Tarrawonga Coal Project

Environmental Assessment

APPENDIX J

VISUAL ASSESSMENT

Resource Strategies

Tarrawonga Coal Pty Ltd

Tarrawonga Coal Project

Visual Assessment

Prepared for Tarrawonga Coal Pty Ltd

October 2011

urbis

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1 Introduction

The Tarrawonga Coal Mine is an open cut mining operation located approximately 15 kilometres (km) north-east of Boggabri and 42 km north-northwest of Gunnedah in New South Wales (NSW) (**Figure 1**). Tarrawonga Coal Pty Ltd (TCPL) is the owner and operator of the Tarrawonga Coal Mine, which is a joint venture between Whitehaven Coal Mining Pty Ltd (Whitehaven) (70% interest) and Boggabri Coal Pty Ltd (BCPL) (a wholly owned subsidiary of Idemitsu Australia Resources Pty Ltd) (30% interest). The Tarrawonga Coal Mine commenced operations in 2006 and currently produces up to approximately 2 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal.

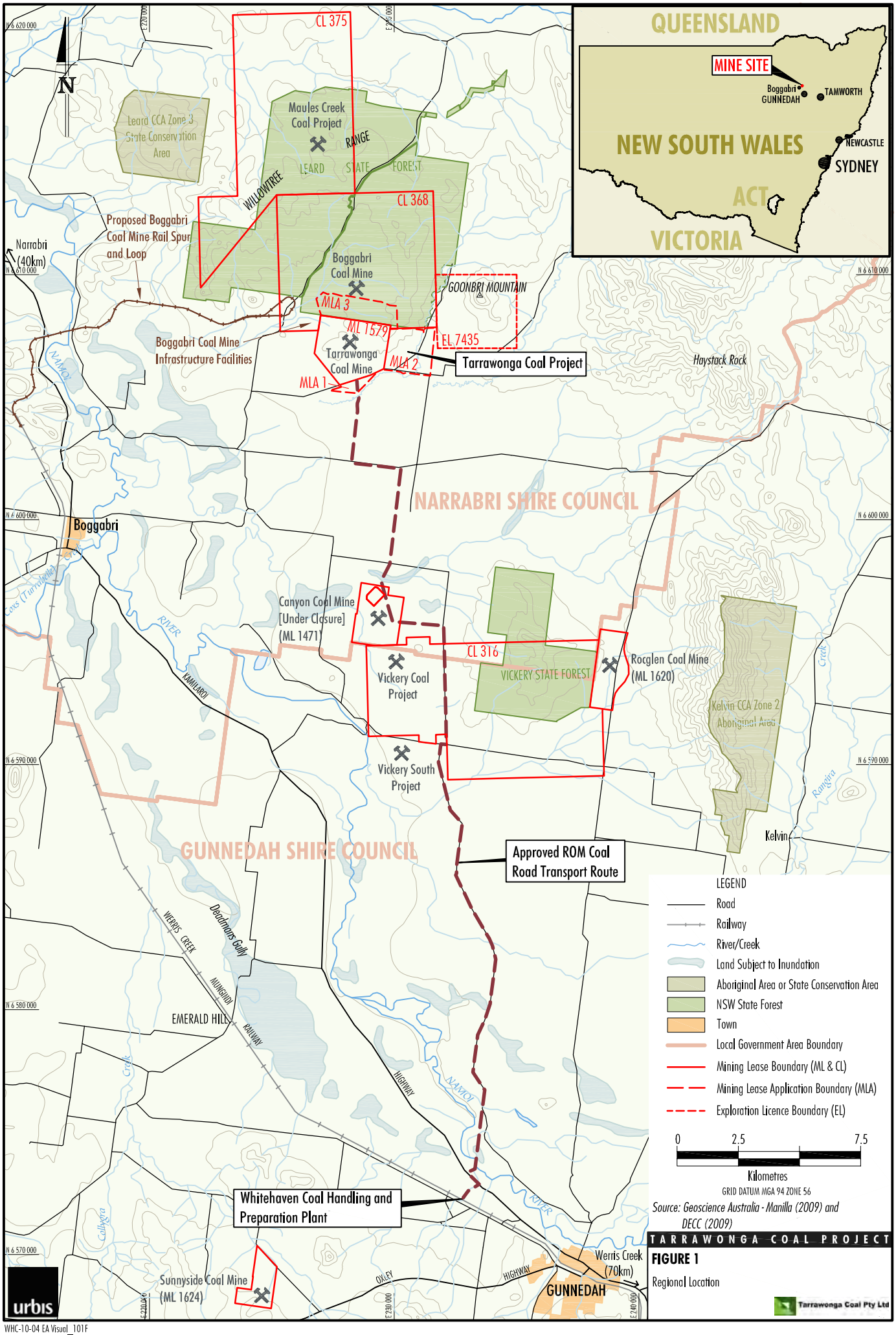
The Tarrawonga Coal Project (the Project) would involve the continuation and extension of open cut mining operations at the Tarrawonga Coal Mine and would facilitate a ROM coal production rate of up to 3 Mtpa. The proposed life of the Project is 17 years, commencing 1 January 2013. This would extend the life of the currently approved operations at the Tarrawonga Coal Mine by approximately 12 years (i.e. until 2029).

The approximate extent of the existing and approved surface development (including open cut, mine waste rock emplacement, soil stockpiles and infrastructure areas) at the Tarrawonga Coal Mine are shown on **Figure 2**.

A detailed description of the Project is provided in Section 2 in the Main Report of the Environmental Assessment (EA).

This report has been prepared by Urbis to provide a visual assessment for inclusion in the EA for the Project. The following components were included as part of this visual assessment:

- Review the main aspects of the Project in regard to potential visual impacts (Section 2).
- Characterisation of the existing landscape and visual setting (Section 3).
- Preparation of a Zone of Visual Influence (ZVI) analysis which compares the viewsheds of the existing approved Tarrawonga Coal Mine and the Project to identify new potential viewpoints (Section 4.2).
- Qualitatively assess (Section 4):
  - Visual modification at key viewpoints – *How would the Project contrast with the landscape character of the surrounding setting?*
  - Visual sensitivity at key viewpoints – *How sensitive would viewers be to the Project?*
  - Potential night-lighting impacts.
  - Potential cumulative impacts.
- Propose visual impact mitigation and management measures (Section 5).



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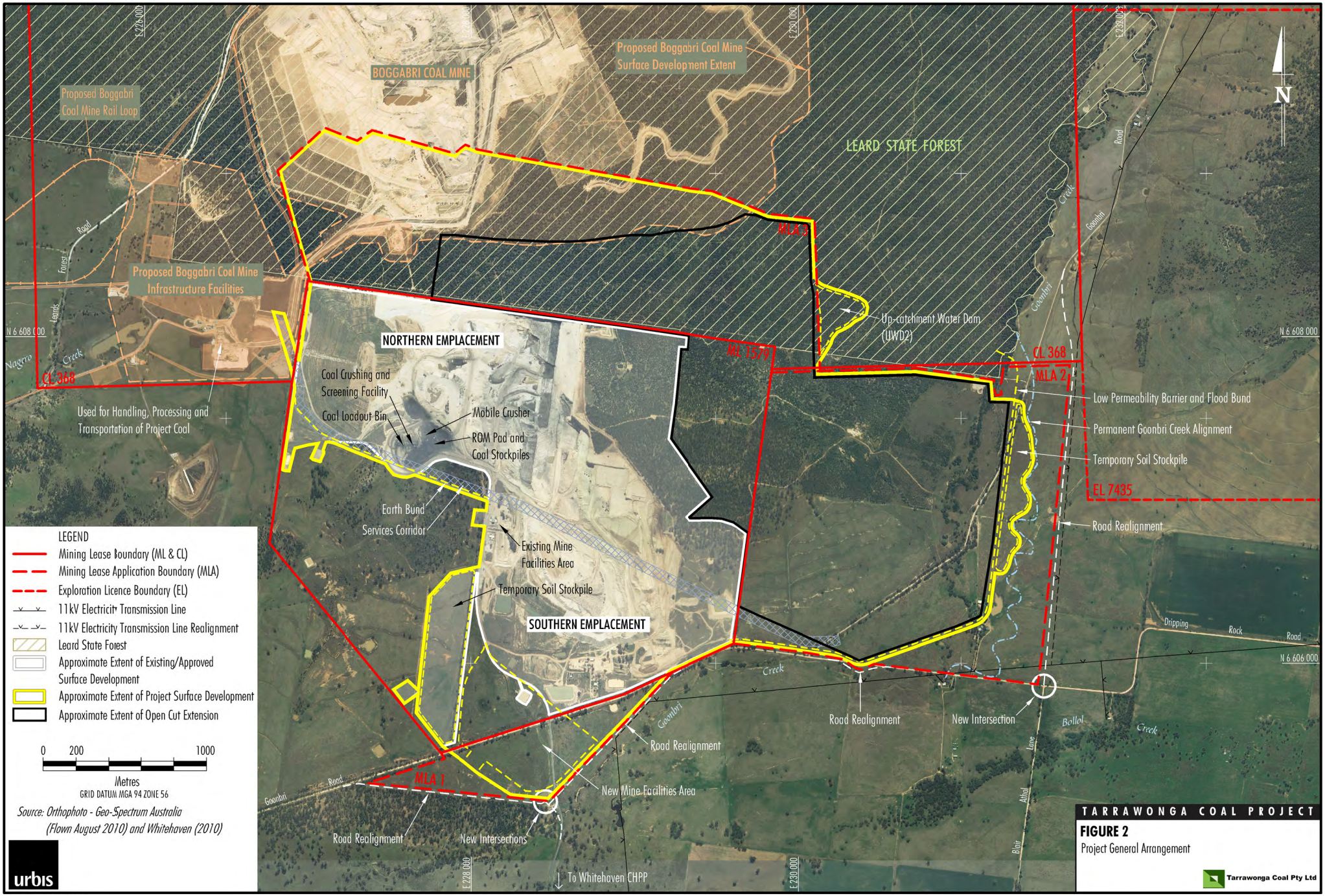

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2 Project Description – Visual Character

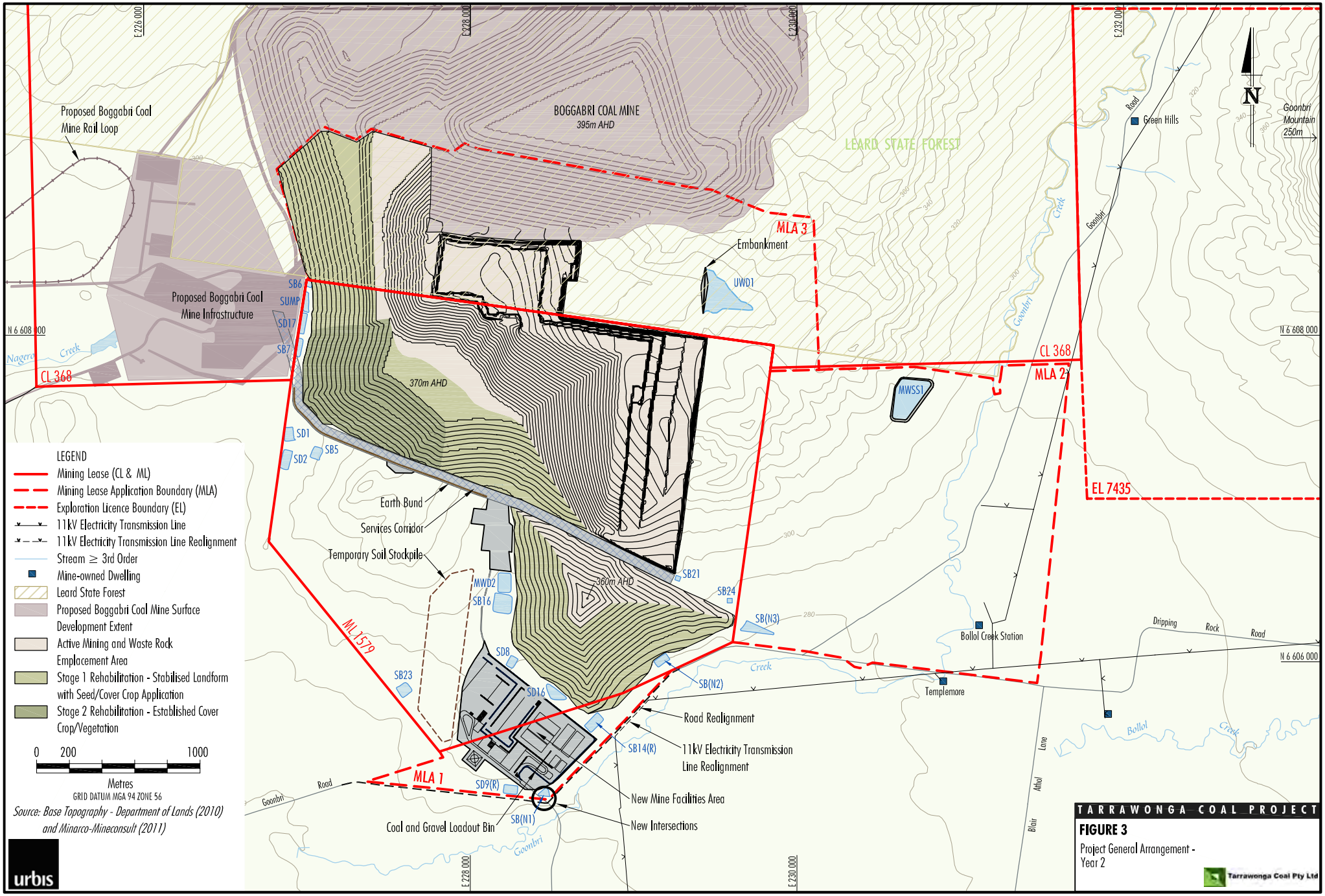
2.1 OVERVIEW

The Project would involve mining to the east within Mining Lease (ML) 1579 and Mining Lease Application (MLA) 2 and to the north into Coal Lease (CL) 368 (MLA 3) **(Figures 3** to **8).** The key components of the proposed Project are summarised below.

- continued development of mining operations in the Maules Creek Formation to facilitate a Project ROM coal production rate of up to 3 Mtpa, including open cut extensions:
  - to the east within ML 1579 and MLA 2; and
  - to the north within CL 368 (MLA 3) which adjoins ML 1579;
- ongoing exploration activities;
- construction and use of a services corridor (including haul road link) directly from the Project open cut mining operation to the upgraded Boggabri Coal Mine Infrastructure Facilities[1];
- use of upgraded Boggabri Coal Mine Infrastructure Facilities for the handling and processing of Project coal and the loading of Project product coal to trains for transport on the Boggabri Coal Mine private rail spur to the Werris Creek Mungindi Railway[1];
- construction and use of a new mine facilities area including relocation of existing mine facilities infrastructure and service facilities;
- use of an existing on-site mobile crusher for coal crushing and screening of up to 150,000 tonnes of domestic specification coal per annum for direct collection by customers at the mine site;
- use an existing on-site mobile crusher to produce up to approximately 90,000 cubic metres of gravel materials per annum for direct collection by customers at the mine site;
- progressive backfilling of the mine void behind the advancing open cut mining operation with waste rock and minor quantities of coarse reject material;
- continued and expanded placement of waste rock in the Northern Emplacement (including integration with the Boggabri Coal Mine emplacement) and Southern Emplacement, as mining develops;
- progressive development of new haul roads and internal roads, as mining develops;
- realignment of sections of Goonbri Road and construction of new intersections;
- construction of an engineered low permeability barrier to the east and south-east of the open cut to reduce the potential for local drainage of alluvial groundwater into the open cut;
- removal of a section of Goonbri Creek within the Project open cut and the establishment of a permanent Goonbri Creek alignment and associated flood bund to the east and south-east of the open cut;
- progressive development of sediment basins and storage dams, pumps, pipelines and other water management equipment and structures;
- continued development of soil stockpiles, laydown areas and gravel/borrow areas;
- ongoing monitoring and rehabilitation; and
- other associated minor infrastructure, plant, equipment and activities.

The proposed life of the Project is 17 years, commencing 1 January 2013.

[1] Subject to approvals and upgrades being in place for the transfer of Project ROM coal to the Boggabri Coal Mine Infrastructure Facilities.



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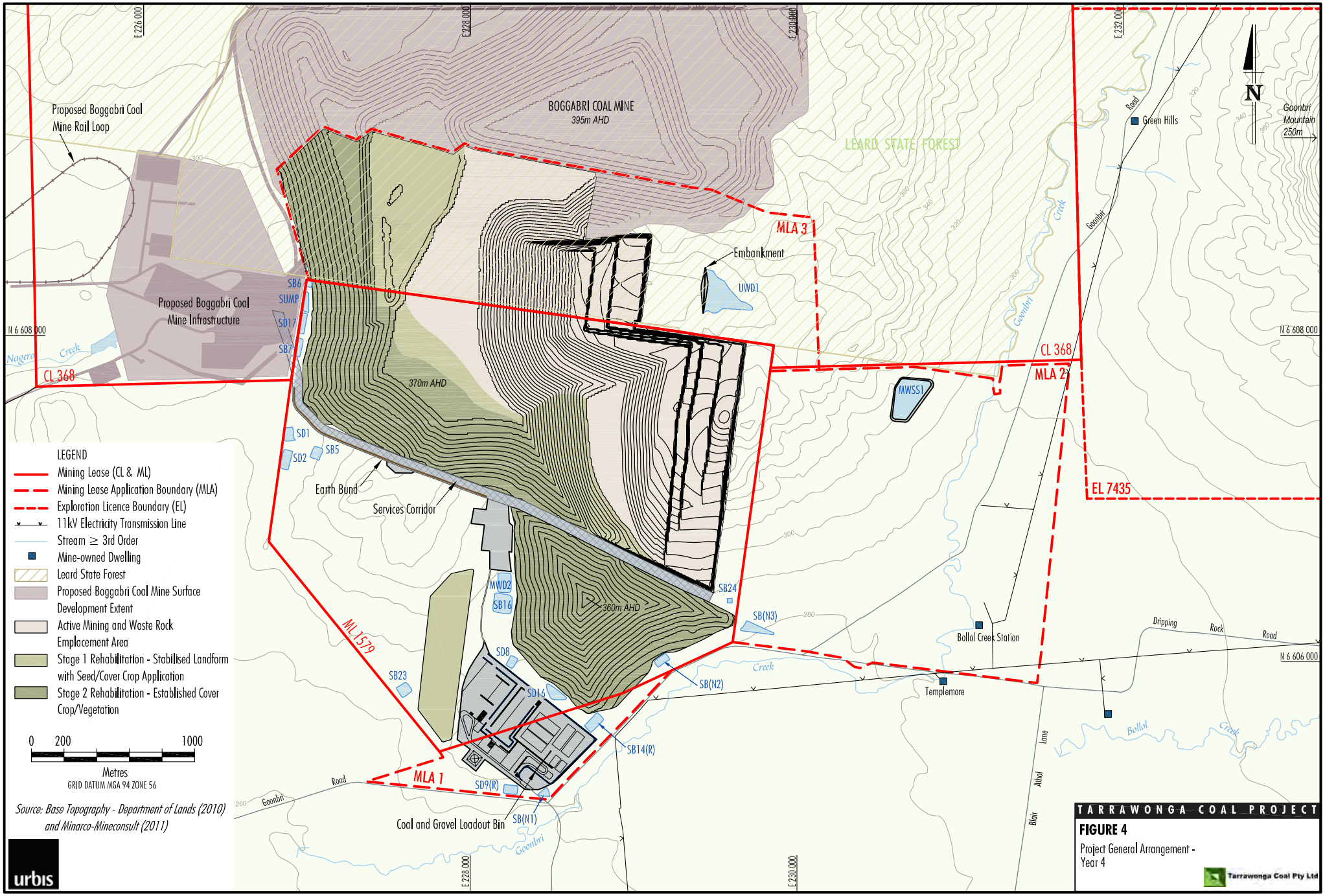

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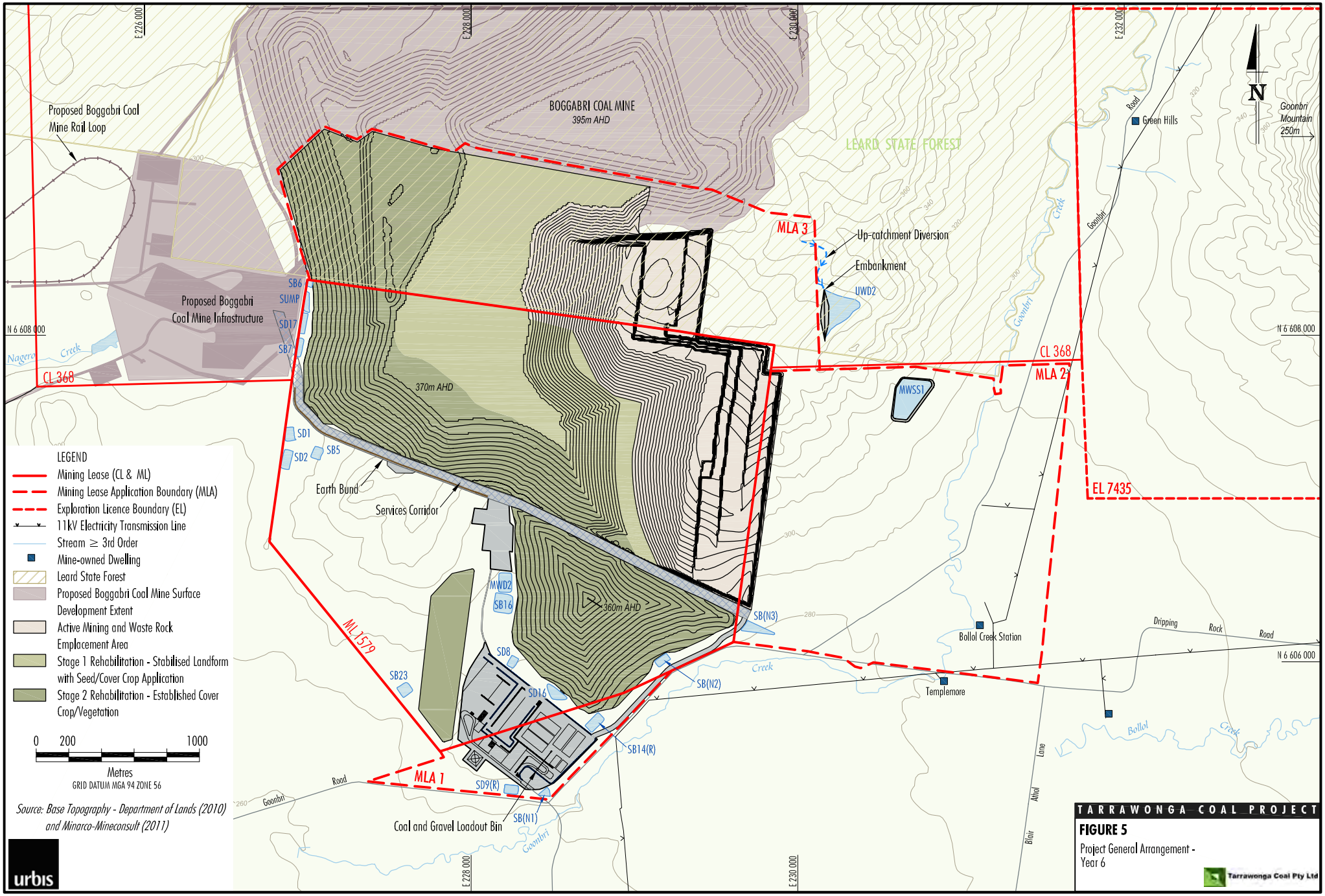

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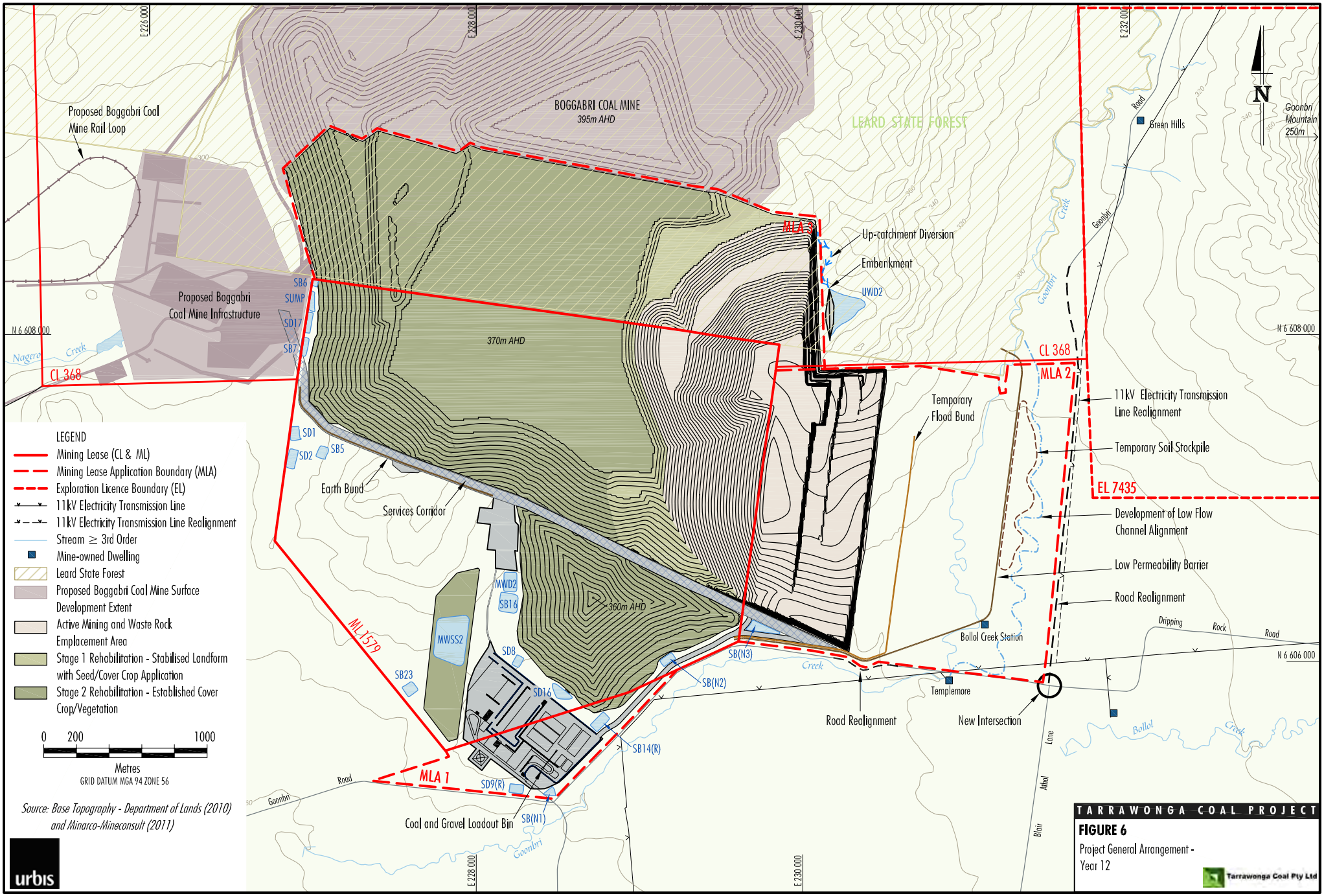

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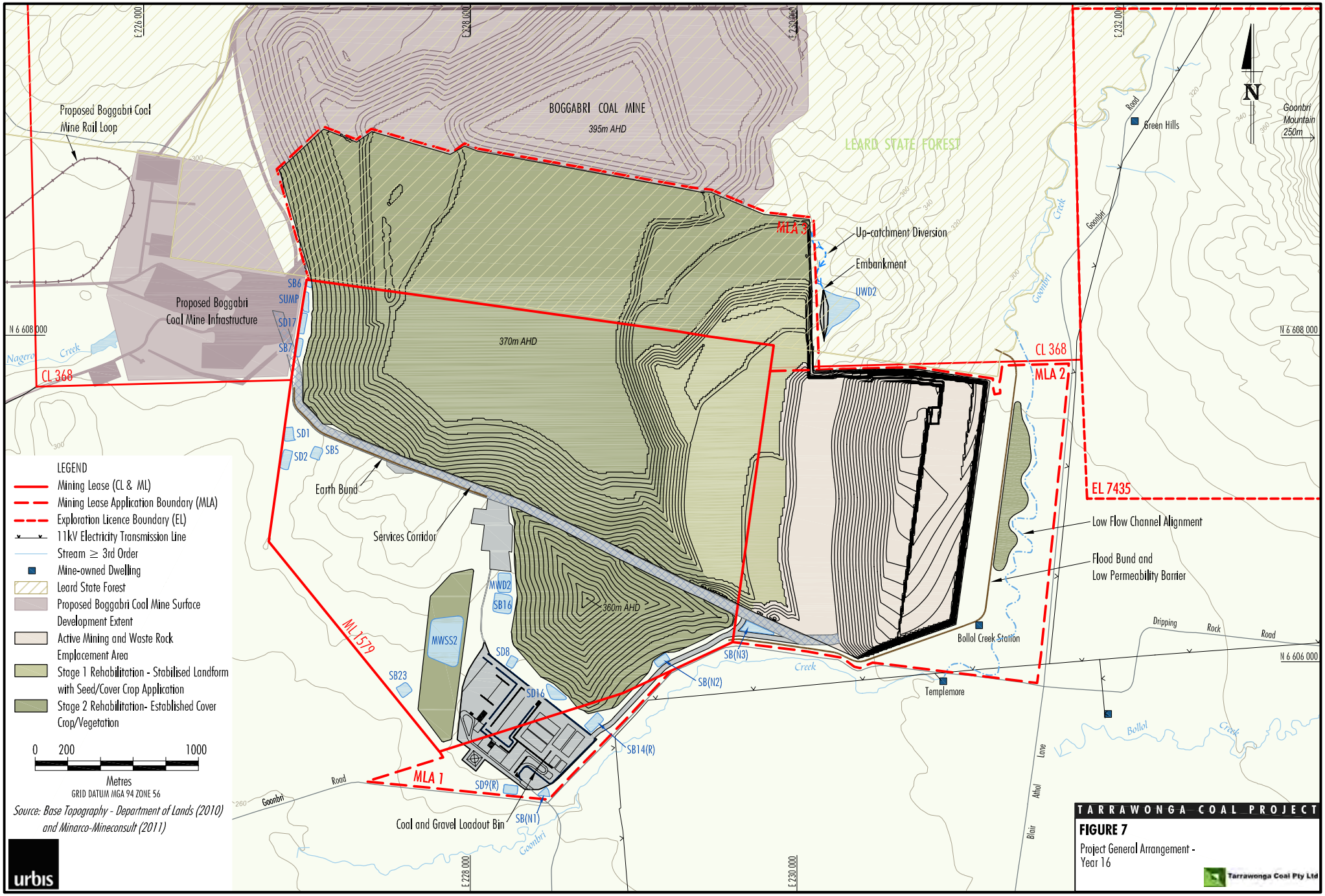

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The major aspects of the Project considered to have the potential to impact on the visual landscape include:

- modification of topographic features, including:
  - extension of the open cut;
  - expansion of the Northern and Southern Emplacement extents;
  - temporary increase in height of the Southern Emplacement prior to a reduction in final height during rehabilitation;
  - construction of the flood bund;
  - construction of the earth bund; and
  - establishment of the permanent Goonbri Creek alignment;
- realignment of sections of Goonbri Road and electricity transmission line;
- additional vegetation clearance; and
- extension of lighting associated with extended night-time mining operations.

These are described further below.

2.2 PROJECT LANDFORMS

The extent of the open cut and mine waste rock emplacements would be increased by the Project. The final elevation of the Northern Emplacement would remain unchanged at a height of 370 metres (m) Australian Height Datum (AHD). The height of the Southern Emplacement would temporarily increase to a maximum height of 360 m AHD (i.e. an increase of 20 m) during the operational life of the Project. During rehabilitation the elevation of the Southern Emplacement would be reduced to a final height of 330 m AHD. However, these changes, while altering the layout and extent of the approved/existing mine, are effectively extensions to, and consolidation of, existing approved mine landforms, particularly with the integration of the Northern Emplacement with the waste rock emplacement at the Continuation of the Boggabri Coal Mine to the north.

A summary of the final elevations of the Project landforms is provided in **Table 1**.

Mine Landform	*Approved Elevation (m AHD)*	*Maximum Elevation (m AHD)*	*Final Elevation (m AHD)*
Northern Emplacement	370	370	370
Southern Emplacement	340	360	330

Table 1 – Summary of Final Project Landform Elevations

The rehabilitation of mine waste rock emplacements would be undertaken on a progressive basis in order to improve integration of the Project landforms with the surrounding environment and mitigate potential visual impacts.

Mine waste rock emplacements would, over time, vary in appearance from freshly placed rock and soil material to rehabilitated landforms. As such, the level of visual modification created by these landforms would change, reducing as vegetation becomes established and matures. The landforms would be rehabilitated in accordance with the Rehabilitation and Landscape Management Strategy presented in Section 5 in the Main Report of the EA.

The Project would include the construction of a flood bund on the eastern and southern extent of the Project (**Figures 2** and **6**) before Year 12. The flood bund would be approximately 1.5 to 2.5 m above the ground level. Where the flood bund runs adjacent to the internal haul road link on the southern extent of the Project, the flood bund would be up to 6 m above the ground level. The flood bund would be revegetated with endemic plants that are compatible with the existing surrounding vegetation. The level of visual modification created by the flood bund would change, reducing as vegetation becomes established and matures. Once established, the vegetated flood bund would effectively become a visual screen and would assist in the screening of views of the Project from the eastern and southern extents of the Project.

An earth bund on the southern side of the internal haul road link would also be established as part of the Project (**Figure 2**) during Year 1. The earth bund would be approximately 6 m high and located on the southern side of the internal haul road link approximately 60 m from the toe of the Northern Emplacement. As with the flood bund, the earth bund would be revegetated with endemic plants that are compatible with the existing surrounding vegetation. The level of visual modification created by the earth bund is expected to be low as it would blend in with the Northern Emplacement once the vegetation screen has been established.

The Project would include the establishment of the permanent Goonbri Creek alignment adjacent to, and east of, the proposed open cut extent (**Figure 2**). The level of visual modification associated with the rehabilitated permanent alignment of Goonbri Creek would be low as it would be consistent with the surrounding landscape. In addition, the rehabilitated permanent Goonbri Creek alignment would assist in the further screening of views of the Project from the eastern extent of the Project.

Temporary soil stockpiles would be required for the Project (**Figure 2**). These temporary soil stockpiles would be up to 3 m high and would immediately be covered with a cover crop after stockpiling. The level of visual modification created by the soil stockpiles would change, reducing as the cover crop develops. Once established, the temporary soil stockpile located on the eastern side of the Project (**Figure 2**) would assist in the screening of views of the Project from the eastern extent of the Project. The temporary soil stockpile on the western side of the Project (**Figure 2**) would assist in the screening of views of the mine infrastructure area from the western extent of the Project.

It is considered that the visual prominence of the flood bund, earth bund and temporary soil stockpiles would insignificant in comparison to the visual prominence of the mine waste rock emplacements.

2.3 REALIGNMENT OF GOONBRI ROAD AND ELECTRICITY TRANSMISSION LINE

The Project would include the realignment of Goonbri Road and the construction of new intersections (**Figure 2**). The road realignments would also include realignment of sections of the existing 11 kilovolt electricity transmission line (**Figure 2**). These realignments may modify existing views from private dwellings and roads located to the south and east of the Project. A vegetation screen consisting of endemic plants that are compatible with the existing surrounding vegetation would be developed along the realigned sections of Goonbri Road in advance of its construction to minimise views of the Project from the realigned Goonbri Road and to minimise potential visual impacts associated with the realigned road and electricity transmission line. The road and electricity transmission line realignments are expected to result in a low level of visual modification with the implementation of the proposed vegetation screen.

2.4 VEGETATION CLEARANCE

A large proportion of the Project disturbance area is cleared agricultural land, due to a history of grazing and cultivation. The surface disturbance associated with the Project would involve disturbance of approximately 557 hectares (ha) of land, which includes clearing of approximately 145 ha within the Leard State Forest. Portions of the vegetation in this area may provide some vegetation screening of the existing mine waste rock emplacements from viewpoints to the east-north-east.

2.5 NIGHT–LIGHTING

Night-lighting is currently emitted from the following key sources at the Tarrawonga Coal Mine:

- overhead lighting of the mine infrastructure area;
- mobile lighting plants (floodlights) used on the Northern and Southern Emplacements and the open cut; and
- mobile vehicle-mounted lights (e.g. haul trucks, loaders, coal trucks, and other heavy and light vehicles in various locations within ML 1579).

The Project would vary the potential effects of existing night-lighting over the life of the Project. Lighting from the Project may be visible at additional locations due to the increased elevation of light sources on the Southern Emplacement and the increased extent of the mine waste rock emplacements.

In addition, the Project would include an increase in the number of mine fleet and operational hours. It is proposed that mining operations would be extended from up to 19.5 hours per day to 24 hours per day, seven days per week. Consequently there would be an increase in the duration of night-lighting.

3 Existing Landscape and Visual Setting

3.1 LOCAL LANDSCAPE CHARACTER AND SCENIC QUALITY

It has been established through previous studies that scenic quality increases as topographic ruggedness and relative relief increase (Leonard and Hammond, 1984; Burns and Rundell, 1969; Anderson *et al*, 1976). Scenic quality, particularly in modified landscapes, can also increase as the patterning of vegetation increases.

The area surrounding the Project comprises a number of distinct land use types and landscape units of varying levels of landscape quality. These have been defined as follows:

- Agricultural Areas – the Project is predominantly surrounded to the south, east and west by heavily cleared dryland agriculture areas.
- Boggabri Coal Mine – located to the immediate north-west of the Project, is an open cut coal mining operation.
- Leard State Forest – located to the immediate north of the Project, is a wooded area of higher elevation in the local area.
- Residential Dwellings – detached private dwellings located to the east, south and west of the Project.
- Goonbri Mountain (546 m AHD) – a prominent feature within the regional landscape with its "table top" and convex side slopes, is located approximately 2 km to the north-east of the Project.
- Merriown Mountain (409 m AHD) – is located adjacent the Leard State Forest approximately 3 km north-west of the Project.
- Barbers Pinnacle (360 m AHD) – isolated knoll located approximately 5 km south–west of the Project.
- Willow Tree Range – located approximately 6 km to the north of the Project and partly located in the Leard State Forest, is an area of higher elevation within the region with a number of peaks to a maximum elevation of 467 m AHD.
- An unnamed wooded range – runs north to south, approximately 9 km to the east of the Project with a number of peaks to a maximum elevation of 823 m AHD.
- Nagero Creek – runs near the northern and western extent of the Project.
- Goonbri Creek – runs along the eastern and southern extent of the Project.
- Bollol Creek – runs near the south-eastern extent of the Project.

Local, sub-regional and regional visual settings are based on distance from the Project and have been defined as follows:

- Regional Setting – greater than 5 km from the Project;
- Sub-regional Setting – 1 to 5 km from the Project; and
- Local Setting – up to 1 km from the Project.

Major topographic features in the vicinity of the Project are provided on **Figure 1**. A description of landscape character and scenic quality for each of these settings is provided below.

3.1.1 Regional Setting (>5 km)

The regional setting has attributes of moderate scenic quality due to the presence of the Willow Tree Range 6 km to the north and the unnamed wooded range 9 km to the east of the Project. The contrast between the vegetation and topography of the ranges and agricultural areas of the valley adds to visual interest. The regional setting also has many attributes of low scenic quality due to the generally flat, cleared dryland agricultural areas that dominate the landscape.

A number of reserved areas are also located in the regional setting of the Project, including the Vickery State Forest (located approximately 9 km to the south-east), Leard Co-ordinated Conservation Area (CCA) Zone 3 State Conservation Area (located approximately 7 km to the north-west), Kelvin CCA Zone 2 Aboriginal Area (located approximately 16 km to the south-east), and Mount Kaputar National Park (located approximately 15 km to the north).

Towns within the Project regional setting include Boggabri, Gunnedah and Narrabri.

3.1.2 Sub-regional Setting (1-5 km)

The sub-regional setting has many attributes of low scenic quality due to the generally flat, cleared dryland agricultural areas that dominate the landscape, but has attributes of moderate scenic quality due to the presence of Leard State Forest, Merriown Mountain (located approximately 3 km to the north-west of the Project), Barbers Pinnacle (located approximately 5 km to the south-west of the Project), Goonbri Mountain (located approximately 3 km to the north-east) and other smaller localised hills and ridgelines and associated areas of denser vegetation.

Areas of cleared agricultural land are interspersed with vegetation generally associated with local roads and dwellings and other farm buildings.

There are no towns or small villages located within the sub-regional setting.

3.1.3 Local Setting (<1 km)

The local setting has been heavily modified over time with the majority of vegetation disturbed by historic agricultural clearing and mining operations. The overall visual character of the local setting is considered to be of low scenic quality.

Notwithstanding, to the immediate north of the Project, is the Leard State Forest (**Figure 2**) which predominantly comprises native woodland and forest vegetation and is of moderate scenic quality. The Leard State Forest is zoned for the purposes of forestry, recreation and mineral extraction. Part of the Boggabri Coal Mine (owned by BCPL) landforms, located in the Leard State Forest to the immediate north-west of the Project, also comprises part of the local setting.

Goonbri Creek runs adjacent the eastern and southern boundaries of the Project (**Figure 2**). Nagero Creek is located on the western boundary of the Project (**Figure 2**).

3.2 SITE TOPOGRAPHY AND VEGETATION

The topography of ML 1579 comprises a series of rolling hills which vary in elevation from approximately 280 to 380 m AHD. The development of the Tarrawonga Coal Mine and its associated open pit and mine waste rock emplacements has resulted in alteration to the site's pre-mining topography.

The proposed open cut expansion to the north into MLA 3 would extend into a small, east-west trending valley located in the Leard State Forest. The upper catchment of the valley has a maximum elevation of approximately 380 m AHD in the area that would be impacted by the expanded open cut. MLA 1 and MLA 2 encompasses the floodplains of Bollol Creek and Goonbri Creek to the south and east, and have elevations of between approximately 270 and 370 m AHD.

The north-east portion of ML 1579 and MLA 3 is comprised of regrowth vegetation and the Boggabri Coal Mine (**Figure 2**). The majority of MLA 1 and MLA 2 consists of cleared agricultural land with scattered trees (**Figure 2**). The remnant vegetation communities which exist within the Project area include *White Cypress Pine - Narrow-leaved Ironbark shrubby open fore*st, *White Box - White Cypress Pine shrubby woodland*, *White Box - White Cypress Pine grassy woodland*, *Narrow-leaved Grey Box - Poplar Box - White Cypress Pine grassy open woodland*, and *Bracteate Honeymyrtle low riparian forest* (FloraSearch, 2011) (Appendix F of the EA).

In general, views of the Tarrawonga Coal Mine from the surrounding area are generally limited due to the generally flat to slightly undulating topography and the presence of scattered vegetation along roadsides and around dwellings that partially or wholly screen some potential views.

4 Assessment of Potential Visual Impacts

The following sub-sections present a visual assessment of the potential impacts associated with the Project.

4.1 METHODOLOGY

The methodology employed by this visual assessment is based on the United States Department of Agriculture – Forestry Service (1974) methodology. Potential visual impact is assessed by evaluating the level of visual modification of the Project in the context of the visual sensitivity of relevant surrounding land use areas (i.e. those areas from which the Project may be visible). Levels of visual impact resulting from visual modification and sensitivity are illustrated in **Table 2**.

Level of Visual Impact VL = Very Low, L = Low, M = Moderate, H = High		***Viewer Sensitivity***		
		H	**M**	**L**
Level of Visual Modification	**H**	**H**	**H**	**M**
	M	**H**	**M**	**L**
	L	**M**	**L**	**L**
	VL	**L**	**VL**	**VL**

Table 2 – Visual Impact Matrix

4.1.1 Visual Modification

The level of visual modification of a proposed development can be 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 the level of visual modification generally decreases as the distance from the development to various viewpoint locations increases, and is categorised as follows:

- Negligible (or very low) level of visual modification – where the development is distant and/or relates to a small proportion of the overall viewscape.
- Low level of visual modification – 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 modified landscape.
- Moderate level of visual modification – where a component of the development is visible and contrasts with the landscape, while at the same time achieving a level of integration. This occurs where surrounding topography, vegetation or existing modified landscape provide some measure of visual integration or screening.
- High level of visual modification – where the major components of the development contrast strongly with the existing landscape.

4.1.2 Visual Sensitivity

Visual (viewer) sensitivity is a measure of how critically a change to the existing landscape is viewed from various use areas, and is a function of both land use and duration of exposure (i.e. individuals generally view changes to the visual setting of their dwelling more critically than changes to the visual setting of the broader setting in which they travel or work).

Visual sensitivity to a development depends on a range of viewer characteristics. The primary characteristics used in this visual assessment are land use at the viewpoint, the distance between viewers and the Project and the visibility of the Project landforms. The extent to which the viewer has become accustomed to the Tarrawonga Coal Mine, which is an existing modification to the landscape, has also been considered.

Typical visual sensitivity levels are defined in **Table 3**.

Use Area	Foreground (Local Setting)		Middleground (Sub-regional Setting)		Background (Regional Setting)
	0-0.5 km	0.5-1 km	1-2.5 km	2.5-5 km	> 5 km
Natural Area – Recreation	H	H	H	M	L
Residential – Rural	H	H	H	M	L
Tourist Roads	H	M	M	L	L
Other Main Roads	M	L	L	L	L
Local Roads	L	L	L	L	L
Industrial Areas	L	L	L	L	L

Table 3 – Typical Visual (Viewer) Sensitivity Levels

For the purposes of this visual assessment, visual sensitivity was classified using the relevant land use and distance from the Project in accordance with **Table 3**.

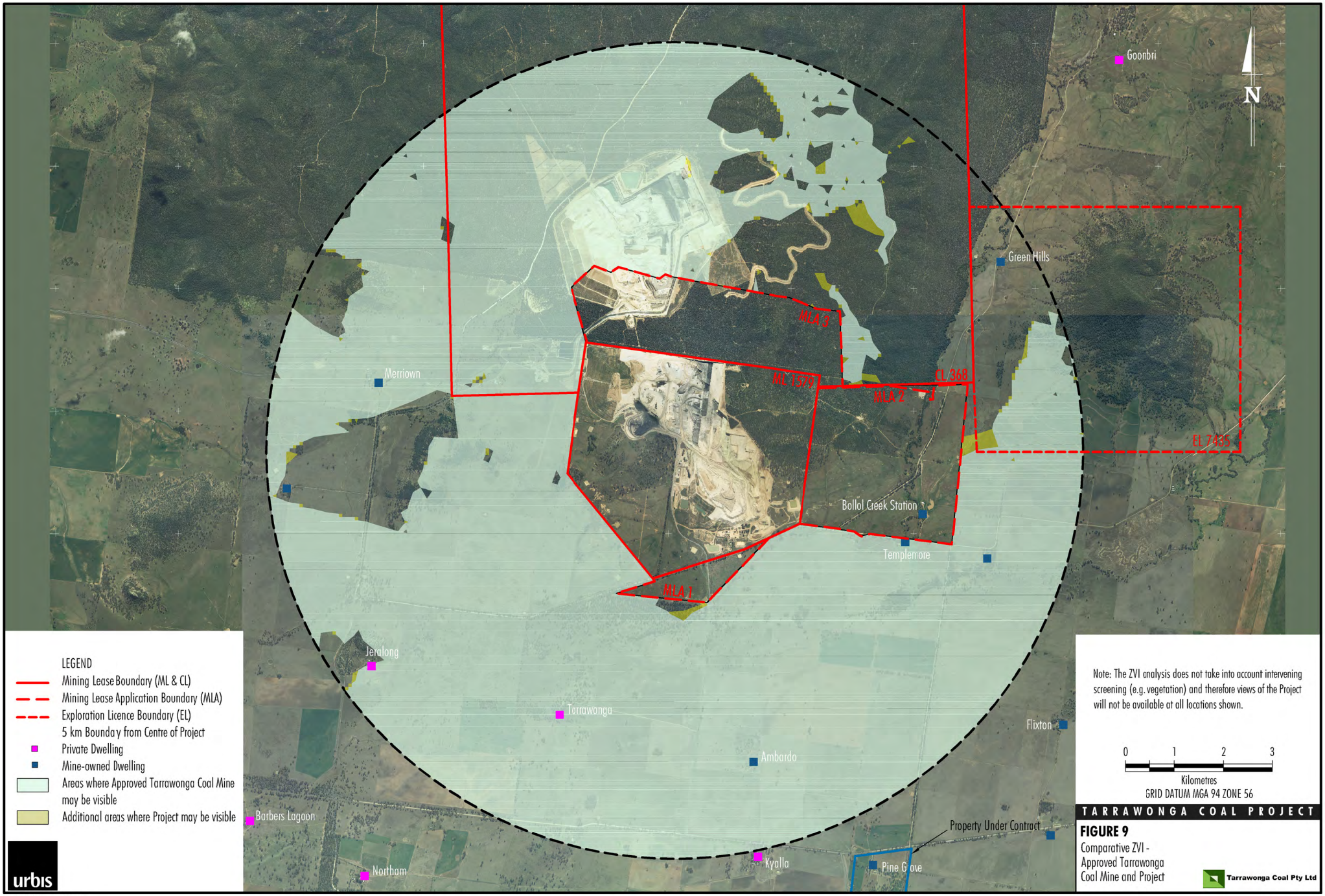
4.2 IDENTIFICATION OF SENSITIVE VISUAL SETTINGS

The main issues to consider in the assessment of potential visual impacts are:

- the number of sensitive viewing locations; and
- the level to which the proposed works are visible from the viewpoint – if they are not seen, then there is no impact.

To assist identify additional potential viewpoints for the Project, the extent of the viewshed for the approved Tarrawonga Coal Mine and the Project up to 5 km from the centre of the Project have been calculated (**Figure 9**). This area has been assessed as this area is where higher levels of sensitivity are experienced. There would be a limited number of potential new locations where views of the Project would be obtained. These areas are concentrated in the south and the north-east of the Project (**Figure 9**).

It should be noted that the ZVI analysis does not take into account intervening screening (e.g. vegetation) and therefore views of the Project would not be available at all locations shown on **Figure 9** (i.e. the ZVI analysis is conservative), as evidenced by the photo simulations.



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Potential views of the Project landforms would be available from the following locations:

- rural dwellings to the east, south and west of the Project (regional and sub-regional settings);
- southern boundary of the Leard State Forest looking south-west to the Project (local setting);
- local roads (local, sub-regional and regional settings); and
- other areas such as private roads and paddocks.

These locations are discussed further below.

Limited views of the Project are available from surrounding viewpoints due to generally flat to slightly undulating topography and the presence of scattered vegetation along roadsides and around dwellings that partially or wholly screen some potential views.

Visual simulations (based on a computer generated 3D model) have been created for the locations identified in **Table 4** and shown on **Figure 10a** (relevant land ownership list provided on **Figure 10b**) for Year 12 of the Project and post-mining landforms. Visual simulations (**Figures 11** to **14**) were prepared using the Project landforms during Year 12 of operations, as the landforms would be at their maximum heights, representing the greatest potential for visual impact. The final landform simulations take into account the rehabilitation and final land use objectives for the existing Tarrawonga Coal Mine, as described in the Rehabilitation and Landscape Management Strategy presented in Section 5 in the Main Report of the EA.

Visual Simulation No.	Visual Simulation Location	Potential View of Project Landforms	Visual Simulation Figure
1	Adjacent to the "Bellevue" Dwelling (BCPL-owned[1])	View towards Northern and Southern Emplacements.	Figure 11
2	Adjacent to the "Coomalgah" Dwelling (privately-owned)	View towards Northern and Southern Emplacements.	Figure 12
3	Adjacent to the "Ambardo" Dwelling (Whitehaven-owned[1])	View towards Northern and Southern Emplacements.	Figure 13
4	Goonbri Road	View towards Northern and Southern Emplacements.	Figure 14

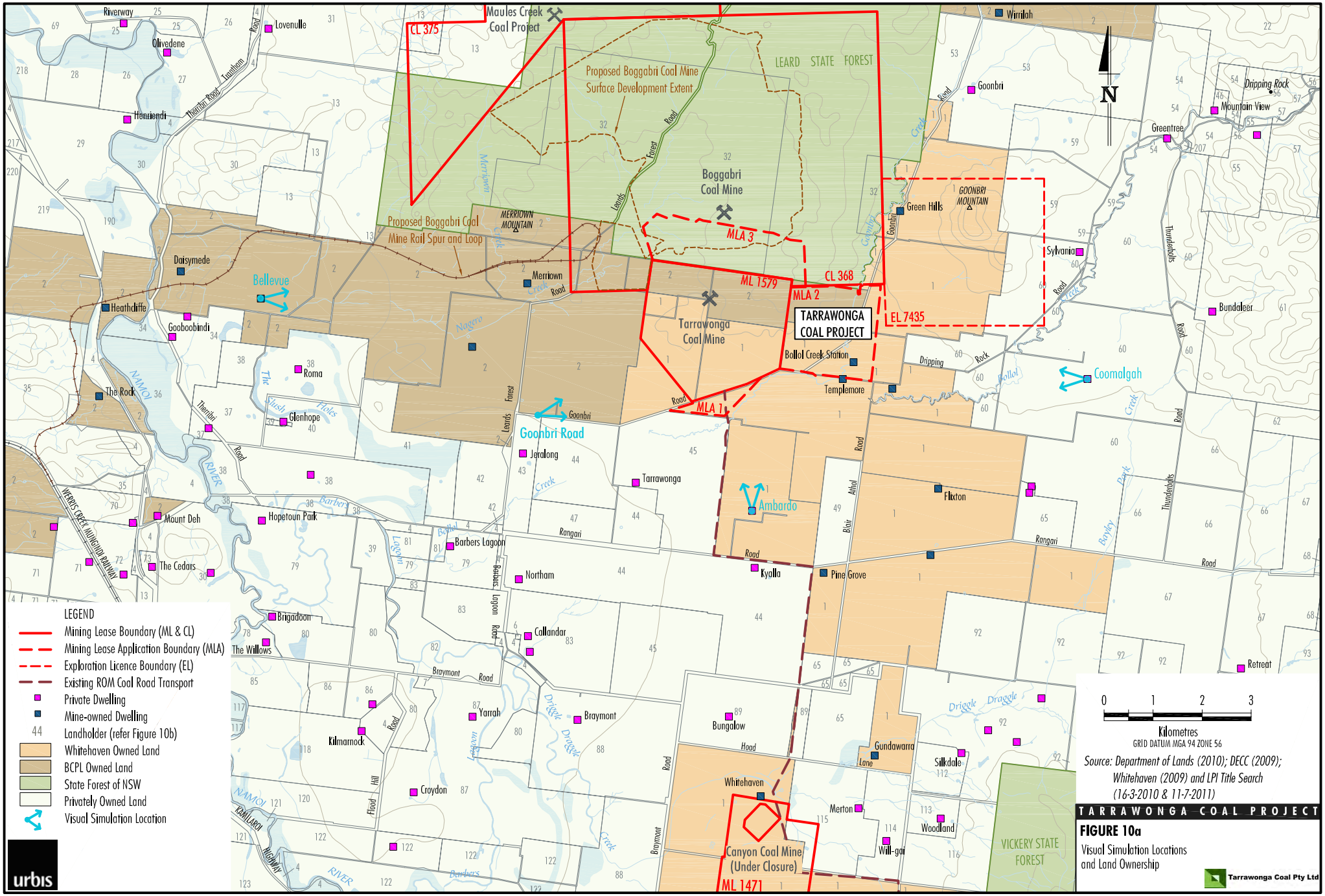
[1] The "Bellevue" and "Ambardo" dwellings were privately-owned when these locations were selected for visual simulations.

Table 4 – Locations of Visual Simulations

4.3 IMPACT ASSESSMENT

This section assesses potential visual impacts that are expected to arise as a result of the Project based on the methodology described in Section 4.1. The level of potential visual impact is assessed for the Project prior to rehabilitation works being completed. Impacts after amelioration are considered when some maturation of rehabilitation works has occurred (i.e. 5 to 10 years).

A summary of the visual assessment locations analysed in the following subsections is provided in **Table 4**.



TARRAWONGA COAL PROJECT

FIGURE 10a

Visual Simulation Locations and Land Ownership

Tarrawonga Coal Pty Ltd

REFERENCE No.	LANDHOLDER	REFERENCE No.	LANDHOLDER
1	Whitehaven Coal Mining Pty Limited	65	T.R. Hall and A.I. Myers Johnson
2	Boggabri Coal Pty Limited	66	M.G. and F.J. Farquhar
4	The State of New South Wales	67	R.L. and K.A. Penrose
6	Narrabri Shire Council	68	P.G. and I.L. Capel
7	The Council of the Shire of Namoi	69	B.G. and K.M. Bomford
13	Aston Coal 2 Pty Ltd	70	D.W. and A.M. Keys
22	C.D. and C.A. Baldwin	71	R.A. and C.M. Collyer
25	Riverway Boggabri Pty Ltd	72	R.W. and E.J. Kemp
26	Bresrow Pty Ltd	73	L.W. and M.D. Hunt
27	J.A. Bastardo	78	J.M. and N.M. McKechnie
28	D.B. Hudson	79	K.D. Gillham
29	P.J. Watson and G. Parkin	80	A.D. Watson Holdings Pty Ltd
30	M.F., S.T. and S.L. Hart and P.F. Rice	81	K.L. Grover
31	Estate: Perpetual Lease M.J. and M.L. Nott	82	E.C. and J.E. Clarke
32	State Forests of NSW	83	R. P. McGregor
34	R.W., A. and R.W. Grover	85	Kilmarnock (Boggabri) Pty Ltd
35	Aston Coal 2 Pty Ltd and Boggabri Coal Pty Ltd	86	Peter J Watson Holdings Pty Ltd
36	G.P., L.F. and W.P. Clarke	87	D.S. Riley
37	R.J. and E.J. Browning	88	M.J. and J.H. Maunder
38	R.J. Heiler	89	K.A. and C. Blanch
39	D.V. Gillham	92	I. Macleod Hall
40	D.V. and R.J. Gillham	93	G.A. and M.E. Geddes
41	L.E. James and K.E. Woodward	112	N.P. and S.A. Jackson
42	K.R. and K.A. Pryor	113	J.R. and K.L. Fletcher
43	H.M. Lockwood	114	L.P. and T.G. Mainey
44	R.R. and P.L. Crosby	115	R.D. Mitchell and C.T. Palmer
45	R.P. and R.D. McGregor	116	C.R. and C.P. Stewart Investments Pty Limited
46	H.J. Lynch	117	J.L. and K. Davis
47	B.J. Crosby	118	A.D. Watson
49	P. and A.C. Laird	120	Nambarloo Pty Limited
53	V.P. and S.M. Mcauliffe	121	D.M. and C.A. Kirkbride
54	P.A. Devine	122	Nandewar Pty Limited
55	P.J. Brien and D.M. Austin	123	Primeag Australia Limited
56	F. Agsten	190	L.E. Christie-Rockliff
57	P.N. Bet	207	J. and T. Milosevski
59	P.M. and M.I. Mainey	217	F.J. Maunder
60	J.E. and R.J. Picton	218	P.A. Maunder
61	P.W.J. Pritchard and M.E. McDonald Pritchard	219	P.J. Watson
62	I. and B. Doshen	220	Glek Pty Ltd

Source: LPI (2010 & 2011)

TARRAWONGA COAL PROJECT

FIGURE 10b

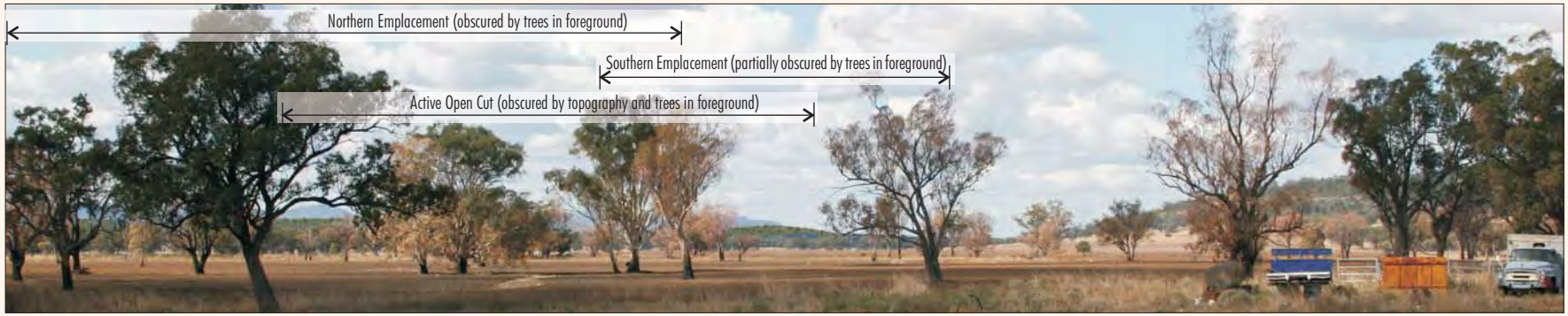
Relevant Land Ownership List

urbis

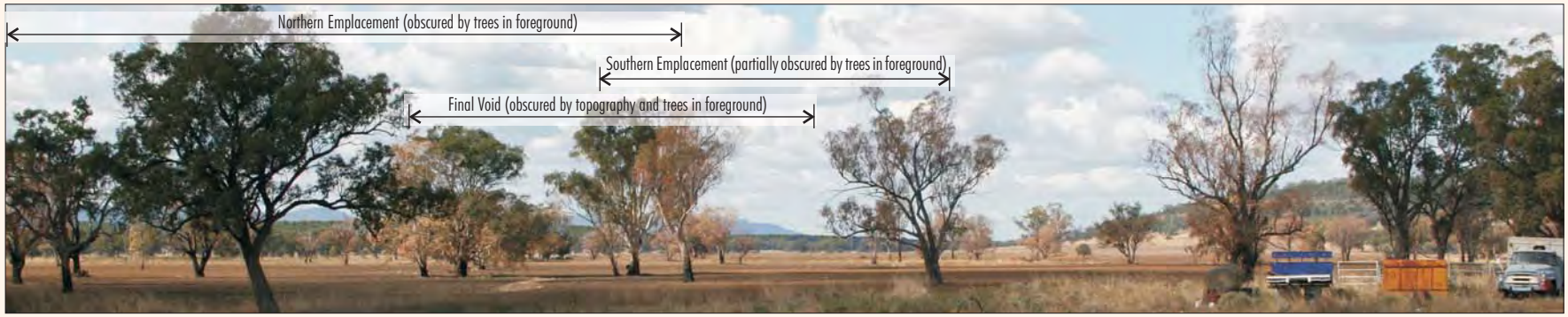
Tarrawonga Coal Pty Ltd

WHC-10-04 EA VA_006C

Existing View



Year 12 Simulation



Post-Mining Simulation

urbis

TARRAWONGA COAL PROJECT

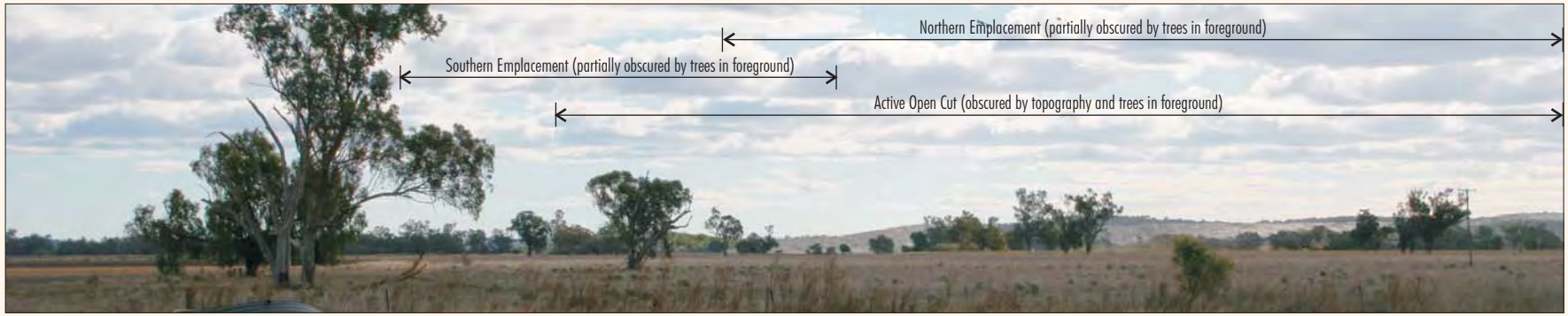
FIGURE 11

Existing View and Visual Simulations - Bellevue

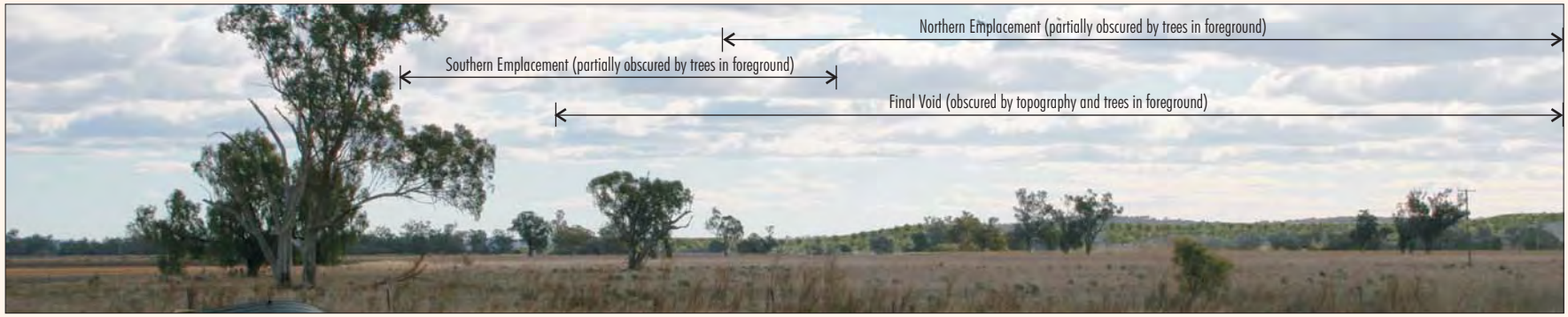
Tarrawonga Coal Pty Ltd

WHC-10-04 EA VA_004C

Existing View



Year 12 Simulation



Post-Mining Simulation

urbis

TARRAWONGA COAL PROJECT

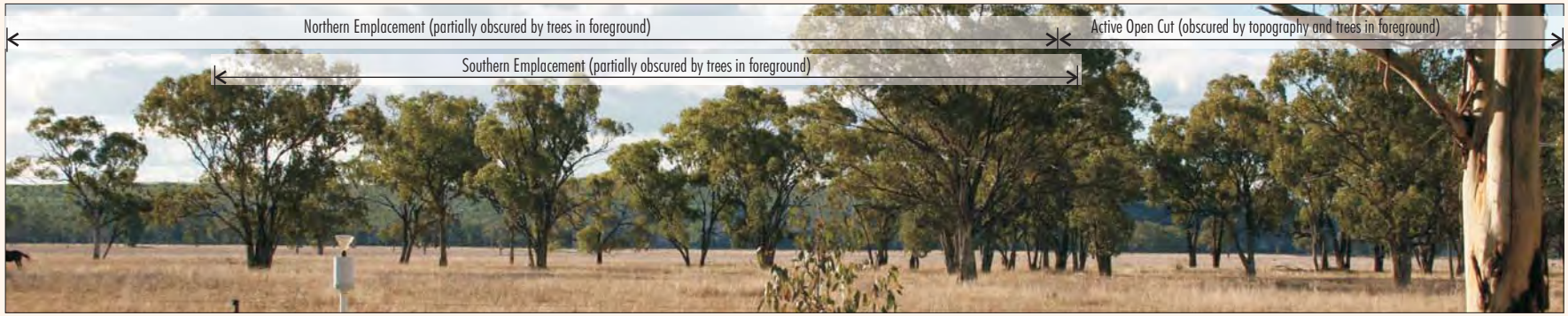
FIGURE 12

Existing View and Visual Simulations - Coomalgah

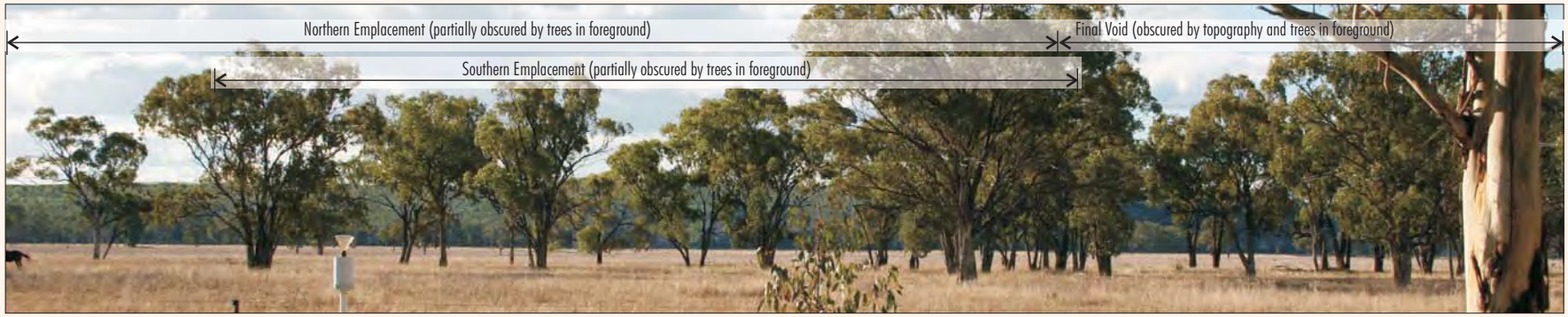
Tarrawonga Coal Pty Ltd

WHC-10-04 EA VA_003C

Existing View



Year 12 Simulation



Post-Mining Simulation

urbis

TARRAWONGA COAL PROJECT

FIGURE 13

Existing View and Visual Simulations - Ambardo

Tarrawonga Coal Pty Ltd

WHC-10-04 EA VA_002C

Existing View

Year 12 Simulation

Post-Mining Simulation

urbis

TARRAWONGA COAL PROJECT

FIGURE 14

Existing View and Visual Simulations - Goonbri Road

Tarrawonga Coal Pty Ltd

WHC-10-04 EA VA_001C

4.3.1 Visual Impacts – Regional Setting

A number of isolated viewing locations are located within the regional setting (**Figure 10a**). The potential visual impacts of the Project for the "Bellevue" dwelling are described below and visual simulations are shown on **Figure 11**.

"Bellevue" Dwelling (Visual Simulation 1)

Level of Visual Modification

The BCPL-owned "Bellevue" dwelling is located approximately 8 km from the western boundary of the Project. Distant, partially screened easterly views of the Project are available from the dwelling due to the flat topography and the sparse intervening vegetation (**Figure 11**).

The greatest potential visual impact at the "Bellevue" dwelling would occur when the Northern and Southern Emplacements reach their maximum heights.

The simulation on **Figure 11** shows that the level of visual modification would be low as a result of the distance between the "Bellevue" dwelling and the Project and the presence of some foreground screening vegetation.

Viewer Sensitivity

Within the regional setting, visual sensitivity at the "Bellevue" dwelling (residential – rural) is considered low given the distance to the Project (i.e. greater than 5 km) (**Table 3**).

Visual Impact

Given the low level of visual modification associated with the Project coupled with the low visual sensitivity at the "Bellevue" dwelling, a low level of potential visual impact is expected (**Table 5**). It should be noted that the "Bellevue" dwelling is now BCPL-owned (it was privately owned when this location was selected for a visual simulation.)

Duration of Impact

The level of potential visual impact would initially increase as the heights of the Project landforms increase then progressively decrease as vegetation cover is established on the rehabilitated Project landforms. The level of visual modification would further decrease once the height of the Southern Emplacement is reduced during Project rehabilitation.

The simulation on **Figure 11** shows that following rehabilitation, the level of potential visual impact would reduce to very low (**Table 5**).

Other Dwellings

Typically, other dwellings within the regional setting are set within a "house paddock" with a surrounding perimeter of vegetation, which, when combined with intervening scattered vegetation and flat topography, results in heavily screened, distant views to the Project.

There are a number of dwellings in the regional setting (**Figure 10a**) and some of these dwellings may also have distant views of the Project. The level of potential visual impact at other dwellings with views of the Project in the regional setting would generally be expected to be equivalent to, or less than, the impacts predicted at the "Bellevue" dwelling.

Roads

There are a number of locations on roads in the regional setting where partial views of the Project would be available. The level of potential visual impact at these locations with views of the Project would generally be expected to be equivalent to, or less than, the impacts predicted at Goonbri Road (i.e. low) (Section 4.3.2).

Other Locations

It is expected that there would be a number of viewpoints (e.g. from paddocks, private roads) in the regional setting where some views of the Project would be available. These viewpoints would typically be associated with elevated areas where no vegetation screening is present. Given the low sensitivity of these viewpoints (due to their distance from the Project – **Table 3**) and the expected low to moderate level of visual modification, a low level of potential visual impact is expected. The potential visual impact would reduce to very low following rehabilitation of the Project.

4.3.2 Visual Impacts – Sub-regional Setting

A number of isolated viewing locations are located within the sub-regional setting (**Figure 10a**). The potential visual impacts of the Project from the "Coomalgah" dwelling, the Whitehaven-owned "Ambardo" dwelling and from Goonbri Road are described below and visual simulations are shown on **Figures 12**, **13** and **14**.

"Coomalgah" Dwelling (Visual Simulation 2)

Level of Visual Modification

The "Coomalgah" dwelling is located within 5 km of the eastern boundary of the Project. Distant, partially screened westerly views of the Project are available from the dwelling due to the flat topography and the sparse intervening vegetation (**Figure 12**).

The greatest potential visual impact at the "Coomalgah" dwelling would occur during the latter years of the Project as the expansion of the open cut progresses towards the east (i.e. towards the dwelling) and the heights of the Project landforms increase to their maximum elevations.

The simulation on **Figure 12** shows that the level of visual modification would be moderate as a result of the distance between "Coomalgah" and the Project and the presence of screening vegetation.

Viewer Sensitivity

Within the sub-regional setting, visual sensitivity at the "Coomalgah" dwelling (residential – rural) is considered moderate given the distance to the Project (i.e. approximately 5 km) (**Table 3**).

Visual Impact

Given the moderate level of visual modification associated with the Project coupled with the moderate visual sensitivity at the "Coomalgah" dwelling, a moderate level of potential visual impact is expected (**Table 5**).

Duration of Impact

The level of potential visual impact would initially increase as the expansion of the open cut progresses towards the dwelling and the heights of the Project landforms increase. The level of potential visual impact would then progressively reduce as vegetation cover is established on the rehabilitated Project landforms. The level of visual modification would further decrease once the height of the Southern Emplacement is reduced during Project rehabilitation.

The simulation on **Figure 12** shows that following rehabilitation, the level of potential visual impact would reduce to low (**Table 5**).

"Ambardo" Dwelling (Visual Simulation 3)

Level of Visual Modification

The Whitehaven-owned "Ambardo" dwelling is located approximately 2 km south of the southern boundary of the Project. Direct northerly views of the Project from this dwelling are partially obscured by intervening vegetation (**Figure 13**).

The greatest potential visual impact at the "Ambardo" dwelling would occur when the heights of the Project landforms (particularly the mine waste rock emplacements) would increase to their maximum elevations. This would occur for the Southern Emplacement and the southern extent of the Northern Emplacement during Year 1 of the Project. During this period a moderate level of visual modification would result from the contrasting colour and texture of the existing landscape and the newly placed and unvegetated material on the Project landforms before a cover is established as part of the rehabilitation process. There would also likely to be some contrast between the colour of newly established vegetation and the existing landscape that would reduce over time.

The simulation on **Figure 13** shows that the level of visual modification at Year 12, following establishment of the vegetation on the mine waste rock emplacements, would be low due to the presence of screening vegetation and low level of contrast between the vegetated emplacement and the landscape of the setting.

Viewer Sensitivity

Within the regional setting, visual sensitivity at the "Ambardo" dwelling (residential – rural) is considered high given the distance to the Project (i.e. approximately 2 km) (**Table 3**).

Visual Impact

Given the low to moderate level of visual modification associated with the Project coupled with the high visual sensitivity at the "Ambardo" dwelling, a moderate to high level of potential visual impact is expected (**Table 5**). It should be noted that the "Ambardo" dwelling is now Whitehaven-owned (it was privately owned when this location was selected for a visual simulation.)

Duration of Impact

The level of potential visual impact would progressively reduce as vegetation cover is established on the rehabilitated Project landforms. The level of visual modification would further decrease once the height of the Southern Emplacement is reduced during Project rehabilitation. The simulation on **Figure 13** shows that following final rehabilitation, the level of potential visual impact would reduce to low (**Table 5**).

Other Dwellings

There are a number of other dwellings in the vicinity of the Project in the sub-regional setting (**Figure 10a**) and some of these dwelling may also have partial views of the Project. The level of potential visual impact at other dwellings with views of the Project in the sub-regional setting (e.g. "Tarrawonga") would generally be expected to be equivalent to, or less than, the impacts predicted at the "Ambardo" dwelling. The "Tarrawonga" dwelling is located in an area of existing vegetation that would provide significant screening of the Project from the dwelling similar to the "Ambardo" dwelling. Views of the Tarrawonga Coal Mine from the "Jeralong" dwelling are obscured by a ridge which is located between the house and Goonbri Road (Resource Strategies, 2010).

Goonbri Road – South of Project (Visual Simulation 4)

Level of Visual Modification

Figure 14 simulates views of the Project from the south from Goonbri Road, approximately 2.5 km from the Project boundary (**Figure 10a**).

The greatest potential visual impact along Goonbri Road would occur when the heights of the Project landforms increase to their maximum elevations.

Potential visual impacts would result from the contrasting colour and texture of the existing landscape and the newly placed rock/soil material on the Project landforms before a vegetation cover is established as part of the rehabilitation process. There is also likely to be some contrast between the colour of newly established vegetation and the existing landscape that would reduce with time.

There would be a high level of visual modification for views from Goonbri Road where no intervening, or foreground vegetation existed between the viewpoint and the existing Tarrawonga Coal Mine. Where some intervening vegetation exists, the visual modification level would be moderate.

Viewer Sensitivity

Although the Project landforms would be moderately to highly visible from Goonbri Road, there are relatively few users who would be exposed to the views along this local road. In addition, these users would be accustomed to the existing modified landscape that includes views of the Tarrawonga Coal Mine (**Figure 14**). Within the sub-regional setting, the visual sensitivity of users on Goonbri Road (local road) is therefore considered to be low (**Table 3**).

Visual Impact

The low level of visual sensitivity coupled with the moderate to high level of visual modification associated with the Project means a low to moderate level of potential visual impact is expected for users of Goonbri Road (**Table 5**).

Duration of Impact

The level of visual modification would decrease once the height of the Southern Emplacement is reduced during rehabilitation of the Project. The level of potential visual impact is expected to be low following progressive rehabilitation of the Project landform components (**Table 5**).

Other Roads

There are a number of locations on roads in the sub-regional setting where partial views of the Project would be available. The level of potential visual impact at these locations with views of the Project would generally be expected to be equivalent to, or less than, the impacts predicted at Goonbri Road (i.e. low).

Other Locations

It is expected that there would be a number of viewpoints (e.g. from paddocks, private roads) in the sub-regional setting where some views of the Project would be available. These viewpoints would typically be associated with elevated areas where no vegetation screening is present. Given the lower sensitivity of these viewpoints compared to private dwellings and the expected low to moderate level of visual modification, a low to moderate level of potential visual impact is expected. The potential visual impact would reduce to low following rehabilitation of the Project.

4.3.3 Visual Impacts – Local Setting

Leard State Forest

Level of Visual Modification

The Leard State Forest is located immediately north of the Tarrawonga Coal Mine (**Figure 2**). Limited views of the Project from the Leard State Forest would be largely restricted due to vegetation screening. Some views would be available at points of higher elevation and at the southern boundary of the Leard State Forest.

The greatest potential visual impact from points of higher elevation and at the southern boundary of the Leard State Forest would occur as the expansion of the open cut progresses towards the north and the east and the heights of the mine waste rock emplacements increase to their maximum elevations.

There would be a high level of visual modification from viewpoints at the Leard State Forest where no intervening or foreground vegetation exists between the viewpoint and the Project (i.e. at the southern boundary). However, the majority of viewpoints for recreational users would be screened by intervening vegetation and therefore the level of visual modification is considered low to moderate overall.

Viewer Sensitivity

Although some views of the Project would be available at points of higher elevation and at the southern boundary of the Leard State Forest, there are no defined recreational facilities adjacent to the Project and relatively few users who would be exposed to the views due to the difficulty in accessing these viewpoints. The visual sensitivity of the Leard State Forest is therefore considered moderate, rather than high.

Visual Impact

The moderate level of visual sensitivity coupled with the low to moderate level of visual modification associated with the Project means a low to moderate level of potential visual impact is expected for users of the Leard State Forest at the specified viewpoints (**Table 5**).

Duration of Impact

The level of progressive impact is expected to be low following progressive rehabilitation of the Project landform components (**Table 5**).

Goonbri Road – East of Project

Level of Visual Modification

There are a number of locations on the existing and the proposed realigned Goonbri Road where views of the Project would be available. The greatest potential visual impact would occur during the latter years of the Project as the expansion of the open cut progresses towards the east (i.e. towards Goonbri Road) and the heights of the Project landforms increase to their maximum elevations.

Prior to the realignment of Goonbri Road (i.e. before Year 12), potential views of the Project from the existing Goonbri Road would be reduced by existing vegetation located along Goonbri Road and Goonbri Creek (where present between Goonbri Road and the Project). Views from the realigned Goonbri Road would also be reduced by this vegetation prior to its removal during Project mining operations. The construction of the flood bund (including vegetation screen), construction of a temporary soil stockpile (including cover crop) and the establishment of the permanent Goonbri Creek alignment (including revegetation) would reduce potential views of the open cut and mine waste rock emplacements from the realigned Goonbri Road.

In addition, a vegetation screen consisting of endemic plants that are compatible with the existing surrounding vegetation would be developed along the realigned sections of Goonbri Road in advance of its construction to minimise views of the Project from the realigned Goonbri Road.

Potential visual impacts would result from the contrasting colour and texture of the existing landscape and the disturbed open cut and newly placed rock/soil material on the Project landforms before a vegetation cover is established as part of the rehabilitation process. There is also likely to be some contrast between the colour of newly established vegetation and the existing landscape that would reduce with time.

There would be a moderate to high level of visual modification for views from Goonbri Road/realigned Goonbri Road where there is no intervening vegetation between the viewpoint and the Project. Where some intervening vegetation exists, the visual modification level would be moderate.

Viewer Sensitivity

Although the Project landforms would be moderately to highly visible from Goonbri Road, there are relatively few users who would be exposed to the views along this local road. In addition, these users would be accustomed to the existing modified landscape that includes views of the Tarrawonga Coal Mine. Within the local setting, the visual sensitivity of users on Goonbri Road (local road) is therefore considered to be low (**Table 3**).

Visual Impact

The low level of visual sensitivity coupled with the moderate to high level of visual modification associated with the Project means a low to moderate level of potential visual impact is expected for users of Goonbri Road (**Table 5**).

Duration of Impact

The level of potential visual impact is expected to be low following progressive rehabilitation of the Project landform components (**Table 5**).

Viewing Location	Visual Sensitivity	Visual Modification Level	Potential Visual Impact	Impact After Amelioration
Regional Setting > 5km				
"Bellevue" Dwelling (Visual Simulation Location 1)	**L**	**L**	**L**	**VL**
Sub Regional Setting 1 – 5 km				
"Coomalgah" Dwelling (Visual Simulation Location 2)	**M**	**M**	**M**	**L**
"Ambardo" Dwelling (Visual Simulation Location 3)	**H**	**L – M**	**M – H**	**L**
Goonbri Road – South of Project (Visual Simulation Location 4)	**L**	**M – H**	**L – M**	**L**
Local Setting <1 km				
Leard State Forest (limited viewpoints only)	**M**	**L – M**	**L – M**	**L**
Goonbri Road – East of Project	**L**	**M – H**	**L – M**	**L**
(H = High, M = Moderate, L = Low, VL = Very Low)				

Table 5 – Summary of Visual Impact at Sensitive Locations

4.4 NIGHT-LIGHTING

The glow produced by night-lighting at the Tarrawonga Coal Mine is visible at nearby dwellings and along transport routes (e.g. Kamilaroi Highway). The night glow is similar to that associated with existing towns and villages in the region. Direct views of mobile machinery lights and operational lighting are also available from some exposed positions and nearby dwellings.

The Project would vary the potential effects of existing night lighting over the life of the Project. Lighting from the Project may be visible from additional locations due to the increased elevation of light sources on the Southern Emplacement and the increased extent of both the mine waste rock emplacements.

In addition, the Project would include an increase in the number of mine fleet items and operational hours. It is proposed that mining operations would be extended to 24 hours per day, seven days per week. Consequently there would be a potential increase in night lighting impacts associated with night-glow and mobile vehicle-mounted lights. There would be increased potential for direct views of mobile machinery lights and operational lighting to be available from some exposed dwellings and roads due to the extension of the mine waste rock emplacement areas and associated vegetation clearance

Notwithstanding the above, the nature of the night-lighting for the Project would be similar to the existing night-lighting at the Tarrawonga Coal Mine and the change in potential night-lighting impacts would be minor.

The Siding Springs Observatory is located approximately 125 km to the south-west of the Tarrawonga Coal Mine. It is considered night-lighting produced by the Project would not be visible from the Siding Springs Observatory.

Mitigation measures to reduce the potential impacts of night-lighting from the Project are described in Section 5.3.

4.5 CUMULATIVE ASSESSMENT

The assessment of cumulative visual impacts has considered the combined effects of the Project with the effects of the proposed Continuation of the Boggabri Coal Mine. The combined disturbance areas of the Project and the Continuation of the Boggabri Coal Mine represent a very small proportion of the Namoi Valley and cumulatively would not detract from the region's essentially rural nature.

It is expected that views of both the Project and the Continuation of the Boggabri Coal Mine landforms would generally be only available from viewpoints from the southern and western sides of the Project. As with views of the Project, these viewpoints would typically be associated with elevated areas where no vegetation screening is present (e.g. from paddocks, private roads). To minimise the cumulative impact of the Project and the Continuation of the Boggabri Coal Mine, the Northern Emplacement would be integrated with the southern extent of the Continuation of the Boggabri Coal Mine waste rock emplacement (**Figure 2**) to maximise the level of integration between the two operations and the surrounding environment. The integration of the two operations would reduce the maximum height and/or extent of the Northern Emplacement and would therefore minimise potential visual impacts from the Project.

The potential night-lighting impacts associated with the Continuation of Boggabri Coal Mine would be of a similar level to that of the currently approved Boggabri Coal Mine operations (Integral Landscape Architecture and Visual Planning, 2010) and the change in potential night-lighting impacts for the Project would be minor (Section 4.4). The Project is therefore not expected to not result in significant cumulative night-lighting impacts.

Given the above, it is expected that the cumulative visual impacts as a result of the Project and the Continuation of Boggabri Coal Mine are considered to be low.

5 Mitigation Measures and Management

5.1 PROGRESSIVE REHABILITATION

Progressive rehabilitation of the Northern Emplacement, Southern Emplacement, open cut and other mine infrastructure areas would be undertaken in order to reduce the contrast between the Project landforms and the surrounding environment. The existing Northern Emplacement would be extended to the north and east, and integrated with the southern extent of the Continuation of the Boggabri Coal Mine waste rock emplacement (**Figure 2**) to maximise the level of integration between the two operations and the surrounding environment. In addition, the design of the mine waste rock emplacements maximise visual shielding of the active open cut operations from viewpoints in the west and south.

Rehabilitation would be conducted in accordance with the Rehabilitation and Landscape Management Strategy presented in Section 5 in the Main Report of the EA.

5.2 VISUAL SCREENING

Visual screening (e.g. a vegetation screen consisting of endemic plants that are compatible with the existing surrounding vegetation) is considered to mitigate potential visual impacts from sensitive viewpoints. The flood bund and the earth bund would be revegetated to minimise views of the Project operations. Once established, the vegetated flood bund and earth bund would effectively become visual screens. The revegetated flood bund would reduce potential views of the open cut and mine waste rock emplacements from viewpoints to the south and east of the Project. Views from the south and west of the Project of mobile equipment operating along the services corridor (particularly at night) would be reduced by the revegetated earth bund.

A vegetation screen would be developed along the realigned sections of Goonbri Road in advance of its construction to minimise views of the Project from the realigned Goonbri Road and to minimise potential visual impacts associated with the realigned road and electricity transmission line.

In addition, upon receiving a request from an owner of any privately-owned dwelling which has significant direct views of the Project, TCPL would implement reasonable and feasible visual mitigation measures (e.g. vegetation screening) in consultation with the owner to minimise the visibility of the Project from the dwelling.

5.3 NIGHT-LIGHTING

TCPL would seek to minimise light emissions from the Project by carefully selecting the sites where lights would be placed, and by use of physical barriers and/or operational measures to reduce light 'spill' without compromising operational safety. Measures that would be employed to mitigate potential impacts from night-lighting would include one or more of the following, where practicable:

- All external lighting associated with the Project would comply with Australian Standard AS 4282: 1997 – *Control of the Obtrusive Effects of Outdoor Lighting.*
- Restriction of night-lighting to the minimum required for operations and safety requirements.
- Use of directional lighting techniques.
- Use of light shrouds and reflectors to limit the spill of lighting.
- Revegetation of the flood bund and the earth bund to establish visual screens (refer Section 5.2).

- In consultation with the landholder, planting of trees at nearby private dwellings to help screen any potential visual impacts (refer Section 5.2).
- In consultation with the landholder, provision of curtains, cladding and/or screens at nearby private dwellings to help screen any potential night-time lighting impacts, in consultation with the landholder.

6 References

Anderson, J.R., Hardy, E.E. and Roach, J.T. (1976) *Land Use and Land Cover Classification System for Use with Remote Sensing Data*. Geological Survey Professional Paper 964. A revision of the land use classification system as presented in US. *Geological Circular* 671. U. S. Government Printing Office, Washington, D.C.

Burns and Rundell (1969) *A Test of Visual Preferences in a Rural New England Landscape.*

FloraSearch (2011) *Tarrawonga Coal Project Flora Assessment*.

Integral Landscape Architecture and Visual Planning (2010) *Visual Impact Assessment*.

Leonard and Hammond (1984) *Landscape Character Types of Victoria.*

Resource Strategies (2010) *Tarrawonga Coal Mine Modification Environmental Assessment.* Prepared for Whitehaven Coal Pty Ltd.

United States Department of Agriculture – Forestry Service (1974) *National Forest Landscape Management, Volume 2, Chapter 1 – The Visual Management System.* Agricultural Handbook No. 462, April 1974.

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