the north east sector are dispersed and are generally rural residences depending on micro-siting and orientation. As well there are intermittent views from elevated parts of the Leichhardt Highway, areas north of Woleebee Creek, and Nathan Road to the west of Number Four Road. Homesteads will have a high sensitivity up to 7.5km away and a moderate sensitivity to 12.5km and low beyond this, as defined in Figure 2.3.

The Leichhardt Highway is a state controlled road providing a north-south route through central and southern Queensland, linking Goondiwindi (NSW/QLD border) to Rockhampton. It is considered to have high visual sensitivity because of the number of travelers that use the road, its tourist function and the close proximity of the highway to the Project.

The northern journey (travelling from Wandoan to Taroom) is less exposed to views of the mining infrastructure than the southern journey in this sector. This is due to the screening effect of variations in topography and roadside vegetation.

The elevated topography, approximately 15 km north of Wandoan, allows for clear views of the mining infrastructure when travelling south along the highway. The Project will be noticeably visible from this vantage point due to the size of the Project, elevated topography and lack of roadside vegetation in this area. At this distance the highway is considered to have low sensitivity, see figure 2.3.

From a distance of approximately 16 km north of the Project along the Leichhardt Highway, views to the Project site are generally blocked by intervening variations in topography and bands of roadside vegetation. Similarly as one travels from the elevated hills to the flood plain associated with Woleebee Creek views are lost due to topography and the open woodland of the flood plain.

Similarly mining operations will be visible from elevated locations along Nathan Road that could potentially include some homesteads.

Visual Effect

The visual effect of the mine pits on this sector is for the greater part caused by the Austinvale Pit and the Leichardt Pit in the middle ground and the Woleebee Creek group of pits in the background. Visual effects will be created by various views onto pits with the working face orientated often orientated to major view lines. Here the visual effect will be on to the front face of the overburden strips and the banks of these in repetitive formation before rehabilitation of land form and revegetation.

Major view lines across the sides of pits occur in relation to the Austinvale and Frank Creek Pits with only the Leichhardt Pit having some orientation of the active working face towards the sector.

The pits will create a high visual effect due to the strong contrast created by the exposed overburden. This in turn will create a high visual effect with the area of exposed mining operations generally being greater than 5% of the primary view zone.

Photomontage illustration of Visual Effect

In this sector the views of the mining operations are illustrated from

- Viewpoint 4: Yeovil Road
- Viewpoint 5: Leichhardt Highway adjacent to Fairfield Homestead
- Viewpoint 6: Nathan Road
- Viewpoints 10, 11 & 12: for the Gas Supply Pipeline along Leichhardt Highway and Nathan Road

Viewpoint Location 4: Yeovil Road, Figures 5.3

This view is south towards the Mud Creek and Summer Hill Mine Pits where operations become visible approaching Year 20 through to Year 30, as operations are at higher elevations than earlier years. Visual effects although high are at distances of 10 to 14km away.

Mining before Year 20 is generally screened by intervening topography becoming visible as illustrated in Figure 5.3b and 5.3c. The visibility of mine areas increases until Year 30, however

all but the last two years operations would not be rehabilitated, as mining operations are likely to continue beyond Year 30. An amended mining lease will be undertaken for ongoing mining operations.

The visual effects would generally be moderate due to the distance and rehabilitation implementation reducing this to low.

Viewpoint Location 5: Leichhardt Highway near Fairfield Homestead Figure 5.4

Viewpoint 5 is located along the Leichhardt Highway and overviews part of the MLAs. The existing view from this location is one of the few elevated highway locations that has views over the MLA towards the Austinvale, Leichhardt and Woleebee Creek Pits. In this view the view is towards the more distant Woleebee Creek Pits. The visual effect of the closer view over Austinvale and Leichhardt Pits is similar to the overview obtained from Nathan Road illustrated in Figure 5.6.

In the view illustrated in Figure 5.4, the light colours of the disturbed earth contrast with the woodland vegetation that surrounds unmined areas (Figures 5.4c and 5.4e). However at distances of over 14km to the Woleebee Pits, the strong colour contrast becomes muted, creating a low to moderate visual effect. This is reduced to low as rehabilitation is completed, as shown in Figure 5.4e.

This view is representative of the 0.5km stretch of highway that overviews the MLAs to the south and south west.

Landscape rehabilitation during the mining process will minimise the visual effects on this view point and the sector.

Lights at night are clearly visible as can be seen from the photomontage of Figure 5.5. Light includes diffuse light and some direct light spots around the dragline operations. However the distance ensures that the effects are minimised and do not create significant nuisance light effects at these distances.

Viewpoint Location 6: Nathan Road, Figures 5.6

The existing view from this location is to the west over the MLAs and is illustrated in Figure 5.6a. Mining progresses in all directions in different pits at different times, see Figure 4.1. Significantly in pits closest to the viewpoint, mining progresses towards the viewpoint.

Scenario Years 5, 10, 20 and 30 are illustrated as:

- Year 5 – Figures 5.6 b & c
- Year 10 – Figures 5.6 d & e
- Year 20 – Figures 5.6 f & g
- Year 30 – Figures 5.6 h & i

It can be seen that from this elevated position, a high visual effect is created by operations within the Leichhardt and Austinvale Pits at middle ground distances of 5-6km and far middle ground distances of 6-8km, respectively. It can be seen that for all scenario years, major visual change is created to significant parts of the landscape ensuring that high visual effect levels are sustained until rehabilitation is undertaken and established.

Lights at night will be visible from elevated locations along Nathan Road, but affects are limited to very diffuse light and the effect does not cause significant nuisance light. Photomontage images in Figure 5.7 illustrate these effects.

Viewpoints 10, 11 & 12: for the Gas Supply Pipeline along Leichhardt Highway and Nathan Road

The gas supply pipe line is illustrated by Figures 5.8 – 5.10. Figure 5.8 illustrates the highway crossing of the pipeline and illustrates its minimal effect limited to a perceivable change in bitumen colour, illustrating the resurfaced section of road following completion of pipe laying. No vegetation clearing is evident in the road reserve.

Figures 5.9 and 5.10 illustrate the pipeline in various fields. The temporary effect of removal of ground cover vegetation is apparent in the immediate post construction period. This effect will be lost after about a year due to revegetation of the pipeline area.

Visual Impact

The visual impact on a small section of approximately 1km of highway, south bound from in the vicinity of the Fairfield homestead to the bottom of the hill below that homestead will be low due to the low sensitivity and low to moderate visual effects. The highway trip, north bound in this sector will not be affected. Nathan Road experiences high visual effects but has a low sensitivity creating moderate impacts until rehabilitation is achieved.

Similarly the visual impact on homesteads in the sector with views to the mine areas will also be high based on high to moderate visual effects and high sensitivity up to 7.5km and then generally will be moderate to low. However, the views from homesteads based on topography are limited to a small number on the highway and on the western end of Nathan Road. The actual visibility will depend on local foreground screening factors such as micro-topographic features and vegetation. Also important is the general orientation of the homestead to the longer distant views, whether they are towards the mine or away from it.

The visual impact of lights at night on this sector will consist of evening glow resulting from lights at the MIA, CHPP and Gas Power Station. There will be no direct lines of sight to these lights from sensitive locations. The booms of draglines will be visible and there will be direct lines of sight to this tall element.

5.3.2 Visual Impacts in the South East Sector

Visibility and Visual Sensitivity

The south east sector contains the township of Wandoan, the Leichhardt Highway, local roads, some rural residences and the Wandoan Cemetery. This sector is dominated by open grassland with some woodland areas.

Visually sensitive areas in the south east sector are along the Leichhardt Highway north of Wandoan. Due to limited roadside vegetation and the Project's close proximity to the highway, views to the Leichhardt and Austinvale Pits will be seen from the Highway, giving it a high sensitivity.

Generally the Project will not be noticeably visible from the Wandoan Township due to the small ridge running adjacent to the Leichhardt Highway west of the town.

Very limited views of the Project will be seen from the Leichhardt Highway south of Wandoan. Due to topography and roadside vegetation views to the Project site will be generally screened.

However at certain times a dragline may be visible from Wandoan and this section of the highway.

The Woleebee Pits would be visible from the realigned Jackson Wandoan Road that will generally follow the existing alignment of Peakes Road south from Wandoan and then skirt the southern boundary of MLA 50230 to join the original Jackson Road alignment at the south west corner of MLA 50230. This road will have a moderate sensitivity to mine operations up to 2.5km away

Also in this sector are a number of rural residences north of the Mooyouee Peaks that would have open views to the Woleebee Pits.

Visual Effect

This Sector is most affected by the mine pits of MLAs 50230 and 50231. When mining begins in this area it will initially be on a 5km front in two pits. This will expand up to 9km wide as seen from the east or west and a 10 to 13km front as seen from the north and south, with similar scales of pit development viewed from other directions.

For eastern view points at 9km width, the pits would represent a high visual effect for distances up to 4km away, assuming a visible height of 25m of work area. Higher visual effects would be experienced from southern view points due to the increased height of the visible workings and disturbed area and increased width of working pits.

These visual effects would remain high until rehabilitation and revegetation is undertaken. This will decrease visual effects to a moderate level.

Low visual effects will be achieved when land forms and landscape pattern of grassland and scattered tree cover is achieved.

Photomontage illustration of Visual Effect

In this sector the visual effects of the Project are illustrated by photomontages from:

- Viewpoint 7: Leichhardt Highway
- Viewpoint 8: Wandoan township
- Viewpoint 9: Paradise Downs Road

Viewpoint 7: Leichhardt Highway – Figures 5.11

The existing viewpoint from the highway is illustrated by Figure 5.11a with the view west into the MLA. The workings of Leichhardt and Austinvale Pits at Years 5, 10, 20 and 30 clearly illustrate the progression of mining operations.

In the first instance, as illustrated in the Year 5 scenario, see Figures 5.11b & c, overburden stockpiles are created by removal of the overburden, causing strong visual contrast with existing landform and colour contrast between mined areas and adjoining vegetated areas.

Year 10, Figures 5.11 d & e illustrates the new landform having been reshaped. Year 20, Figures 5.11 f & g, illustrates the progression of mining, and Year 30 illustrates the mine area having undergone rehabilitation and revegetation.

This sequence of photomontages clearly illustrates visual effects from a foreground location with some pit areas only 1km away to middle ground situations with pits 1km to 5km away. Visual effects are high as shown in Figures 5.11b & c until earth reshaping and rehabilitation are undertaken, when moderate visual effects result, see figures 5.11 d & e. Low visual effects are

achieved when tree cover is established and very low nearly unperceivable visual effects will occur when the tree and grass cover assume the pattern, colour and texture of the surrounding landscape, see Figures 5.11 f, g, h & i.

The Wandoan Cemetery is located close to this view point and would be exposed to similar visual effects, albeit that views would be filtered by trees around and within the cemetery grounds.

Viewpoint 8: Wandoan – Figures 5.12 and Figure 5.13

The mining operation is fully screened from Wandoan by a ridgeline that exists between the township and nearest mining operations of Frank Creek Pit. Three dimensional modelling indicates that the mining works using truck and shovel operations are below the ridgeline of the adjoining hill between Wandoan and the Frank Creek Pit. While a dragline, if used, would possibly be visible when used in the eastern end of this pit, draglines will not be used in the Frank Creek Pit due to potential visual, noise and air quality impacts.

Figure 5.13 illustrates the effect of lights at night in Wandoan. The effect of higher ambient light as well as the absence of the dragline from the Frank Creek Pit keeps light effects at an almost non discernable level at night.

The visual effect of the Potable Water Facility will be low due to the limited scale of the construction elements and the co-location of these elements with existing water infrastructure, including the town's water tower.

Viewpoint 9: Paradise Downs Road – Figures 5.14

At Year 5 glimpses of distant pits becoming theoretically visible. Figure 5.14a illustrates the existing visual setting from this view point with the *'redline rendition'* the locality of those operations in the distant Woleebee North Pit and the more distant operations associated with the Mud Creek Pits, see Figure 5.14b. However Figure 5.14c illustrates the difficulty in seeing these workings in a real view.

In Year 10, see Figures 5.14 d & e, while operations are closer with glimpses to operations in the Woleebee Pit and again the more distant Mud Creek Pit, they are still limited in extent.

However by Year 20 and Year 30 operations are clearly visible in the Woleebee, Woleebee South and Woleebee Creek Pits with operations spreading from middle ground to foreground areas, as shown in Figures 5.14f - 5.14i.

It is worth noting the screening effect of relatively small trees in the foreground in relation to all operations and how much more effective that screening would be if trees were located at the edge of the road reserve along the fence line.

As illustrated in the photomontages, visual impacts from mining pits are only minor in Years 5 and 10. However after that and progressing through Years 20 to 30, mining impacts increase across the landscape and at closer distances to the viewpoint. This increases the visual effects from low in Years 5 to 10, to high soon after that and remaining high until Year 30 after which mining is likely to continue. Rehabilitation and revegetation, not illustrated in the Year 30 scenario, would be carried out following completion of mining activities.

Visual Impact

One of the viewing locations most affected is the 4 km stretch of highway north of Wandoan. This area including the Cemetery is visually exposed to the Leichhardt Pit and the northern part of

the Frank Creek Pit. This sector will experience high visual impact due to high sensitivity and high visual effects with operations in the near middle ground.

Another location of high impact will be the residences to the south of the MLAs. Those that have open views will be highly impacted by mining operations of the Woleebee Pits. The replacement road for that part of the Jackson Road that is impacted by the Woleebee Pits and relocated to the south of the MLAs and connecting to the Leichhardt Highway at Wandoan will experience high impacts as a result of mining operations within 2.5km, beyond this distance impacts reduce to moderate.

When viewed from Wandoan, limited to negligible views will occur, as no dragline is proposed be used in Frank Creek Pit. Given the existing lighting within the town, the effect of glow from lighting of mining operations will be reduced.

The impact of the Potable Water Facility is low to moderate. Although the low visual effect levels, are low the high sensitivity of the highway and the town create a moderate impact.

The effect of lighting at night on rural residences to the south would be high compared to the existing dark ambient night time condition.

5.3.3 Visual Impacts in the South West Sector

Visibility and Visual Sensitivity

Limited views of the Project are seen from the south west sector, due to a combination of gently sloping topography and roadside vegetation. Views of the Project will be possible however from some rural residences along Bundi Road and Bundi 2 Road that have high visual sensitivity as well as from the roads themselves that would have a moderate to low sensitivity.

Views would generally be limited to those residences north of Bundi Road. From these locations potential views into the working pits of Mud Creek and Summer Hill would be possible with Turkey Hill being screened by intervening topography.

Visual Effect

The visual effect on this sector is high. The working pits are generally orientated to the sensitive rural residences so that no reduction of visual effect by rehabilitation will be possible until the pits have completely worked. The high levels of visual contrast and low integration along with the visual change being experienced over various parts of a 10km front when Mud Creek and Summer Hill are considered together. Turkey Hill will generally be seen separately from different locations and will have a 4-5km front.

The visual effect of lights at night in this location relate mainly to the lights associated with establishing and working the pits. The visual effect will vary depending on viewing point and the likely influence of intervening topography.

Photomontage illustration of Visual Effect

In this sector the visual effects of the Proposal are illustrated by photomontage imagery from:

- Viewpoint 1: Bundi Road

Viewpoint 1: Bundi Road – Figures 5.15

From this location, views of mining operations in earlier years are screened by intervening ridges, however at years approaching Year 20, as illustrated in Figures 5.15b & c, operations extend

above shielding spurs and are clearly visible and increasing in extent up to Year 30, as illustrated in Figures 5.15 d & e.

The operations are those in the Summer Hill Pit. The view from this location typifies the views in southern areas in that the mining operation progresses towards the viewing location. This minimises opportunities for rehabilitation prior to completion of mining. The Year 30 photomontage illustrates the rehabilitation and revegetation of this mine area.

Visual effect would be high until this rehabilitation and revegetation is achieved.

Visual Impact

The visual impact on rural residences that have visibility to mine pit areas will be high. This is especially true of houses to the north of Bundi Road. The visual impact on Bundi Road will be moderate due to decreased sensitivity of this viewing location.

Visual impacts will reduce to low only when rehabilitation and revegetation is completed.

5.3.4 Visual Impacts in the North West Sector

Visibility and Visual Sensitivity

The critical view areas from this sector are rural residences along Kabunga Road and K Road and the Grosmont Primary School. These sensitive use areas will have clear views to the south towards the mine pit areas. These locations overview the site due to the higher elevation of these locations compared to mining activities. View distances range from 2 - 5 km for rural residences and the Grosmont Primary School. These locations view over the north-west group of pits namely Turkey Hill, Summer Hill and Mud Creek.

The visual sensitivity of the residences and the school will be high. The roads are local roads and will have a moderate to low sensitivity.

Visual Effect

The visual effects in this location will relate to views onto the rows of overburden stockpiles with the active work face progressing to the south and generally being screened by the overburden stockpiles. These bunds will also screen part of the draglines however the upper portion of the boom will be clearly visible.

The visual effect of the Turkey Hill, Summer Hill and Mud Creek Pits on this sector will be high and will remain so until rehabilitation of landform and revegetation occurs. This effect will be further reduced once landscape patterns are restored on the mine areas.

The visual effect of lights at night on this sector will be higher than for other sectors given its elevated position. This is especially true for the Summer Hill North Pit that is within 2km of some houses.

Photomontage illustration of Visual Effect

In this sector the visual effects of the Proposal are illustrated by photomontage imagery from:

- Viewpoint 2: Kabunya Road
- Viewpoint 3: Grosmont School

Viewpoint 2: Kabunya Road – Figures 5.16 and 5.17

From this location, mainly Turkey Hill Pit area is seen with Summer Hill screened. Views are mainly onto the western portion of this operational area, with more eastern portions screened below or just projecting above intervening topography, see red rendition Figure 5.16 a.

It can be seen from the photomontage set that operations are generally screened from this viewing location for at least 15 years but after that slowly become more visible so that by Year 20 they are in full view, see Figures 5.16 b & c. Operation visibility does not increase significantly by Year 30, as shown in Figures 5.16 d & e, with a largely rehabilitated landscape established by Year 30.

The Turkey Hill Pit is within the middle-ground being 3 to 7 km away. Visual effects are moderate to high given the relatively small area of view that is affected by the mining operations. This effect will quickly reduce to moderate to low as rehabilitation occurs and to low when rehabilitation covers disturbed areas.

Figure 5.17a illustrates the simulated existing condition at night. Night light effects created by the lights from working pits are illustrated at Year 20, see Figure 5.17b. There will be light effects from pit workings at night that this will create minor glow focal points on the southern evening horizon. However this visual effect is not considered to be at a significant disturbance level. At Year 30, see Figure 5.17c, this effect is further reduced and only the general glow of more distant pit workings.

Viewpoint 3: Grosmont School – Figures 5.18

The view illustrated in the photomontage imagery shows views over the Mud Creek Pit. Figure 5.18a illustrates the existing view. In relation to this section of the view, operations will not come into major view until approaching Year 20; see Figures 5.18 b & c. Although mining progresses away from the school viewing location, mining activities become increasingly visible at a range of approximately 7-7.5km due to the natural topographic relief of the landscape.

There is the potential to minimise this visual effect by progressive rehabilitation to minimise the area of disturbed earth that is visible from the school.

High visual effects occur until rehabilitation and revegetation is achieved.

Visual Impact

The visual impact on residences in this sector will be high due to the high sensitivity and high visual effect created by the Turkey Hill, Summer Hill and Mud Creek Pits.

Similarly the visual impact on the School will be high given its open views to the south.

The visual impact of lighting at night will be highest on this sector given the elevated location of many sensitive receptors. This is especially true for the Summer Hill North Pit and will lessen for the other pits as these work areas generally are more than 4km away.

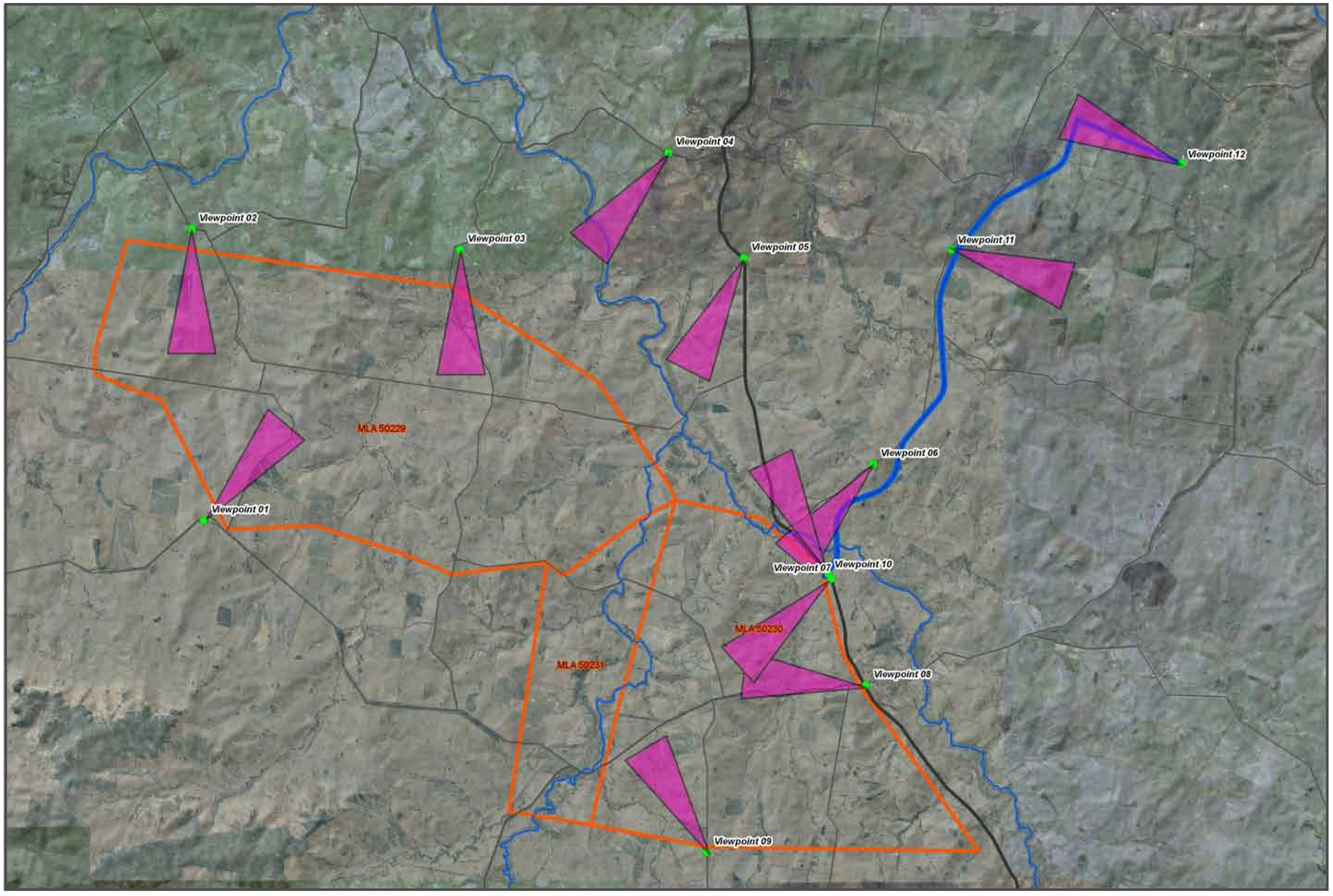


Figure 5-2
Photomontage Viewpoint Locations
A series of photomontage images illustrating what is seen of the mine works has been completed from various vantage points around the Mine Lease Area.

Figure 5-3a
Location 4 - Yeovil Road | existing
The view from this location is over the Mud Creek Pit and the south eastern part of the Summer Hill Pit at year 1, before operations commence and at years 20 and 30 years during the mining operations.

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Figure 5-3b
Location 4 - Yeovil Road | year 20 red rendition

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Figure 5-3c
Location 4 - Yeovil Road | year 20

Integral
landscape architecture
& visual planning

Figure 5-3d
Location 4 - Yeovil Road | year 30 red rendition

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Figure 5-3e
Location 4 - Yeovil Road | year 30

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Figure 5-4a
Location 5 - Leichhardt Highway near Fairfield Homestead | existing
The view from this location is over the Woleebee North and Woleebee Creek Pits at year 1 before operations commence and at years 5, 10, 20 and 30 years during the mining operations.

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Figure 5-4b
Location 5 - Leichhardt Highway near Fairfield Homestead | year 20 red rendition

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Figure 5-4c
Location 5 - Leichhardt Highway near Fairfield Homestead | year 20

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Figure 5-4d
Location 5 - Leichhardt Highway near Fairfield Homestead | year 30 red rendition

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Figure 5-4e
Location 5 - Leichhardt Highway near Fairfield Homestead | year 30

Figure 5-5a

Location 5 - Leichhardt Highway near Fairfield Homestead | existing night view

The night view from this location is over the Woleebee North and Woleebee Creek Pits, at year 1 before operations commence and at years 20 and 30 years during the mining operations

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Figure 5-5b
Location 5 - Leichhardt Highway near Fairfield Homestead | year 20 night view

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Figure 5-5c
Location 5 - Leichhardt Highway near Fairfield Homestead | year 30 night view

Figure 5-6a
Location 6 - Nathan Road | existing
The view from this location is over The Leichardt and Austinvale Pits with the Woleebee Pits in the background, at year 1 before operations commence and at years 5, 10, 20 and 30 years during the mining operations

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Figure 5-6b
Location 6 - Nathan Road | year 5 red rendition

Integral
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& visual planning

Figure 5-6c
Location 6 - Nathan Road | year 5

Integral
landscape architecture
& visual planning

Figure 5-6d
Location 6 - Nathan Road | year 10 red rendition

Integral
landscape architecture
& visual planning

Figure 5-6e
Location 6 - Nathan Road | year 10

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Figure 5-6f
Location 6 - Nathan Road | year 20 red rendition

Integral
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Figure 5-6g
Location 6 - Nathan Road | year 20

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Figure 5-6h
Location 6 - Nathan Road | year 30 red rendition

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Figure 5-6i
Location 6 - Nathan Road | year 30

Figure 5-7a
Location 6 - Nathan Road | year 10 night view
The night view from this location is over The Leichardt and Austinvale Pits with the Woleebee Pits in the background before operations and at years 10, 20 and 30.

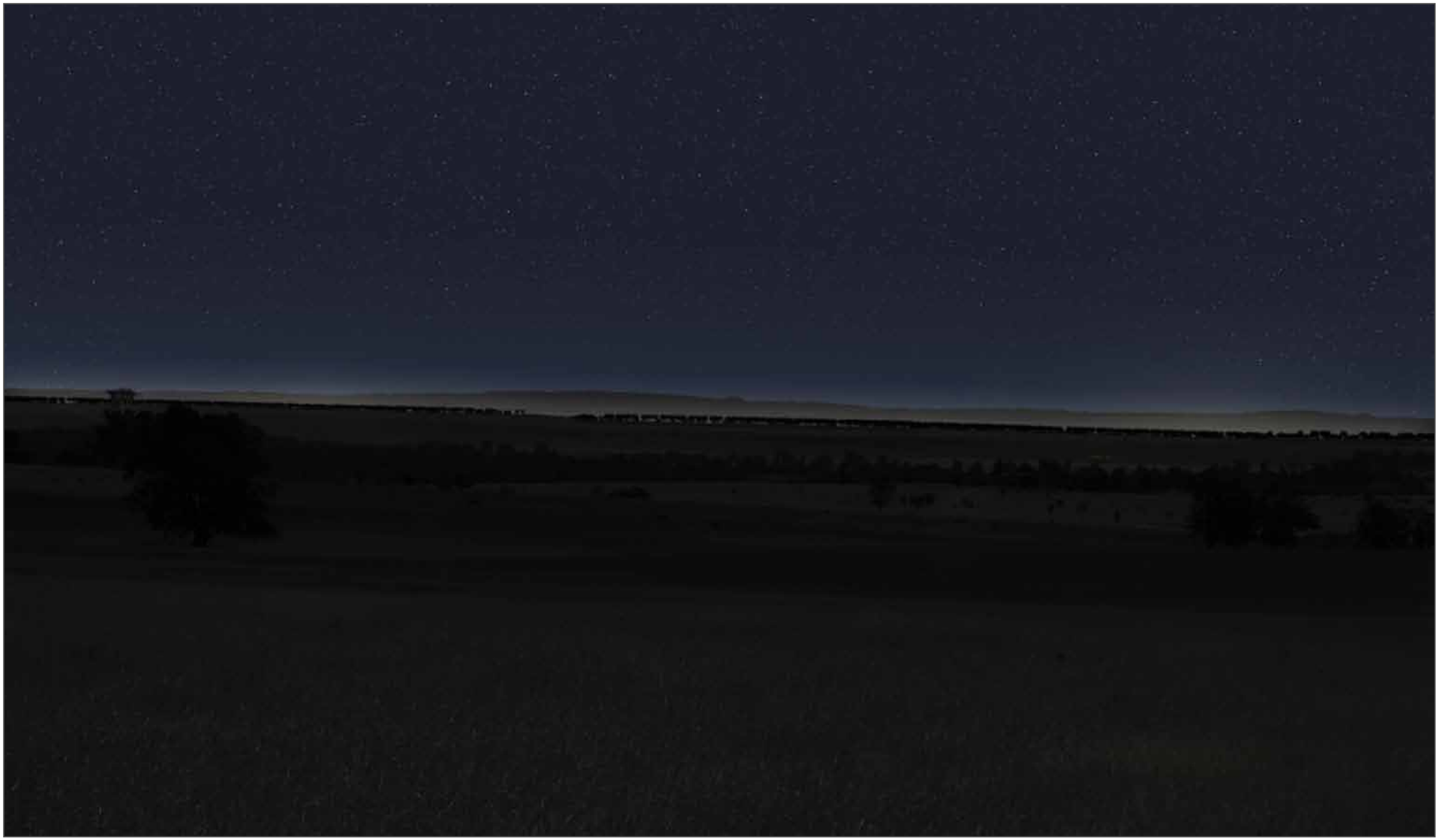

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Figure 5-7b
Location 6 - Nathan Road | year 20 night view

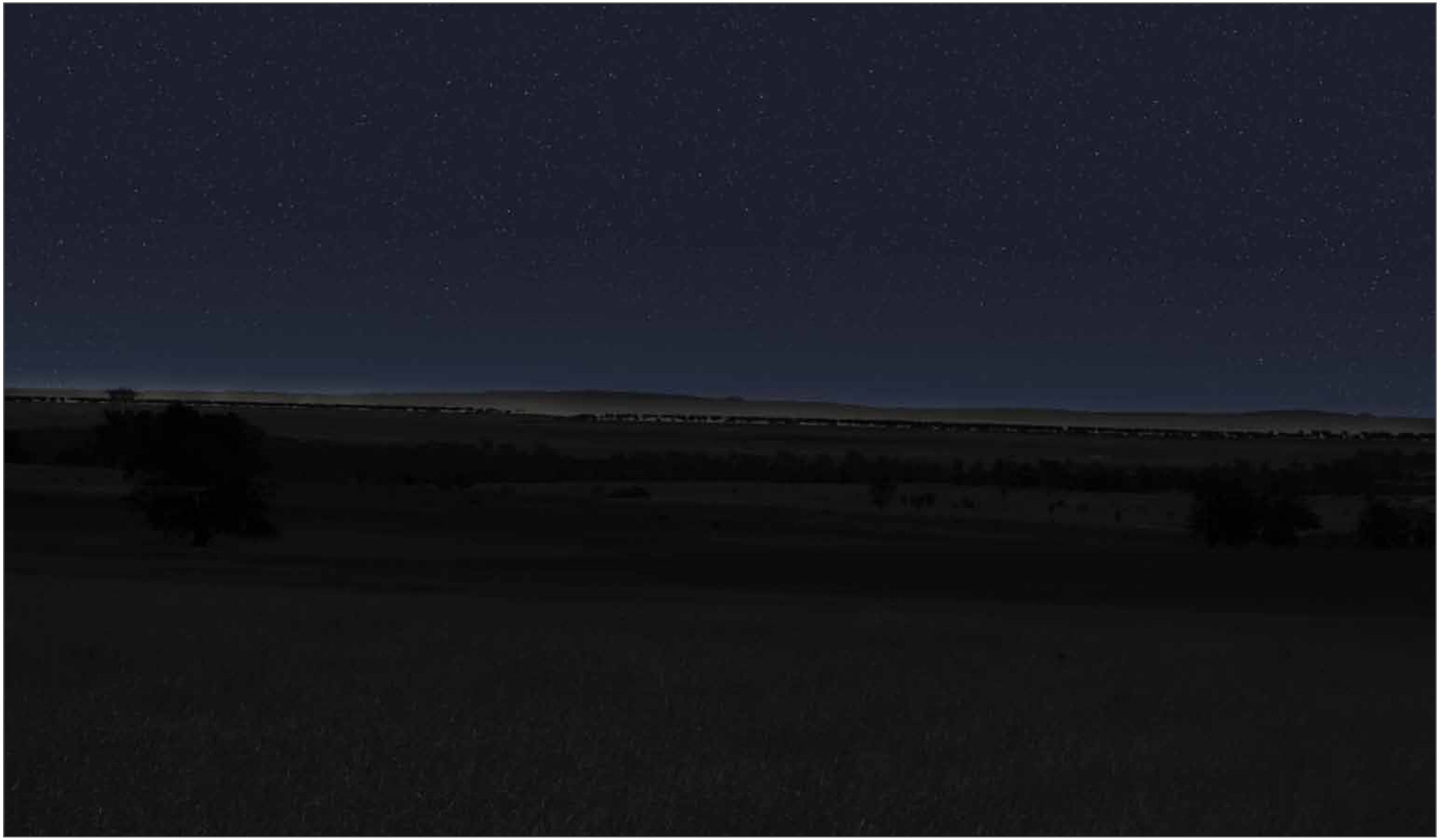

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Figure 5-7c
Location 6 - Nathan Road | year 30 night view

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Figure 5-8a
Location 10 - Leichhardt Highway | existing
The view from the highway to the eastern gas pipeline route crossing the highway.

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Figure 5-8a
Location 10 - Leichhardt Highway | proposed

Figure 5-9a
Location 11 - Nathan Road | existing
A view from the side of Nathan Road to a section of the newly layed Eastern Gas Pipeline route as it passes through open field to the south of Nathan Road. Pipeline route temporarily visible due to ground cover disturbance.

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Figure 5-9b
Location 11 - Nathan Road | proposed

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Figure 5-10a
Location 12 - Nathan Road | existing
A view along a newly completed section of the Eastern Gas Pipeline illustrating newly restored ground levels before re-grassing has occurred.

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Figure 5-10b
Location 12 - Nathan Road | proposed

Figure 5-11a

Location 7 - Leichhardt Highway north of Wandoan | existing

A view looking west into the Leichardt Pit and Frank Creek West Pit that are close to the highway at this point, with the Woleebee Pits in the background at year 1 before operations commence and at years 5, 10, 20 and 30 years during the mining operations.

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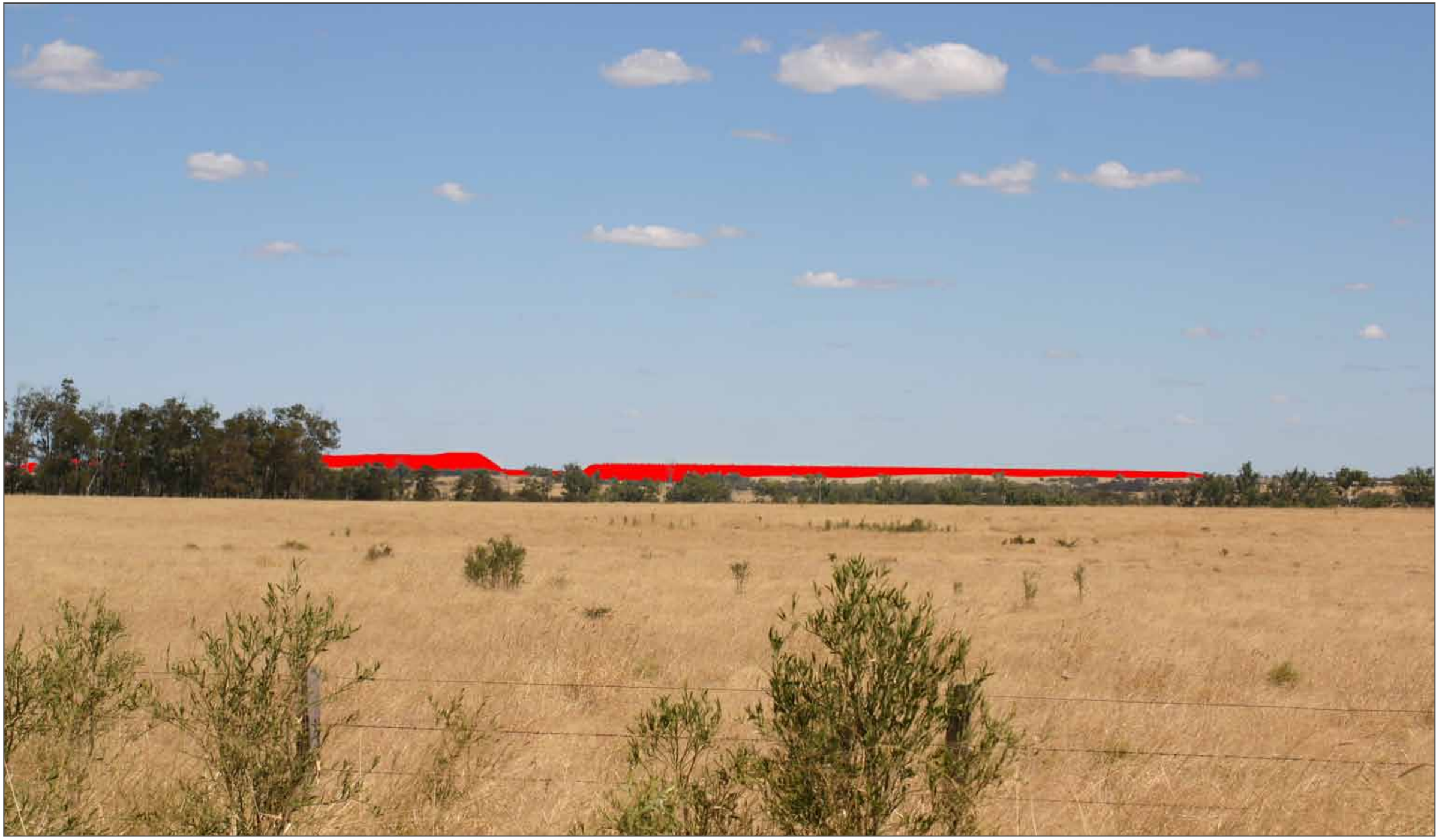

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Figure 5-11b
Location 7 - Leichhardt Highway north of Wandoan | year 5 red rendition

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Figure 5-11c
Location 7 - Leichhardt Highway north of Wandoan | year 5

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Figure 5-11d
Location 7 - Leichhardt Highway north of Wandoan | year 10 red rendition

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Figure 5-11e
Location 7 - Leichhardt Highway north of Wandoan | year 10

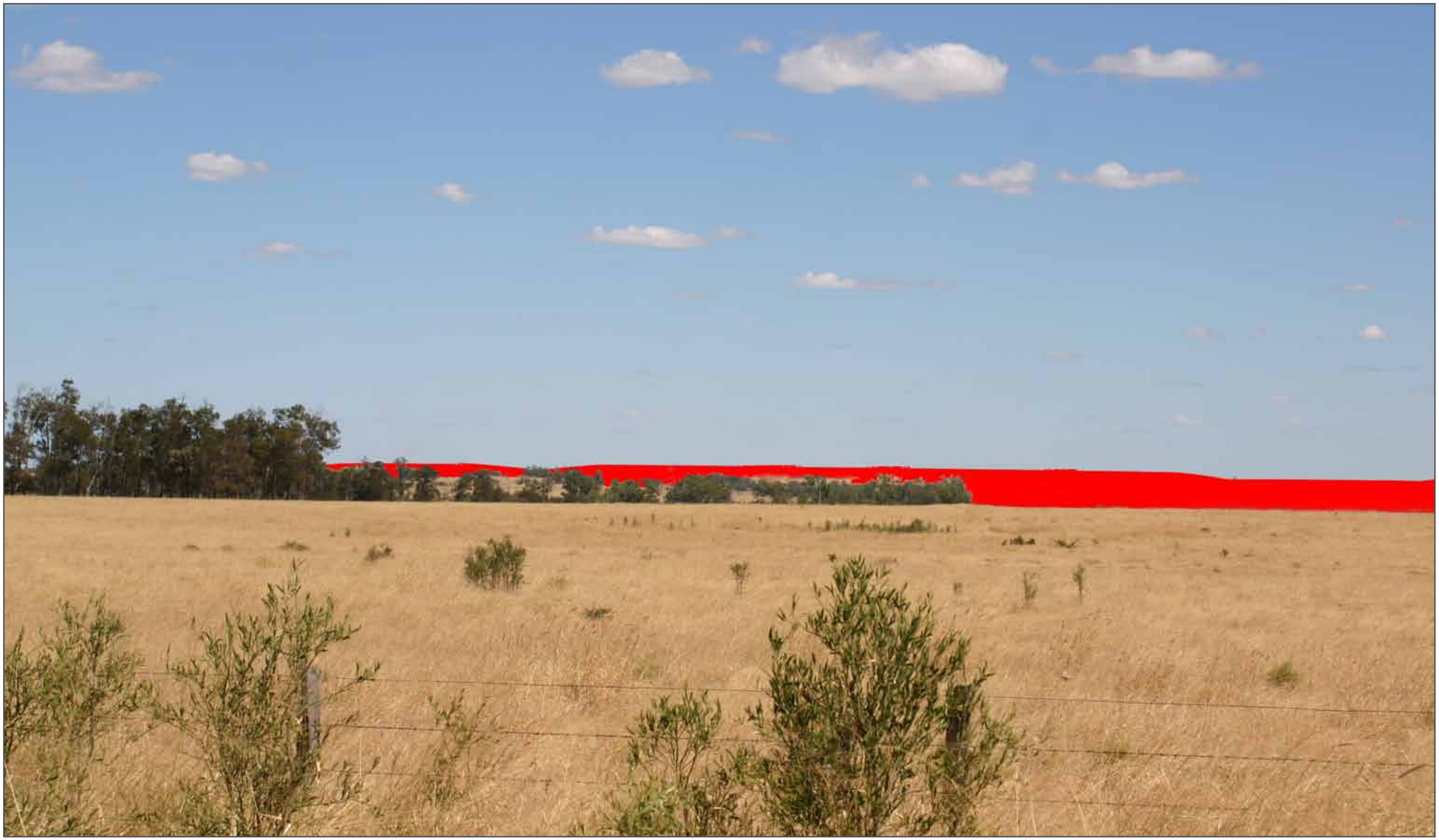

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Figure 5-11f
Location 7 - Leichhardt Highway north of Wandoan | year 20 red rendition

Integral
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& visual planning

Figure 5-11g
Location 7 - Leichhardt Highway north of Wandoan | year 20

Integral
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Figure 5-11h
Location 7 - Leichhardt Highway north of Wandoan | year 30 red rendition

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Figure 5-11i
Location 7 - Leichhardt Highway north of Wandoan | year 30

Figure 5-12a
Location 8 - Wandoan | existing
A view looking west towards the hill that screens the Frank Creek Pit from the township of Wandoan

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Figure 5-13a
Location 8 - Wandoan | existing night view
A night view looking west towards the hill that screens the Frank Creek Pit from the township of Wandoan

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Figure 5-13b
Location 8 - Wandoan | year 20 night view

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Figure 5-13c
Location 8 - Wandoan | year 30 night view

Figure 5-14a
Location 9 - Paradise Downs Road | existing
Views looking north west towards Woleebee South, Woleebee and Woleebee Creek and Woleebee North Pits at year 1 , before operations commence and at years 5, 10, 20 and 30 years during the mining operations

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landscape architecture
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Figure 5-14b
Location 9 - Paradise Downs Road | year 5 red definition

Integral
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& visual planning

Figure 5-14c
Location 9 - Paradise Downs Road | year 5

Integral
landscape architecture
& visual planning

Figure 5-14d
Location 9 - Paradise Downs Road | year 10 red definition

Integral
landscape architecture
& visual planning

Figure 5-14e
Location 9 - Paradise Downs Road | year 10

Integral
landscape architecture
& visual planning

Figure 5-14f
Location 9 - Paradise Downs Road | year 20 red definition

Integral
landscape architecture
& visual planning

Figure 5-14g
Location 9 - Paradise Downs Road | year 20

Integral
landscape architecture
& visual planning

Figure 5-14h
Location 9 - Paradise Downs Road | year 30 red definition

Integral
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Figure 5-14i
Location 9 - Paradise Downs Road | year 30

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Figure 5-15a
Location 1 - Bundi Road | existing
Views looking north east towards Summer Hill Pit at year 1 before operations commence and then at years 20 and 30 during the mining operations.

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Figure 5-15b
Location 1 - Bundi Road | year 20 red definition

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Figure 5-15c
Location 1 - Bundi Road | year 20

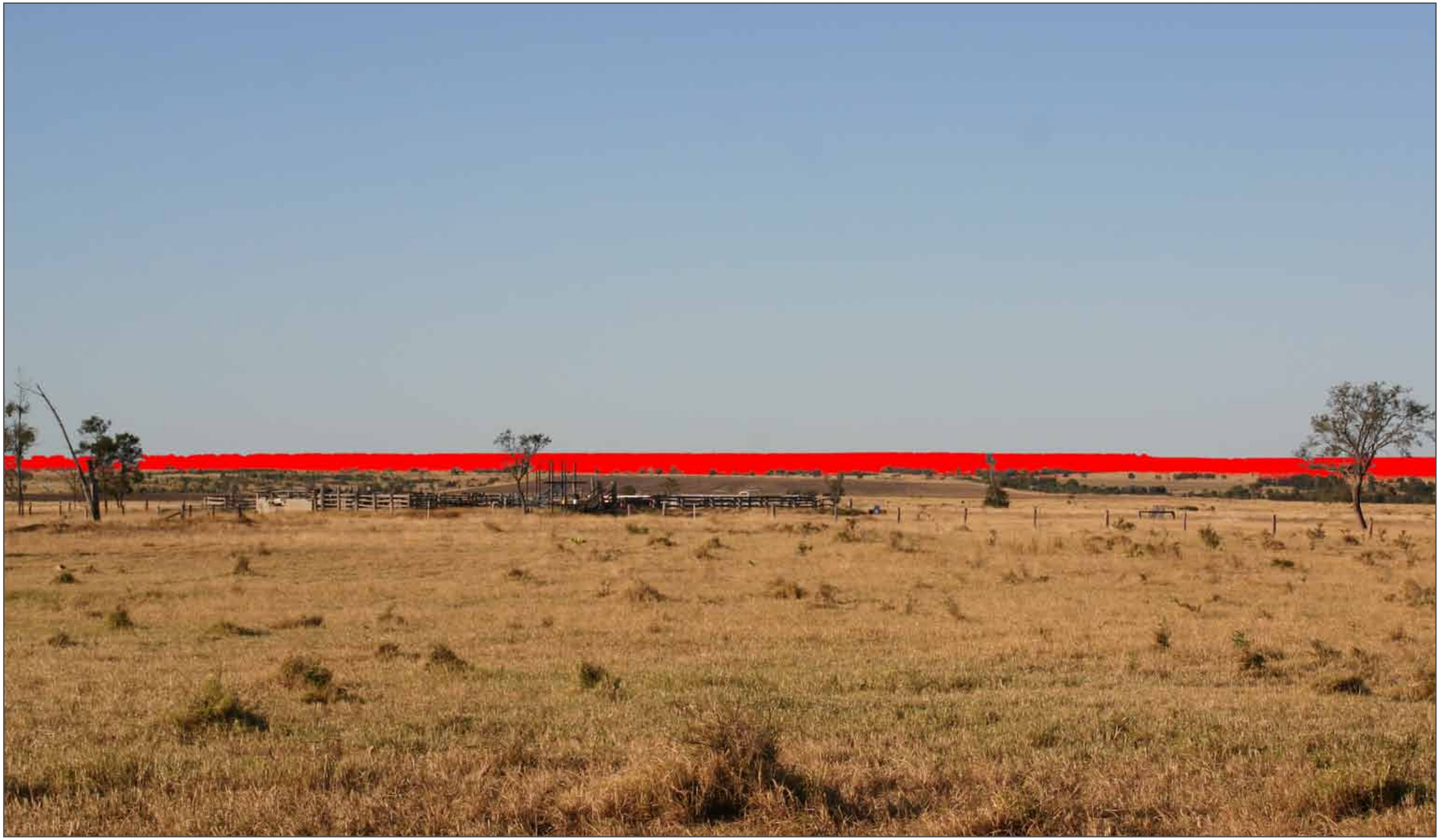

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Figure 5-15d
Location 1 - Bundi Road | year 30 red definition

Integral
landscape architecture
& visual planning

Figure 5-15e
Location 1 - Bundi Road | year 30

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Figure 5-16a
Location 2 - Kabunya Road | existing
Views to the south east towards Turkey Hill Pit at year 1 before operations commence and at years 20 and 30 years during the mining operations.

Integral
landscape architecture
& visual planning

Figure 5-16b
Location 2 - Kabunya Road | year 20 red definition

Integral
landscape architecture
& visual planning

Figure 5-16c
Location 2 - Kabunya Road | year 20

Integral
landscape architecture
& visual planning

Figure 5-16d
Location 2 - Kabunya Road | year 30 red definition

Integral
landscape architecture
& visual planning

Figure 5-16e
Location 2 - Kabunya Road | year 30

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Figure 5-17a
Location 2 - Kabunya Road | existing night view
A view looking across pits at night without the mine and at years 20 and 30 with the mine.

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Figure 5-17b
Location 2 - Kabunya Road | year 20 night view

Integral
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Figure 5-17c
Location 2 - Kabunya Road | year 30 night view

Figure 5-18a
Location 3 - Grosmont Road | existing
Views south over Mud Creek and Part of Summer Hill Pits at year 1 before operations commence and at years 20 and 30 years during the mining operations.

Integral
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Figure 5-18b
Location 3 - Grosmont Road | year 20 red definition

Integral
landscape architecture
& visual planning

Figure 5-18c
Location 3 - Grosmont Road | year 20

Integral
landscape architecture
& visual planning

Figure 5-18d
Location 3 - Grosmont Road | year 30 red definition

Integral
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Figure 5-18e
Location 3 - Grosmont Road | year 30

6. MITIGATION MEASURES

6.1 General

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

- at site treatments
- at viewer location treatments

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

Treatments for the gas pipeline need only be completed at the site of the pipeline trench and generally only involves reinstating original ground levels and ground covers following the laying of the pipes themselves.

6.2 At Site Treatments

At site treatments relate to the MLAs as a whole and to pit areas in particular. The most important treatments are those that relate to the pit areas as this is where the greatest visual impact will occur. These include in sequential order:

Rehabilitation Sequence

Rehabilitation includes establishing the landform and groundcover re-establishment. The quicker this can be done and the narrower the rows of the untreated overburden stockpiles, the lower will be the visual effect of the mining operation. Rehabilitation and revegetation will commence within two years of becoming available for rehabilitation works after an area has been mined. This significantly reduces the visual effect of the mined area.

Landform

While landform rehabilitation cannot totally emulate the existing landform, the nature of the shallow coal, limited overburden and variation in overburden should enable semblances of micro-topographic detail to be reintroduced into the final landforms.

Land Cover

Following completion of landform rehabilitation, rehabilitated areas should endeavour to establish various native grass and herbaceous species types by sowing seed and use of tube stock seedlings that will provide quick short term cover and longer term sustained ground cover. As needed in various locations, shrub and tree cover should be created to emulate existing landscape patterns and/or to achieve other ecological goals. The spread of weed species should be avoided through appropriate pest management practices

Non Mine Pit MLA Areas

Areas not used for mine pits should be managed as farm lands and the spread of weed species avoided through appropriate pest management practices.

Consideration should also be given to the potential for tree planting on high ground on the outer edge of various mine pits and near the boundary of the MLAs, where such plantings may break

up the extent of views to mining pit activities. This is considered to have potential as a long term mitigation measure, due to the dominant height of trees and the time some tree species will take to reach valuable heights for visual impact mitigation.

Landscape Management Plan

Development of a multiple use landscape management plan as part of the biodiversity management plan should be undertaken that is responsive to the ecological, farm uses, mining uses and visual requirements to provide a sustainable landscape outcome that is realistically based on the full range of factors that are relevant to the land use of the MLAs and surrounding areas.

Light Spillage Control.

To minimise light spillage from the site every effort should be made to minimise the number of lights consistent with health and safety standards. In a similar way all lights should be shielded and as much as possible pointed to the ground to avoid direct light effects on sensitive receptors around the MLAs.

Gas Pipe Line

Rehabilitation of ground levels and ground covers consistent with pre-construction conditions should be achieved as soon as is practical. Such re-establishment works should be maintained to ensure successful establishment. Land owners should be consulted in relation to the location of gas valves and any other above ground support infrastructure.

6.3 At Viewer Location Treatments

The scale of the mining operations, the levels of visual effect, and the difficulty in achieving screening or amelioration of these effects at the mine site, as well as the long duration of visual impact, require that at viewer location treatments be considered.

Such treatments would include:

- Determination of primary, secondary and tertiary view zones
- Light Exposure at Night
- Development of screening treatments for various zones in response to above
- Consideration of "Off-set" strategies where major impacts are experienced for a considerable period of time
- Specific Sites for Treatment

Determination of primary, secondary and tertiary view zones

For sensitive view locations at dwellings or important community facilities such as Grosmont Primary School determine how significant a view is to a view location. For example a view from a lounge room window or a verandah or front door is a primary view zone and is more significant than a view from the driveway, a secondary view zone, or the back of the house or laundry, which would be a tertiary view zone. Similarly a view from a garden entertainment area which can be a primary or secondary view zone is more important than a view from the clothesline or work shed, which will be a tertiary view zone.

This assessment should be completed by a qualified landscape architect for homesteads and community facilities that are affected or could potentially be affected. Such an approach would for the greater part be proactive in terms of a service being offered by the WJV.

Treatments to mitigate any visual impact would consist of native and or exotic planting in keeping with any style that is already established around a homestead and or driveway. Such plantings would be with tube stock or equivalent and would need to be maintained with adequate water supply for the first two years.

Plantings should be carried out in the first one to three years of the mining operations commencing achieving the best results if they are established well before a visual impact is experienced.

It is anticipated that 23 homesteads around the MLAs will require landscape works, while another 28 will require investigation for potential impacts, see Figure 6.1. Further to this, the mitigation strategy should allow for other receptors that consider themselves to potentially be impacted to be assessed, thus alleviating undue visual sensitivity to the Project.

Light Exposure at Night

From potentially affected dwellings and community facilities that will have direct line of sight to areas projecting a light source up to 2.5km away, as shown on Figure 6.1, an assessment by a qualified landscape architect or equivalent lighting specialist of potential light source impacts from various directions should be conducted. For properties that are considered to be affected in a significant way by landowners beyond 2.5km away or out of direct line of sight, night time visual impact assessment of their affected should be undertaken upon request.

Indoor areas affected would most effectively be treated with window blinds, whereas outdoor areas would require screen planting.

The need for specific treatments would then be developed as part of a Screening Strategy for the specific dwelling or community facility. Treatments may include architectural and landscape solutions.

Development of screening treatments for various zones

Based on an assessment of visibility and significance of view, development of a screening strategy could be undertaken that maintains unaffected views but screens or filters out mine affected views.

Such zones will require screen planting to completely block views or to create a visual filter. Such plantings can include informal mass planting areas, generally not less than three rows wide or more formal avenue plantings associated with elements such as driveways.

Consideration of "Off-set" strategies where major impacts are experienced for a considerable period of time

Where it is considered that major impacts are sustained on primary view zones of a homestead for significant periods of time, consideration could be given to visual off-set landscape treatments that could include re-orientating primary view zones or upgrading areas unaffected by mine views. This could involve additional landscape works for affected properties, where much used but visually affected outdoor areas are relocated and or protected from views to the mine. Such treatments could include re-establishing appropriate ground cover treatments, screening and or creating new landscape or recreational focus points and views. All of these elements are

possible tools but the implementation of one over another is dependant on an assessment of the affected property and the preferences of the affected land owner.

Sites for Specific Treatment

There are a number of public places that are impacted by the mine activities. Treatment of these areas will significantly reduce visual impact and restore the integrity of regional landscape views.

These locations include:

- Leichhardt Highway, Wandoan to Juandah Creek
- Cemetery
- Realigned Jackson Wandoan Road
- Grosmont Primary School

Treatment of these areas will require detail design by a qualified landscape architect in co-ordination with terrestrial ecologists.

Leichhardt Highway adjacent to Fairfield Hill Homestead

Treatment at the Leichhardt Highway site are not considered warranted because of the limited time, area of the mine pits and distance that can be seen.

There is a strip of highway within the vicinity of "Fairfield" Homestead that if treated could alter impacts on this locality. This would require the treatment of up to 1km of the western side of the highway within the highway road reserve to create a visual screen with an elevation of a minimum of 4-5m, as shown in Figure 6.1.

The screen planting should consist of up to three rows of small trees to screen out views from this elevated location.

Leichhardt Highway, Wandoan to Juandah Creek

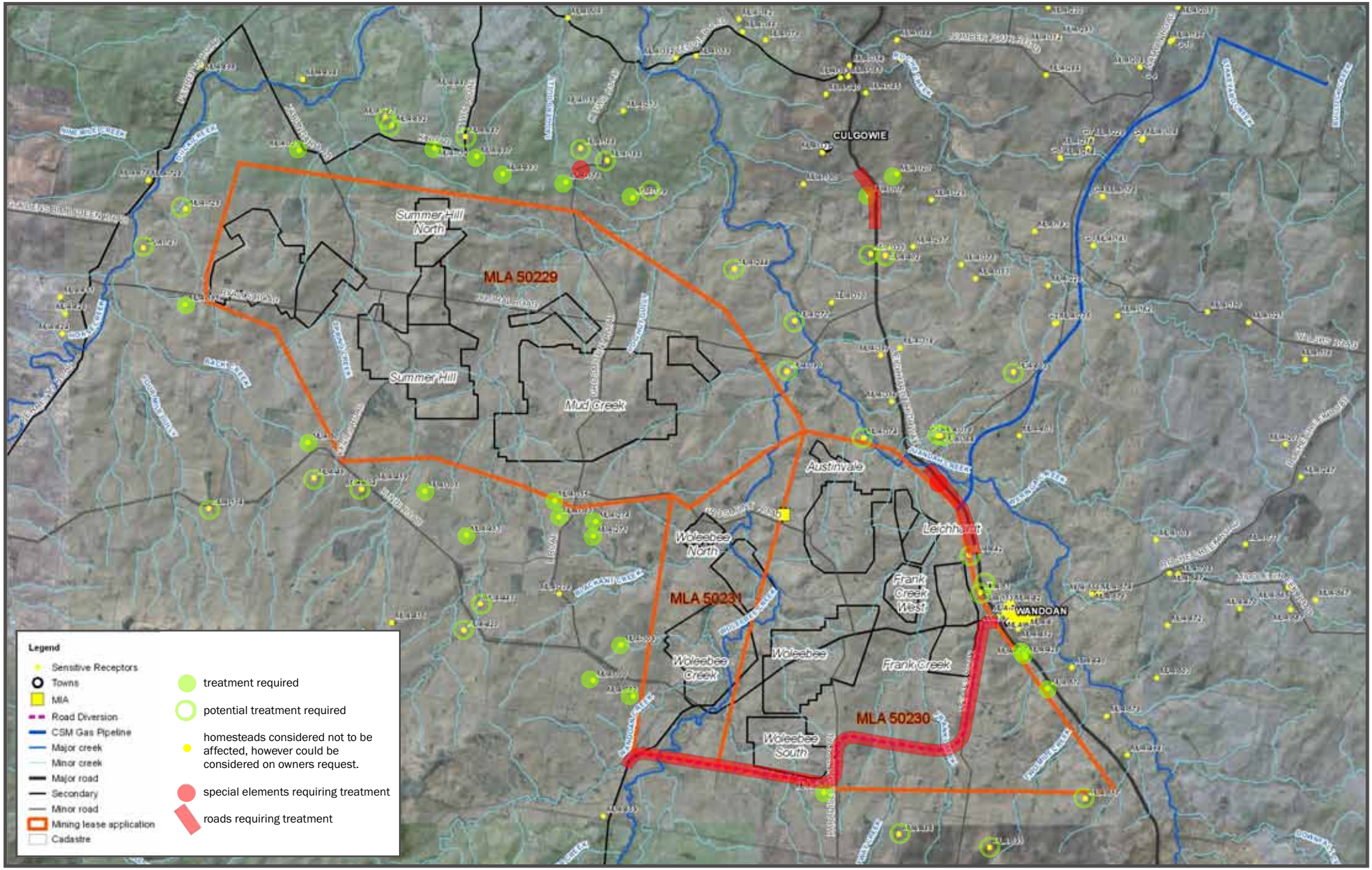
The requirement to treat approximately 4km of highway from north of Wandoan to the southern edge of Juandah Creek to screen out the Frank Creek and Leichhardt Pits

Screen planting should be carried out immediately adjacent to the eastern boundary of the MLA in this location. Plantings should consist of a minimum of three rows, road easement allowing, using endemic species that can reach heights exceeding 5m. This should include plantings around the western side of the cemetery.

Realigned Jackson Wandoan Road

Road reserve treatments should be carried out to the western and northern edges of the re-aligned Jackson Wandoan Road to filter views to Frank Creek Pit and the Woleebee group of pits.

This should consist of screen planting along the 19 km realignment. Screen planting should consist of a minimum of three rows of endemic trees planted at 3-5m centres with rows 4m apart. Selection of species should be in co-ordination with the biodiversity management plan.



Integral landscape architecture & visual planning

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Figure 6-1
Visual Mitigation Strategies

Grosmont Primary School

While giving consideration to the future of the school in the time frames of when mining will affect the school, screening should be considered and as needed designed and implemented, working with school community.

Treatments should include screen plantings around the playground and school oval. Additional consideration may be given to 'offset' landscape treatments in terms of playground upgrade in addition to screening elements. Screening should consist of belts of trees not less than three rows wide and may include exotic and native species that are appropriate to the school function and other environmental needs.

Potable Water Facility at Wandoan.

The existing facility is in a very visible location at the Wandoan town entrance and adjacent to the Leichhardt Highway. Despite the prominent location of the Potable Water Facility, the additional facilities are small in scale and co-located with other existing water supply facilities.

7. RESIDUAL IMPACTS

In the longer term the residual visual impacts are minimal. In the 'interim', that is over the 30 year mining period, impacts are inevitably high due to the nature of the mining operation and the long duration of exposure to visual impact.

In the case of the Wandoan Project Coal MLAs, the finished landforms will not vary greatly from the original landform. Once these landforms are achieved and revegetation completed, visual contrasts will be minimal and landscape patterns re-established. In this situation, visual effects will be reduced to low and then very low with a resultant fall in visual impact.

The major concern is the length of the 'interim' period during which impacts are experienced and are often high. Hence there is a need to implement 'at viewer location' visual management strategies that will reduce visual effects at the point of viewing and in so doing also enhance the landscapes of those locations in a permanent way.

The residual impact of the gas pipeline is minimal and is not significant. The only visual impacts experienced due to the gas pipeline will be temporary during the construction period. Landscape rehabilitation following the laying of the pipeline will reinstate original landscape values in most locations within a one year period.

8. CONCLUSIONS

The Wandoan Coal Project is a major open cut mining operation that will inevitably have high visual effects and impacts. However the nature of the operation, with limited overburden removal allows for high quality rehabilitation of landform and land cover. This will result in low visual impacts in the longer term.

Management of visual impacts at the viewer location in relation to sensitive locations will more immediately influence visual impact levels. Landscape treatments will achieve measurable reductions in visual impact in relatively short time frames and achieve lasting landscape outcomes that will enhance the landscape settings of the viewing locations.

8. SUMMARY OF MITIGATION STRATEGIES

Recommended mitigation strategies to minimise potential impacts of the Project on adjoining sensitive receptors, as previously detailed in this visual assessment, are summarised below:

- Landscape assessment and treatment of up to 23 homesteads around the MLAs
- Landscape investigation and potential treatment of a further 28 homesteads
- Landscape screen planting around Grosmont School play areas and sports field as well as consideration of playground equipment enhancement
- Screen planting of the western side of the Leichhardt Highway for a maximum of 1km adjacent to the *'Fairfield'* Homestead
- Screen planting around the western edge of the Wandoan Cemetery
- Screen planting along a 4km stretch of highway north of Wandoan and generally up to the cemetery
- Screen planting along the realigned Jackson Wandoan Road for a distance of up to 19km
- Landscape design and planting around the Potable Water Facility at Wandoan
- Rehabilitation of mine lands as soon as practically possible

9. REFERENCES

The Landscape Institute with the Institute of Environmental Management and Assessment 2002, *Guidelines for Landscape and Visual Impact Assessment (Second Edition)*. Spon Press, London.