WILPINJONG COAL PROJECT

APPENDIX N

Visual Impact Assessment

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WILPINJONG COAL PROJECT
VISUAL IMPACT ASSESSMENT

For Wilpinjong Coal Pty Limited

By

EDAW gillespies

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Melbourne 3000

April 2005

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N1 INTRODUCTION

EDAW Gillespies Australia (EDAW) was commissioned by Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Excel Coal Limited, to prepare a Visual Impact Assessment Report as part of an Environmental Impact Statement (EIS) for the development of the Wilpinjong Coal Project (the Project). The Project is located approximately 40 kilometres (km) north-east of Mudgee and approximately 3 km west of the village of Wollar in the upper Hunter Valley in New South Wales (**Figure N1.1**).

The following components were included as part of the study:

- A site inspection to identify the Project viewshed and potentially sensitive viewing locations within the Project vicinity (e.g. private residences, public roads and natural/recreation areas).
- Characterisation of the existing visual landscape in terms of topography, existing land use and vegetation, including site photography.
- Consultation with members of the local community to discuss the content and objectives of the visual impact assessment.
- Characterisation of the Project components with respect to potential visual impacts.
- Preparation of a visual impact assessment to include characterisation of the existing visual landscape, potential visual impacts and provide recommendations for the management of potential visual impacts.

This study assesses the potential visual impact of the Project in accordance with the relevant requirements of the Director-General of the Department of Infrastructure, Planning and Natural Resources (DIPNR). Consideration has been given to the *EIS Guideline: Coal Mines and Associated Infrastructure* (Planning NSW, 2000).

N1.1 Methodology

The methodology employed by EDAW has been based on an analysis of the visual setting and assessment of the anticipated impacts of the development of the Project. The key factors considered include:

- Sensitive land uses (e.g. private rural dwellings, natural and recreational areas and major roads). Dwellings owned by WCPL have not been assessed as part of this study.
- The visual form, scale and colour of the development.

The methodology is comprised of two components including:

- ***Quantitative Assessment (Refer to Attachment NA)***
  - How much of the proposed development may be visible from particular viewpoints?
- ***Qualitative Assessment***
  - Visual modification – How does the proposed development contrast with the landscape character of the surrounding setting?
  - Sensitivity – How sensitive will viewers be to the proposed development?

The methodology employed by EDAW is based on the Visual Management System (VMS) developed by the US Forestry Service whereby the visual impact of a proposed development is determined by evaluating the degree of visual modification/fit of the development in the context of the visual sensitivity of surrounding land use areas from which a proposed development may be visible. The visual impact resulting from the combination of visual modification and visual sensitivity is illustrated in **Table N1.1.**

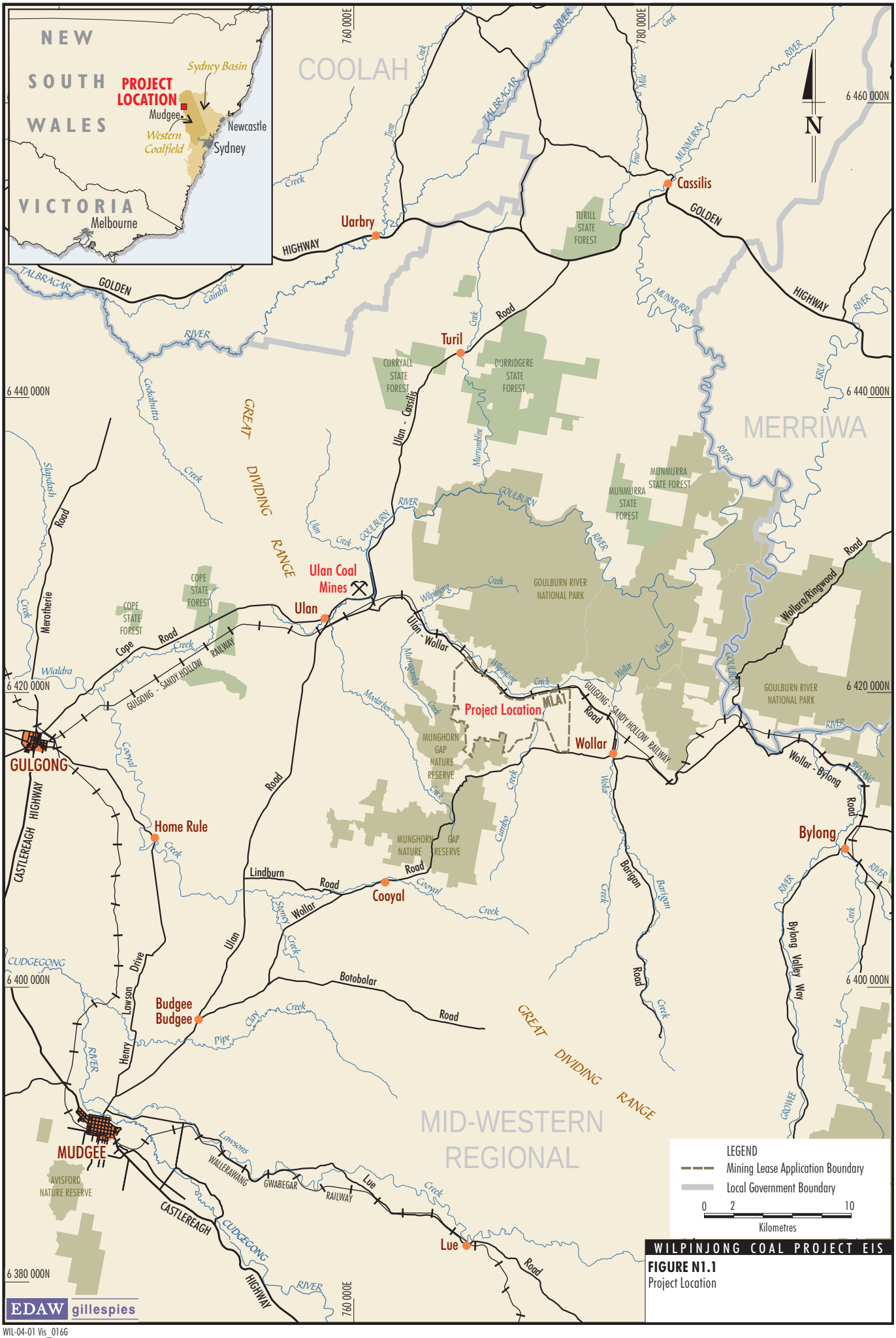

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FIGURE N1.1
Project Location

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Table N1.1 - Visual Impact Matrix.

Visual Modification \ Viewer Sensitivity	H	M	L
H	H	H	M
M	H	M	L
L	M	L	L

L = Low

M = Moderate

H = High

N1.1.1 Visual Modification

The level of visual modification of a proposed development can be best measured as an expression of the visual interaction, or the level of visual contrast between the development and the existing visual environment. Throughout the visual catchment (or zone of visual influence) the degree of visual modification generally decreases as the distance from the development to various viewing locations increases.

The degree of visual modification is considered negligible where the development is distant and/or relates to a small proportion of the overall viewscape.

A low degree of visual modification occurs where there is minimal visual contrast and a high level of integration of form, line, shape, pattern, colour or texture values between the development and the landscape. In this situation the development may be noticeable, but does not markedly contrast with the existing landscape.

A moderate degree of visual modification occurs where a component of the development is visible and contrasts with the landscape, while at the same time achieving a degree of integration. This occurs where surrounding vegetation and/or topography provide some measure of visual screening and/or other forms of visual integration.

A high degree of visual modification occurs where the major components of the development contrast strongly with the existing landscape.

N1.1.2 Visual Sensitivity

Visual sensitivity is a measure of how critically a change to the existing landscape will be viewed from surrounding areas, and is a function of both land use and duration of exposure.

Different activities undertaken within the landscape setting have different visual sensitivity levels. Individuals on holiday who are using the surrounding landscape as a part of the holiday experience will generally view changes to the landscape more critically than agricultural or industrial workers in the same setting. Similarly, individuals will view changes to the visual setting of their residence more critically than changes to the visual setting of the broader setting in which they travel or work.

The visual sensitivity of the development depends on a range of viewer characteristics. The primary characteristics used in this study are land use, the distance of the development from viewers and its visibility from critical viewing areas and view angle. The visual sensitivity of different land uses was assessed to assist in determining the visual impact of the development. As distance from the viewer to the proposed development increases, the level of visual sensitivity reduces.

Typical visual sensitivity levels are defined in **Table N1.2.**

Table N1.2 – Typical Visual (Viewer) Sensitivity.

Use Area	Foreground (Local Setting) 0 - 0.5 0.5 - 1km		Middle ground (Sub-Regional Setting) 1 - 2 .5 2.5 - 5 km		Background (Regional Setting) > 5 km
NATURAL AREA – RECREATION	H	H	H	M	L
RESIDENTIAL - TOWNSHIP	H	H	H	M	L
RESIDENTIAL - RURAL	H	H	H	M	L
TOURIST ROADS	H	M	M	L	L
OTHER MAJOR ROADS	M	L	L	L	L
LOCAL ROADS	L	L	L	L	L
MINING AREAS	L	L	L	L	L
AGRICULTURAL AREAS	L	L	L	L	L

For the purposes of this visual impact assessment, land uses in the vicinity of the Project are characterised in terms of low, moderate or high visual sensitivity as follows:

- Low visual sensitivity – areas of rural land use (e.g. agricultural land) and local roads (e.g. Ulan-Wollar Road).
- Moderate visual sensitivity – Tourist/major roads (e.g. Wollar Road).
- High visual sensitivity – Rural residences, townships and natural/recreation areas (e.g. village of Wollar and Goulburn River National Park).

N2 EXISTING LANDSCAPE AND VISUAL SETTING

N2.1 Local Landscape Character Types and Scenic Quality

It has been established through previous studies that scenic quality increases as the presence of water forms, water edge and water area increase (Leonard and Hammond, 1984; Zube, 1973; Zube et al, 1976; Brush and Shafer, 1975; Anderson et al, 1976). Scenic quality also increases as topographic ruggedness and relative relief increase (Leonard and Hammond, 1984; Burns and Rundell, 1969; Anderson *et al*, 1976). Scenic quality can also increase as the patterning of vegetation increases.

The Project area and surrounds are comprised of a number of distinct land use types and landscape units of varying levels of landscape quality. These have been defined as follows and are shown on **Figure N2.1**. The visual settings (e.g. local, sub-regional and regional) are based on distance from the development as described in **Attachment NA**.

Goulburn River National Park

This significant landscape unit to the north of the Project area within the local to regional settings features elevated topography with a high degree of dissection with moderate to steep slopes and a dense vegetation cover. The Goulburn River National Park is listed on the Register of National Estate (Section N2.2.1) and considered to be of high scenic quality.

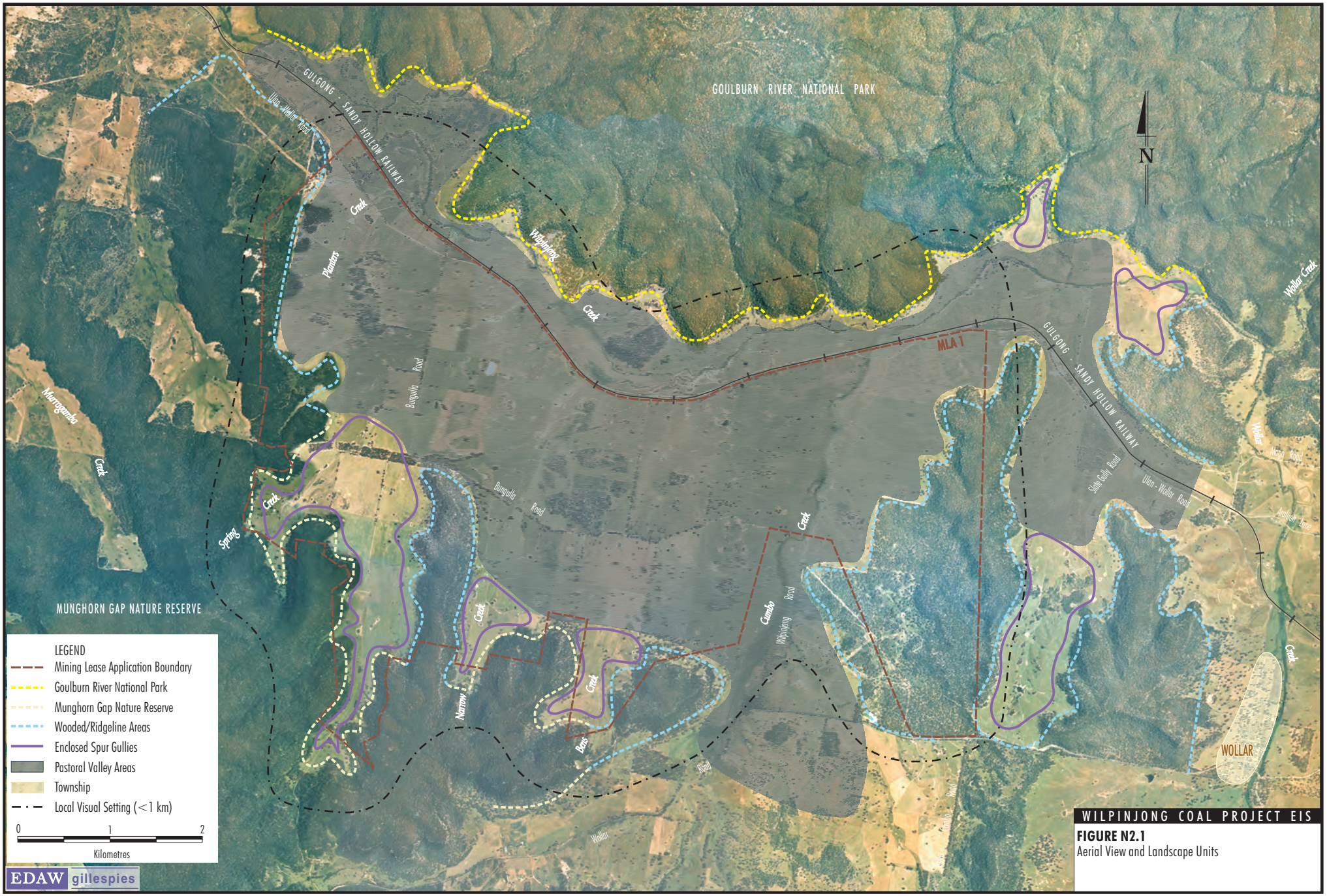

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FIGURE N2.1
Aerial View and Landscape Units

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Munghorn Gap Nature Reserve

Located within the local to sub-regional setting, the topographic form and vegetation cover of the Munghorn Gap Nature Reserve provides a degree of visual interest and is considered to be of moderate to high scenic quality. The Munghorn Gap Nature Reserve is also listed on the Register of National Estate (Section N2.2.1), however no aspects relating to visual amenity are described.

Pastoral Valley Areas

The Project area is located predominantly within the broad and generally flat pastoral valley landscape unit. Sparsely scattered trees are present across the area, which is surrounded by the rising and well-vegetated backdrop of the Goulburn River National Park, Munghorn Gap Nature Reserve and the wooded ridgeline landscape units. The Ulan-Wollar Road and the Gulgong-Sandy Hollow Railway Line traverse the northern edge of the landscape unit and is considered to be of moderate scenic quality.

Wooded Ridgeline Areas

This landscape unit is comprised of often dense woodland on top of the ridgelines and elevated areas surrounding the Project area. The side slopes are moderately steep with numerous rock outcrops and the landform often forms smaller spurs off the main ridgelines. The contrast of the vegetation and topographic form between the ridgelines and the adjacent pastoral valley areas adds to the visual interest. This landscape unit is considered to be of moderate to high scenic quality.

Enclosed Spur Gullies

This landscape unit is comprised of narrow cleared valleys surrounded by dense wooded ridgelines with moderately steep slopes and numerous rock outcrops. The contrast of the vegetation and topographic form between the ridgelines and the narrow cleared valleys creates visual interest. This landscape unit is considered to be of moderate to high scenic quality.

Village of Wollar

The village of Wollar has a pleasant landscape character. It is located in a valley approximately 3 km to the east of the Project and is separated by heavily vegetated ridgelines. The village of Wollar is considered to be of moderate scenic quality.

N2.2 Overall Character of the Broader Landscape Setting

The previously described landscape units combine with similar landscapes to the west and east to create the landscape of the western Hunter Valley as a whole. The Ulan Coal Mines located north-west of the Project (**Figure N1.1**) are also a significant element within the existing regional setting.

The Ulan Coal Mines incorporate both underground and open cut mining areas and associated surface infrastructure including a CHPP, rail, rail loading and administrative facilities. It is noted that a 2 Mtpa underground mining operation comprising Underground Mine No. 4, a new CHPP, rail loop and train loading facility was approved in October 1985 as part of Stage 2 of the Ulan Coal Mines (hereafter referred to as Ulan Stage 2). The Underground Mine No. 4 and associated surface facilities that comprised part of Ulan Stage 2 were not developed. Other components of Ulan Stage 2 were developed (i.e. the Stage 2 open cut commenced in 1982 and Underground Mine No. 3 commenced in 1986) and form part of the existing Ulan Coal Mines development.

N2.2.1 Landscape Character Significance

A review was undertaken of designations or classifications of the broader landscape setting from a cultural perspective. Inquiries were made of the databases of the following organisations:

- National Trust of Australia (NSW).
- NSW Heritage Council.
- Commonwealth National Heritage Database.

The Register of National Estate in the Commonwealth National Heritage Database lists both the Goulburn River National Park and Munghorn Gap Nature Reserve.

As stated in the Register of National Estate listing for the Goulburn River National Park:

> *"The landscape of the reserve is visually dramatic, and the vegetation full of colour contrasts, giving this place considerable aesthetic appeal.…*
>
> *The irregular topography and colour contrasts within the forest and woodland canopy has considerable scenic appeal."*

The Munghorn Gap Nature Reserve was gazetted for the protection and study of fauna in 1961. No aspects relating to visual amenity were described in the Register of National Estate listing.

No other citation was found for the classification of significance of the landscape in the vicinity.

N2.2.2 Absorptive Capability

The definition of landscape absorptive quality is closely related to that of visual modification levels. It is generally applied at a broader scale than visual modification and is an assessment of how well a landscape setting is able to accommodate change or development.

The key factors considered in determining absorptive capability are topography and vegetation. In areas of flatter topography, overlooking is not possible and quite low and thin bands of vegetation are able to screen views to a development from a given viewpoint. In areas of undulating or elevated topography, overlooking can occur and vegetation needs to be higher and denser to achieve effective screening. Intervening undulating topography also has the potential to block views in certain landscapes.

The absorptive capability of the landscape units described in Section N2.1 are provided below.

Valley Pastoral Areas, Enclosed Spur Gullies and Village of Wollar Landscape Units

These landscape units are generally flat and effectively absorb the development due to the ability of intervening topography and vegetation to screen views. The landscape settings of the Project area and surrounds subject to the assessment of visual impacts have the following absorptive capabilities:

Topography: High absorptive capability.
Vegetation: Low to moderate absorptive capability.

Goulburn River National Park, Munghorn Gap Nature Reserve and Wooded Ridgeline Landscape Units

The Goulburn River National Park, Munghorn Gap Nature Reserve and wooded ridgeline landscape units are elevated and sloping landforms that provide for overlooking of the valley floor. The ability to absorb development within these settings is low. However, the ridgelines provide effective visual separation of sections of the valley floor, particularly in the south of the Project area.

Topography: Low absorptive capability.
Vegetation: Moderate to high absorptive capability.

N3 DESCRIPTION OF THE PROJECT

N3.1 Overview

The Project general arrangement is shown on **Figure N3.1**. Elements of the Project that have the potential to impact on the visual landscape include:

- progressive clearance of vegetation (some 290 hectares) from within the footprint of the open cut mine and contained infrastructure;
- development of an open cut coal mine and associated waste rock, tailings and water management structures;
- construction of rail and coal handling infrastructure to facilitate the transport of product coal by rail;
- construction of a Coal Handling and Preparation Plant (CHPP) to enable washing of run-of-mine (ROM) coal;
- development of internal access roads, haul roads and a mine facilities area;
- relocation of the existing 11 kilovolt (kV) electricity transmission line to the north of the open pits;
- the relocation of Cumbo Creek;
- progressive rehabilitation of completed landforms; and
- lighting associated with night-time mining operations.

N3.2 Progressive Mine Development

A conceptual mine plan has been developed for the Project that incorporates a construction period during Year 1 of the Project and allows for the completion of mining within six delineated pits over a 21 year Project life.

Progressive development of the Project is illustrated on **Figures N3.2 to N3.6** (Years 1, 3, 9, 14 and 21). **Figure N3.7** provides a conceptual illustration of the post-mining landform.

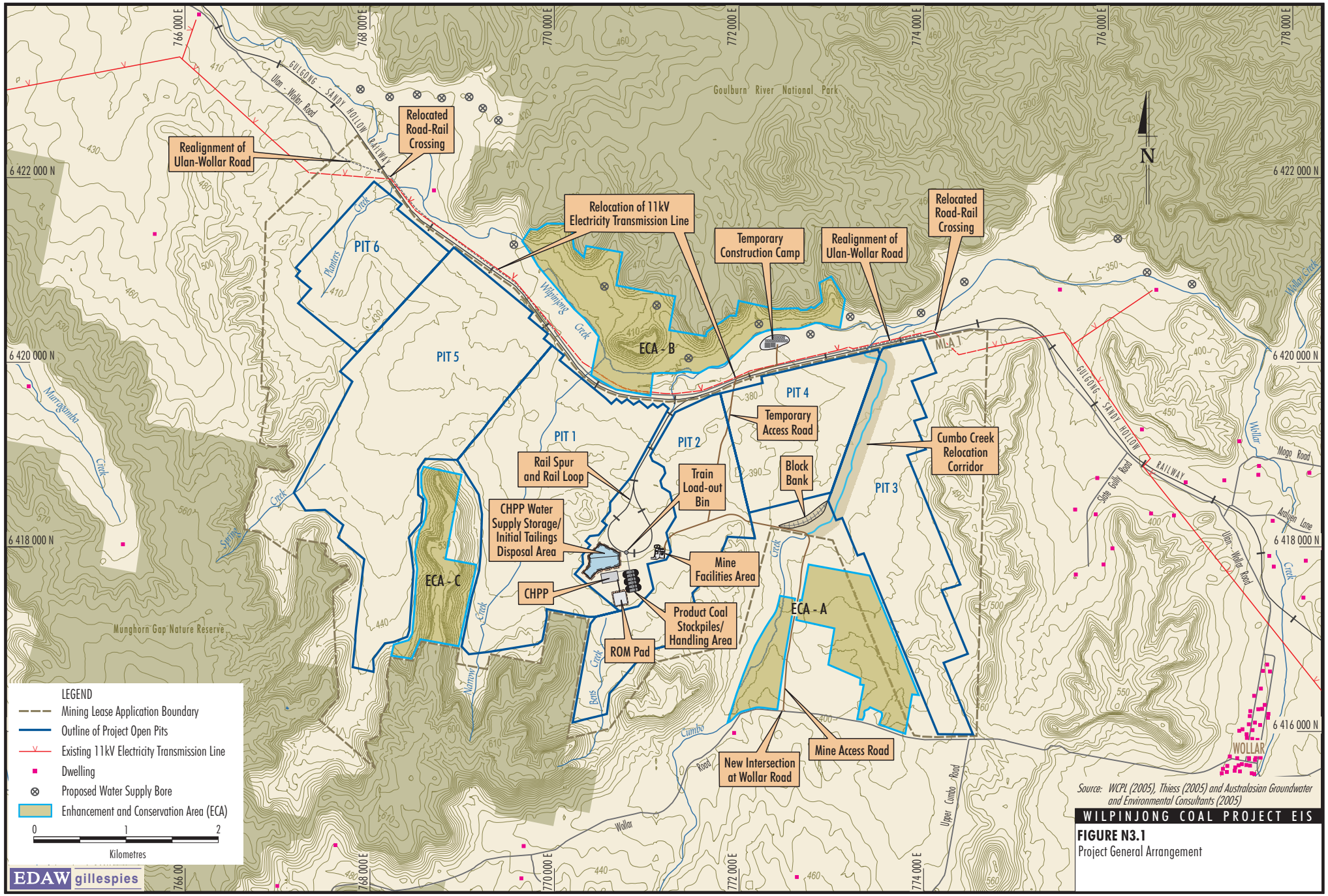
N3.3 Mining Method

Mining would be carried out using open cut methods at a rate of up to 13 million tonnes per annum (Mtpa) of ROM coal. The open cut resource would be mined by a strip-mining method that incorporates the removal of waste rock material through a combination of throw-blast, dozers, excavators and trucks. A description of the mining method is provided in Section 2 of Volume 1 of the Environmental Impact Statement (EIS) and is illustrated on **Figures N3.8 and N3.9**.

Mining is scheduled to commence with the development of an initial box-cut in the south-eastern section of Pit 1 (**Figure N3.2**). Waste rock material from the box-cut would be used in the construction of mine and rail infrastructure.

The general sequence of the open cut mining operation for the Project would be as follows (**Figures N3.8 and N3.9**):

1. Vegetation clearing and topsoil/subsoil stripping. Stripped topsoil and subsoil would be used directly in progressive rehabilitation or placed in temporary stockpiles.
2. Drilling and blasting of overburden, with some waste rock "throw-blast" into the adjacent mined out strip.
3. Dozer pushing of blasted overburden into the adjacent mined out strip to expose the upper ply of the Ulan Seam. Exposed coal would then be selectively mined and hauled by trucks to the ROM coal stockpiles.
4. Interburden/parting material would then be ripped, pushed or excavated and hauled to expose the underlying working sections of the Ulan Seam.
5. Progressive rehabilitation of the mine waste rock emplacements.



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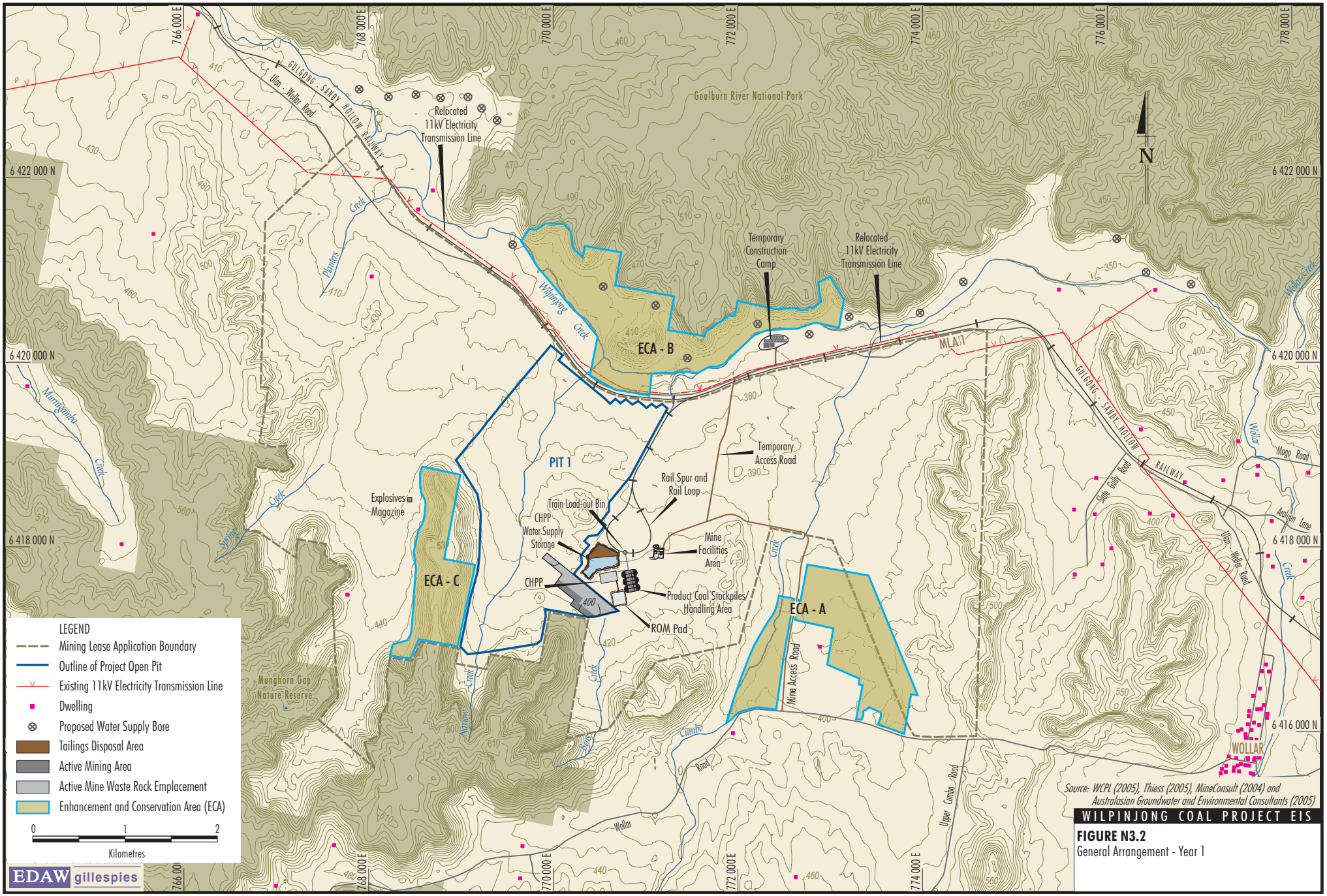

Source: WCPL (2005), Thiess (2005), MineConsult (2004) and Australasian Groundwater and Environmental Consultants (2005)

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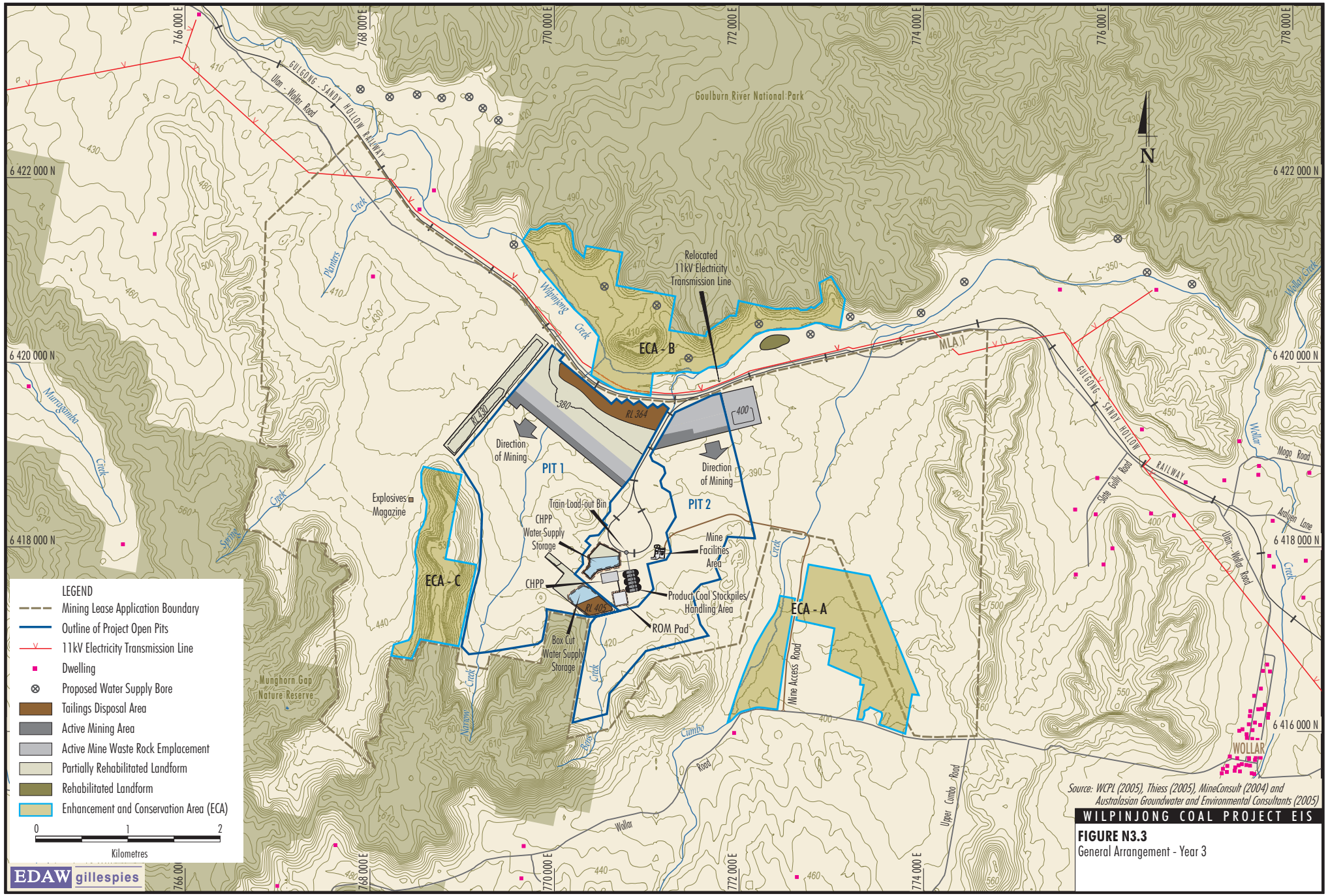
FIGURE N3.2
General Arrangement - Year 1

WIL-04-01 Vis_0091



Source: WCPL (2005), Thiess (2005), MineConsult (2004) and Australasian Groundwater and Environmental Consultants (2005)

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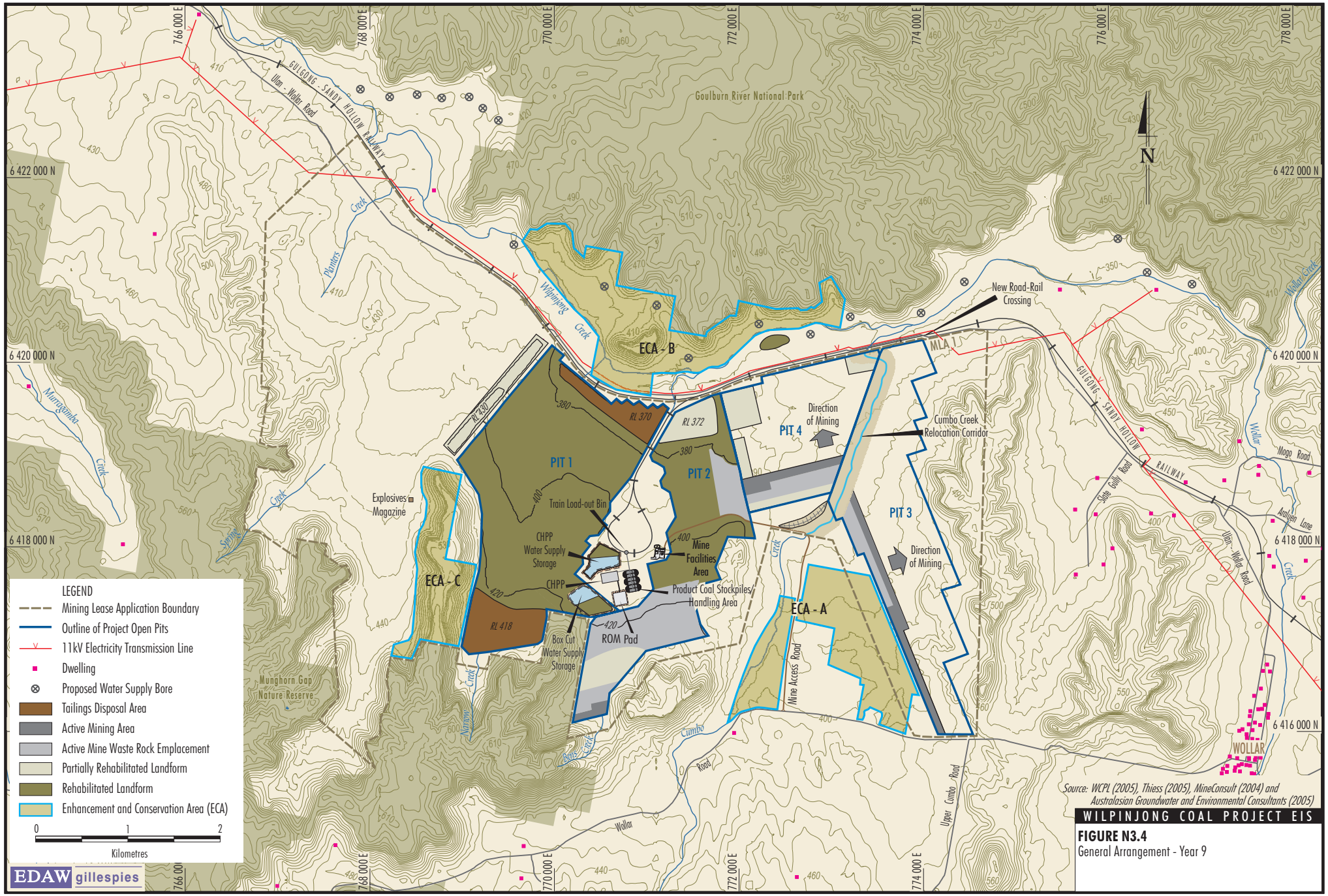
FIGURE N3.3
General Arrangement - Year 3

WIL-04-01 Vis_010H



Source: WCPL (2005), Thiess (2005), MineConsult (2004) and Australasian Groundwater and Environmental Consultants (2005)

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FIGURE N3.4
General Arrangement - Year 9

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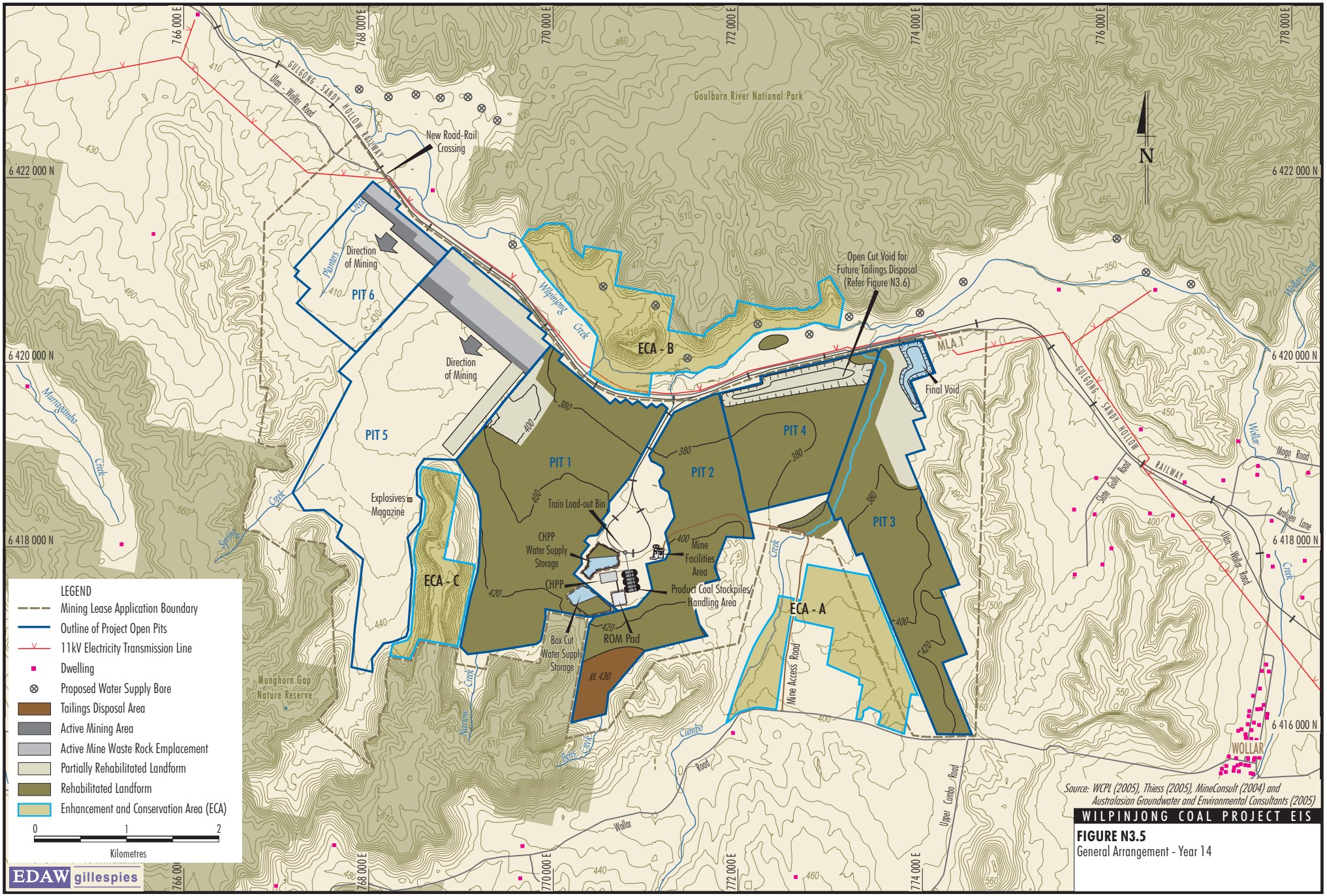

Source: WCPL (2005), Thiess (2005), MineConsult (2004) and Australasian Groundwater and Environmental Consultants (2005)

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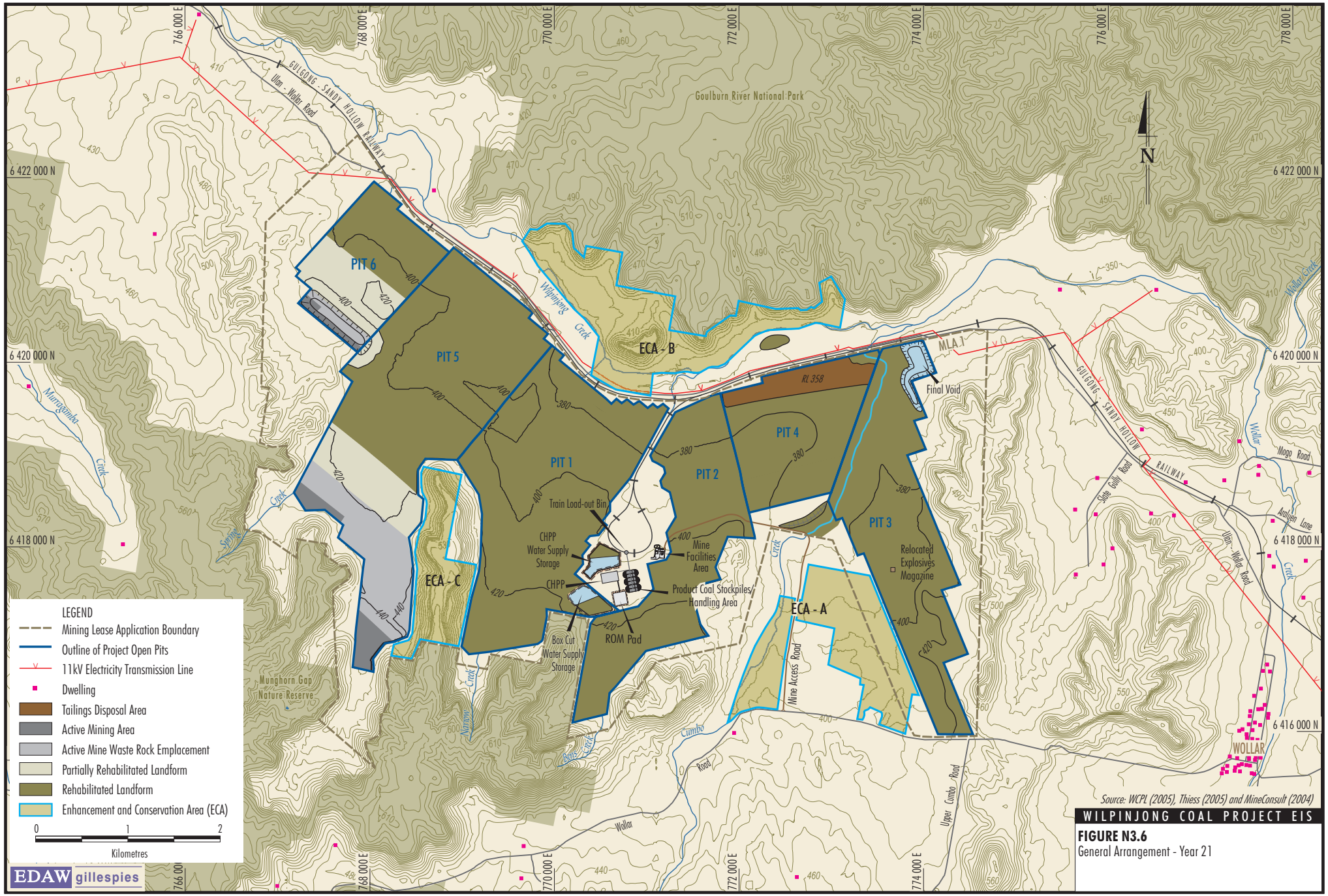
FIGURE N3.5
General Arrangement - Year 14

WIL-04-01 Vis_012J



Source: WCPL (2005), Thiess (2005) and MineConsult (2004)

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FIGURE N3.6
General Arrangement - Year 21

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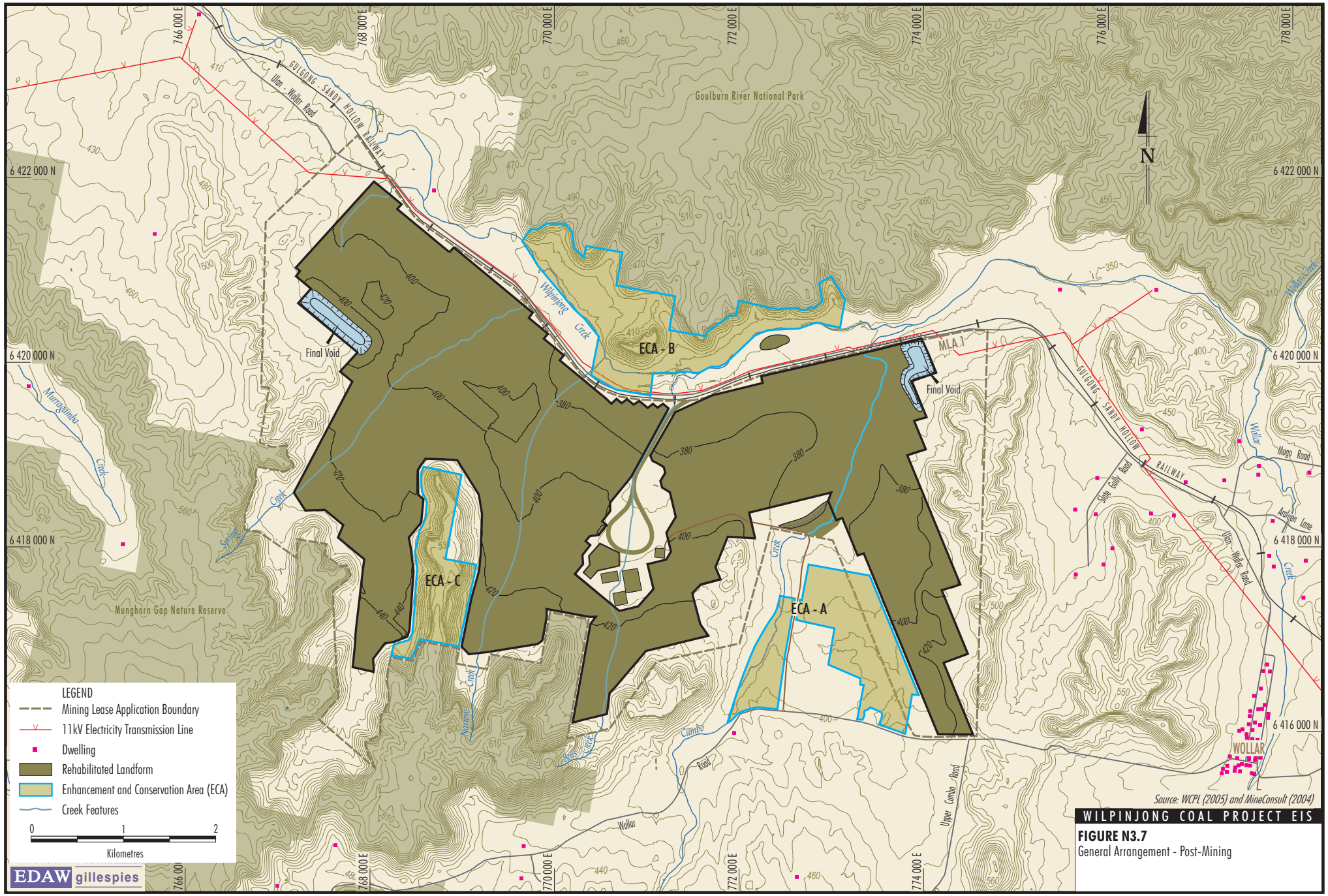

Source: WCPL (2005) and MineConsult (2004)

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FIGURE N3.7
General Arrangement - Post-Mining

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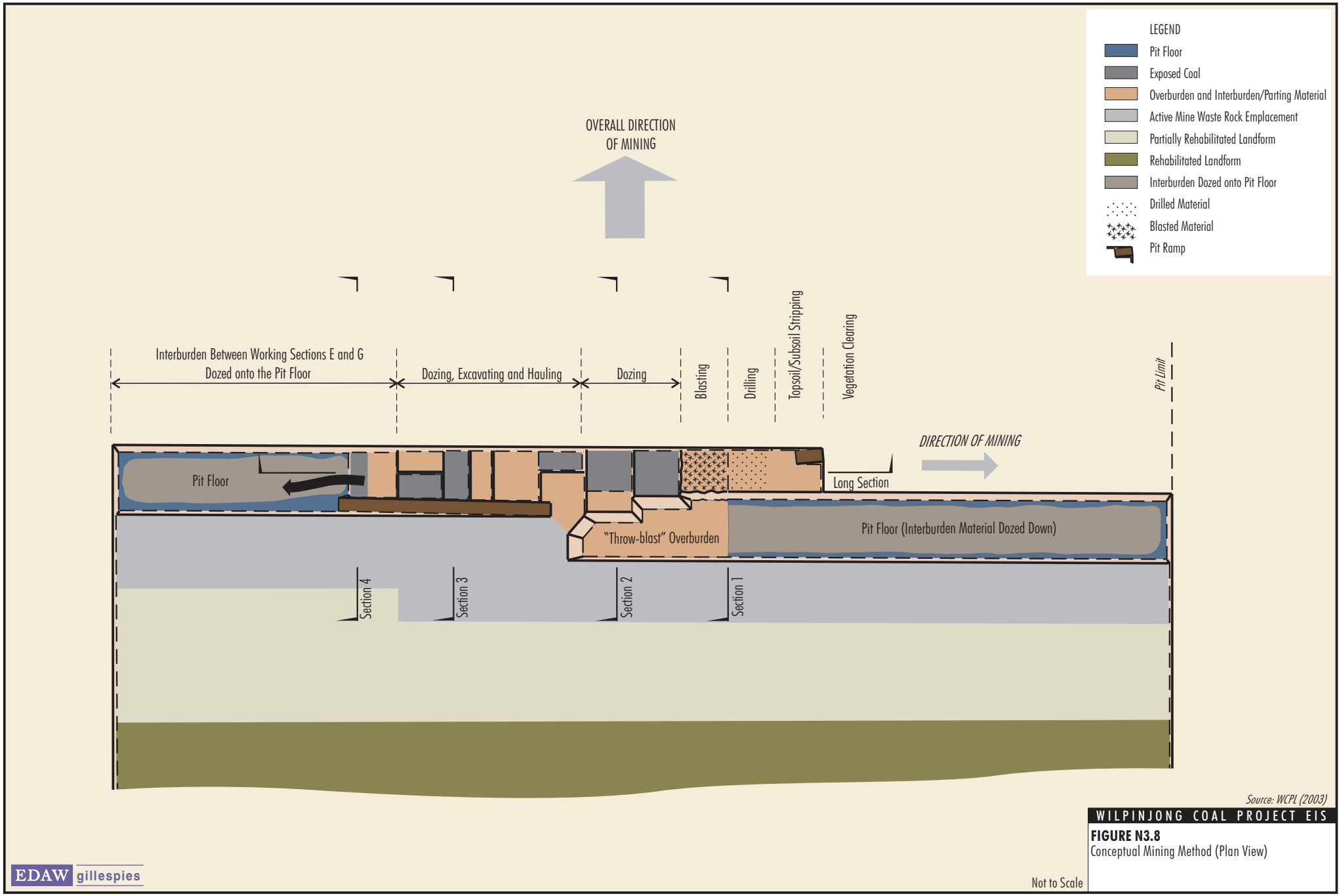

Source: WCPL (2003)

WILPINJONG COAL PROJECT EIS

FIGURE N3.8
Conceptual Mining Method (Plan View)

Not to Scale

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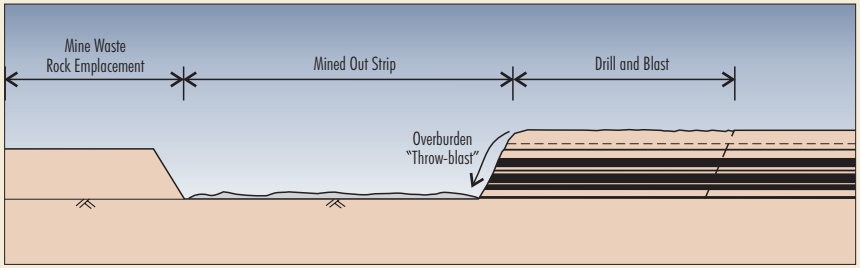
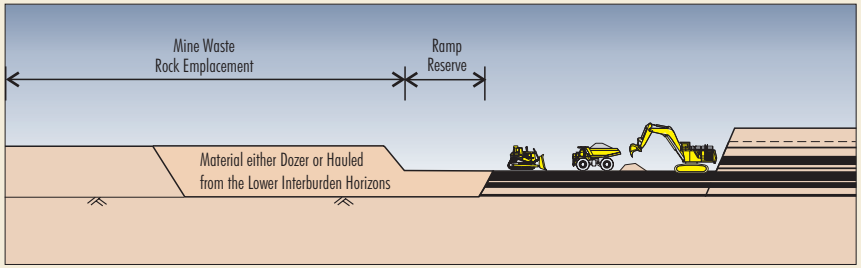
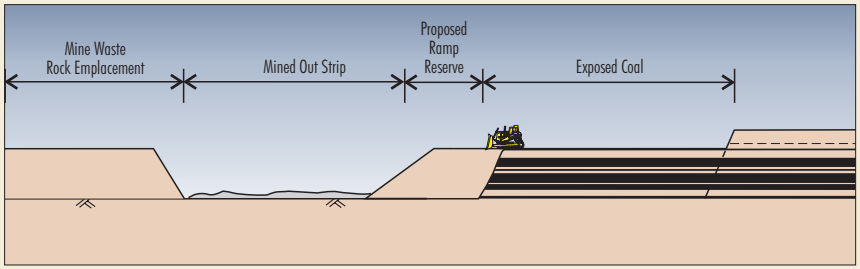
WIL-04-01 Vis_014D



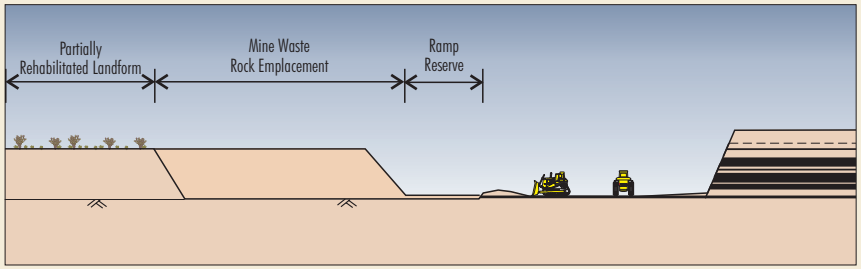
Section 1 - Drilled And Blasted (Including Throw-blast)



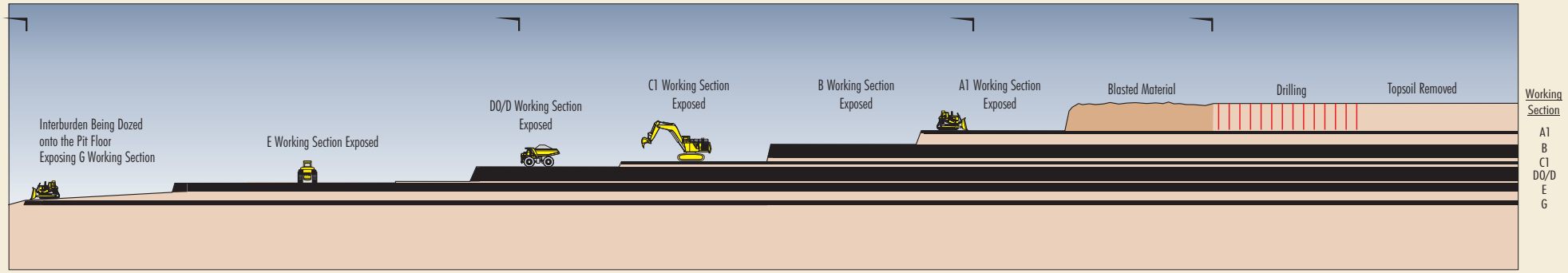
Section 3 - D Working Section Exposed



Section 2 - Dozer Pass



Section 4 - Dozer Exposing G Working Section



Section 4 | Section 3 | Section 2 | Section 1

Long Section

Source: WCPL (2003)

Not to Scale

EDAW gillespies

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FIGURE N3.9
Conceptual Mining Method (Section View)

WIL-04-01 Vis_015E

N3.4 Project Components

A description of the major components of the Project is provided below.

Mine Waste Rock Emplacements and Final Voids

The final levels of the in-pit mine waste rock emplacements are expected to approximate the pre-mining topography. Only temporary out-of-pit mine waste rock emplacements are anticipated.

Re-profiled mine waste rock emplacement areas would be progressively rehabilitated. This would improve the integration of Project landforms with the surrounding environment and mitigate potential visual impacts. Mine waste rock emplacements would, over time, vary in appearance from freshly placed waste rock to rehabilitated landforms, complete with topsoil and vegetation. As such, the level of visual modification created by the mine waste rock emplacements would change, reducing as vegetation establishes.

During the 21 year Project life, some final voids would be created as a result of open cut mining. While these voids would be progressively used for CHPP rejects disposal, some voids would remain at the completion of mining. Final voids would remain at the north-eastern extent of Pit 3 and at the southern extent of Pit 6 (**Figure N3.7**).

Coal Handling and Preparation Plant (CHPP)

A CHPP would be constructed to facilitate the washing of ROM coal to meet domestic and export market coal specifications. The CHPP would be situated south of the Project rail loop (**Figure N3.1**).

The estimated maximum heights for the various infrastructure components for the Project including the CHPP are provided in **Table N3.1**.

Table N3.1 Estimated Infrastructure Heights.

Structure	Height*
CHPP	31.4 m
ROM Dump Hopper	19.6 m
Rejects Bin	38.1 m
Train Load-Out Bin	21.0 m

Sedgman (2004)
*The above height values may vary during the detailed design of the infrastructure components.

Safety Bunds

Mine waste rock material would be placed along selected boundary areas of each open pit to act as a safety bund (i.e. to prevent accidental access). In some areas these bunds would also assist in reducing direct views to open cut workings from publicly accessible locations. Bunds would be constructed up to 5 m above the existing surface level and would remain as permanent landscape features or in some cases be incorporated into the rehabilitation of final landforms. Grasses, shrubs and trees would be planted on the bunds to integrate with the vegetation character of the surrounding landscape setting. As such, the level of visual modification created by the safety bunds would reduce as vegetation establishes.

Other Infrastructure

A 3.8 km long rail spur and rail loop would be constructed between Pits 1 and 2 as shown on **Figure N3.1,** connecting to the Gulgong-Sandy Hollow Railway Line. A rail service road would be constructed to provide maintenance access along both sides of the rail loop.

The mine facilities area would be situated within an area that does not contain recoverable coal to the immediate south of the rail loop. The mine facilities area would contain a workshop, storage building, office buildings, muster area and a range of service facilities.

A mine access road would connect the mine facilities area to Wollar Road (**Figure N3.1**). The mine access road would be constructed along the alignment of Wilpinjong Road and would require relocation of its intersection with Wollar Road.

The existing 11 kV transmission line would be relocated to the north of the Gulgong-Sandy Hollow Railway Line outside of the open pit limits (**Figure N3.1**).

N3.5 Night-Lighting

Construction activities during Year 1 of the Project would generally be conducted during daytime hours up to seven days per week. Mining operations would be conducted up to 24 hours per day seven days a week, therefore night-lighting would be required.

The night-lighting proposed to be employed during mining operations would be emitted from three main sources:

- **Stationary Work Lights** – Including trailer mounted lighting comprising a number of directional, shielded lights mounted on a post above a small generator. These lights are moved to suit changing mine operational requirements. These lights would be widely spaced, illuminating locations where night operations occur and would generally be located within the open pit limits to minimise light spill.
- **Vehicle Mounted Lights** - Including headlights mounted on working haul trucks, excavators and dozers.
- **CHPP, Coal Handling Areas, Train Loading Infrastructure and Mine Facilities Area Lights** - Stationary work lights would be installed for safety and operational purposes in and around these facilities. These lights would be directional/shielded wherever possible to minimise light spill away from these facilities.

Street lights may be installed for security/safety purposes at the intersection of Wollar Road and the mine access road.

The potential impacts of Project night-lighting are discussed in Section N4.4.

N3.6 Visual Character of the Project

The most notable changes in the landscape during the development of the Project would be the removal of vegetation remnants, grassed surface cover, the construction of mine infrastructure and progressive mining operations.

From surrounding viewpoints, the main visible elements would be the in-pit mine waste rock emplacements, active mining areas (from elevated viewpoints in particular) and the outer batters of the safety bunds constructed along selected boundary areas of each open pit. These landforms would be progressively rehabilitated with vegetation cover maturing over time.

The open cut mining operation would modify the visual landscape setting in a number of ways including:

- the size and depth of the open cut voids in comparison to the human dimension, particularly for closer or elevated viewing locations; and
- the colour contrast of the mine waste rock emplacements (which can be a relatively light colour and the open cut coal face a very dark colour in appearance) to the existing green pastures.

The major vertical elements of the development that would be present during the Project (i.e. CHPP, coal handling and train loading infrastructure and mine facilities area) are centrally located within the Project area and are close to a ridgeline that protrudes from the elevated areas of the Munghorn Gap Nature Reserve which provides a back drop to views from the north and screens views from the south.

N3.6.1 Rehabilitation and Final Land Use

Rehabilitation and final landform design and land use plans would be progressively developed throughout the life of the Project and ultimately finalised in consultation with relevant government authorities and stakeholders during the mine closure process.

The following principles would form the basis for Project rehabilitation planning and design:

- Integration of open cut mining and rehabilitation planning to minimise the area of disturbance at any one time.
- Progressive rehabilitation of disturbed areas, including partial rehabilitation of temporarily inactive mine waste rock emplacements.
- Creation of post-mining landforms consistent with the visual amenity of the local landscape and that contribute to local and regional habitat corridors.
- Consideration of issues of public safety in the design of final landforms.
- Consultation with the relevant State authorities and the Project Community Consultative Committee during the final design and planning of rehabilitated landforms.
- Implementation of rehabilitation trials and design studies as necessary to maximise effectiveness of the rehabilitation programme.
- Routine monitoring to track the progression of rehabilitated areas.

This visual impact assessment assumes that the average height of tree species after direct seeding could be expected to be in the order of 1.5 to 2 m after 3 years post sowing. Grass cover, where applied, would also be expected to have a rapid effect in reducing the raw appearance of the mine waste rock emplacements.

N4 ASSESSMENT OF POTENTIAL VISUAL IMPACTS

This assessment has been conducted to identify areas where visual impacts are most likely to occur as a result of the Project and to assist in the mitigation of those impacts from sensitive viewpoints. The assessment process has focussed on the visual impact that may result on views for the most sensitive visual settings/land uses where routinely accessed or readily accessible viewpoints exist.

As stated in the Goulburn River National Park and Munghorn Gap Nature Reserve Plan of Management (NPWS, 2003):

> *"Goulburn River National Park and Munghorn Gap Nature Reserve attract few visitors compared to other protected areas closer to metropolitan centres of Sydney and Newcastle."*

The Plan of Management (NPWS, 2003) lists the public roads, park roads and management trails in the park/reserve. Public roads and park roads together comprise the public access system of the Goulburn River National Park. The management trails are not available for public use (*ibid*.). Several recreational facilities are also available in the Goulburn River National Park and Munghorn Gap Nature Reserve and are described in the Plan of Management (*ibid*.).

A review of walking tracks published in the visitor guides for the Munghorn Gap Nature Reserve (NPWS, 1995) and Goulburn River National Park (NPWS, 2001) identified no public access routes leading to areas of the Goulburn River National Park or Munghorn Gap Nature Reserve that overlook the Project area. Although it is accepted that escarpment areas of the Goulburn River National Park (in particular directly to the north) and the Munghorn Gap Nature Reserve (in the south west) overlook the Project area from a local and sub-regional setting perspective, such areas are neither routinely accessed by the public nor are the escarpment areas readily accessible to the public. Therefore no further assessment of potential views from these locations has been undertaken.

In addition, low sensitivity visual settings, such as broadscale agricultural areas within the pastoral valley areas, have not been considered.

N4.1 Sensitive Visual Settings

The most sensitive visual settings in the vicinity of the Project area are rural residences. Some residences that may be impacted by views of the Project are located within the foreground of the visual catchment and would therefore have a high level of visual sensitivity to the development (**Table N1.2**).

Several residences have been identified and are assessed in the following subsections. The locations of the visual simulation points are shown on **Figure N4.1**. Residences in the vicinity that have views that relate to a small proportion of the overall viewscape from the sensitive visual setting (e.g. dwelling) however may potentially have views of the Project from elevated areas on their properties are considered to have a negligible impact.

Both Ulan-Wollar Road and Wollar Road are located within the foreground of the visual catchment to the north and south of the Project area respectively. As Wollar Road (Main Road 208) is the major road between Wollar and Mudgee it would therefore have a low to moderate level of visual sensitivity to the Project (see **Table N1.2**). Ulan-Wollar Road is a local road that provides direct access between Wollar to Ulan and to some rural residences. As such, the visual sensitivity for local road network users on Ulan-Wollar Road is considered low. The assessed viewing locations from Wollar Road and Ulan-Wollar Road are shown on **Figure N4.1** and are discussed in Section N4.3. Local roads (Bungulla Road and Wilpinjong Road) which would be de-gazetted as part of the Project have not been considered.

Given the current status of the Gulgong-Sandy Hollow Railway Line as a railway carrying freight, particularly coal from the Ulan Coal Mines, the level of visual sensitivity is low. The visual impacts of the Project on the Gulgong-Sandy Hollow Railway Line are also discussed in Section N4.3.

N4.2 Quantitative Assessment - Sensitive Sites

Quantitative assessment measures the amount of development that may be visible. It does not take into account the visual fit of the development with its setting (i.e. visual modification). The methodology as described in **Attachment NA** has been used to define the potential visual prominence for the quantitative assessment for moderate and high sensitivity sites (**Table N4.1**).

The results of the quantitative assessment have been used as a basis for the qualitative assessment (Section N4.3) to assess the visual impacts of the Project.

WIL-04-01 Vis_001E

Table N4.1 Quantitative Assessment – Sensitive Sites

Viewpoint	Viewshed	Horizontal Distance from Viewer *(Refer Attachment NA)*	Horizontal Angle *(Refer Attachment NA)*	*Horizontal Potential Visual Prominence*	Vertical Angle *(Refer Attachment NA)*	*Vertical Potential Visual Prominence*
"**Wilpin Farm**" Residence	Local	400 m	70º	Potentially Dominant	1º	Potentially Noticeable
"**Yawanna**" Residence	Sub-Regional	1,500 m	25º	Potentially Noticeable	<0.5º	Insignificant
"**Castle View**" Residence	Sub-Regional	1,200 m to edge of Pit 2 2,100 m to edge of Pit 3.	60º	Potentially Dominant	<0.5º	Insignificant
"**Binngarra**" Residence	Sub-Regional	4,500 m	25º	Potentially Noticeable	<0.5º	Insignificant
"**Hillview**" Residence	Sub-Regional	4,500 m	25º	Potentially Noticeable	<0.5º	Insignificant
Wollar Road Major Road	Local	2,000 m	60º	Potentially Dominant	1º	Potentially Noticeable

N4.3 Qualitative Assessment

The potential visual impact of the Project is determined by considering the visual sensitivity of the different viewing areas with the level of visual modification apparent from each particular viewing location.

The following assessment represents the views of EDAW based on the methodology discussed previously in **Attachment NA**. The potential visual impact level of the Project is assessed for the development prior to any rehabilitation/amelioration works and then for the period after initial rehabilitation/amelioration is undertaken. The final category considers some maturation of the revegetation/planting works (i.e. 5 years). A summary of the assessment of the sensitive sites analysed in the following subsections is provided in **Table N4.2**.

Table N4.2 – Qualitative Assessment - Summary of the Visual Impact Assessment

Viewing Location		Sensitivity	Visual Modification Level	Impact	Impact After Initial Rehabilitation/ Amelioration	Impact After Final Rehabilitation
Regional setting (Greater than 5km)		**L**	**L**	**L**	**L**	**L**
Sub-Regional Setting (1 – 5km)		**Varies**	**Varies**	**Varies**	**Varies**	**N-L**
Figure N4.2	**"Yawanna"**	**H**	**N**	**N**	**N**	**N**
Figure N4.2	**"Castle View"**	**H**	**N**	**N**	**N**	**N**
Figure N4.3	**"Hillview"**	**M**	**L-M**	**L-M**	**L-M**	**L**
Figure N4.4	**"Binngarra"**	**M**	**L-M**	**L-M**	**L-M**	**L**
	Ulan–Wollar Road *	**L**	**N**	**N**	**N**	**N**
	Wollar Rd *	**L**	**N**	**N**	**N**	**N**
	Gulgong-Sandy Hollow Railway Line *	**L**	**N**	**N**	**N**	**N**
	Village of Wollar	**M**	**Nil**	**Nil**	**Nil**	**Nil**
Local Setting (Up to 1km)		**Varies**	**M**	**Varies**	**L-M**	**L**
Figure N4.5a&b	**"Wilpin Farm"**	**H**	**M**	**H**	**M**	**L**
Figure N4.6/4.7	**Ulan–Wollar Road (R1 & R2)**	**L**	**M**	**L**	**L**	**L**
Figure N4.8	**Wollar Rd (R3)**	**L-M**	**L**	**L**	**L**	**L**
	Gulgong-Sandy Hollow Railway Line	**L**	**M**	**L**	**L**	**L**

* Minimal visibility
H – High, M – Moderate, L – Low, N – Negligible

N4.3.1 Regional Settings – beyond 5 km

The potential visual impact of the Project on the regional setting is considered to be low. There may be elevated viewing locations within this setting that have distant views to the site but at this distance the sensitivity level reduces to low. The level of apparent visual modification from this distance would also be low due to the reduction in clarity of viewing which occurs over distance. The low level of visual sensitivity coupled with the low level of visual modification would result in a low visual impact on the regional setting.

N4.3.2 Sub-Regional Settings – 1 to 5 km

A number of isolated viewing locations are located within the sub-regional setting (**Table N4.2**) and the visual impacts vary according to the visual sensitivity and visual screening provided by intervening vegetation and topography. Areas closer to the site without intervening elements would experience an increase in visual exposure.

Visual simulations were prepared for selected views of the Project area within the sub-regional setting and are shown on **Figures N4.2 to N4.5**. As discussed in Section N4, the assessment has focussed on the visual impact that may result on views for the most sensitive visual settings/land uses where routinely accessed or readily accessible viewpoints exist. No public access routes leading to areas of the Goulburn River National Park or Munghorn Gap Nature Reserve that overlook the Project area were identified within the sub-regional setting however it is accepted that escarpment areas of the Goulburn River National Park (in particular directly to the north) and the Munghorn Gap Nature Reserve (in the south west) overlook the Project area. These escarpment areas are neither routinely accessed by the public nor are the areas readily accessible to the public. As such, no further assessment of potential views from these locations has been undertaken.

The village of Wollar is visually separated from the Project area by substantial vegetated ridgelines. Therefore, there would be no viewscape impacts on the most densely inhabited viewing point within the sub-regional setting.

The potential visual impacts of the Project from selected viewpoints within the sub-regional setting are described below. Where a visual modification would result, the simulations are presented to represent the greatest potential for visual impact during the life of the Project. A post-mining simulation has also been developed to illustrate the conceptual landform following the completion of mining and rehabilitation activities. The post-mining simulation takes into account the Environmental Protection Plan presented in Section 5 of Volume 1 of the EIS (including the proposed Enhancement and Conservation Area (ECA) programme and regeneration areas).

Views from Rural Residence – "Yawanna"

Level of Visual Modification

The "Yawanna" residence is located approximately 1.5 km from the north-eastern limit of the Project area. Due to the general flatness of the valley floor and slightly elevated topography resulting from the intrusion of the toe of a ridgeline to the east of the Project area, views from this residence to the Project area are obscured (**Figures N4.1, N4.2 and N3.1**) and relate to a small proportion of the overall viewscape. As such, the level of visual modification would be negligible.

It is acknowledged that isolated views of the Project may be available from elevated areas of the "Yawanna" property. Most views however would be obscured by intervening vegetation and further reduced as the Project regeneration areas are established. Details of the proposed regeneration areas for the Project are provided in Section 5 of Volume 1 of the EIS.

Viewer Sensitivity

Within the sub-regional setting, visual sensitivity at the rural residence would be high.

Visual Impact

Given that views of the Project area are obscured from the rural residence, there would be a negligible visual impact as a result.

Views from Rural Residence – "Castle View"

Level of Visual Modification

Although the "Castle View" residence is located approximately 1.2 km in a direct line from the edge of the Project area, the presence of a well-vegetated ridgeline as well as foreground vegetation would block views of the open cut mining operation area (**Figure N4.1**).

It is acknowledged that isolated views of the Project may be available from elevated areas of the "Castle View" property. Most views however would be obscured by intervening vegetation and further reduced as the Project ECA programme (in particular ECA-A – refer **Figure N3.1**) and regeneration areas are established. Further details are provided in Section 5 of Volume 1 of the EIS.

EXISTING VIEW - "YAWANNA"

EXISTING VIEW - "CASTLE VIEW"

WILPINJONG COAL PROJECT EIS

FIGURE N4.2
Existing View - "Yawanna" and "Castle View" Residences

EDAW gillespies

WIL-04-01 Visual_019E

Given the effectiveness of existing screening vegetation and intervening topography (**Figures N4.1, N4.2 and N3.1**) and the distance to the most adjacent edge of the open cut mining operation area, the resulting level of visual modification would be negligible.

Viewer Sensitivity

The visual sensitivity of the rural residence within the sub-regional setting would be high.

Visual Impact

Given that views of the Project from the rural residence would be obscured by existing screening vegetation and intervening topography there would be a negligible visual impact as a result.

Views from Rural Residences – "Hillview" and "Binngarra"

Level of Visual Modification

Although the "Hillview" and "Binngarra" residences off Wollar Road are located approximately 1.3 and 1.6 km respectively in a direct line from the edge of the Project area, the presence of a well-vegetated ridgeline of the Munghorn Gap Nature Reserve blocks the views of the Project to the north from these residences.

The valley in which the residences are located extends north-east towards the Project area, however views of the Project area are approximately 4.5 km distant and partially screened by undulations in topography and scattered vegetation. Open cut mining operations in Pit 3 (**Figure N3.4**) would result in the removal of a band of trees (**Figures N4.3 and N4.4**). Further details of the Project ECA programme are provided in Section 5 of Volume 1 of the EIS.

Although distant, a thin band of disturbance would be visible resulting in a low to moderate level of visual modification.

Viewer Sensitivity

Located within the sub-regional setting (based on views available of Pit 3 at approximately 4.5 km distant), visual sensitivity at these rural residences would be moderate.

Visual Impact

The low to moderate visual modification level coupled with moderate level of visual sensitivity would result in a low to moderate visual impact at these residences.

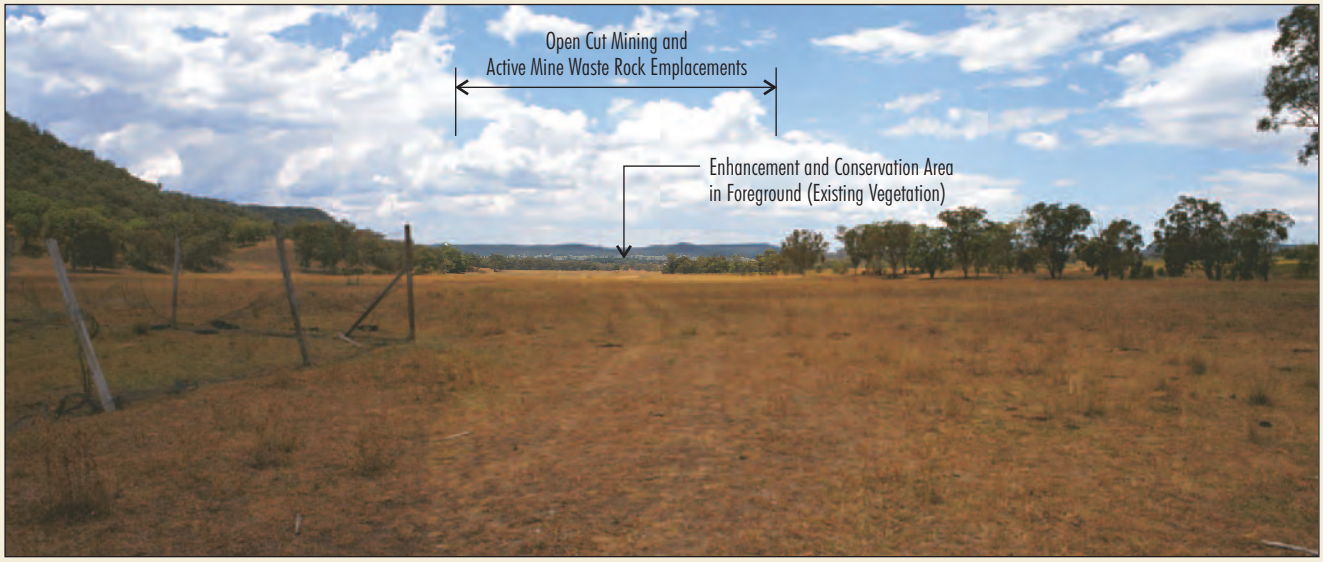
Duration of Impact

As shown on **Figure N3.4**, mining in Pit 3 would commence in Year 9 of the Project and would be completed by Year 14 (**Figure N3.5**). During these years a thin band of disturbance would be visible from the "Hillview" and "Binngarra" residences (**Figures N4.3 and N4.4**). These views would progressively reduce once a vegetative cover begins to establish on the rehabilitated mine waste rock emplacements.

Views from Ulan-Wollar Road and Wollar Road to the East and West of the Project Area

Views of the Project from Ulan-Wollar Road and Wollar Road within the sub-regional setting would generally be obscured from view beyond 1 km of the edge of the Project area and would relate to a small proportion of the overall viewscape due to the relative flatness of the valley floor. As such, there would be a negligible visual impact within the sub-regional setting.

EXISTING VIEW



YEAR 9 SIMULATION

POST-MINING SIMULATION (Landform Completed Year 14)

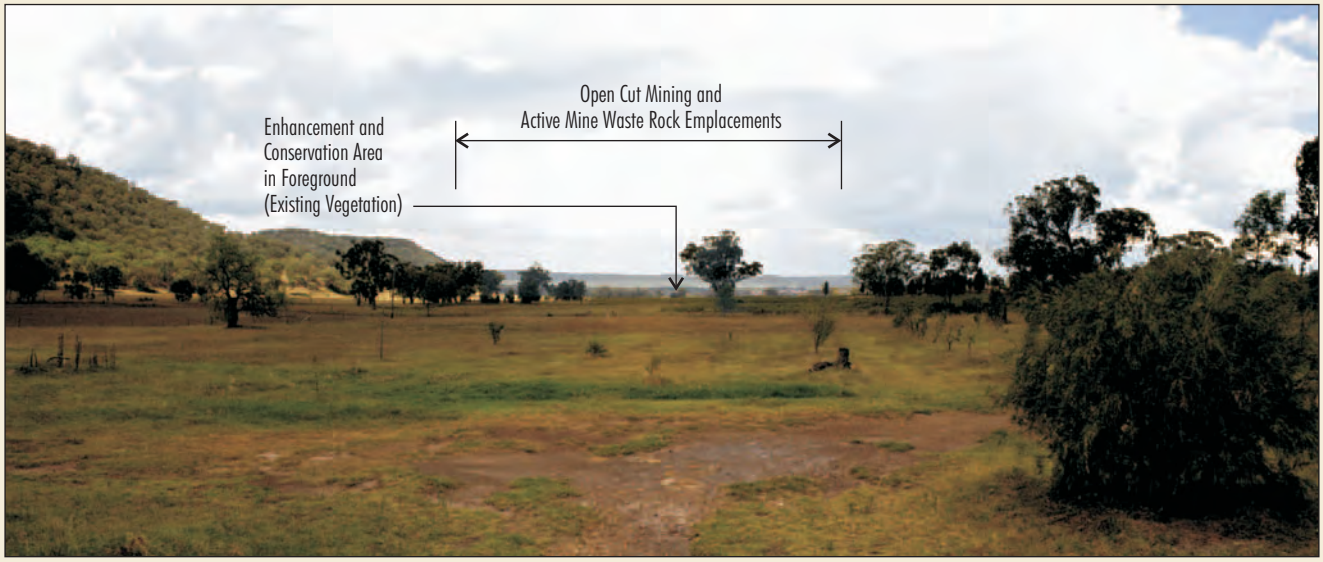
WILPINJONG COAL PROJECT EIS

FIGURE N4.3
Existing View and Visual Simulations -
"Hillview" Residence

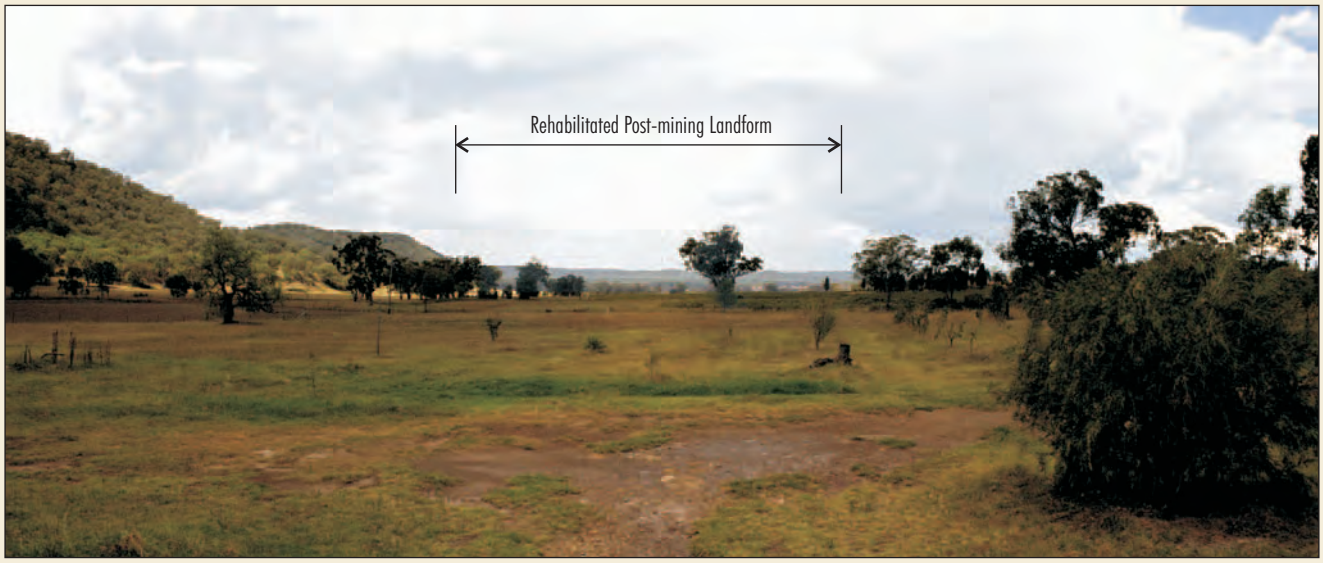
EDAW gillespies

WIL-04-01 Vis_003C

EXISTING VIEW



YEAR 9 SIMULATION



POST-MINING SIMULATION (Landform Completed Year 14)

WILPINJONG COAL PROJECT EIS

FIGURE N4.4
Existing View and Visual Simulations -
"Binngarra" Residence

EDAW gillespies

WIL-04-01 Vis_004E

Views from Gulgong-Sandy Hollow Railway Line

Given the relative flatness of the valley floor and slightly elevated topography resulting from the intrusion of the toes of ridgelines at the eastern and western ends of the valley in which the Project lies, views from the Gulgong-Sandy Hollow Railway Line within the sub-regional setting would generally be obscured and would relate to a small proportion of the overall viewscape. As such, there would be a negligible visual impact within the sub-regional setting.

N4.3.3 Local Settings – within 1 km

As discussed in Section N4, the assessment has focussed on the visual impact that may result on views for the most sensitive visual settings/land uses where routinely accessed or readily accessible viewpoints exist. No public access routes leading to areas of the Goulburn River National Park or Munghorn Gap Nature Reserve that overlook the Project area were identified within the local setting however it is accepted that escarpment areas of the Goulburn River National Park (in particular directly to the north) and the Munghorn Gap Nature Reserve (in the south west) overlook the Project area. These escarpment areas are neither routinely accessed by the public nor are the areas readily accessible to the public. As such, no further assessment of potential views from these locations has been undertaken.

Views from Rural Residence – "Wilpin Farm"

Visual simulations were prepared for views of the Project from the "Wilpin Farm" residence and are shown on **Figures N4.5a and N4.5b**. The simulations are presented for Project landforms during Year 3 and Year 14 to represent progressive stages in the Project life. Year 14 represents the greatest potential for visual impact. A post-mining simulation has also been developed to illustrate the conceptual landform following the completion of mining and rehabilitation activities. The post-mining simulation takes into account the Environmental Protection Plan presented in Section 5 of Volume 1 of the EIS (including rehabilitation and regeneration areas).

Level of Visual Modification

The "Wilpin Farm" residence is located approximately 400 m from the edge of the Project open cut mining operation area. The vertical angle of view from the residence to the Project area is shallow due to the flat topography and the slight elevation of the Gulgong-Sandy Hollow Railway Line (**Figure N4.5a**).

Existing vegetation in the immediate foreground around the residence, and between the residence and the Gulgong-Sandy Hollow Railway Line provide partial screening of views. Some views may be available from elevated areas on the "Wilpin Farm" property (including a shack at the northern end of the property) however most views are partially screened by foreground vegetation.

The safety bunds and distant open cut mining operations would be the most visually prominent components of the Project from the rural residence in the latter years of the Project life (i.e. Year 14 onwards in Pits 5 and 6) (**Figure N4.5b**). The safety bunds would also assist in reducing views directly into the open pits.

Grasses, shrubs and trees would be planted on the bunds to integrate with the vegetation character of the surrounding landscape to reduce the level of visual modification on the visual setting. The mine waste rock emplacements behind the advancing open cut would also be progressively rehabilitated as discussed in Section N3.6.1. As such, the visual modification level would be moderate.

Viewer Sensitivity

Visual sensitivity at the rural residence within the local setting would be high.

EXISTING VIEW

YEAR 3 SIMULATION

WILPINJONG COAL PROJECT EIS

FIGURE N4.5a
Existing View and Visual Simulations -
"Wilpin Farm" Residence

EDAW gillespies

WIL-04-01 Vis_005D

YEAR 14 SIMULATION (Without Proposed Foreground Vegetation Screen Shown)

POST-MINING SIMULATION (Landform Completed Year 18)
(Without Proposed Foreground Vegetation Screen Shown)

EDAW gillespies

WILPINJONG COAL PROJECT EIS

FIGURE N4.5b
Existing View and Visual Simulations -
"Wilpin Farm" Residence

WIL-04-01 Vis_006C

Visual Impact

The moderate level of visual modification coupled with a high degree of visual sensitivity at the rural residence, would initially result in a high level of visual impact at the "Wilpin Farm" residence, without amelioration.

Amelioration

It is recommended that foreground vegetation screening be established early during the Project life to obscure potential views during the latter years (i.e. Year 14 onwards) when there is the greatest potential for visual impact at the "Wilpin Farm" residence. It is also recommended that vegetation screens be established on the top of the safety bunds once constructed. Implementation of these amelioration measures would reduce the level of visual impact at the "Wilpin Farm" residence from high to moderate.

Duration of Impact

During the earlier years of the Project, views of the temporary mine waste rock emplacement along the western limit of Pit 1 and distant views of the CHPP would be partially obscured by intervening topography and vegetation (**Figure N4.5a**). The outer face of the temporary mine waste rock emplacement would be planted with grasses, shrubs and trees taking away the raw waste rock appearance as the vegetation establishes and progressively reducing the visual impact. The temporary mine waste rock emplacement would be resumed as mining within Pit 5 is undertaken (i.e. Year 14 onwards).

The greatest potential for visual impact at the "Wilpin Farm" residence would be during the latter years of the Project life (i.e. from Year 14 onwards). The most visually prominent component of the Project from the "Wilpin Farm" residence would be the safety bunds placed along selected boundary areas of the open pits (i.e. Pits 5 and 6) (**Figure N4.5b**). The safety bunds would remain as a permanent landscape feature. The safety bunds would be planted with grasses, shrubs and trees therefore reducing the level of visual impact as the vegetation establishes. This would result in a low level of visual impact from the rural residence in the long term.

Views from Ulan-Wollar Road to the East and West of the Project Area

Visual simulations were prepared for views of the Project from the east (R1) and west (R2) along Ulan-Wollar Road within the local setting and are shown on **Figures N4.6 and N4.7**. The simulations are presented to represent progressive stages in the Project life and the greatest potential for visual impact. A post-mining simulation has also been developed to illustrate the conceptual landform following the completion of mining and rehabilitation activities. The post-mining simulation takes into account the Environmental Protection Plan presented in Section 5 of Volume 1 of the EIS (including the rehabilitation and regeneration areas).

Level of Visual Modification

The safety bunds constructed along selected boundary areas of each open pit would be the most visually prominent component of the Project from Ulan-Wollar Road that would be available within 1 km of the Project area. The bunds would be constructed between the road and the open cut mining operation to prevent accidental access and would also assist in reducing views directly into the open pit. Distant views of the open cut mining operations would also be available from some elevated areas. The safety bunds would be planted with grasses, shrubs and trees therefore reducing the level of visual impact as the vegetation establishes. The mine waste rock emplacements behind the advancing open cut would also be progressively rehabilitated as discussed in Section N3.6.1. As such, the visual modification level would be moderate.

Viewer Sensitivity

Within the local setting, visual sensitivity for local road network users on Ulan-Wollar Road would be low.

Visual Impact

Given the low sensitivity for local road network users coupled with the moderate level of visual modification (with the safety bunds as the most visually prominent component of the Project), a low level of visual impact would result.

EXISTING VIEW

YEAR 17 SIMULATION

POST-MINING SIMULATION (Landform Completed Year 21)

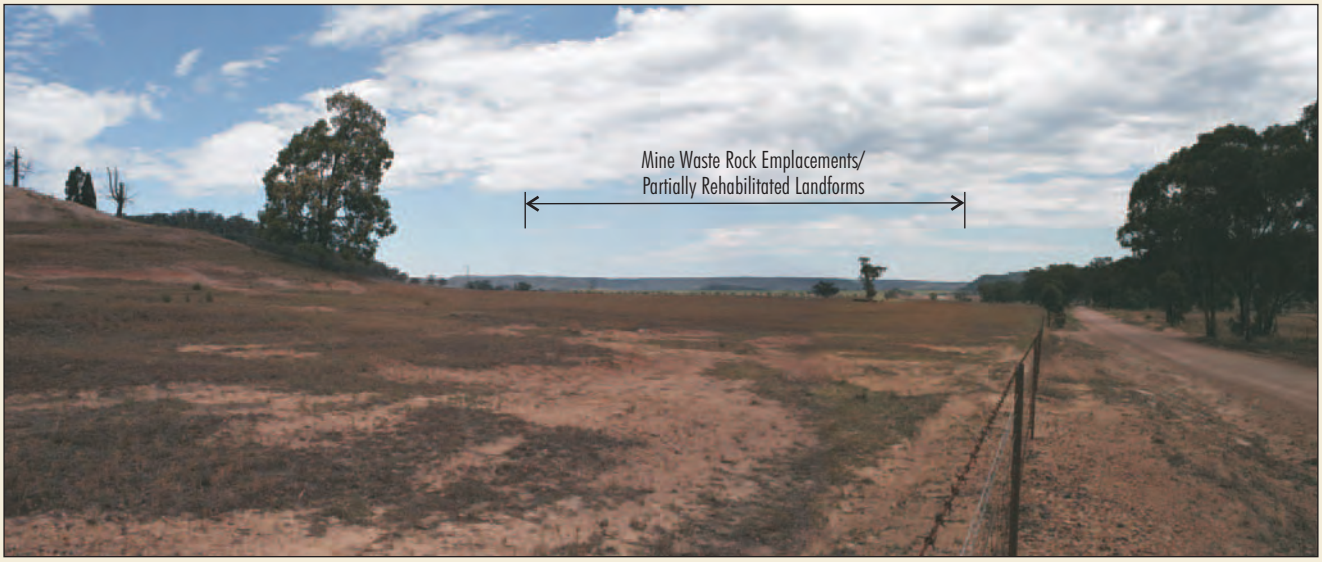
WILPINJONG COAL PROJECT EIS

FIGURE N4.6
Existing View and Visual Simulations -
Ulan-Wollar Road (West)

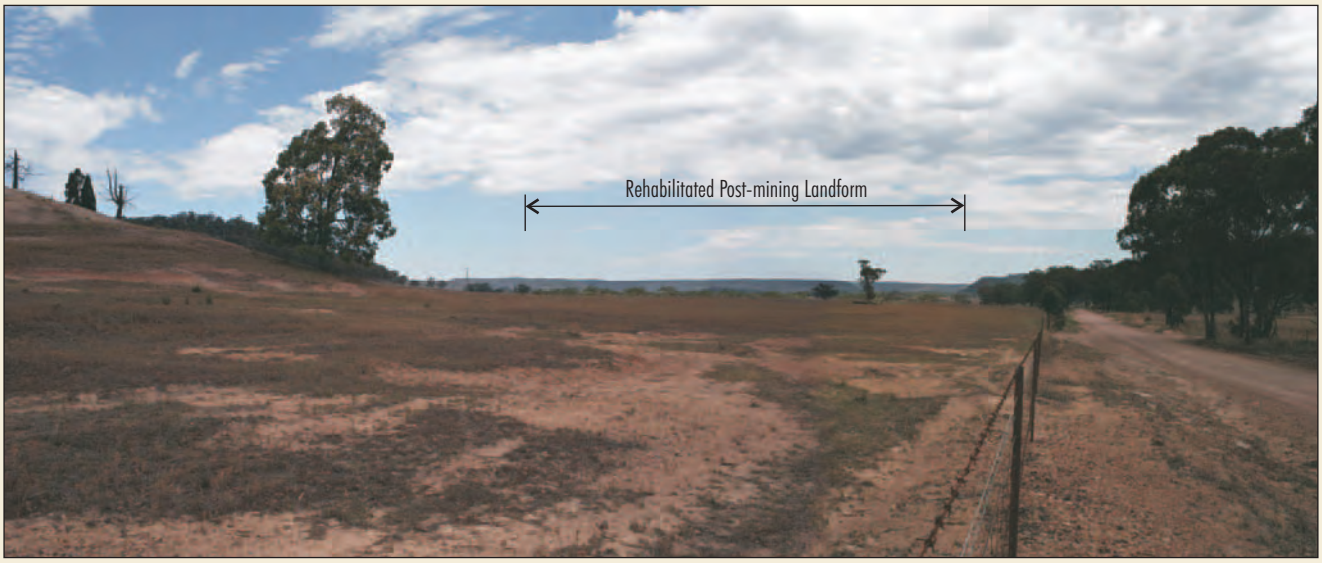
EDAW gillespies

WIL-04-01 Vis_008B

EXISTING VIEW



YEAR 14 SIMULATION



POST-MINING SIMULATION (Landform Completed Year 14)

WILPINJONG COAL PROJECT EIS

FIGURE N4.7
Existing View and Visual Simulations -
Ulan-Wollar Road (East)

EDAW gillespies

WIL-04-01 Vis_021B

Duration of Impact

The safety bunds would remain as a permanent landscape feature. As discussed above, the outer face of the safety bunds would be planted with grasses, shrubs and trees taking away the raw waste rock appearance in the long term as the vegetation establishes.

Views from Wollar Road

A visual simulation was prepared from Wollar Road (R3) within the local setting and is shown on **Figure N4.8**. The simulation is presented for Year 9 of the Project to represent the stage of the Project life with the greatest potential for visual impact from the viewpoint. A post-mining simulation has also been developed to illustrate the conceptual landform following the completion of mining and rehabilitation activities. The post-mining simulation takes into account the Environmental Protection Plan presented in Section 5 of Volume 1 of the EIS (including the Project ECA programme and regeneration areas).

Level of Visual Modification

Views of the Project from Wollar Road that would be available within the local setting would be limited to those above saddles in the intervening topography and vegetation between the road and the Project area (**Figure N4.8**). The existing vegetation along the south-eastern boundary of Pit 3 nearest Wollar Road would be retained as a screen obscuring views of the Project area. As such, the visual modification would be low.

Viewer Sensitivity

Within the local setting, the visual sensitivity of the major road users and local road network users on Wollar Road would be low to moderate.

Visual Impact

The low level of visual modification coupled with the low to moderate level of visual sensitivity would result in a low visual impact on users of Wollar Road within the local setting.

Duration of Impact

The duration of impact would be limited to those periods when mining operations in Pit 2 (refer **Figure N3.4**) are visible above the saddles in the existing topography and whilst progressive rehabilitation of the mine waste rock emplacements is undertaken. The level of visual impact would reduce as the revegetation establishes taking away the raw waste rock appearance in the long term.

Views from Gulgong-Sandy Hollow Railway Line

Level of Visual Modification

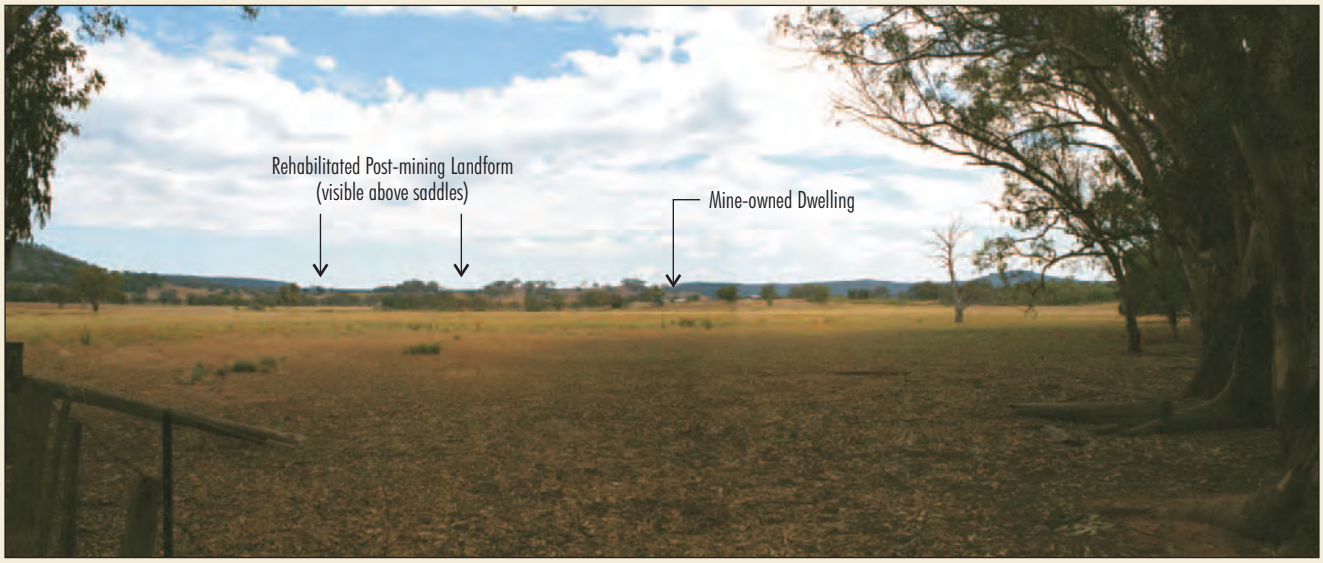
The safety bunds placed along selected boundary areas of each open pit would be the most visually prominent component of the Project from the Gulgong-Sandy Hollow Railway Line within the local setting and would assist in reducing direct views into the open pit. Distant views of the open cut mining operations would be available from some elevated positions. The safety bunds would be planted with grasses, shrubs and trees therefore reducing the level of visual impact as the vegetation establishes. The mine waste rock emplacements behind the advancing open cut would also be progressively rehabilitated as discussed in Section N3.6.1. As such, the visual modification level would be moderate.

Viewer Sensitivity

Given its status as a railway carrying freight, particularly coal from the Ulan Coal Mines, the visual sensitivity of the Gulgong-Sandy Hollow Railway Line within the local setting is low.

EXISTING VIEW

YEAR 9 SIMULATION



POST-MINING SIMULATION

WILPINJONG COAL PROJECT EIS

FIGURE N4.8
Existing View and Visual Simulations -
Wollar Road

EDAW gillespies

WIL-04-01 Vis_007D

Visual Impact

Given the low sensitivity of the Gulgong-Sandy Hollow Railway Line and moderate level of visual modification with the safety bunds as the most visually prominent component of the Project within the local setting, a low level of visual impact would result.

Duration of Impact

As discussed above, the safety bunds would be the most visually prominent component of the Project and would remain as a permanent landscape feature. The outer face of the safety bunds would be planted with grasses, shrubs and trees taking away the raw waste rock appearance in the long term as the vegetation establishes.

N4.4 Potential Impacts of Night-Lighting

Night-lighting at the Ulan Coal Mines has modified the levels of lighting in the regional setting. The local and sub-regional settings are generally isolated from the effects of night-lighting sources apart from those associated with farm residences, shed and work area lighting and occasional car lights on the local road network.

As described in Section N3.5, night-lighting to be employed for the Project would be emitted from three main sources, *viz.*:

- stationary work lights;
- vehicle mounted lights; and
- overhead lighting of the CHPP, coal handling area, train loading infrastructure and mine facilities area.

Night-lighting would be restricted to the minimum required for operational and safety requirements and would be directed away from incoming views. All lighting above natural topographic screens would be directed downwards and light shields would be used to limit the effect of lighting where required.

Direct views of the above night-lighting sources along Ulan-Wollar Road in the north would be screened by the safety bunds placed along boundary areas of each open pit however some views of the lights may be available from some exposed positions. Direct views from Wollar Road in the south would be screened by the ridgeline associated with the Munghorn Gap Nature Reserve to the south of the Project area and intervening vegetation. Direct views of vehicle mounted lighting and stationary work lights may however be available from some exposed positions.

Project night-lighting would therefore be largely restricted to the production of a light glow above the operational areas contrasting with the night sky and would decrease with distance as the light disperses. The light glow would be visible at nearby residences and along the local road network within the local to sub-regional setting. Some further light spill may occur particularly on nights when there is a low cloud base and reflection off the cloud base occurs.

N4.5 Potential Cumulative Impacts

As discussed in Section N2.2, the Ulan Coal Mines located north-west of the Project (**Figure N1.1**) are a significant element within the existing regional setting. The primary visual impacts in the local setting of the Ulan Coal Mines are associated with the existing surface infrastructure (i.e. CHPP, rail, rail loading and administrative facilities). Ulan Stage 2 surface infrastructure (which have not been developed) would be located to the immediate east of the Ulan Coal Mines and would comprise a new CHPP, rail loop and train loading facility (Kinhill Stearns, 1983). The potential visual impact of the surface infrastructure of Ulan Stage 2 would be similar to the existing Ulan Coal Mines development.

As the Ulan Coal Mines (including Ulan Stage 2) is located approximately 11 km north-west of the Project, these activities would not contribute to potential visual impacts within the local or sub-regional setting of the Project area.

As discussed above in Section N4.4, night-lighting at the Ulan Coal Mines has modified the levels of lighting in the regional setting. Potential cumulative night-lighting impacts would result in a light glow above the operational areas of the Project and Ulan Coal Mines (including Ulan Stage 2) within their respective visual settings.

N5 VISUAL/LANDSCAPE MANAGEMENT STRATEGIES AND RECOMMENDATIONS

N5.1 Landscape Design and Rehabilitation Strategies

The mining method as described in Section N3.3 involves progressive backfilling of the mined-out voids behind the advancing open cut (**Figure N3.8**). The rehabilitation programme would be progressive, commencing soon after the completion of re-profiling of the backfilled landform. After completion of final landform shaping and amelioration works, the raw appearance of the backfilled landforms and the exposed soils would decline as grass cover establishes.

The most effective ameliorative measure would involve forward planting and vegetation establishment to provide screening of views from areas of high visual sensitivity. The Project Environmental Protection Plan would involve the enhancement and conservation of existing vegetation in three ECAs. Details of the ECA programme and regeneration areas are provided in Section 5 of Volume 1 of the EIS.

The following visual/landscape management strategies have been recommended for incorporation into the rehabilitation plans to assist in reducing the level of visual impact of the Project.

N5.1.1 Final Landform Shaping

As mine waste rock is backfilled into mined-out voids behind the advancing open cut, it would be progressively shaped to a final landform profile prior to the commencement of revegetation works. Final landform shaping should reinforce and mimic where possible the existing topographic form. Regular slopes and sharp transition angles should be varied and rounded to provide a more natural appearance.

Potential visual impacts would reduce from the time that the final landform shaping is completed.

N5.1.2 Progressive Rehabilitation and Revegetation

The visual impacts would progressively reduce once a vegetative cover begins to establish. Areas rehabilitated with pastoral grasses would provide quick amelioration, while trees established within the pastoral landscape and revegetation areas would not be expected to provide effective amelioration until they reach an advanced immature stature (i.e. within 5-7 years).

The approach to rehabilitation should reflect the predominant pastoral landscape character of the valley and enhance environmental values wherever possible. Denser planting of lower, middle and upper storeys should occur where linkages can be provided to existing/recreated waterways and areas of remnant vegetation. Any revegetation should utilise native species characteristic of the area to ensure consistency of colour and texture.

N5.1.3 Foreground Visual Screening/Vegetation Screens

At the “Wilpin Farm” residence, it is recommended that foreground vegetation screening be established early during the Project life to obscure potential views of the Project during the latter years (refer Section N4.3.3). It is also recommended that vegetation screens be established on the top of the safety bunds once constructed to assist in reducing direct views into the open pit.

N6 REFERENCES

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ATTACHMENT NA

Visibility Rationale

Visibility – Relationship with Viewsheds

The report defines a number of viewsheds based on distance from the development for the purposes of assessment. The methodology is based on the reduction of impact with an increase in distance between a given viewpoint and the development. These viewsheds or settings are:

- **Local Setting** – up to 1km from the development
- **Sub-Regional Setting** – between 1km and 5km from the development
- **Regional Setting** – beyond 5km of the development

These distances have been established based on previous studies undertaken by EDAW. They are based on the reduction of visibility of objects in the distance as the field of view reduces.

Horizontal Line of Sight

It is generally accepted that the central field of vision for the human eye covers a horizontal angle of approximately 50 degrees to 60 degrees. Given both eyes see simultaneously and that there is a degree of overlap, a central field of view results in a person looking straight ahead ***(Refer to Figure NA-1).***

In the production of visual simulations, a 50mm lens on a 35mm film format is most widely used as it captures a field of view of approximately 46 degrees, similar to that of the view from one eye. Two photos taken with a 50mm lens produced as a panorama, with a degree of central overlap, capture the central field of view in a similar way to that of the human binocular view (binocular field).

Within the central field of vision, the viewed image is sharp, colours are separately defined and depth perception occurs.

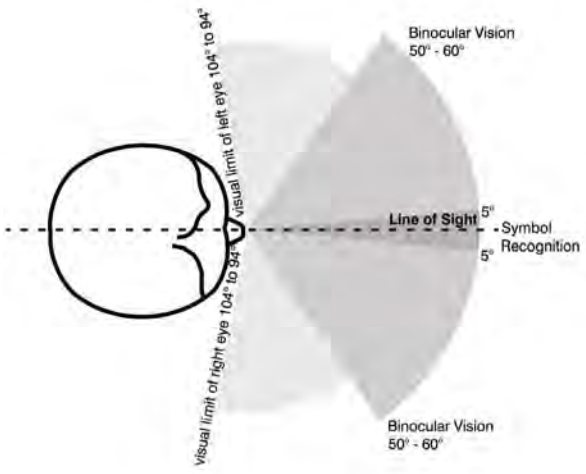

Figure NA-1 – Horizontal Line Of Sight

Visual Impact/Visual Prominence

The potential visual impact of a development will, to a large extent, depend on how much of the central field of vision that it occupies. In relation to the assessment of mining sites that often extend across the landscape, the calculation of horizontal view angle is not the only factor to be considered.

Degrees of Field of View Occupied	Potential Visual Prominence – Horizontal Field of View
Less than 5°	***Insignificant*** The development will not be highly visible in the view, unless it contrasts strongly with the background.
5° – 30°	***Potentially Noticeable*** The development may be noticeable. The degree that it intrudes on the view will be dependant on how well it integrates with the landscape setting.
Greater than 30°	***Potentially Dominant*** The development may be highly noticeable.

Vertical Line of Sight

As for the horizontal line of sight, there is also a vertical central field of view. If we assume that the horizon is 0° then the eye clearly defines colour, field of view and has image sharpness for an angle of approximately 25° upwards and 30° downwards. However, in reality, the typical line of sight for a standing person at ground level is approximately 10° below the horizon line ***(Refer to Figure NA-2).***

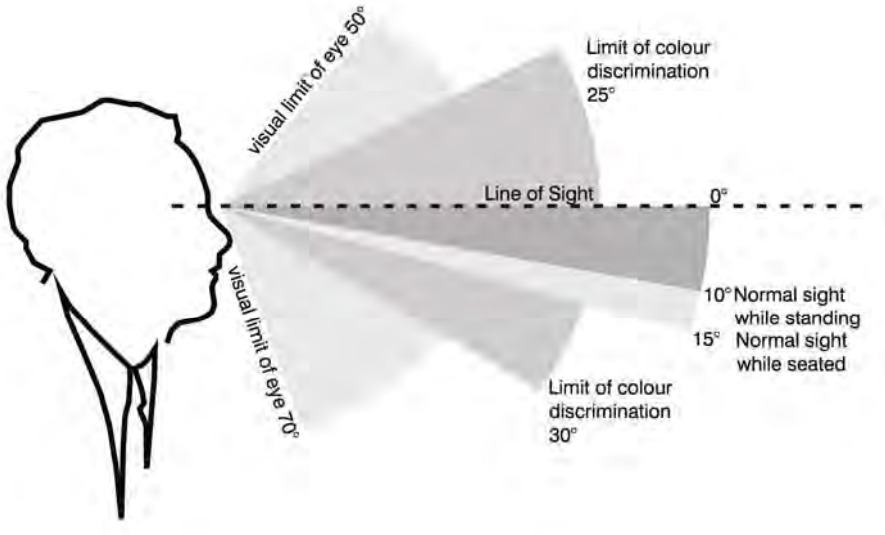

Figure NA-2 – Vertical Line Of Sight

Visual Impact/Visual Prominence

Objects that occupy a small proportion of the vertical field of view are visible but not dominant, particularly when they occur within landscapes that have been modified by human activity.

Degrees of Field of View Occupied	Potential Visual Prominence – Vertical Field of View
Less than 0.5°	***Insignificant*** A small thin line in the landscape.
0.5° – 2.5°	***Potentially Noticeable*** The development may be noticeable. The degree that it intrudes on the view will be dependant on how well it integrates with the landscape setting.
Greater than 2.5°	***Potentially Dominant*** The development may be highly noticeable, although the degree of visual intrusion will depend on the landscape setting and the width/thickness of the object.

Visual Prominence in Relation to Distance and Viewshed Settings

The following distances relating to visual prominence are based on the previous field of view exercises. The distances also relate to the distances for the setting types in the visual assessment methodology.

Distance from Object	Potential Visual Prominence
5000 metres	***Insignificant*** Visually insignificant.
1000 – 5000 metres	***Potentially Noticeable*** The development may be noticeable. The degree that it intrudes on the view will increase as distance reduces.
Less than 1000 metres	***Potentially Dominant*** The development may be highly noticeable.