

Section 4. Environmental Features, Management Measures and Impacts

PREAMBLE

This section describes the specific environmental features of the Project Site and its surrounds that would or may be affected by the LOM Project. The proposed design and/or operational safeguards and management measures are presented, followed by an assessment of the predicted level of impact the proposed activities may have after implementation of these measures. Where appropriate, proposed monitoring programs are also described.

This section is presented in two parts.

Part A: presents a range of background information relating to a number of the subsequent issues.

Part B: presents the existing conditions, proposed design and operational safeguards, and predicted impacts on the local environment associated with the LOM Project.



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Section 4A

Background Information

PREAMBLE

The descriptions of various assessments of potential environmental impacts (Section 4B) are reliant upon a range of background information common to many of the key environmental issues. Background information is provided on topography, meteorology, land ownership, land uses and surrounding residences.



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4A.1 TOPOGRAPHY

4A.1.1 Regional Topography

The Project Site lies within the Namoi River Basin in an area characterised by the transition from the elevated ranges associated with the Liverpool Ranges to the south, Great Dividing Range to the east, Nandewar Range to the north, and open plains to the west (see **Figure 4A.1**).

4A.1.2 Local Topography

Locally, the Project Site is located within a valley created by two north-south trending ridgelines extending from Werris Creek in the north to Quipolly Creek in the south. Elevations within this area are effectively bounded by the north-south oriented ridgelines and Werris and Quipolly Creeks and range from approximately 340m AHD on the banks of Werris Creek to 670m AHD on Grenfell Hill, 3.5km west of the Project Site (**Figure 4A.2**).

4A.1.3 Topography of the Project Site

The pre-mining topography of the Project Site comprised a central ridge trending almost north south with side slopes of up to 7° decreasing to less than 1° on the surrounding near flat cropping land. Elevations within the Project Site vary from 360m AHD near the southern extremity of the overburden emplacement to approximately 445m AHD on the top of "Old Colliery" hill (**Figure 4A.3**).

4A.2 METEOROLOGY

4A.2.1 Introduction

This section provides a summary of the meteorological data relevant to the Project Site. It effectively draws together the various data sets used by the specialist consultants for the studies relating to the proposal. The information provided in this section has been presented to provide an overview of meteorological conditions within and surrounding the Project Site.

4A.2.2 Source of Data

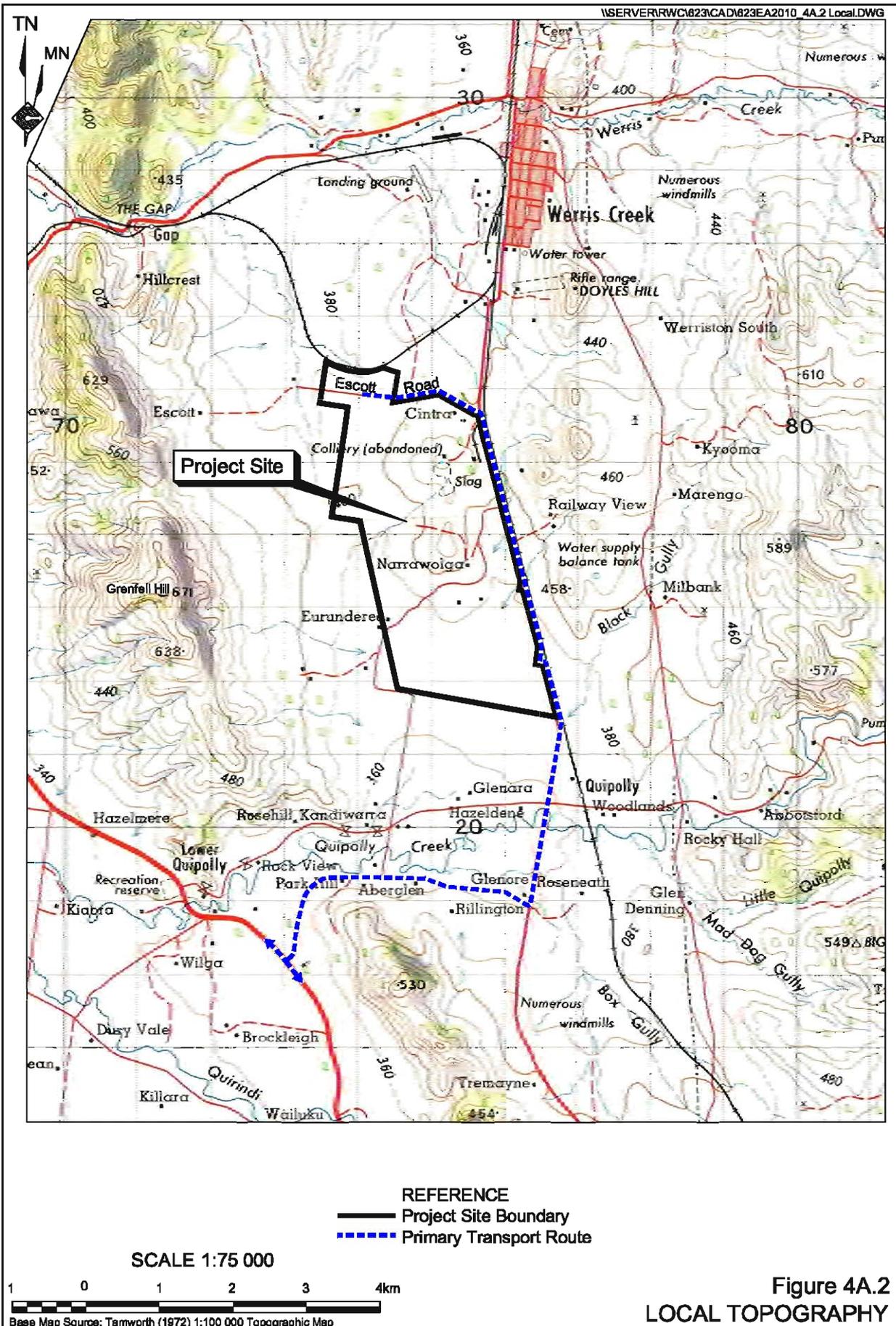
The following summaries of meteorological information for the LOM Project have been derived principally from long term data collected by the Bureau of Meteorology (BOM) at Station No. 055049 (Quirindi Post Office) located approximately 11km south-southeast of the Project Site and Stations 055054 and 055325 (Tamworth Airport), approximately 40km northeast of the Project Site.

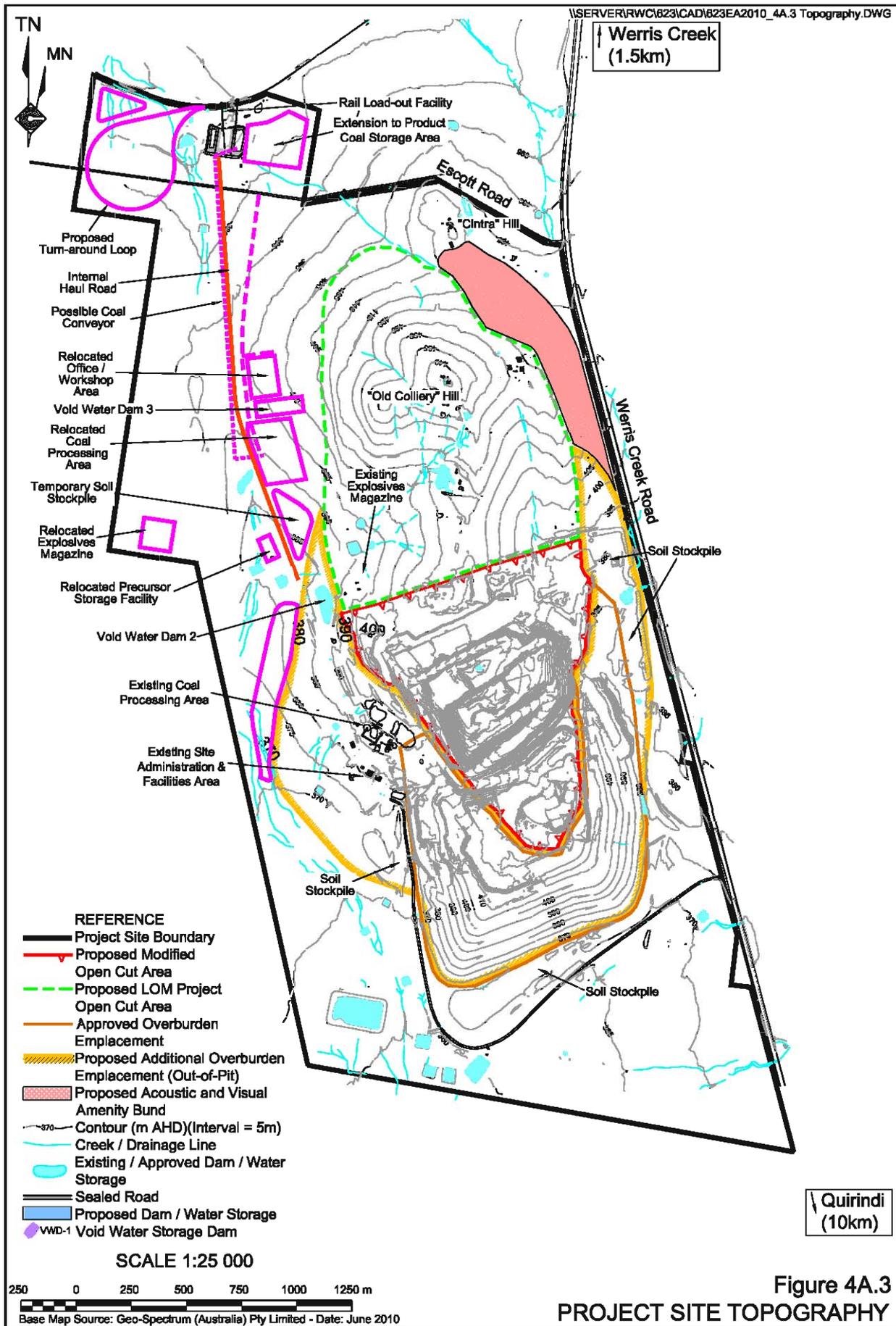
Data collected from each of the above stations is as follows.

- Station 055049: temperature, rainfall, relative humidity and wind speed.
- Station 055054: temperature, rainfall, relative humidity, evaporation and wind speed to 1993.
- Station 055325: temperature, rainfall, relative humidity and wind speed from 1993 to the present.









Where applicable, comparison has also been made to the data collected at the Werris Creek Coal Mine meteorological station.

Information on wind speed and direction has been taken largely from the predictive modelling performed for the purposes of the *Air Quality Assessment* undertaken by Heggies (2010). With the exception of wind data, all meteorological data is presented in **Table 4A.1**.

4A.2.3 Temperature

Average daily maximum and minimum temperatures recorded at Quirindi and both Tamworth stations are presented in **Table 4A.1**. December, January and February are the warmest months at each location with mean daily maxima of between just above 30°C to approximately 32°C. Days of higher summer temperatures are largely due to northwesterly winds blowing hot dry continental air from Central Australia. July is the coldest month for the Quirindi and Tamworth stations with mean daily minima of between 1.6°C and 2.9°C. Mean diurnal temperature variations at the stations are relatively constant throughout the year at approximately 15°C. Within the region, autumn and spring are generally mild.

4A.2.4 Relative Humidity

Table 4A.1 presents the mean morning and afternoon relative humidity recorded at all three weather stations. June has the highest relative humidity at all stations, averaging between 80% and 82% in the morning and between 50% and 51% in the afternoon (note no data is available in the afternoon for the Quirindi Station). The warmer months tend to have the lowest relative humidity at all the stations with values in the morning ranging from 54% to 58% in Tamworth and 59% to 63% in Quirindi. In the afternoon, the relative humidity drops in the warmer months in Tamworth to between 34% and 39%. No data is available for the Quirindi station for relative humidity in the afternoon.

4A.2.5 Rainfall

Rainfall in the local area is likely to result from the passage of one of three major synoptic systems, or from localised convective thunderstorms, namely:

- the regular passage of cold fronts across NSW, whenever these fronts extend north into the area;
- the passage of moist upper atmospheric low cells into the area from Queensland;
or
- the passage of inland tropical cyclones or low pressure systems which have been located over the Pacific Ocean.

Of these, the latter two principally occur in the warmer months when convectional storms are also most frequent and result in the majority of the area's total rainfall. Falls during this period are often of high intensity.

The annual rainfall distribution in the vicinity of both Quirindi and Tamworth are shown on **Table 4A.1** and are based on 127 years (Quirindi) and 114 years (Tamworth Airport to 1993) and 18 years (Tamworth Airport AWS after 1993) of records. The average annual rainfall is approximately 683mm at Quirindi and 673mm at Tamworth prior to 1993 and 602mm after 1993.



Table 4A.1
Mean Monthly Meteorological Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
TEMPERATURE (°C)													
Station 055054 TAMWORTH AIRPORT													
Mean Maximum	31.9	31.1	29.0	24.8	20.0	16.4	15.5	17.4	21.1	25.0	28.5	31.0	
Mean Minimum	17.4	17.1	14.8	10.6	6.7	4.1	2.9	3.7	6.1	9.9	13.1	16.0	
Station 055325 TAMWORTH AIRPORT AWS													
Mean Maximum	32.5	31.2	29.2	25.3	20.7	16.9	16.1	18.4	21.6	25.2	27.9	30.3	
Mean Minimum	17.3	16.9	14.1	10.0	6.2	3.6	2.2	2.8	5.8	9.6	13.2	15.5	
Station 055049 QUIRINDI POST OFFICE													
Mean Maximum	32.2	31.3	29.3	24.9	20.5	16.6	15.9	17.9	21.5	25.2	28.5	31.2	
Mean Minimum	16.4	16.1	13.5	8.9	5.1	2.8	1.6	2.4	5.0	8.7	11.9	14.8	
RAINFALL (mm)													
Station 055054 TAMWORTH AIRPORT													
Mean	85.4	66.7	49.0	42.2	44.2	49.3	46.1	45.6	47.6	58.4	66.4	72.3	673.2
Mean Rain Days	7.4	6.2	5.5	5.1	6.1	7.6	7.6	7.2	6.8	7.7	7.3	7.7	82.0
Highest	322	348	233	164	152	167	191	163	161	177	199	245	
Lowest	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	2.4	5.1	1.5	0.8	
Station 055325 TAMWORTH AIRPORT AWS													
Mean	57.8	72.7	40.5	25.9	25.9	47.6	42.9	37.0	43.3	57.6	84.1	68.3	601.8
Mean Rain Days	4.6	6.2	4.0	2.7	3.1	4.9	5.2	3.9	4.5	5.8	7.2	5.8	57.9
Highest	228	169	125	123	80	135	154	100	108	122	284	145	
Lowest	3.6	15.4	0.0	0.0	0.2	1.2	7.2	0.0	0.8	10.6	36.2	0.0	
Station 055049 QUIRINDI POST OFFICE													
Mean	80.9	65.5	53.1	42.1	44.4	51.3	47.9	45.2	46.6	60.6	64.6	80.3	683.7
Mean Rain Days	6.0	4.8	4.1	3.7	4.3	5.5	5.6	5.4	5.1	5.8	6.1	6.1	62.5
Highest	278	335	293	183	157	235	187	137	156	168	220	244	
Lowest	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.3	3.8	0.3	0.0	
EVAPORATION (mm)													
Station 055054 TAMWORTH AIRPORT													
Mean Monthly Pan Evaporation	270	224	214	141	93	60	65	90	129	183	228	279	
RELATIVE HUMIDITY (%)													
Station 055054 TAMWORTH AIRPORT													
Mean 9:00am	57	61	59	64	74	81	80	74	65	58	54	54	65.2
Mean 3:00pm	38	41	38	41	48	53	50	46	41	39	34	34	42
Station 055325 TAMWORTH AIRPORT AWS													
Mean 9:00am	56	63	64	60	72	83	81	70	63	56	58	57	65
Mean 3:00pm	35	40	37	36	44	52	51	41	39	38	39	36	41
Station 055049 QUIRINDI POST OFFICE													
Mean 9:00am	63	68	68	67	78	84	82	72	65	59	61	61	69.0
Mean 3:00pm	nd												
Source: Bureau Of Meteorology Tamworth Airport Station (No. 055054), Bureau Of Meteorology Tamworth Airport Station AWS (No. 055325) and Bureau Of Meteorology Quirindi Post Office Station (No. 055049) nd – no data available													

Highest monthly rainfalls within the Quirindi/Tamworth area occur in the period between November and February, with January recording the highest mean monthly rainfall at Quirindi and Tamworth prior to 1993 and November recording the highest average in Tamworth after 1993. The rest of the year is generally drier, with the least number of rainfall and rain days occurring in April. On average, the local area has 58 to 82 rain days per year or up to approximately 6.8 rain days per month.

A comparison of rainfall data collected at the Werris Creek Coal Mine weather monitoring station and records from the BOM Station at Quirindi Post Office (Station No. 055049) illustrates a reasonably high correlation (GSSE, 2010a). While a full comparison of rainfall data could not be undertaken as there is an incomplete data set for the Werris Creek Coal Mine weather monitoring station, the generally high correlation observed suggests rainfall records obtained from Station No. 055049 should provide a suitable dataset for predicting future rainfall and therefore developing a water balance model for the Project Site.

4A.2.6 Wind

Heggies (2010) summarise the wind environment within and surrounding the Project Site as follows. Winds experienced at the Project Site are predominantly light to moderate (between 1.5 m/s and 8 m/s) from the southeast to south-southeast (approximately 25% combined) and from the west-northwest to north-northwest (approximately 33% combined). Calm wind conditions (wind speed less than 0.5 m/s) occur approximately 8.6% of the time.

Figure 4A.4 presents the annual wind rose for the Project Site. From the results of the wind analysis conducted by Heggies (2010), the following observations about the seasonality of winds within and surrounding the Project Site were made.

- In spring, light to moderate winds are experienced predominantly from the southeast to south-southeast (approximately 22% combined) and west to northwest (approximately 27% combined).
- In summer, light to moderate winds are experienced predominantly from the east-southeast to south-southeast (approximately 44% combined).
- In autumn, light to moderate winds are experienced predominantly from the east-southeast to south (approximately 41% combined).
- In winter, light to moderate winds are experienced from the west to north (approximately 47% combined) and from the southeast to south (approximately 23% combined).

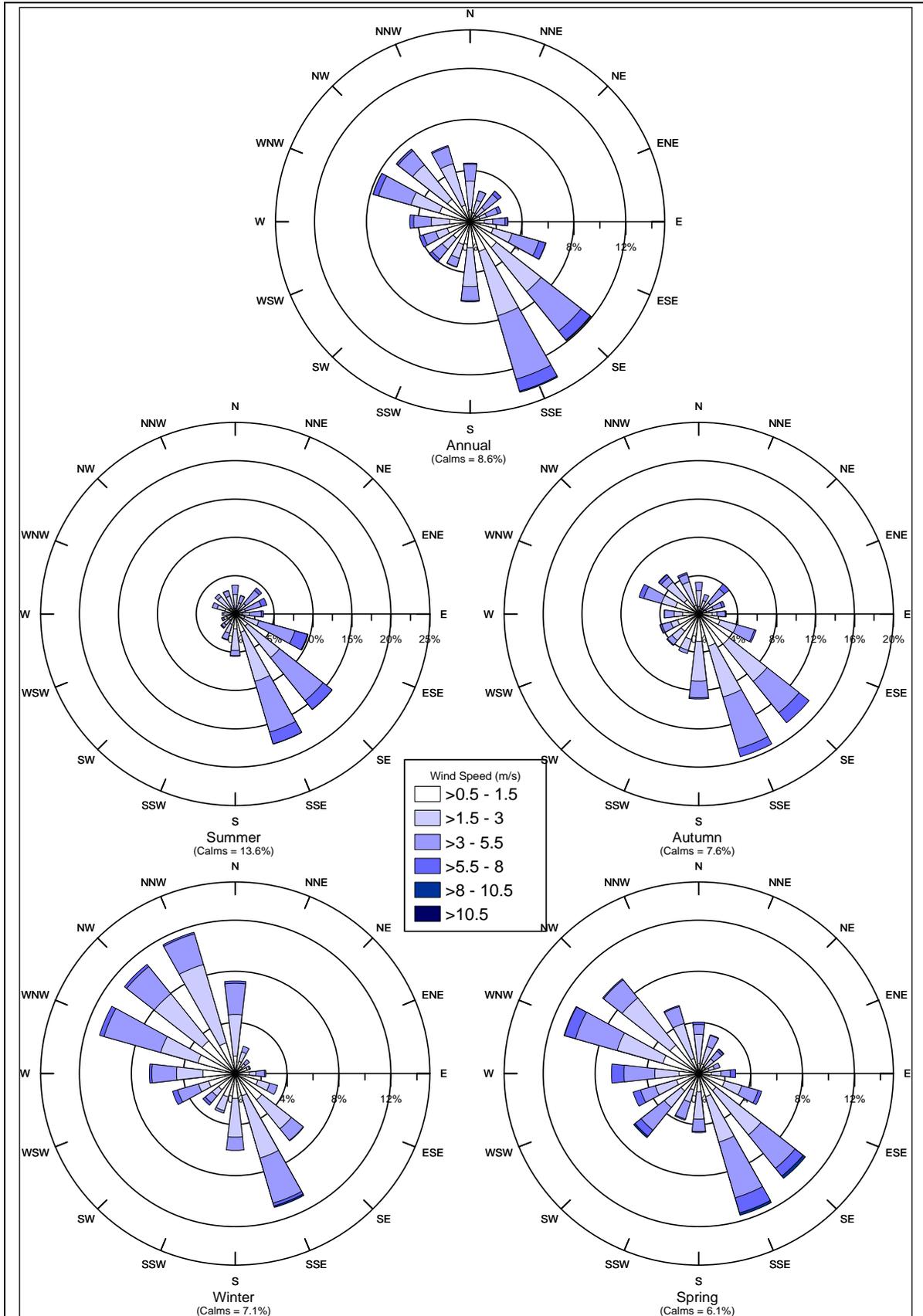
4A.2.7 Evaporation

Table 4A.1 presents the mean monthly evaporation rates at the Tamworth Airport to 1993. Monthly evaporation rates are the greatest between November and February (224mm to 279mm) falling to rates of 60mm in June.

4A.2.8 Temperature Inversions

Inversion monitoring is undertaken at the Werris Creek Coal Mine at 10 minute intervals by determining temperature difference at 2m and 10m above ground and then extrapolating the difference to determine the temperature differential over 100m. Where the temperature increases with elevation, an inversion is present.





Source: Heggies (2010) – Appendix A

FIGURE 4A.4
PROJECT SITE WIND ROSE



Temperature inversions are observed regularly during the cooler months at the Werris Creek Coal Mine, particularly in the months of May and June. During June 2010, Spectrum Acoustics completed a monitoring survey of inversion conditions on the Project Site by placing temperature loggers over a vertical separation of 50m and measuring the difference in temperature between these. Temperature data were recorded at half-hourly intervals from 1 June to 24 June 2010 and it was found that there were inversions on 20 of the 23 nights. The 90th percentile equivalent inversion strength was measured as 12⁰C/100m.

Typically, calm daytime conditions do not exhibit inversion conditions.

4A.3 LAND OWNERSHIP, SURROUNDING RESIDENCES AND LAND USE

4A.3.1 Land Ownership and Surrounding Residences

4A.3.1.1 Landholding Categories

In order to assess the impact the LOM Project would have on the surrounding environment, an understanding of the number and location of surrounding landholdings and residences along with the land use is required.

This sub-section considers land ownership and land use of three separate categories, namely:

- the landholdings of the Project Site and immediate surrounds;
- the landholdings on the southern and eastern perimeters of Werris Creek; and
- the landholdings along the primary transport route, namely Werris Creek Road / Taylors Lane.

4A.3.1.2 The Project Site and Surrounds

Through progressive acquisition of properties on and surrounding the LOM Project Site, the Proponent is now a significant land owner in the local area. **Figure 4A.5** identifies the land owned by the Proponent on and surrounding the Project Site, along with the location of Proponent owned and privately owned residences. **Table 4A.2** lists the proximity of the “non project-related” residences to the main proposed areas of activity within the LOM Project Site. To assist in demonstrating the change in proximity of the LOM Project activities to those already approved, the distance of each residence to the approved mining operations is also provided.

4A.3.1.3 Werris Creek

Figure 4A.5 also identifies the ownership of properties on the southern and eastern edge of Werris Creek, i.e. those landholdings most likely to notice any changes to visual amenity, noise or air quality. **Table 4A.2** lists the proximity of these “non project-related” residences in Werris Creek to the main proposed areas of activity within the LOM Project Site. The distance of each residence to the approved mining operations is also provided.

4A.3.1.4 Transport Route

Figure 4A.6 identifies those land holdings located along the primary road transport route between the Project Site and the Kamilaroi Highway, i.e. Werris Creek Road and Taylors Lane. The proximity of the identified residences to the road edge along this route is also provided.



4A.3.2 Land Use

4A.3.2.1 Project Site and Immediate Surrounds

Land use within the Project Site and immediate surrounds is best described as smaller scale mixed farming. This mixed farming involves a combination of cropping (generally wheat, oats and/or lucerne) and cattle grazing and has been maintained on several of the properties owned by the Proponent, including “Narrawolga”, “Escott”, “Cintra”, “Eurunderee”, “Hill View” and “Railway View”, through lease agreement with the former owners or current occupiers.

Within this general environment of mixed farming are several other current or previous land uses within or immediately surrounding the Project Site. These include:

- Liverpool Plains Shire and Tamworth Regional Council gravel extraction quarries;
- a zeolite processing plant, operated by Zeolite Australia Pty Ltd, and servicing a zeolite mine west of the Project Site; and
- coal mining at the former Werris Creek Colliery was undertaken on and adjacent to the Project Site. Remnants of this underground mining and surface activity are present on the “Preston Park” property.

An important land use recently established over the Project Site and sections of the “Eurunderee” and “Railway View” properties is for a biodiversity offset. As illustrated on **Figure 4A.7**, a Biodiversity Offset Strategy encompassing a corridor of land from the “Railway View” property in the east, the southern section of the Project Site and a portion of the “Eurunderee” property to the west has been established with sole function of this land is to protect native vegetation for the creation of a wildlife corridor between the large remnants of native vegetation which occur on the ridges to the east and west of the Project Site.

4A.3.2.2 Werris Creek and Surrounds

Land use in the Werris Creek and Quipolly locality area can be described as smaller scale mixed farming, however, this trends to larger more intensive agriculture further west on the Liverpool Plains. To the south of the Project Site between Taylors Lane and Paynes Road, a number of landholders are dependent on irrigation to sustain relatively high intensity lucerne cropping with cattle grazing.

The town of Werris Creek is situated to the north of the Project Site. Referenced as the first railway town in Australia, the rail industry has historically been an important feature of the town. While less significant now, the railway station, railway museum and rail yards on the western side of town still represent a significant land use. The land within Werris Creek is, however, predominantly used for residential and commercial purposes.

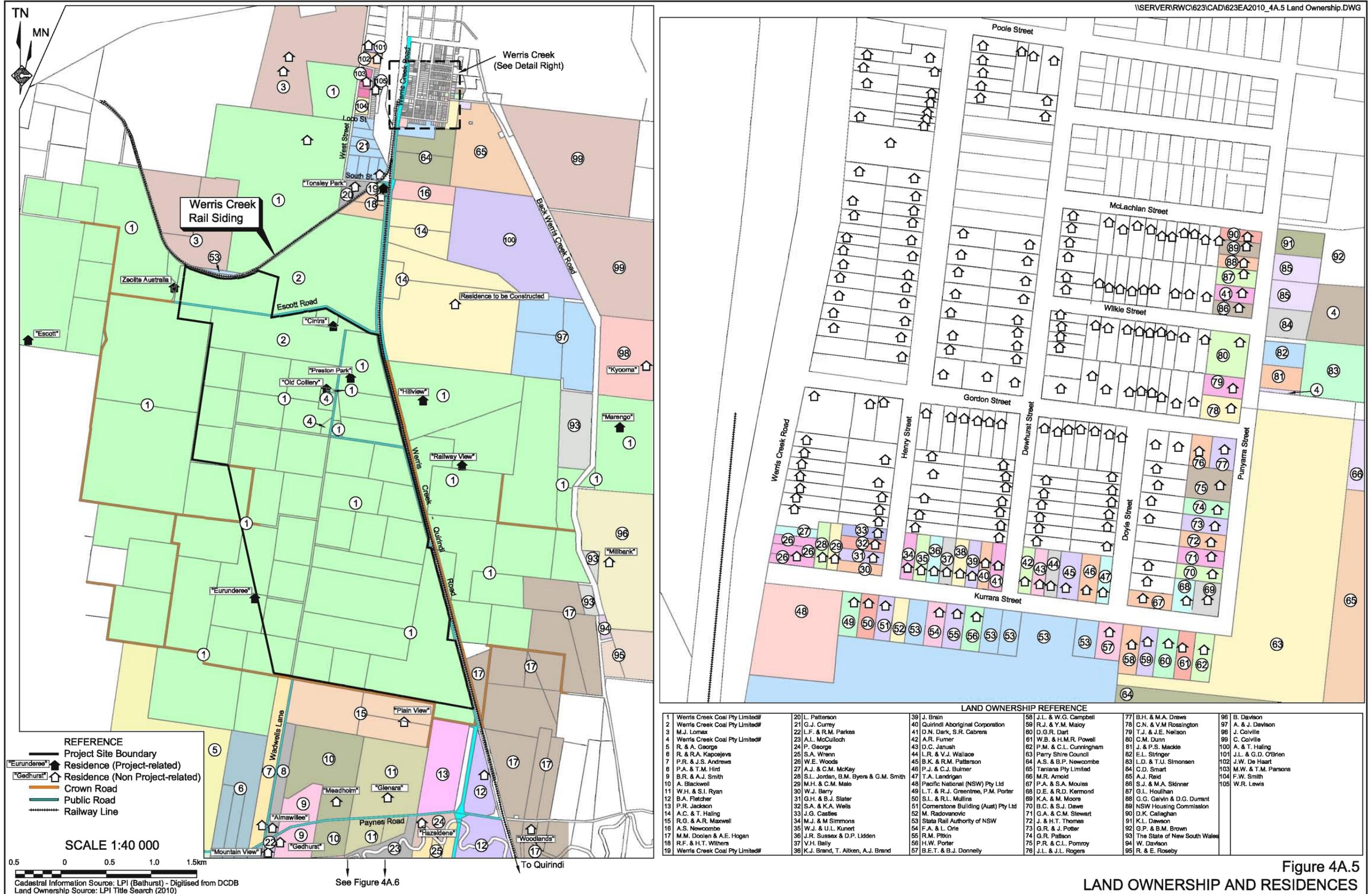


Figure 4A.5
LAND OWNERSHIP AND RESIDENCES

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Table 4A.2
Land Ownership and Residences – Project Site and Surrounds

Reference*	Owner	Property Name	Distance of Residence from Mining Activity		Distance of Residence from Rail Load-out Facility
			Approved Mine	LOM Project	
1	Werris Creek Coal Pty Limited	"Escott"	3.3km NW	2.7km W	2.4km SW
		Zeolite Australia	2.5km NW	1.4km NW	0.9km W
		"Cintra"	1.5km N	300m N	1.1km ESE
		"Preston Park"	930m N	In footprint	1.7km SE
		"Old Colliery"	870m N	In footprint	1.6km SSE
		"Hillview"	1.2km NNE	480m E	2.4km SE
		"Railway View"	800m E	860m E	3.2km SE
		"Marengo"	2.6km ENE	2.6km E	4.5km ESE
		"Eurunderee"	1.0km W	1.3km SW	3.6km S
3.	M.J. Lomax	-	4.8km NNW	2.9km NNW	2.3km NNE
4.	Werris Creek Coal Pty Limited	-	-	-	-
5.	R. & A. George	"Rosehill"	2.5km SSW	3.9km SSW	5.3km S
6.	R. & R.A. Kapcejevs	-	-	-	-
7.	P.R. & J.S. Andrews	-	2.9km S	3.7km SSW	6.0km S
8.	P.A. & T.M. Hird	"Almawillee"	2.8km S	3.7km SSW	6.1km S
9.	B.R. & A.J. Smith	"Gedhurst"	3.0km S	3.9km S	6.0km S
10.	D.I. Athelston Bowd	"Meadholm"	2.4km S	3.5km S	5.9km S
11.	W.H. & S.I. Ryan	"Glenara"	2.3km S	3.6km S	6.0km SSE
12.	B.A. & B. Fletcher	"Roseneath"	2.4km SSE	3.7km SSE	6.1km SSE
13.	P.R. Jackson	-	-	-	-
14.	A. & T. Haling	-	1.8km NNE	1.2km NE	2.4km E
15.	R.G. & A.R. Maxwell	"Plain View"	1.5km S	2.8km S	5.3km SSE
16.	A.S. Newcombe	-	-	-	-
17.	J.C. Doolan & A.E. Hogan	"Woodlands"	3.2km SSE	4.4km SSE	6.8km SE
18.	R.F. & H.T. Withers	-	2.8km NNE	1.7km N	1.7km NE
19.	Werris Creek Coal Pty Limited	-	2.9km NNE	1.8km N	1.8km NE
20.	L. Patterson	"Tonsley Park"	2.9km N	1.7km N	1.6km NE
21.	G.J. Currey	-	3.1km NNE	1.9km N	1.9km NE
22.	L.F. & R.M Parkes	"Mountain View"	3.1km S	4.0km SSW	6.3km S
23.	A.L. McCulloch	-	-	-	-
24.	P. & M. George	"Hazeldene"	2.6km S	3.9km S	6.3km SSE
25.	S.A. Wren	-	-	-	-
26.	W.E. Woods	-	3.7km NNE	2.6km NNE	2.5km NE
27.	A.J. & C.M McKay	-	-	-	-
28.	S.L. Jordan, B.M .Byers & G.M. Smith	-	3.7km NNE	2.6km NNE	2.5km NE
29.	M.H. & C.M Male	-	3.7km NNE	2.6km NNE	2.5km NE
30.	W.J. Barry	-	-	-	-



Table 4A.2 (Cont)
Land Ownership and Residences – Project Site and Surrounds

Reference*	Owner	Property Name	Distance of Residence from Mining Activity		Distance of Residence from Rail Load-out Facility
			Approved Mine	LOM Project	
31.	G.H & B.J. Slater	-	3.7km NNE	2.6km NNE	2.5km NE
32.	S.A. & K.A Wells	-	3.7km NNE	2.6km NNE	2.5km NE
33.	G.J. Castles	-	3.7km NNE	2.6km NNE	2.5km NE
34.	M.J. & M. Simmons	-	3.7km NNE	2.6km NNE	2.6km NE
35.	W.J. and U.L. Kunert	-	3.7km NNE	2.6km NNE	2.6km NE
36.	J.R. Sussex & D.P Lidden	-	3.7km NNE	2.6km NNE	2.6km NE
37.	V.H Baily	-	3.7km NNE	2.6km NNE	2.6km NE
38.	K.J. Brand, T. Aitken & A.J. Brand	-	3.7km NNE	2.6km NNE	2.6km NE
39.	J. Brain	-	3.7km NNE	2.6km NNE	2.6km NE
40.	Quirindi Aboriginal Corporation	-	3.7km NNE	2.6km NNE	2.6km NE
41.	D.N. Dark & S.R. Cabrera	-	3.7km NNE	2.6km NNE	2.6km NE
42.	A.R. Furner	-	3.7km NNE	2.7km NNE	2.7km NE
43.	D.C. Janush	-	3.7km NNE	2.7km NNE	2.7km NE
44.	L.R. & V.J Wallace	-	3.7km NNE	2.7km NNE	2.7km NE
45.	B.K. & R.M Patterson	-	3.7km NNE	2.7km NNE	2.7km NE
46.	P.J. & C.J. Bulmer	-	3.7km NNE	2.7km NNE	2.7km NE
47.	T.A. Landrigan	-	3.7km NNE	2.7km NNE	2.7km NE
48.	Pacific National (NSW) Pty Ltd	-	-	-	-
49.	L.T. & R.J. Greentree & P.M. Porter	-	3.6km NNE	2.5km NNE	2.5km NE
50.	S.L. & R.L. Mullins	-	3.6km NNE	2.5km NNE	2.5km NE
51.	Cornerstone Building (Aust) Pty Ltd	-	3.6km NNE	2.5km NNE	2.5km NE
52.	M. Radovanovic	-	-	-	-
53.	State Rail Authority of NSW	-	-	-	-
54.	F.A. & L. Orle	-	3.6km NNE	2.5km NNE	2.5km NE
55.	R.M. Pitkin	-	3.6km NNE	2.5km NNE	2.5km NE
56.	H.W. Porter	-	3.6km NNE	2.5km NNE	2.5km NE
57.	B.E.T. & B.J. Donnelly	-	3.6km NNE	2.5km NNE	2.7km NE
58.	J.L. & W.G. Campbell	-	3.6km NNE	2.5km NNE	2.7km NE
59.	R.J. & Y.M. Maloy	-	3.6km NNE	2.5km NNE	2.7km NE
60.	D.G.R. Dart	-	3.6km NNE	2.5km NNE	2.7km NE
61.	W.B. & H.M.R. Powell	-	3.6km NNE	2.5km NNE	2.7km NE
62.	P.M. & C.L. Cunningham	-	3.6km NNE	2.5km NNE	2.7km NE
63.	Parry Shire Council	-	-	-	-
64.	A.S. & B.P. Newcombe	-	-	-	-
65.	Taniana Pty Limited	-	-	-	-

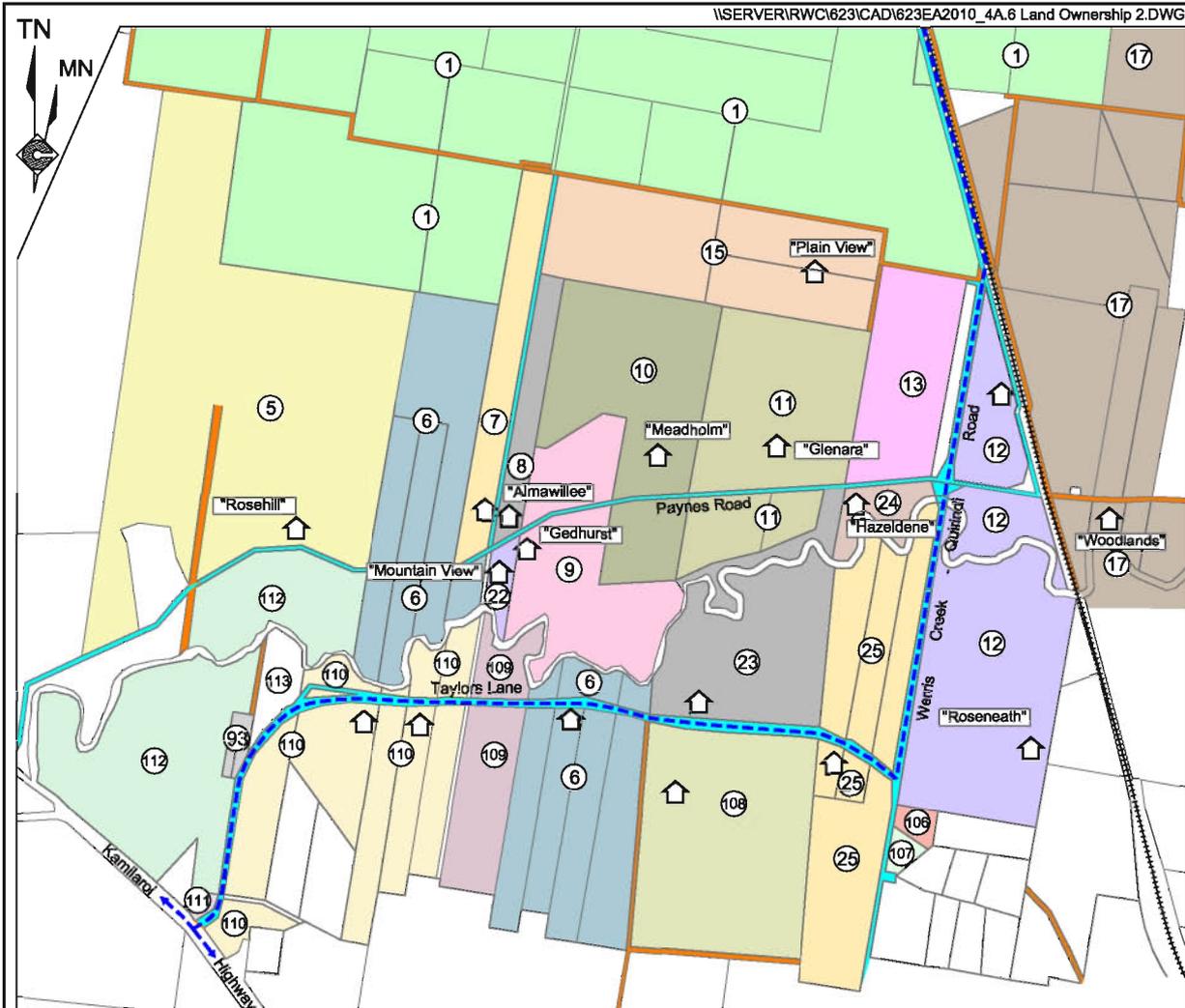


Table 4A.2 (Cont)
Land Ownership and Residences – Project Site and Surrounds

Reference*	Owner	Property Name	Distance of Residence from Mining Activity		Distance of Residence from Rail Load-out Facility
			Approved Mine	LOM Project	
66.	M.R. Arnold	-	-	-	-
67.	P.A. & S.A. Moules	-	3.7km NNE	2.7km NNE	2.8km NE
68.	D.E. & R.D. Kermond	-	3.7km NNE	2.7km NNE	2.8km NE
69.	K.A. & M. Moore	-	3.7km NNE	2.7km NNE	2.8km NE
70.	B.C. & S.J. Dawe	-	3.7km NNE	2.7km NNE	2.8km NE
71.	G.A. & C.M. Stewart	-	3.7km NNE	2.7km NNE	2.8km NE
72.	J. & H.T Thomas	-	3.7km NNE	2.7km NNE	2.8km NE
73.	G.R. & J. Potter	-	3.7km NNE	2.7km NNE	2.8km NE
74.	G.R. Patison	-	3.7km NNE	2.7km NNE	2.8km NE
75.	P.R. & C.L. Pomroy	-	3.7km NNE	2.7km NNE	2.8km NE
76.	J.L. & J.L. Rogers	-	3.9km NNE	2.9km NNE	2.9km NE
77.	B.H. & M.A Draws	-	3.9km NNE	2.9km NNE	2.9km NE
78.	C.N. & V.M. Rossington	-	3.9km NNE	2.9km NNE	2.9km NE
79.	T.J. & J.E. Neilson	-	3.9km NNE	2.9km NNE	2.9km NE
80.	C.M. Dunn	-	4.0km NNE	3.0km NNE	3.0km NE
81.	J. & P.S. Mackie	-	-	-	-
82.	E.L. Stringer	-	-	-	-
83.	L.D. & T.U. Simonsen	-	-	-	-
84.	C.D. Smart	-	-	-	-
85.	A.J. Reid	-	-	-	-
86.	S.J. & M.A. Skinner	-	4.0km NNE	3.0km NNE	3.0km NE
87.	G.L. Houlihan	-	4.0km NNE	3.0km NNE	3.0km NE
88.	G.G. Gavan & D.G. Durrant	-	4.0km NNE	3.0km NNE	3.0km NE
89.	NSW Housing Commission	-	4.0km NNE	3.0km NNE	3.0km NE
90.	D.K. Callaghan	-	4.0km NNE	3.0km NNE	3.0km NE
91.	K.L. Dawson	-	-	-	-
92.	G.P. & B.M. Brown	-	-	-	-
93.	The State of NSW	-	-	-	-
94.	W. Davison	-	-	-	-
95.	R. & E. Roseby	-	-	-	-
96.	B. Davison	"Millbank"	2.4km E	2.7km SE	5.1km SE
97.	A. & J. Davison	-	-	-	-
98.	J. Colville	"Kyooma"	3.0km NE	2.9km NE	4.6km ESE
99.	C. Colville	"Werriston South"	-	-	-
100.	A. & T. Haling	-	-	-	-
101.	J.L. & G.D. O'Brien	-	5.1km N	3.3km N	3.0km NE
102.	J.W. De Haart	-	4.9km N	3.1km N	2.9km NE
103.	M.W. & T.M. Parsons	-	4.8km N	2.9km N	2.3km N
104.	F.W. Smith	-	-	-	-
105.	W.R. Lewis	-	4.7km N	2.8km N	2.2km NE

* Refer to Figure 4A.5





LAND OWNERSHIP REFERENCE

1	Werris Creek Coal Pty Limited
5	R. & A. George
6	R. & R.A. Kapcejevs
7	P.R. & J.S. Andrews
8	P.A. & T.M. Hird
9	B.R. & A.J. Smith
10	D.I. Athelston Bowd
11	W.H. & S.I. Ryan
12	B.A. Fletcher
13	P.R. Jackson
15	R.G. & A.R. Maxwell
17	M.M. Doolan & A.E. Hogan
22	L.F. & R.M. Parkes
23	A.L. McCulloch
24	P. George
25	S.A. Wren
93	The State of New South Wales
106	M.R. & J.G. Potter
107	I.J. & J.A. Morgan
108	R.J. & C.F. Pursehouse
109	F.L. Halliger
110	N.J. Taylor
111	Nungaroo Local Aboriginal Land Council
112	J.E. Anderson
113	Ref. Not Held

REFERENCE

- Project Site Boundary
- Residence (Project-related)
- Residence (Non Project-related)
- Primary Road Transport Route
- Crown Road
- Public Road
- Railway Line

SCALE 1:35 000

500 0 500 1000 1500m

Cadastral Information Source: LPI (Bathurst) - Digitised from DCDB
 Land Ownership Source: LPI Title Search (2010)

Figure 4A.6
LAND OWNERSHIP AND RESIDENCES
ALONG THE PRIMARY ROAD
TRANSPORT ROUTE



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