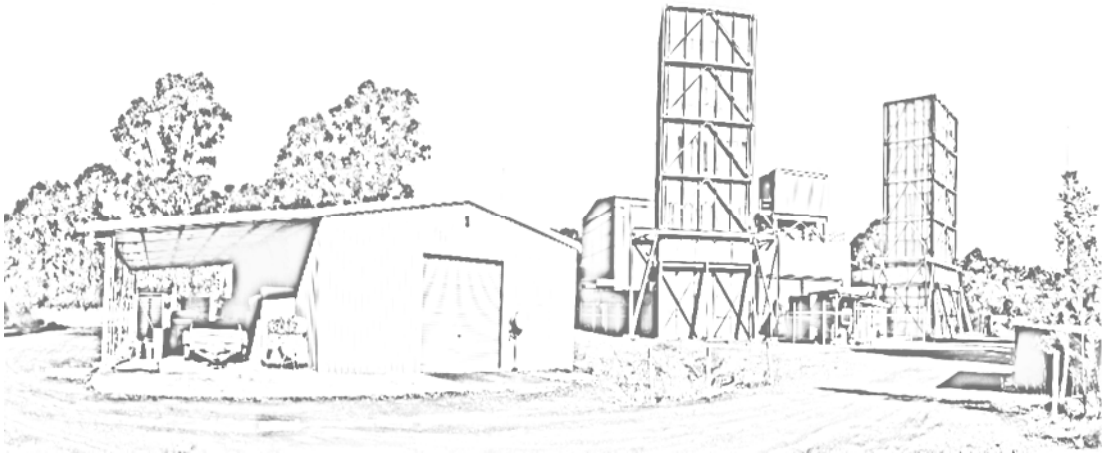
APPENDIX S

Appendix S - Visual Impact Assessment

This page has been left blank intentionally.

GREEN BEAN DESIGN landscape architects

Tahmoor South Project



Visual Impact Assessment

Prepared for:

TAHMOOR COAL Pty Ltd

Prepared by:

GREEN BEAN DESIGN
landscape architects

GREEN BEAN DESIGN PTY LTD
PO Box 3178 Austral NSW 2179

DOUCMENT CONTROL

Item	Detail
Project Name:	**Tahmoor South Project**
Report Title:	**Visual Impact Assessment**
Project Number:	**12-168**
Version Number:	**v9**
Status:	**Final**
Author:	**Andrew Homewood**, Registered Landscape Architect, AILA, EIANZ *Graduate Diploma Landscape Management, Bachelor Science (Dual Honours) Landscape Design and Archaeology, National Diploma Horticulture*
Date	**15 November 2018**

Contents Page

Executive summary			6
Section 1	**Introduction**		
	1.1	Introduction	7
	1.2	Overview	7
	1.3	Proposed development	7
	1.4	Study requirements	8
Section 2	**VIA objectives and methodology**		
	2.1	VIA objectives	9
	2.2	Methodology	9
	2.3	Desktop study	9
	2.4	Fieldwork and photography	9
	2.5	Assessment of visual significance	10
	2.6	Mitigation measures	10
Section 3	**Project location**		
	3.1	Project regional location	11
Section 4	**Project Area**		
	4.1	Project Area and local context	12
	4.2	Panorama photos	18
Section 5	**Project description**		
	5.1	Overview	26
	5.2.1	Mine ventilation	26
	5.2.2	Gas drainage operations	27
	5.2.3	Pre-gas drainage	27
	5.2.3	Post gas drainage	28
	5.2.4	Gas ventilation system	28
	5.2.5	Mine access	28
	5.2.6	Coal logistics	28
	5.3	Surface facilities area	29
	5.3.1	Coal handling and preparation plant	29
	5.3.2	Rejects management	29
	5.3.3	Plant and equipment	30
Section 6	**Landscape effects**		
	6.1	Introduction	32
	6.2	Existing land use	32
	6.3	Landscape pattern and scale	32

	6.4	Visual enclosure and openness of views	32
	6.5	Visual Absorption Capability	32
	6.6	Nattai National Park	33
Section 7	**Visual effects**		
	7.1	Introduction	34
	7.2	Visual effect and significance	36
	7.2.1	Underground mining operations	36
	7.2.2	TSC1 up-cast ventilation shaft	36
	7.2.3	TSC2 down cast ventilation shaft	36
	7.2.4	Mine access	37
	7.2.5	Coal logistics	37
	7.2.6	Surface facilities area	37
	7.2.7	Electrical infrastructure works	37
	7.3	Reject Emplacement Areas	38
	7.4	Cross sections	38
	7.5	Construction activities	38
	7.6	Night time lighting	39
	7.7	Summary of visual significance	39
Section 8	**Cumulative Impact Assessment**		
	8.1	Cumulative Impact Assessment	43
Section 9	**Mitigation Measures**		
	9.1	Mitigation measures	44
	9.2	Structures	44
	9.3	Lighting	44
	9.4	Landscape mitigation	44
Section 10	**Conclusion**		
	10.1	Summary	46
	Limitations		47

Figures

Figure 1	Tahmoor South Project – Regional Location
Figure 2	Tahmoor South Project - Project Area
Figure 3	Tahmoor South Project – Local Context
Figure 4	Existing ventilation shafts T1 and T2 – locality plan
Figure 5	Existing up-cast ventilation shaft T2 Rockford Road
Figure 6	Panorama photo locations
Figure 7	Photo sheet 1
Figure 8	Photo sheet 2
Figure 9	Photo sheet 3
Figure 10	Photo sheet 4
Figure 11	Photo sheet 5
Figure 12	Photo sheet 6
Figure 13	Proposed TSC1 and TSC2 ventilation shafts – locality plan
Figure 14	Reject Emplacement Areas
Figure 15	Cross Section A
Figure 16	Cross Section B

Executive summary

Green Bean Design Pty Ltd (GBD) has been commissioned by Tahmoor Coal Pty Ltd (Tahmoor Coal) to prepare a visual impact assessment for the Tahmoor South Project (the Project). This VIA involved an evaluation of the visual character of the landscape in which the proposed development will be located and an assessment of the potential visual impact that could result from the construction and operation of various components associated with the proposed development.

The magnitude of potential landscape effect associated with the proposed development has been determined as negligible to low. This magnitude of landscape effect is largely due to the location and extent of existing mining operations within, and beyond, the proposed development area, as well as existing landscape characteristics within and surrounding the proposed development. The landscape characteristics are generally robust and have the ability to absorb any change without any significant alteration to the existing landscape character.

The reject emplacement area will be largely visually contained by established and dense tree cover and the final landform will tend to be visually consistent and contiguous with landforms surrounding the reject emplacement area. The final landform is unlikely to result in a disruption to existing distant skyline views where visible from elevated and accessible view locations.

The Project will have a negligible impact on views from vehicles travelling along Remembrance Drive as well as dwellings and community facilities (including the Wollondilly Anglican College), where existing and established tree cover beyond the road corridor will screen views toward proposed infrastructure within the Tahmoor Coal mine surface facilities area.

The Project will also have an overall negligible visual significance on private residential dwellings and publicly accessible areas beyond the proposed development. The negligible visual significance results from the screening influence of gently undulating and low ridgeline landforms, together with moderate to dense tree cover that occurs across large portions of the landscape within and surrounding the Project Area.

The Project will have an overall negligible visual impact on distant views from landscape areas beyond the Tahmoor Mine, including the scenic escarpment of the Nattai National Park.

The proposed development area is considered to have limited potential to increase the significance of cumulative visual impact due to the extent of existing visual screening within the Project Area and the location of proposed constructed elements relative to existing infrastructure within the Tahmoor Mine surface facility.

Introduction

Section 1

1.1 Introduction

GBD has been commissioned by Tahmoor Coal Pty Limited (Tahmoor Coal) to complete a visual impact assessment (VIA) for the Project. Tahmoor Coal is wholly owned by SIMEC Mining (a part of the GFG Alliance). The purpose of this report is to complete the visual assessment component of the Environmental Impact Statement (EIS) for the Project under Part 4 the Environmental Planning and Assessment Act 1979 (EP&A Act).

1.2 Overview

Tahmoor Coal owns and operates the Tahmoor Mine, an underground coal mine approximately 80 km south-west of Sydney, in the Southern Coalfields of NSW. Tahmoor Coal produces up to two million tonnes per annum of product coal from its existing operations at the Tahmoor Mine, and undertakes underground mining under existing development consents, licences and the conditions of relevant mining leases.

Tahmoor Coal is seeking approval for the Project, being the extension of underground coal mining at Tahmoor Mine, to the south of the existing Tahmoor Mine surface facilities area. The proposed development will continue to be accessed via the existing surface facilities at Tahmoor Mine, located between the towns of Tahmoor and Bargo.

The proposed development seeks to extend the life of underground mining at Tahmoor Mine until approximately 2035. The proposal will enable mining to be undertaken within the southern portion of Tahmoor Coal's existing lease areas and for operations and employment of the current workforce to continue for a further 13 years.

The proposed development will extend mining at Tahmoor Mine within the Project Area, using longwall methods, with the continued use of ancillary infrastructure at the existing Tahmoor Mine surface facilities area. The Project Area is adjacent and to the south of the Existing Tahmoor Approved Mining Area. It also overlaps a small area of the Existing Tahmoor Approved Mining Area comprising the surface facilities area, historical workings and other existing mine infrastructure.

1.3 Proposed development

The proposed development will use longwall mining to extract coal from the Bulli seam within the bounds of CCL 716 and CCL 747. Coal extraction of up to 4Mtpa ROM is proposed as part of the development. Once the coal has been extracted and brought to the surface, it will be processed at Tahmoor Mine's existing Coal Handling and Preparation Plant (CHPP) and then transported via the existing rail loop, the Main Southern Railway and the Moss Vale to Unanderra Railway to Port Kembla and Newcastle (from time to time for export to domestic and the international market.

The components of the proposed development comprise:

- upgrades to the CHPP
- expansion of the existing REA
- additional mobile plant for coal handling
- additions to the existing bathhouses, stores and associated access ways upgrades to onsite services and infrastructure

- upgrades to offsite service infrastructure, including electrical supply
- rail transport of product coal to Port Kembla and Newcastle (from time to time)
- mine closure and rehabilitation and
- environmental management.

1.4 Study Requirements

The Tahmoor South Project Environmental Impact Statement has been prepared in accordance with Division 4.1, Part 4 of the EP&A Act which ensures that the potential environmental effects of a proposal are properly assessed and considered in the decision-making process. The visual assessment is guided by the Secretary's Environmental Assessment Requirements (SEAR's), which require:

'an assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, and minimising the lighting impacts of the development'.

VIA objectives and methodology

Section 2

2.1 VIA objectives

A primary objective of this VIA is to determine the likely visual significance of the proposed development on people living and working in, or travelling through the landscape surrounding the proposed development area. This VIA has also been undertaken to:

- assess the existing visual character of the proposed development area as well as the surrounding landscape;
- determine the extent and nature of the potential visual significance of the proposed development on surrounding areas; and
- identify measures to mitigate and minimise any potential visual impacts arising from the proposed development.

This VIA methodology has been applied to a number of similar VIA's for large scale infrastructure developments prepared by GBD, which have been assessed and approved by the New South Wales Department of Planning and Environment (DPE).

2.2 Methodology

This VIA methodology included the following activities:

- desktop study addressing visual character and identification of receptor locations within the landscape surrounding the proposed development area
- fieldwork and photography
- assessment and determination of visual sensitivity and magnitude
- assessment and determination of visual significance and
- determination of potential mitigation measures.

2.3 Desktop study

A desktop study was carried out to identify an indicative viewshed for key visible elements within the proposed development. This was carried out by reference to 1:25,000 scale topographic maps as well as aerial photographs and satellite images of the proposed development area and surrounding landscape.

Topographic maps and aerial photographs were also used to identify the locations and categories of potential view locations that could be verified during the fieldwork component of the assessment. The desktop study also outlined the visual character of the landscape including features such as landform, elevation, landcover and the distribution of residential dwellings surrounding the proposed development.

2.4 Fieldwork and photography

The fieldwork involved:

- site inspections to determine and confirm the potential extent of visibility of the proposed development and ancillary structures and

- determination and confirmation of the various view location categories and locations from which the key visible structures of the proposed development could potentially be visible.

2.5 Assessment of visual significance

The visual significance of the proposed development on surrounding view locations will result primarily from a combination of the potential visibility of the proposed infrastructure and the characteristics of the landscape between, and surrounding, the view locations and the proposed development. The potential degree of visibility and resultant visual significance will be partly determined by a combination of factors including:

- distance between view location and various proposed elements within the proposed development
- duration of view from view locations toward various constructed elements within the proposed development
- predicted impact of the proposed development on existing visual amenity;
- nature of predicted impacts and
- visual sensitivity of locations from which views toward the proposed development exist.

The determination of a visual significance is also subject to a number of other factors which are considered in more detail in this VIA.

2.6 Mitigation measures

Mitigation measures have been determined to assist in the reduction and, where possible, remediation of any significant adverse effects on surrounding view locations that may arise from the proposed development.

Project regional location

Section 3

3.1 Project regional location

The proposed facilities and visible elements associated with the proposed development will be located within the south east portion of the Wollondilly Shire Council Local Government Area approximately 70 km south west of Sydney and 30 km south-west of the Campbelltown central business district. The Wollondilly Shire, which extends across approximately 2,560 square kilometers, is primarily defined by National Parks, bushland, water catchment and rural land. Modified rural land includes activities such as market gardens, orchards, dairy/poultry farms and grazing. The regional location of the proposed development is illustrated in **Figure 1**.

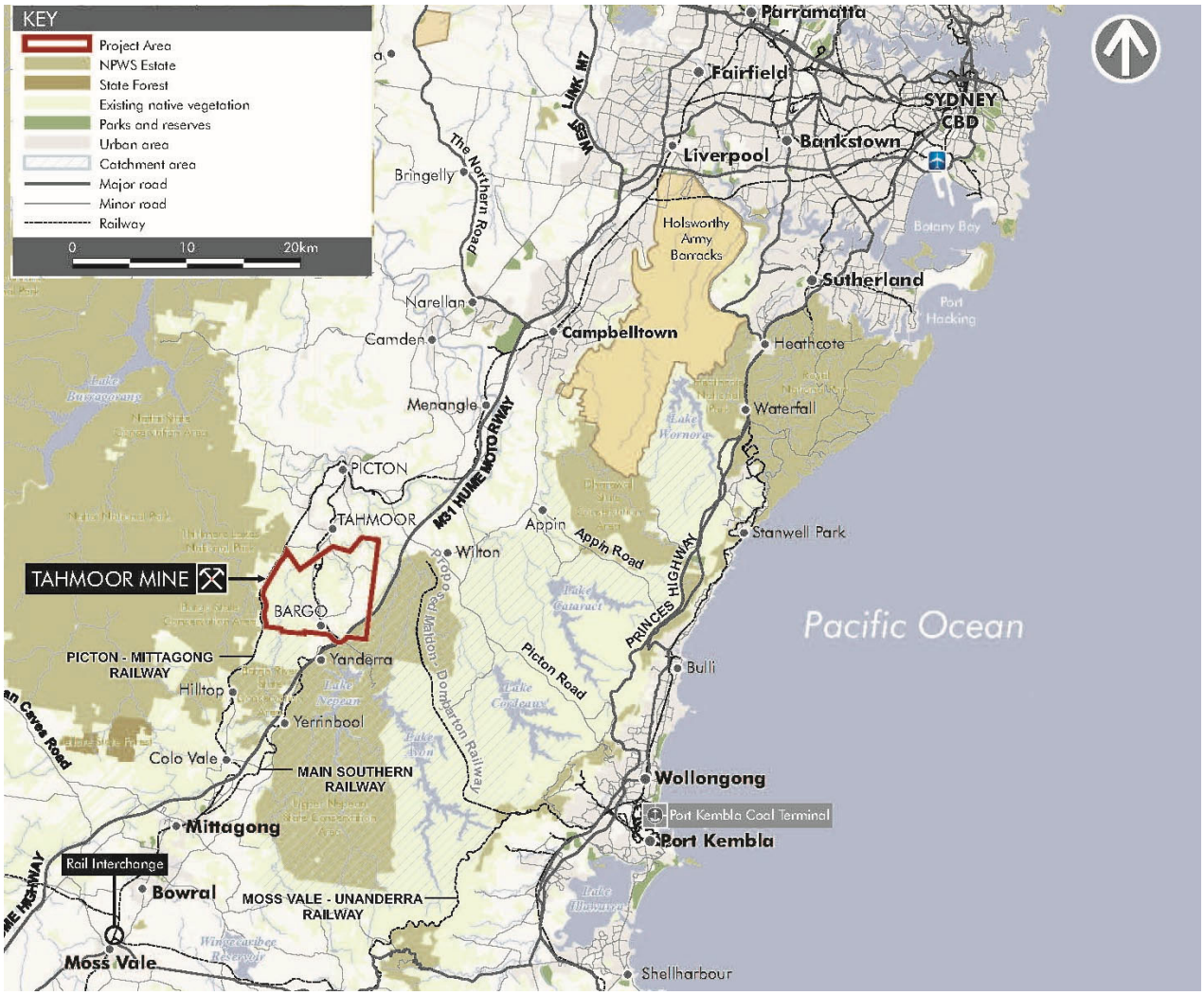


Figure 1 – Tahmoor South Project (Image source: AECOM 2018)

Project Area and local context

Section 4

4.1 Project Area

The Project Area for the proposed development is located within the south east portion of the Wollondilly Shire Local Government Area. The Project Area is illustrated in **Figure 2** and the local context in **Figure 3**.

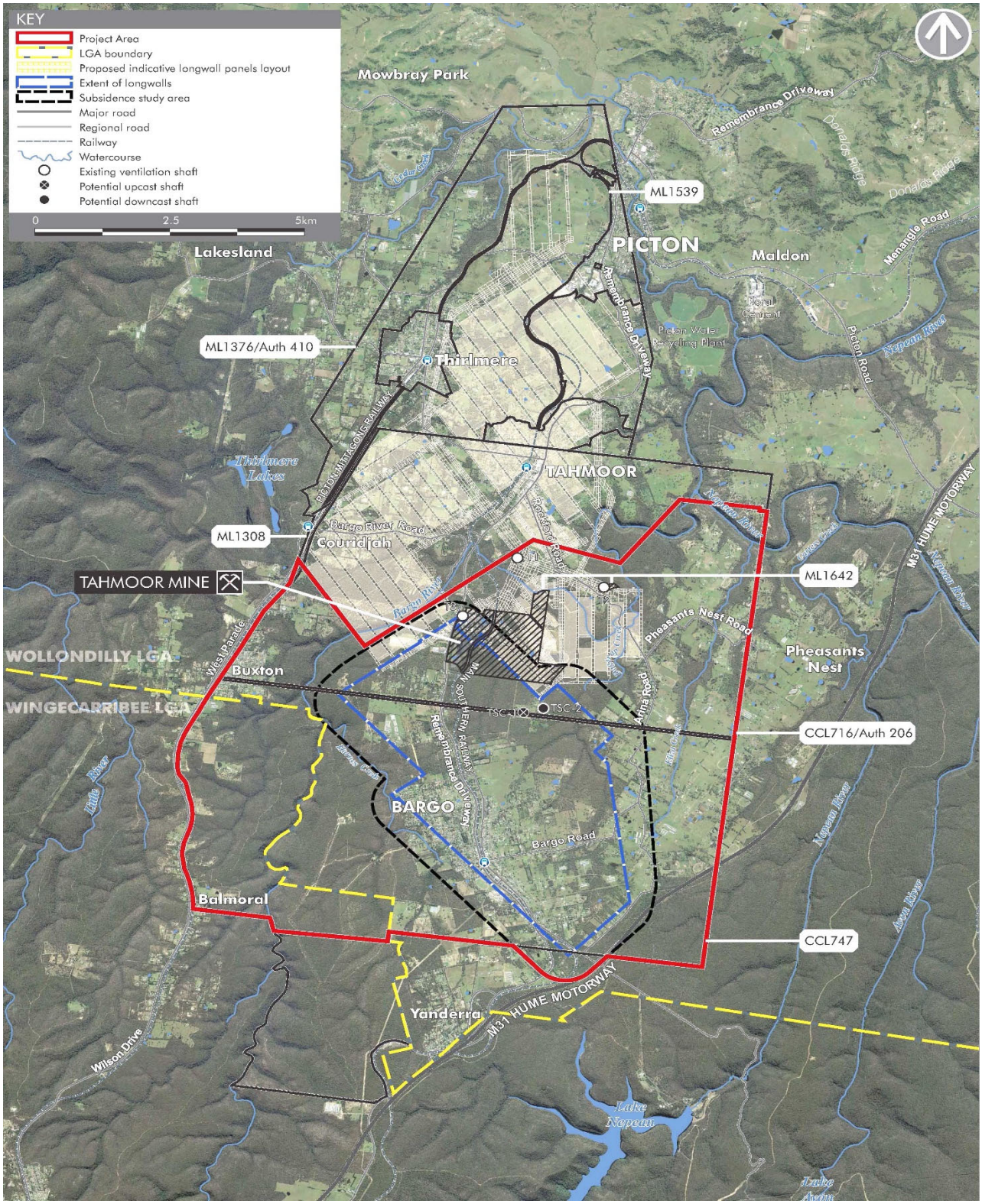


Figure 2 – Tahmoor South Project, Project Area (Image source AECOM 2018)

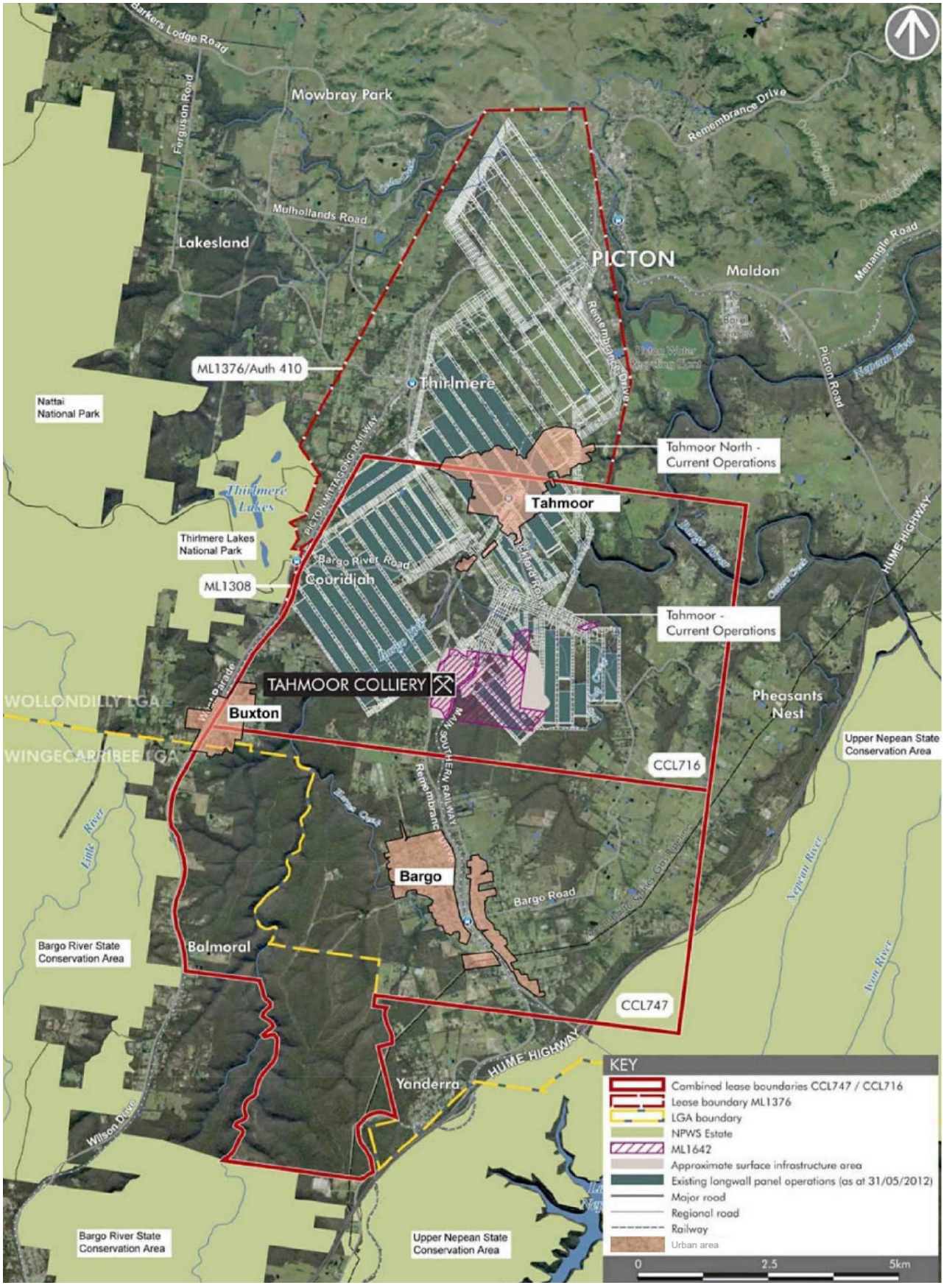


Figure 3 – Tahmoor South Project, Local Context (Image source AECOM 2017)

The Project Area illustrated in **Figure 2** includes the:

- proposed Tahmoor South mining area
- existing Tahmoor Coal mine surface facilities
- existing Tahmoor Coal mine reject emplacement area
- proposed reject emplacement area extension (Stages 1 and 2)
- existing down-cast ventilation shaft T1 (off Stafford Road)
- existing up-cast ventilation shaft T2 (off Rockford Road)
- proposed up-cast ventilation shaft (TSC1)
- proposed down-cast ventilation shaft (TSC2)
- existing and proposed power lines and
- other current infrastructure and activities associated with mining operations, including mine ventilation; gas drainage and management; coal handling; underground and surface water management; waste management; construction activities; post mining closure and rehabilitation; and environmental management and monitoring.

The existing up-cast and down-cast ventilation shafts T1 and T2 are located to the north of the Tahmoor Coal mine surface facilities area and are largely screened from view by established tree cover. The location of the existing T1 and T2 ventilation shafts are illustrated in **Figure 4**. Typical views toward the existing T2 up-cast ventilation shaft are illustrated in **Figure 5**. Whilst the existing T2 up-cast ventilation shaft gives an overall comparison in scale and built form, we note that the T2 up-cast ventilation shaft differs from the design of the proposed TSC1 up-cast ventilation shaft. Whilst the existing T2 outlet stacks are around 20 m high from ground level, the proposed TSC1 outlet stack will be around 30m high and 4m wide; however, the TSC1 outlet stack will be cylindrical rather than square and present a narrower visible profile than the existing T2 up-cast ventilation shaft outlet stacks.

Plates 1 to **5** illustrate a range of typical views toward elements and infrastructure within the existing Tahmoor Coal mine surface facilities, the existing T1 and T2 ventilation shaft site and the approved reject emplacement area.




Plate 1 - View from mine site toward existing Tahmoor Coal mine surface facilities area




Plate 2 - View south to north from the existing and approved reject emplacement area



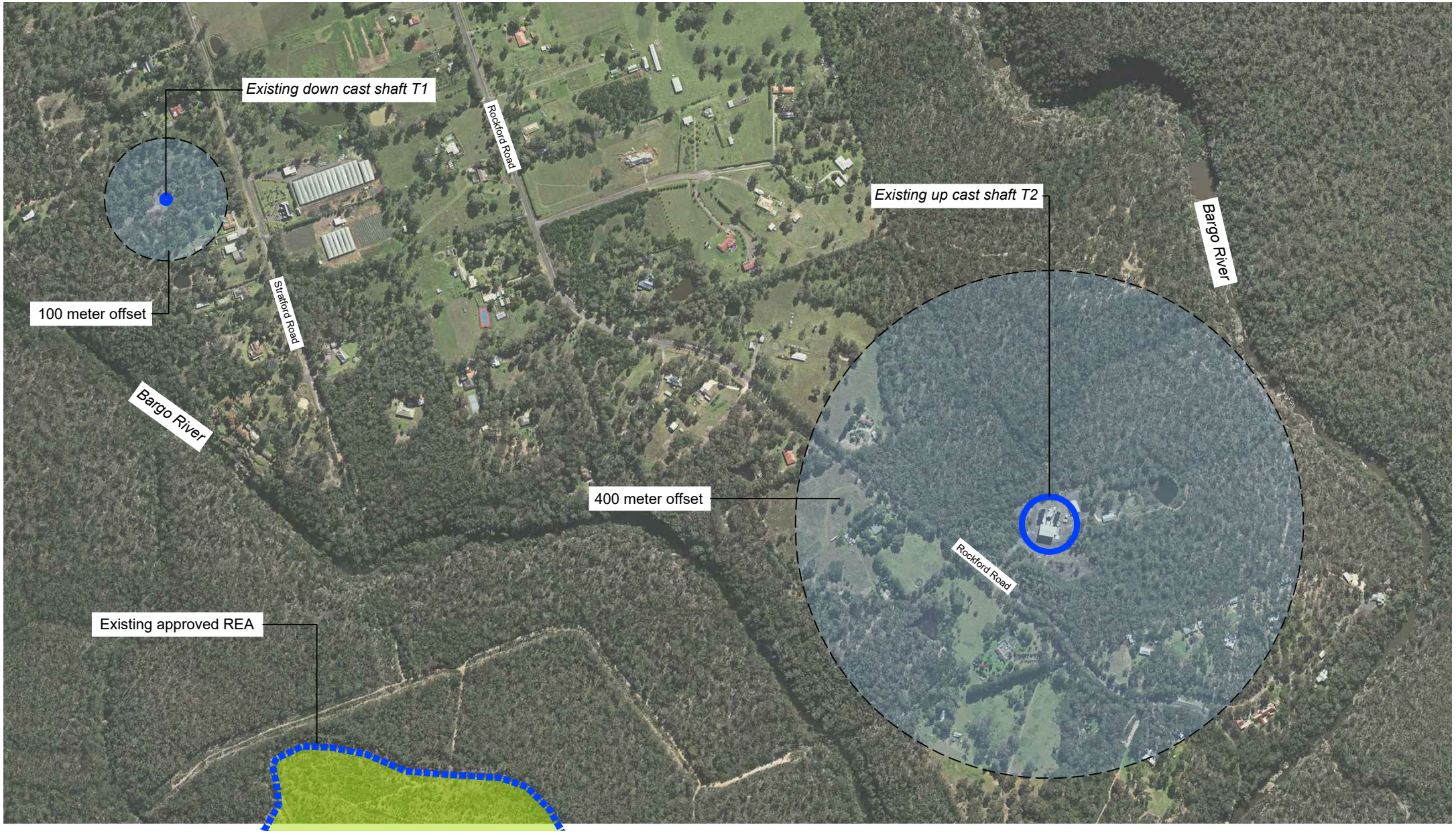
Plate 3 - View toward existing T1 down-cast shaft



Plate 4 - View toward existing T2 up-cast shaft




Plate 5 - View toward existing transmission line west of existing reject emplacement area



Legend

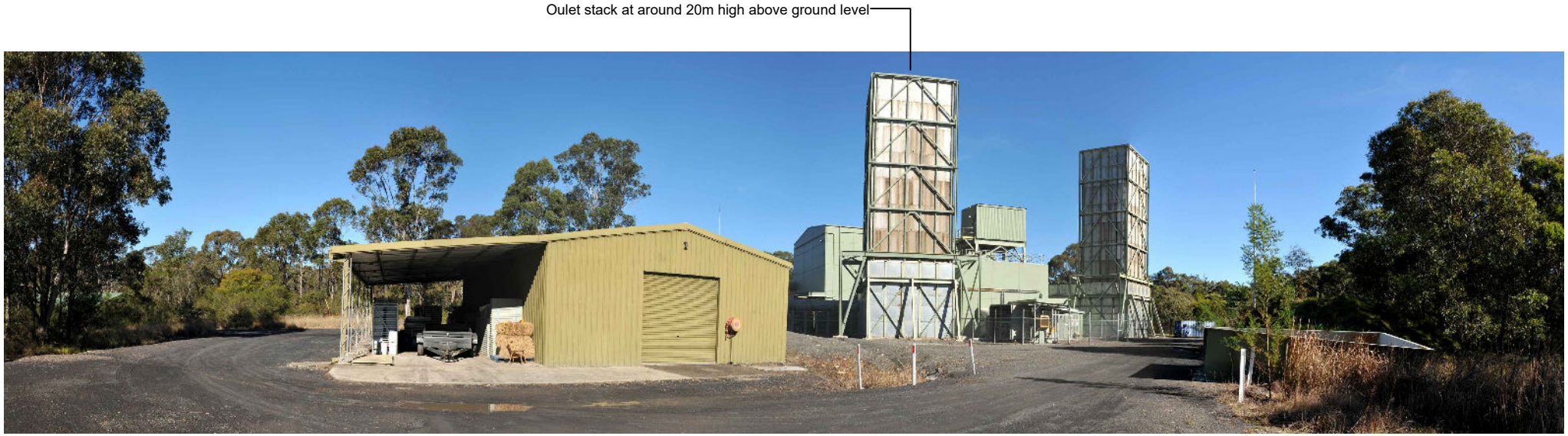
- Existing ventilation shaft
- Existing and approved Reject Emplacement Area (indicative location)

0km 100m

Figure 4
Existing ventilation shafts T1 and T2 - locality plan

GREEN BEAN DESIGN
landscape architects

Tahmoor Coal-Tahmoor South Project



Existing T2 up-cast ventilation shaft (off Rockford Road) - South elevation



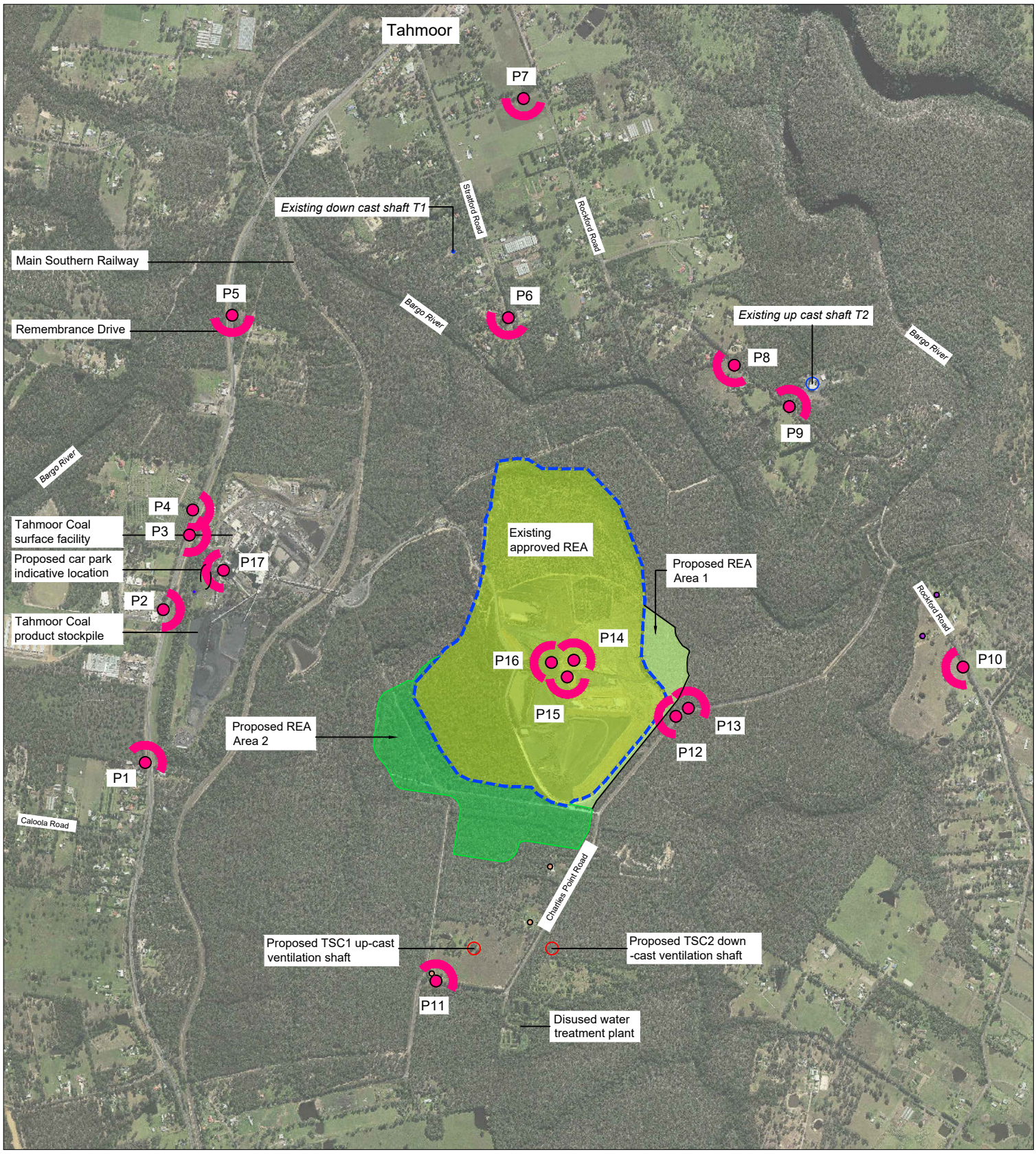
Existing T2 up-cast ventilation shaft (off Rockford Road) - East elevation

Figure 5
Existing T2 up-cast ventilation shaft (off Rockford Road)

4.2 Panoramic Photographs

A series of digital photographs were taken during the course of the fieldwork to illustrate existing views in the vicinity of a number of view locations inspected and assessed as part of this VIA. Individual photographs were digitally stitched together to form a segmented panorama image to provide a visual illustration of the existing view from each photo location.

The panoramic photographs presented in this VIA have been annotated to identify key features or structures located within the existing view. The panoramic photograph locations are illustrated in **Figure 6**, and the panoramic photographs illustrated in **Figures 7** to **12**.



Legend

0km 250m

- Existing and approved Reject Emplacement Area (indicative location)
- Proposed Reject Emplacement Area (REA), Area 1 (indicative location)
- Proposed Reject Emplacement Area (REA), Area 2 (indicative location)
- Existing ventilation structure
- Proposed ventilation structure
- Panorama photo location (refer Figures 7 to 12)

Figure 6
Photo locations

Tahmoor Coal - Tahmoor South Project

GREEN BEAN DESIGN
landscape architects



Photo Location P1- View north east to south east from Tahmoor Garden Centre/Remembrance Drive toward Tahmoor Mine

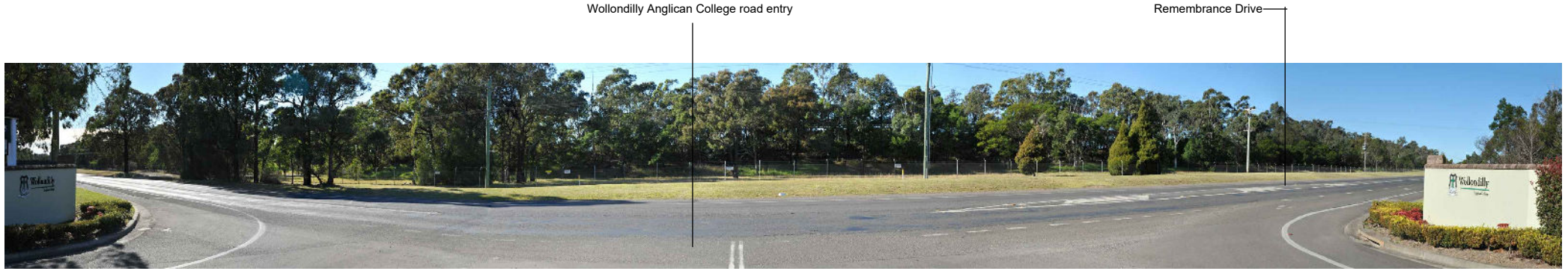


Photo Location P2- View east from Wollondilly Anglican College driveway entry



Photo Location P3 - View east to south east toward Tahmoor Mine surface facility from main entry at Remembrance Drive

Figure 7 - Photo Sheet 1

GREEN BEAN DESIGN
landscape architects



Photo Location P4 - View north east to south east from Olive Lane intersection with Remembrance Drive



Photo Location P5 - View south from Remembrance Drive



Photo Location P6 - View south to south west toward Tahmoor Mine surface facility from Stratford Road

Figure 8 - Photo Sheet 2



Photo Location P7 - View south from Hawkins Road



Photo Location P8 - View west from Rockford Road



Photo Location P9 - View east from Rockford Road toward existing up-cast ventilation shaft T2

Figure 9 - Photo Sheet 3

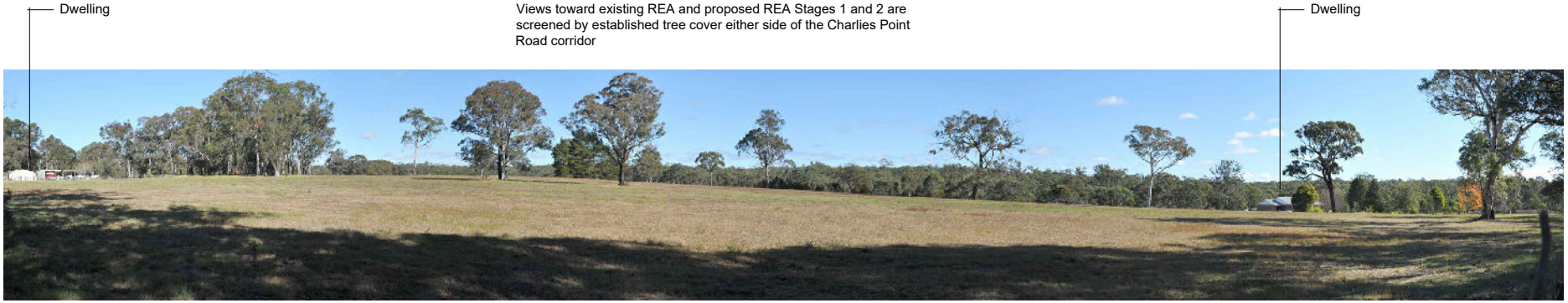


Photo Location P10 - View west to north west from Arina Road



Photo Location P11 - View north to north west toward proposed TSC1 upcast ventilation shaft site from Charlies Point Road



Photo Location P12 - View north west to north toward existing and proposed Stage 2 reject emplacement areas from Charlies Point Road

Figure 10 - Photo Sheet 4

Tahmoor Coal - Tahmoor South Project

GREEN BEAN DESIGN
landscape architects



Photo Location P13 - Views north east and south west along Charlies Point Road

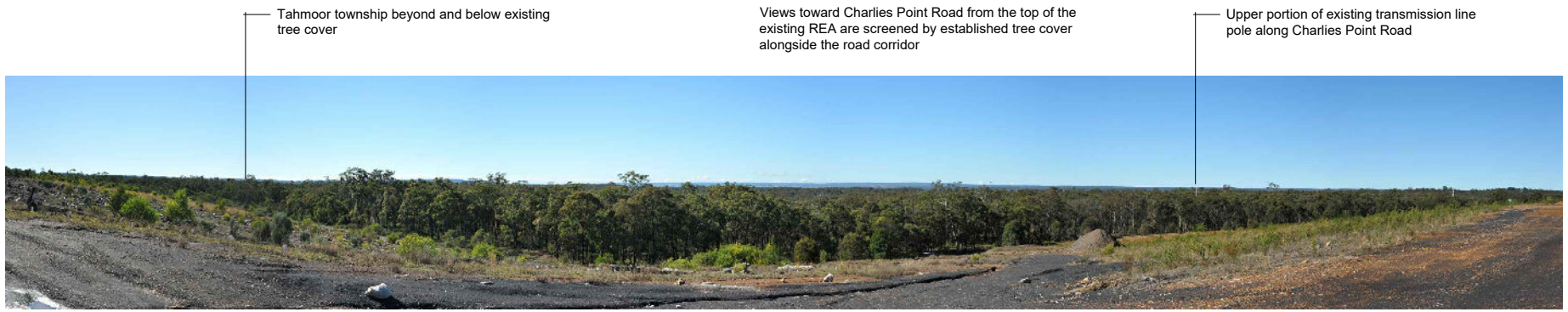


Photo Location P14 - View north east to south east from existing and approved REA toward proposed Stage 2 REA site

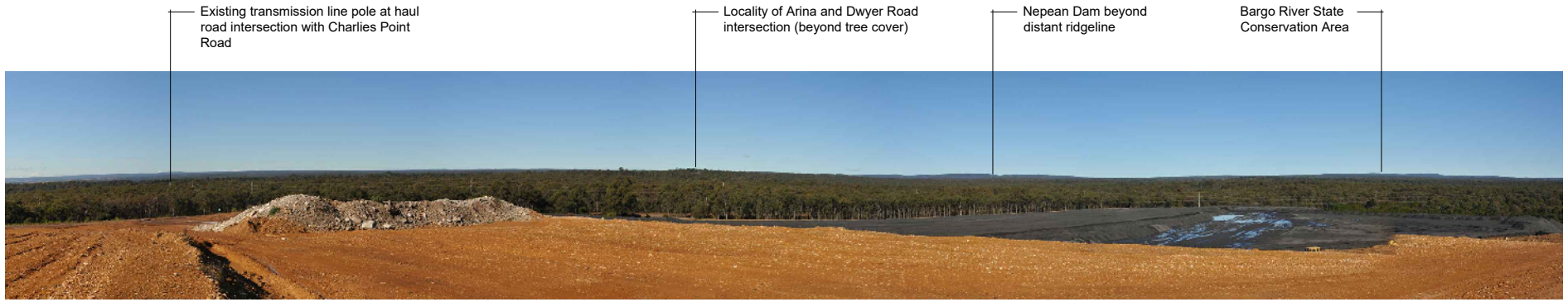


Photo Location P15 - View south east to south west from existing and approved REA toward proposed Stage 1 and Stage 3 REA sites

Figure 11 - Photo Sheet 5



Photo Location P16 - View west to north east from existing and approved REA across proposed Stage 2 REA site

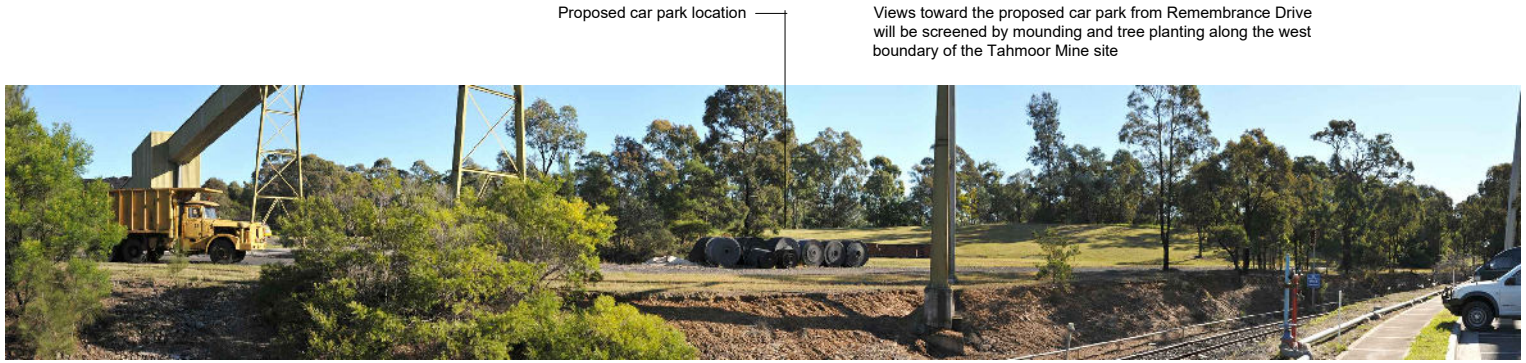


Photo Location P17 - View west across Tahmoor Coal mine rail loop toward proposed car park location

Figure 12 - Photo Sheet 6

Project description

Section 5

5.1 Overview

Tahmoor Coal is seeking approval for the continuation of mining at Tahmoor Mine, extending underground operations and associated infrastructure south, within the Bargo area. The proposed development seeks to extend the life of underground mining at Tahmoor Mine until approximately 2035, depending upon geological and mining parameters.

The proposed development will use longwall mining methods to extract coal from the Bulli seam within CCL 716 and CCL 747. Coal extraction of up to 4Mtpa ROM is proposed as part of the development. The ROM coal brought to the surface will be processed at Tahmoor Mine's existing CHPP, and transported via rail to Port Kembla and Newcastle (from time to time) for export to domestic and international markets. The proposed development will utilise the existing surface infrastructure at the Tahmoor Mine surface facilities area, with some upgrades proposed to facilitate the extension.

The proposed development also incorporates the planning for rehabilitation and mine closure. Additional capacity will be required for the ventilation system, both upcast and downcast shaft An expansion of the REA is also required for both the existing operations and to accommodate the proposed Tahmoor South Project.

5.2.1 Mine ventilation

The Tahmoor South Project will utilise some of the existing mine's ventilation system. In addition the Project will require the construction of two new ventilation shafts to provide reliable and adequate supply of ventilation air to personnel in the mine to ensure a safe working environment is maintained.

The proposed development will make use of three vent shafts currently being used for the operations at Tahmoor North, including one upcast (T2) and two downcast shafts (T1 and T3). The proposed additional vent shafts for the Tahmoor South Project Central Domain are:

- TSC1: an upcast ventilation shaft that will be located on Tahmoor Coal's Charlies Point Road property and
- TSC2: a downcast ventilation shaft that will be located on Crown Land adjacent to Tahmoor Coal's Charlies Point Road property.

The locations of the proposed vent shafts are shown on **Figures 13** and **14**. The construction of the ventilation shafts will require the disturbance of a footprint of between four to six hectares in area at each location. Access to TSC1 and TSC2 will be from the existing road network.

The construction of each of the proposed ventilation shafts will involve the following:

- Construction of access roads to each vent shaft site off the existing road network, including upgrading the access for construction and operational maintenance vehicles.
- Establishment of the construction site to allow sufficient space for stockpiling of shaft liners and , temporary spoil emplacement , water management, storage and safe movement on-site during construction activities. Establishment of the ventilation shaft site will involve:
    - Installation of environmental controls such as silt fences, fencing with lockable gates, as well as display of signage relating to restricted entry.

  - Clearing of vegetation and stripping of topsoil. Topsoil will be temporarily stockpiled for rehabilitation post construction.
  - Excavation and construction of a hardstand area for operation of drilling equipment. The hardstand footprint will be approximately four to six hectares.
- Connection of 66 kV electrical power and establishment of electrical substations at each ventilation shaft site.
- Shaft sinking using blind boring methods, and lining of the shafts using a composite concrete and steel liner.
- Installation of ventilation fans at the upcast shaft site, TSC1. The upcast shaft site fan will also incorporate a fan outlet flue, approximately 30m high, to minimise the impacts of any odours discharge from the mine ventilation return air.

The shaft construction sites will incorporate water treatment sedimentation controls, with the final water treatment from the ventilation shaft being pumped via overland pipeline to a final sedimentation pond on the surface facilities area for further treatment and discharge though LDP1.



Plate 6 – Typical view toward an up-cast vent shaft installation site

5.2.2 Gas drainage operations

Gas in the underground mine will be managed by gas drainage operations including:

- Pre-gas drainage, whereby gas will be drawn from the coal seam and surrounding strata prior to longwall mining;
- Gas extraction via the mine ventilation system, which will occur throughout mining; and
- Post gas drainage, whereby gas will be drawn from the goaf.

5.2.3 Pre-gas drainage

The pre-gas drainage works will include underground directional drilling, through the coal seam from where the extracted gas will be brought to the surface and transferred via a pipeline to the existing gas plant at the Tahmoor Mine.

If the gas has sufficient methane, it will be used to generate electricity at the existing cogeneration plant. If the gas composition does not meet the specification for electricity generation, it will be sent to the onsite gas flare plant where the methane will be flared. The existing gas plant, cogeneration plant and gas flare plant will continue to be utilised.



Plate 7 – Existing cogeneration plant within Tahmoor Mine surface facility

5.2.3 Post gas drainage

Post gas drainage will be required as strata relaxation caused by the retreating underground longwall face will liberate volumes of gas into the mine workings from the underlying Wongawilli seam and from overlying strata, released due to fracturing of the goaf. The gas collected from the in-seam and cross-measure boreholes will be drawn by vacuum via the underground pipe network to the Gas Plant located at the surface facilities area.



Plate 8 – Existing on-site gas plant within Tahmoor Mine surface facility

5.2.4 Gas ventilation system

The ventilation system will deliver fresh air into the mine from the existing and proposed downcast vent shaft and will extract stale air from the mine via the existing and proposed upcast vent shaft. Similar to the existing operations, the ventilation system would carry the remaining diluted gases out of the mine via the upcast mine vent shafts.

5.2.5 Mine Access

The proposed development will use the existing infrastructure at Tahmoor Mine for employee and material access. Access to the Central Domain will be via the existing Tahmoor Mine surface facilities area.

5.2.6 Coal Logistics

The proposed development will transport the product coal from Tahmoor Mine to Port Kembla and Newcastle (from time to time), via the existing mine rail load out, rail loop, the Main Southern Railway and the Moss Vale to Unanderra Railway. The existing rail capacity is sufficient for the proposed transport of product coal to Port Kembla under the proposed development, and no increase in rail capacity between Tahmoor Mine and Port Kembla will be required. As such, existing rail infrastructure and the number of allowable train movements will remain unchanged.



Plate 9 – Rail loop entering surface facilities area

5.3 Surface Facilities Area

The existing surface facilities and infrastructure at the Tahmoor Mine surface facilities area, operating under surface ML 1642, will be utilised for the proposed development. Upgrades to the surface facilities area will be required within the footprint of the existing Tahmoor Mine surface lease (ML 1642) and additional surface lease area proposed for the Tahmoor South Project. The proposed development will include upgrades to the existing surface CHPP and ancillary surface infrastructure. The proposed upgrades are described in further detail in the following sections.

5.3.1 Coal handling and preparation plant (CHPP)

The existing CHPP will be utilised for the proposed development. The existing CHPP will be upgraded including the installation of:

- a new coarse rejects screen
- additional belt press filter capacity
- an increase in thickener capacity and
- other upgrades as required.

The existing ROM stockpile area will continue to be utilised by the proposed development. Reject material generated from the coal washing process at the CHPP would be transported to the expanded REA via the existing reject conveyor to the reject bin for disposal, then transported by haul truck to the REA.



Plate 10 – Existing surface facilities and coal handling preparation plant

5.3.2 Rejects management

The existing REA will be expanded onto adjacent areas to accommodate the reject material associated with the proposed development. The expansion area will cover up to an additional 43 hectares, providing an additional

emplacement capacity of approximately 12 million tonnes for the rejects generated during the operation of the proposed development. The maximum height of the REA would be increased from RL 300 metres to RL 305 metres in the southern section of the REA.

The rejects disposal method has been selected based on a review of a number of disposal options taking into consideration a number of project objectives including:

- provide a safe solution, causing no hazards to mine operations and with low impact on mine stability;
- minimise the impact on the environment where possible, including dust emissions, visual impact, groundwater and sub-surface contamination, use of foreign reagents;
- provide an economic solution, with minimal capital and operating cost, returning a positive benefit to cost ratio, providing employment for the local community and minimising the impact on mine production;
- adopt a sound technical solution, utilising proven technology with high availability and reliability, versatility and flexibility;
- provide a solution that will enable the disposal of the total volume of rejects forecast for the Tahmoor South project.

The adopted expansion of the existing REA takes into consideration a balance of environmental impacts of dust, noise and visual impacts to surrounding properties as well as the impacts to biodiversity.

The southern section of the REA is proposed to be increased in height. Consideration was given to raising the northern section of the existing REA which has been rehabilitated; however, this increased the number of impacted properties from dust and noise hence was not included in the proposed final design.

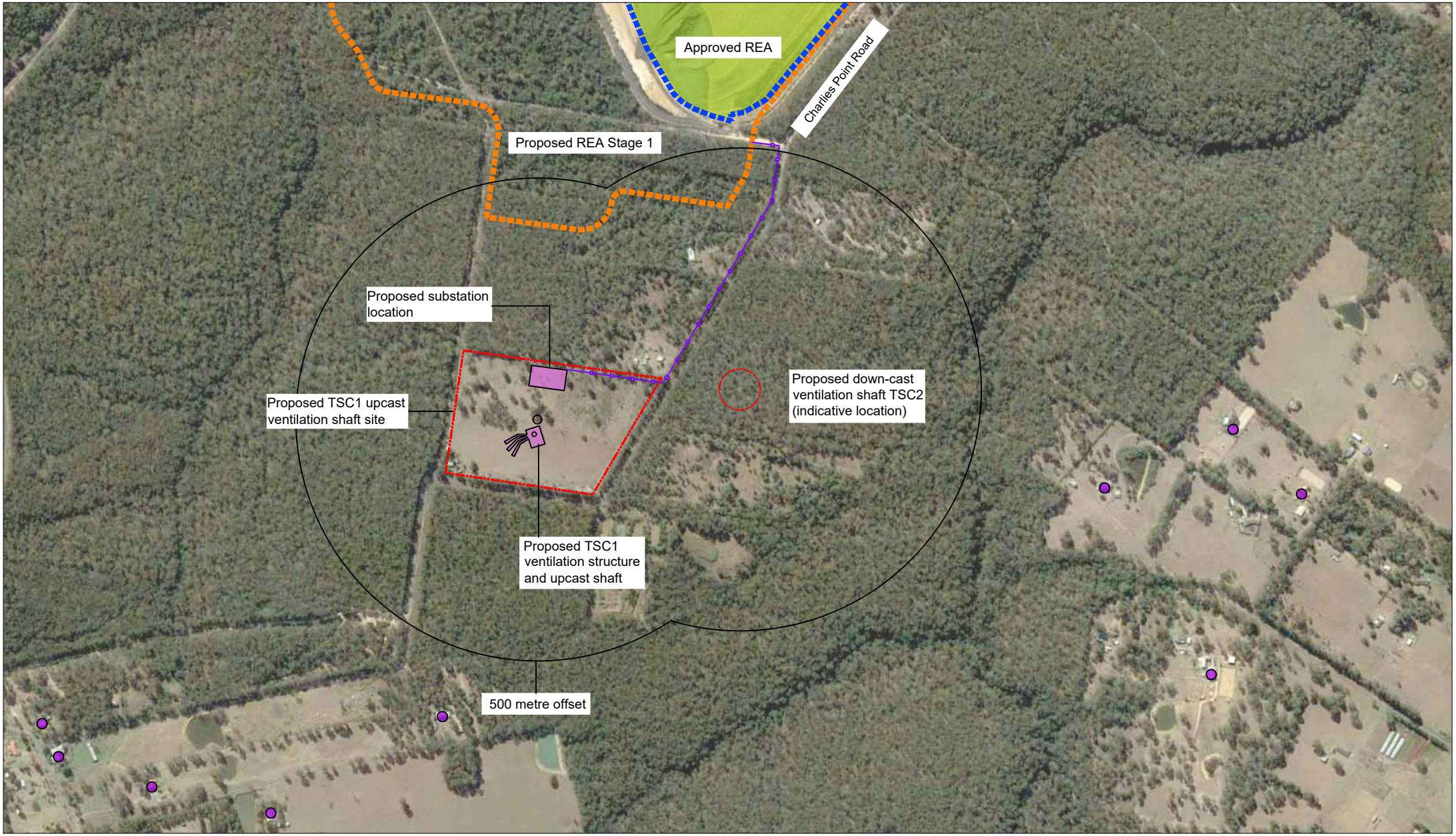
The preferred disposal strategy consists of two new areas adjoining the existing REA, using a staged fill plan approach. The REA will be progressively rehabilitated over the life of the mine.

Construction and maintenance of new internal haul roads around and within the REA will be required to cater for the REA expansion. The existing stormwater infrastructure will be expanded to include bunding, additional surface water drainage controls and sedimentation dams for the additional areas.

5.3.3 Plant and Equipment

The proposed development will utilise existing plant and equipment at the surface facilities area and will also require additional mobile plant for coal material handling at the surface facilities area. The proposed additional plant will include additional ancillary equipment such as trucks, cranes and forklifts for use around the surface facilities area to manage product and equipment stores.

Tahmoor Coal will investigate and utilise improved or alternate coal handling and preparation methods and technology throughout the life of the proposed development to allow for the efficient processing of coal and reject.



Legend

- Proposed ventilation shaft as noted (indicative location)
- Residential dwelling
- Existing and approved Reject Emplacement Area (indicative location)
- Proposed Reject Emplacement Area, Stages 1 and 2 (indicative location)

0km 200m

Figure 13
Proposed TSC1 up-cast and TSC2 down-cast ventilation shaft locality plan

GREEN BEAN DESIGN
landscape architects

Tahmoor Coal - Tahmoor South Project

Landscape effects

Section 6

6.1 Introduction

Landscape effects describe the likely nature and scale of changes to individual landscape elements and characteristics, and the consequential effect on the landscape character, resulting from the proposed development. The significance of landscape effects have been determined by considering the sensitivity of the existing landscape resource and the potential magnitude of landscape effects.

The degree to which a particular landscape area can accommodate change arising from the Project, without detrimental effects on its character will vary with:

- exiting land use
- the pattern and scale of the landscape and
- visual enclosure/openness of views.

6.2 Existing land use

The Project will be located within a local landscape context of existing mining operations within the Project Area, and will in part, seek a continuation of existing activities associated with underground mining within the local and regional area. The land use within the Project Area is defined by a range of industrial scale activities related to underground mining, although this land use is contiguous with areas of native tree cover extending beyond existing mining operations.

Land use within and adjoining the Project Area includes both large scale industrial development as well as rural residential areas and denser urban development to the north (Tahmoor) and south (Bargo).

Given the similar nature of existing and proposed mining activities within the Project Area, the Project will not be expected to have a significant impact on existing landuse both within and surrounding the Project Area.

6.3 Landscape pattern and scale

The landscape pattern within and surrounding the Project Area is characterised and defined by existing land use. The landscape pattern within the Project Area is relatively simple, regular and uniform. The predominant landscape patterns within the Project Area are formed by a mosaic of dense to moderate tree cover across bushland and partially cleared rural residential properties which surround the Tahmoor Mine surface facility. Landscape scale within the Project Area is characterised by a medium to small scale landform which is defined throughout areas of urban development, rural occupation and commercial/industrial development.

6.4 Visual enclosure and openness of views

The landscape within and surrounding the Project Area is a largely enclosed visual environment. Visual restrictions occur through a combination of a gently undulating landform and extensive areas of medium to dense tree cover. Short distance and mostly indirect views occur along a number of constructed corridors, including local roads and power line corridors.

6.5 Visual Absorption Capability

Visual Absorption Capability (VAC) is a classification system used to describe the relative ability of the landscape to accept modifications and alterations without the loss of landscape character or deterioration of

visual amenity. VAC relates to physical characteristics of the landscape that are often inherent and often quite static in the long term.

Low undulating areas with a combination of open views interrupted by groups of trees, residential or industrial areas will tend to have a high capability to visually absorb the Project without significantly changing its amenity. On the other hand, areas of cleared vegetation on level ground with limited screening will have a lower capacity to visually absorb the Project without changing the visual character and potentially reducing visual amenity.

Given the extent and combination of existing tree cover and undulating landform within and surrounding the Project Area, the capability of the landscape to absorb the key components of the Project is considered to be high. The high VAC of the surrounding landscape is likely to reduce the potential magnitude of visual significance.

6.6 Nattai National Park

The south east boundary of the Nattai National Park is located around 8 km from the Tahmoor Coal mine site and extends around 20 km to the north west. The NSW Nattai Reserves Plan of Management (April 2001) identifies the Nattai National Park together with the Bargo, Burragorang, Nattai and Yerranderie State Recreation Areas which together comprise the Nattai Reserves System. The System covers around 86,000 hectares of land and takes in the primary catchments of the Nattai and Tonalli Rivers and Werriberii Creek which feed into the Warragamba Dam. The Plan of Management recognizes two lookouts on the edges of the Nattai Reserves System, the Burragorang Lookout and the Wollondilly Lookout (on the Wombeyan Caves Road). The Burragorang Lookout is located around 25 km to the north east of the Tahmoor Coal mine and the Wollondilly Lookout around 37 km to the south west of the mine. Each lookout offers spectacular views of the Nattai National Park and Yerranderie State Recreation Area; however, views toward the Tahmoor Coal mine are blocked by a combination of landform and established tree cover.

Given the influence of distance, orientation, topography and tree cover, it is highly unlikely that the Project will have any significant visual effect on the scenic escarpment of the Nattai National Park or for visitors to the Park engaged in low impact bush walks or camping activities. The Nattai Reserves Plan of Management notes the relative isolation of the Nattai Reserves and that 75% of the Nattai Reserves System is within the Sydney Catchment Authority Schedule One area which restricts public access to protect water quality.

Visual effect and significance

Section 7

7.1 Introduction

The assessment of visual effect and magnitude describes:

- the changes in the character of the available views resulting from the Project and
- the changes in the visual amenity of the visual receptors.

The visual significance resulting from the construction and operation of the Project will primarily result from a combination of the following factors:

- distance between the view location and elements within the Project
- duration of view from view location toward elements within Project
- predicted impact of the Project on existing visual amenity
- nature of predicted impacts and
- receptor sensitivity of locations from which views toward elements within the Project exist.

An overall determination of visual effect and significance has been assessed and determined against the criteria outlined in **Table 2** and **Table 3** below:

Table 2 – Visual effect criteria

Criteria	Definition
Predicted Impact:	
Nature of Impact: Temporary (T) Permanent (P) Reversible (R) Irreversible (IR)	 Visual impact will be temporary in nature Visual impact will be permanent in nature Visual impact will be considered reversible Visual impact will be considered irreversible
Magnitude:	
High (H)	Total loss or major change to pre-development view or introduction of elements which are uncharacteristic to the existing landscape features.
Medium (M)	Partial loss or alteration to pre-development view or introduction of elements that may be prominent but not necessarily uncharacteristic with the existing landscape features.
Low (L)	Minor loss or alteration to pre-development view or introduction of elements that may not be necessarily uncharacteristic with the existing landscape features.
Negligible (N)	Very minor loss or alteration to pre-development view or introduction of elements which are not uncharacteristic with the existing landscape features (resulting in a no change situation).

#

Table 3 – Visual significance criteria

Criteria	Definition
View Distance:	
Long (L)	> 1 km
Medium (M)	500m – 1 km
Short (S)	< 500m
View Duration:	
Long term (LT)	> 2 hours
Moderate term (MT)	30 - 120 minutes
Short term (ST)	10 – 30 minutes
Receptor Sensitivity:	
High (H)	Residential locations
Medium (M)	Public recreation areas
Low (L)	Motorists or rail passengers
Visual Significance:	
High (HS)	The Project will be a significant and dominant feature within the surrounding landscape and at complete variance with the landform, scale and pattern of the landscape. The Project will have the capacity to cause a significant deterioration in the existing view. The Project's visual effects may not be minimised by mitigation measures and cumulative impacts may result in an increased level of impact.
Moderate (MS)	The Project will be a recognisable feature, but not dominate views within the surrounding landscape. The Project will be out of scale and discordant with the landform, scale and pattern of the landscape and have the capacity to cause a noticeable deterioration in the existing view. The Project's visual effects may be partially mitigated through appropriate measures.
Low (LS)	The Project will form a visible element within the surrounding landscape but is unlikely to constitute a marked effect on existing views. The Project will complement the scale, landform and pattern of the surrounding landscape and will not create a noticeable deterioration in the existing view. The Project's visual effects will be positively mitigated through appropriate measures.
Negligible (NS)	The Project will result in no discernible deterioration in the existing view.

The visual effect criteria outlined in **Table 2** is used **as a guide** to determine significance of visual impact. The significance of visual impact for each view location is also considered against other factors, which include the overall visibility of the Project from surrounding view locations. The general relationship between view category and its potential level of sensitivity is outlined in **Table 2.**

7.2 Visual effect and significance

The following information presents the assessment and determination of visual effect and significance for view locations beyond the Tahmoor Mine site for proposed Project works within and beyond the surface facilities area, ventilation shafts and the REA Stages 1 and 2.

7.2.1 Underground mining operations

The proposed underground mining operations (and pre-mining activities) will be largely confined within the existing surface facilities area and below ground with negligible or no resultant visual effect or significance for view locations beyond the Tahmoor Coal mine site or more broadly within the Project Area.

Visual effect: Negligible

Visual significance: Negligible

7.2.2 TSC1 upcast ventilation shaft

The proposed TSC1 upcast ventilation shaft will be located on Tahmoor Coal's property adjoining the Charlies Point Road corridor, and south of the existing REA (refer **Figure 13)**. Views from vehicles travelling along Charlies Point Road toward the upcast ventilation shaft will be partially screened and filtered by roadside tree planting. Views toward the upcast ventilation shaft from residential dwellings beyond the Tahmoor Coal mine site will be completely screened by extensive tree cover between the upcast ventilation shaft site and surrounding dwellings.

Visual effect: Negligible

Visual significance: Negligible

7.2.3 TSC2 down-cast ventilation shaft

The proposed TSC2 downcast ventilation shaft will be located on Tahmoor Coal's property adjoining the Charlies Point Road corridor, and south of the existing REA (refer **Figure 13)**. Views from vehicles travelling along Charlies Point Road toward the downcast ventilation shaft will be partially screened and filtered by roadside tree planting. Views toward the downcast ventilation shaft from residential dwellings beyond the Tahmoor Coal mine site will be completely screened by extensive tree cover between the downcast ventilation shaft site and surrounding dwellings.

Visual effect: Negligible

Visual significance: Negligible

7.2.4 Mine access

The Project will utilise existing access points to the Tahmoor Coal mine site and no additional visual effect or significance is likely to occur.

Visual effect: Negligible

Visual significance: Negligible

7.2.5 Coal logistics

The Project will utilise existing mine infrastructure (rail load out and rail loop, the Main Southern Railway and the Moss Vale to Unanderra railway) to transport product coal from the mine to Port Kembla. It is understood that the existing rail capacity will be sufficient for the Project. The transportation of coal from the mine will not result in any additional level of visual effect or significance.

Visual effect: Negligible

Visual significance: Negligible

7.2.6 Surface facilities area

The existing CHPP will be utilised for the Project and upgraded. The upgrade will involve installation of:

- a new coarse rejects screen
- additional belt press filter capacity
- an increase in thickener capacity and
- other upgrades as required.

The CHPP upgrades will be visually contained within the surface facilities area and will not be visible from surrounding view locations including the Remembrance Drive and residential dwellings.

Visual effect: Negligible

Visual significance: Negligible

7.2.7 Electrical infrastructure works

A range of electrical infrastructure works and upgrades will be undertaken as part of the Project. The majority of these works will be within the existing Tahmoor Coal mine surface facilities area and will not be visible from view locations within the Project Area beyond the mine site. A new substation and associated 66 kV powerline will be constructed at the TSC2 ventilation shaft site. The location of the proposed substation and general alignment of the proposed 66 kV powerline are illustrated in **Figure 14**.

The proposed substation will not be visible from surrounding dwellings and will be screened by established tree cover surrounding the ventilation shaft site. The proposed 66 kV powerline will be located away from existing dwellings either passing through or alongside areas of established tree cover which will provide full or partial screening from the majority of the surrounding landscape.

Visual effect: Negligible

Visual significance: Negligible to Low

7.3 Reject Emplacement Areas

The Project will include the extension and expansion of the existing REA across an additional 2 Stages. These 2 Stages are illustrated in **Figure 14**. The proposed REA Stages will be constructed over an approximate 15 year period.

The Stage 1 REA will extend around 600 m to the west and around 250 m south of the existing REA and cover an area of around 58 hectares. Approximately 17 hectares of the Stage 1 REA will extend across the existing REA site. The Stage 1 REA will incorporate batters at around 1:5 (vertical to horizontal) and will extend to a final design height of approximately 305.8 m AHD.

The Stage 2 REA will extend around 280 m to the east of the existing REA and cover an area of around 25 hectares. Approximately 17 hectares of the Stage 2 REA will extend across the existing REA site. The Stage 2 REA will incorporate batters at around 1:5 (vertical to horizontal) and will extend to a final design height of approximately 305.8 m AHD.

The REA Stages will be significantly visually contained by established and dense tree cover, which extends up to and beyond 1 km from the proposed REA boundary. It is highly unlikely that views toward the proposed REA Stages will exist from the small number of rural dwellings that are located within and immediately beyond the REA site. The final landform design is visually consistent with contiguous landforms surrounding the REA and will not result in a disruption to existing distant skyline views where visible from elevated and accessible view locations.

The proposed REA Stages will have some limited visual exposure to traffic travelling along Charlies Point Road; however, the proposed REA Stages will be partially screened by existing tree planting alongside the road corridor. Progressive and ongoing planting during the rehabilitation and vegetation of the proposed REA sites will provide further screening potential.

Visual effect: Low

Visual significance: Low

7.4 Cross sections

Two cross sections have been prepared to illustrate the potential visual influence of existing landform and tree cover between existing residential dwellings and the proposed REA Stages. The cross-section locations have been selected to illustrate views between the existing T2 up-cast ventilation shaft (off Rockford Road) through to Remembrance Drive (Cross Section A), and a longitudinal view from Rockford Road through the existing REA as well as Stages 1 and 2. The cross-section locations are illustrated in **Figure 14** and the cross sections in **Figures 15** and **16**.

7.5 Construction activities

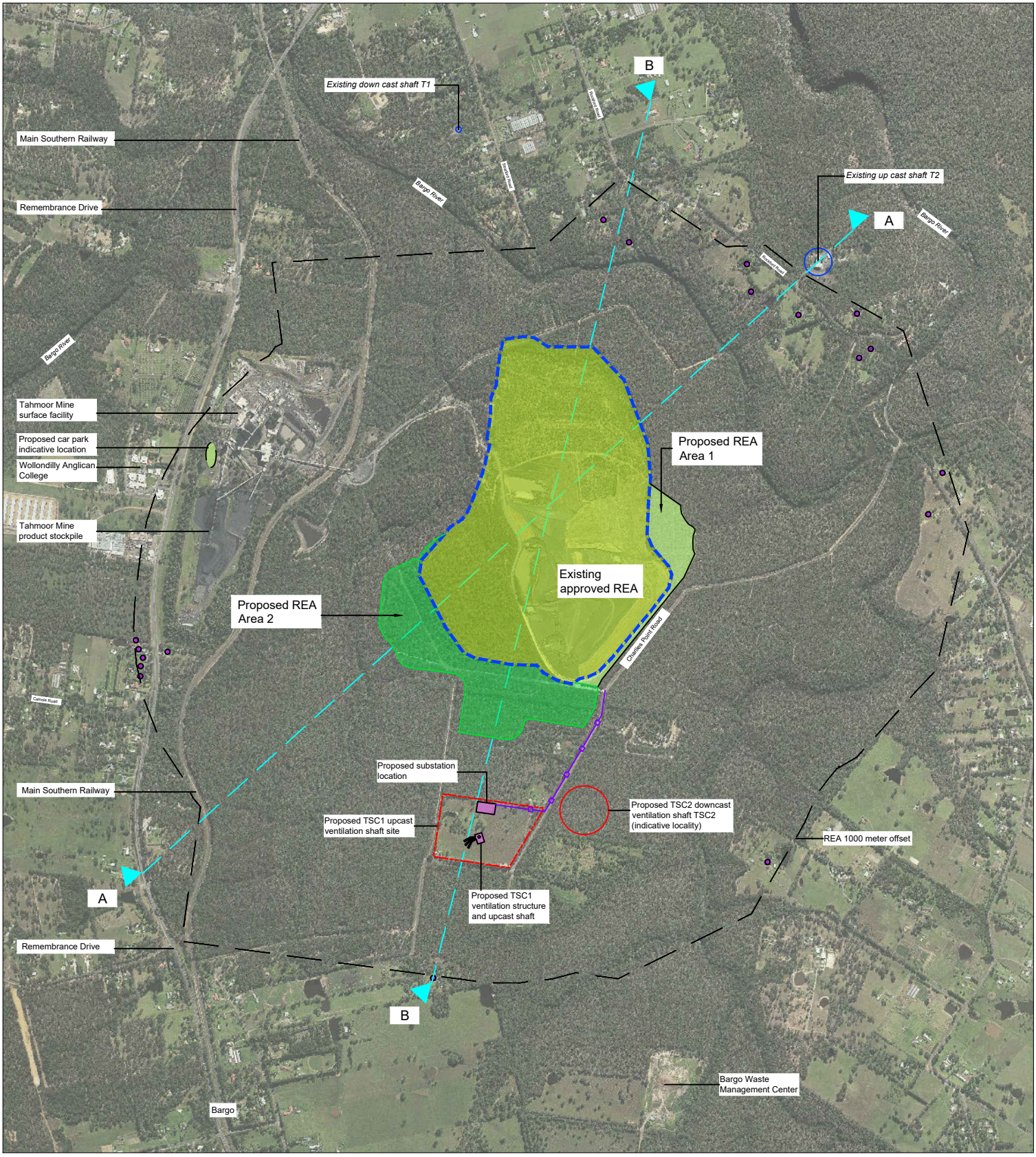
Whilst construction activities will tend to be more visible than the operational stage of the Project, the construction activities will be temporary in nature and transient in nature. Views toward construction activities will be largely restricted by existing tree cover within the Project Area.

7.6 Night time lighting

Some components of the Project will include additional low-level intensity night lighting (i.e. the two new ventilation fan sites). Given the low-level intensity light to be used, and the location of these sites in areas away from residential dwellings, it is unlikely the low-level intensity lighting will be visible from residential dwellings. Low level night lighting at the existing facilities will continue to include individual and direction spot lighting and avoid broad area or floodlighting which will minimise the potential for 'sky glow' above existing facilities. The majority of infrastructure areas associated with the Project will be unlikely to require additional lighting, or light fixtures that will create light spill toward, or be directly visible from surrounding sensitive view locations including private residential dwellings.

7.7 Summary of visual significance

Overall the Project is considered to have a negligible visual effect and significance with regard to the proposed key constructed elements and associated infrastructure. The overall negligible visual effect and significance includes views from the majority of surrounding rural residential dwellings and views from local road corridors as well as roads carrying higher volumes of traffic such as Remembrance Drive. The negligible visual significance results from a combination of sloping and ridgeline landforms that surround the Project Area, together with moderate to dense tree cover within and surrounding the Project Area and residential dwellings.



Legend

- Existing and approved Reject Emplacement Area (indicative location)
- Proposed Reject Emplacement Area (REA), Area 1 (indicative location)
- Proposed Reject Emplacement Area (REA), Area 2 (indicative location)
- Residential dwelling within 1km of proposed REA Stages 1 and 2
- Proposed 66 kV power line (indicative alignment)
- Proposed ventilation shaft as noted (indicative location)
- Existing ventilation shaft as noted (indicative location)
- Proposed car park (indicative location)
- Cross section location

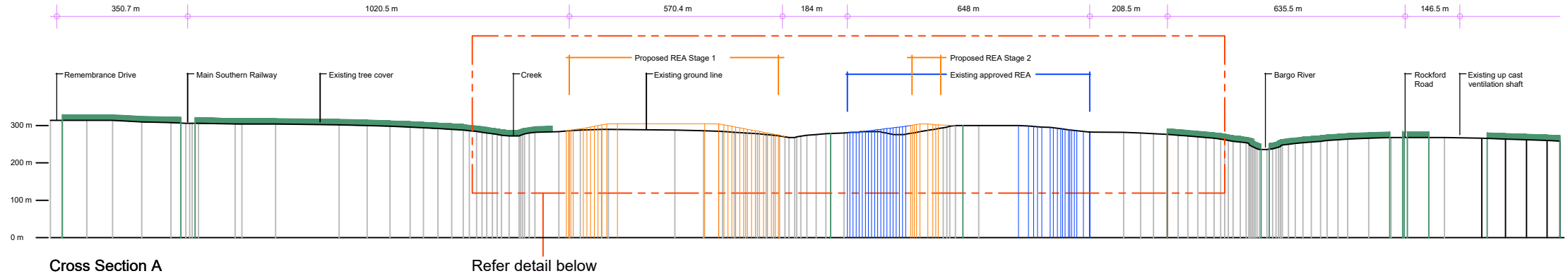
A

0km 250m

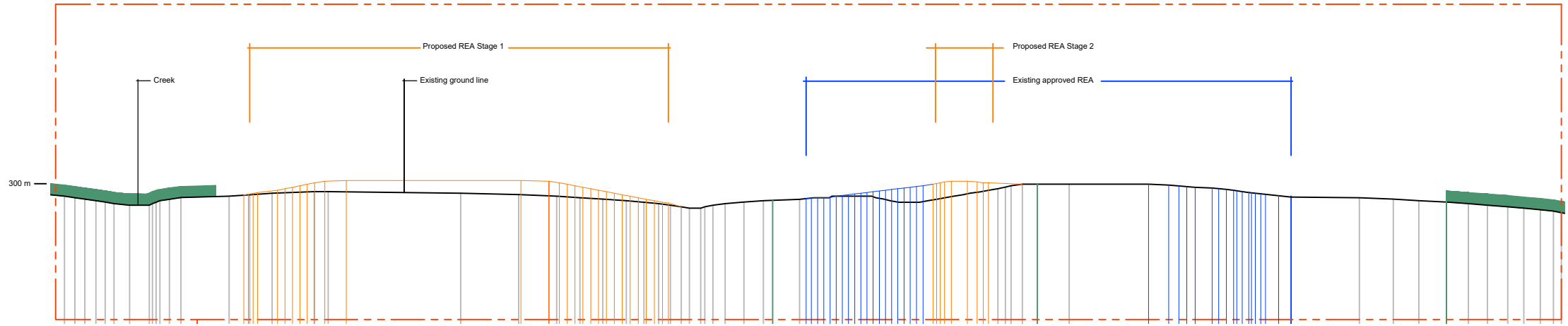
Figure 14
Proposed REA locality plan

Tahmoor Coal - Tahmoor South Project

GREEN BEAN DESIGN
landscape architects

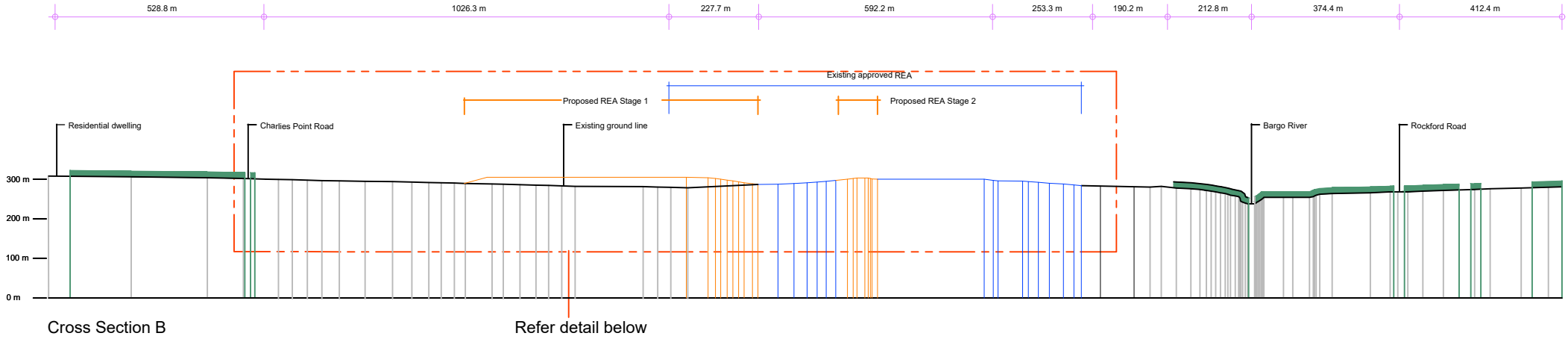


Cross Section A



Cross Section A Detail

Figure 15
Cross section A north east to south west across existing and proposed REA Stages 1 and 2



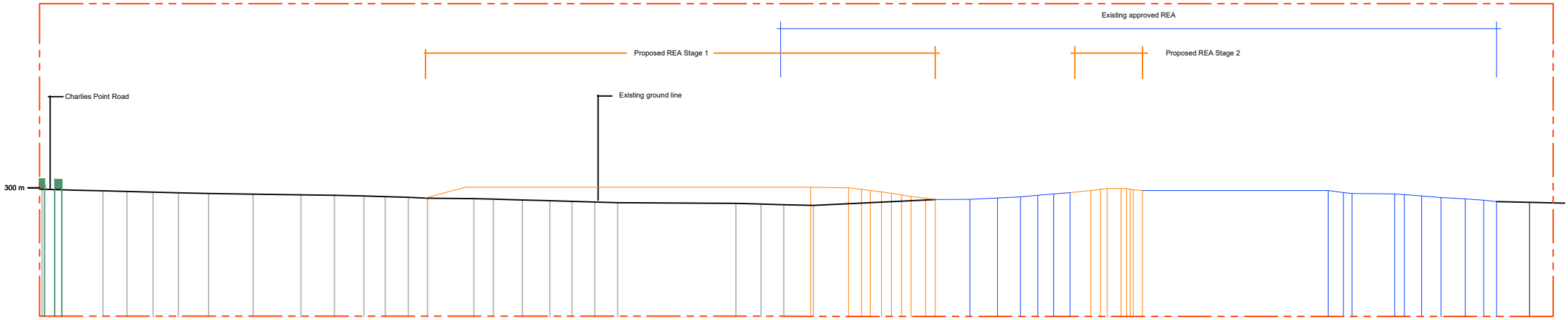


Figure 16
Cross section B north north east to south south west across existing and proposed REA stages 1 and 2

Cumulative Impact Assessment

Section 8

8.1 Cumulative Impact Assessment

A cumulative visual impact may result from elements of the Project being constructed in conjunction with other existing or proposed developments which could be either associated or separate to it.

Separate developments could occur or be located within a regional context where visibility is dependent on a journey between each site or an individual Project viewshed.

The Project is considered to have a very limited potential to increase the significance of cumulative visual impact due to the extent of visual screening surrounding the Project Area and the location of proposed constructed elements relative to existing mine infrastructure within the Project Area.

Mitigation measures

Section 9

9.1 Mitigation measures

While the overall significance of the Project's visual impact has been determined as negligible, the following mitigation measures will potentially help to minimise the level of residual visual impacts.

The mitigation measures generally involve reducing the extent of visual contrast between the visible portions of the Project structures and the surrounding landscape.

9.2 Structures

The colour and texture of new structures in the Project Area should be dark in tone and utilise non-reflective materials where possible. This will potentially minimise the visual contrast between the structures and surrounding background to a number of views locations surrounding the Project Area.

9.3 Lighting

- any lighting associated with the Project should be designed to avoid direct line of sight from areas surrounding the site where possible
- large floodlights will generally not be used, although it is likely that some lights may be required for emergency lighting to allow emergency maintenance
- where necessary security lighting should be designed to minimise light spill.

9.4 Landscape mitigation

Moderate to dense tree cover surrounding the Tahmoor Mine surface facility, and more widely throughout the Project Area, provides a significant level of screening mitigation toward existing and proposed Project infrastructure. Whilst the Project will require the removal of some existing tree cover (as detailed in the EIS Ecological Assessment), this VIA has considered and determined that the extent of proposed tree removal will not have an adverse impact on the overall visibility of the Project including views from sensitive receptors such as residential dwellings and motorists travelling along Remembrance Drive.

Proposed Project work within the Tahmoor Mine surface facility will be effectively screened by areas of contemporary tree cover within and surrounding the surface facility. This includes tree planting on mounds along the Tahmoor Mine boundary with Remembrance Drive. Ongoing landscape maintenance works undertaken by Tahmoor Coal include opportunities to identify and implement landscape works along the Remembrance Drive boundary to maintain the future integrity of visual screening and mitigate views from the road corridor as well as residential dwellings and the Wollondilly Anglican College to the west of the surface facility.

Landscape rehabilitation works such as tree and shrub planting will take place progressively during the establishment of the REA Stages. These works will follow constructed slopes as well as final landform profiles. Ongoing and progressive landscape rehabilitation will assist in the mitigation of potential visual impacts associated with the development and the daily working operations within and surrounding the REA Stages. Whilst ongoing landscape rehabilitation works will assist in the mitigation of views toward constructed landforms additional tree planting works along sections of the REA boundary with Charlies Point Road will consolidate and reinforce the potential screening and filtering of views from the road corridor.

Where possible, existing tree cover within the Project Area should be retained and protected to the fullest extent practical around proposed development areas including the proposed ventilation shaft sites and the proposed REA Stages.

Conclusion

Section 10

10.1 Summary

This VIA concludes that overall the key proposed Project elements will have a negligible visual impact on people living in or travelling through the landscape within and surrounding the Project Area.

The overall negligible visual effect and significance will be due to a combination of the following factors:

- The primary component of the Project and the majority of related activities, are associated with the extension of underground mining which would not be visible from surrounding view locations. Whilst the Project would include some additions to existing surface facilities, these would be located within the context of existing and established mining operations.
- The Project Area is located within a landscape context of sloping and ridgeline landforms with moderate to dense tree cover which will combine to result in an overall low level of visibility and a negligible to low magnitude of visual significance.
- The majority of Project activities and operations will only be partially visible during construction stages including the use of cranes and drill rigs. These impacts will be temporary in nature.
- Existing undulating landforms and tree cover will result in a high visual absorption capability for the existing landscape to accommodate the majority of the Project's key elements and associated development infrastructure.
- The key Project activities within the Project Area will not be visible from surrounding urban centres, the majority of local road corridors or major transport corridors including the Hume Highway.
- The Main Southern Railway passes through the Project Area. Transitory and short term passenger views from the rail corridor will be largely contained by tree cover extending along and beyond the rail corridor.
- There are no significant views toward the Project from surrounding dedicated public lookouts. Distant pubic vantage points will not be significantly impacted by the Project.
- The proposed reject emplacement area works, and final landform, will be largely screened from surrounding residential dwellings by dense tree cover alongside and beyond the Bargo River corridor.
- The extent and condition of existing tree cover surrounding and within the Project Area will also limit the potential for direct, indirect or sequential cumulative visual impacts in association with existing industrial infrastructure or other coal mining activities beyond the Project Area.
- The use of appropriate finished colours and non-reflective materials for proposed infrastructure will help to minimise the potential for visual contrast against the surrounding landscape when viewed from some view locations within and beyond the Project Area.
- Implementing progressive landscape works, including shrub and tree planting for all rehabilitated areas, will assist to minimise potential visual impacts associated with the Project.

Limitations

GBD has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Tahmoor Coal. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the GBD Proposal dated October 2012.

The methodology adopted and sources of information used are outlined in this report. GBD has made no independent verification of this information beyond the agreed scope of works and GBD assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to GBD was false.

This report was prepared between January 2013 and October 2018. This report is based on the conditions encountered and information reviewed at the time of preparation. GBD disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

© Green Bean Design 2018. This report is subject to copyright. Other than for the purposes and subject to conditions prescribed under the Copyright Act, or unless authorised by GBD in writing, no part of it may, in any form nor by any means (electronic, mechanical, micro copying, photocopying, recording or otherwise), be reproduced, stored in a retrieval system or transmitted without prior written permission. Inquiries should be addressed to GBD in writing.

This page has been left blank intentionally.