

Section 3

Environmental Setting

3.1 PLANNING CONTEXT

3.1.1 Local Planning Issues

The Werris Creek Coal Mine is located within the local government area (LGA) of Liverpool Plains, however, as no local environmental plan (LEP) has been created for this LGA (which was formed following the boundary re-distribution of the Parry, Quirindi, Murrurundi and Gunnedah LGA's in 2004), planning on a local level is governed by the Quirindi LEP 1991 (south of Escott Road) and the Parry LEP 1987 (north of Escott Road).

Quirindi LEP 1991

The area of the Mine Site to the south of Escott Road, incorporating the mining and coal processing operations, is zoned as Zone No. 1(a) (Rural "A" Zone). Development for the purpose of mining is not prohibited within the zone and therefore permissible with consent.

Parry LEP 1987

That part of the Mine Site north of Escott Road, including the rail load-out facility and coal product storage area, is zoned as 1(a) (General Rural Zone). Within the 1(a) zone, the development of mines is permissible with development consent and is consistent with objective (f) of this zone.

3.1.2 Regional Planning Issues

Orana Regional Environmental Plan (REP) No 1 – Siding Spring

The Mine Site lies within a region called the Siding Spring Observatory Dark Skies Region, declared by the (then) Minister for Infrastructure and Planning to better protect the observing conditions at the Siding Spring Observatory. The region includes all LGA's falling within 200km of the observatory, although under Section 8 of the REP, consultation or concurrence is only required for locations within 100km of the observatory. The Mine Site is approximately 130km from Siding Spring and therefore no consultation or concurrence is required with the Observatory Director. There will be no change to night time lighting at the Werris Creek Coal Mine as a consequence of the proposed modification and as such, this REP has not been considered further.



3.1.3 State Planning Issues

The following State Environmental Planning Policies (SEPPs) apply to the proposal.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

This SEPP was gazetted on 17 February 2007, in recognition of the importance to New South Wales of mining, petroleum production and extractive industries. The quoted aims of the SEPP are as follows.

- “a. To provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State.*
- b. To facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources.*
- c. To establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources.”*

The SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development, as defined in NSW legislation. A summary of the matters that a consent authority needs to consider when assessing a new or modified proposal (Part 3 - Clauses 12 to 17 of the SEPP) are as follows.

- **Clause 12:** Compatibility of proposed mine, petroleum production or extractive industry with other land uses.

Consideration must be given to:

- the existing uses and approved uses of land in the vicinity of the development;
- the potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and
- any ways in which the development may be incompatible with any of those existing, approved or preferred land uses.

The respective public benefits of the development and the existing, approved or preferred land uses must be evaluated and compared, along with any measures proposed by the Applicant to avoid or minimise the incompatibility.

- **Clause 13:** Compatibility of proposed development with mining, petroleum production or extractive industry.

Consideration must be given to whether the development is likely to have a significant impact on current or future mining, petroleum production or extractive industry and ways in which the development may be incompatible. Measures taken by the Applicant to avoid or minimise any incompatibility are to be considered. The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.



- **Clause 14:** Natural resource management and environmental management.

Consideration must be given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure:

- impacts on significant water resources, including surface and groundwater resources, are avoided or minimised;
- impacts on threatened species and biodiversity, are avoided or minimised; and
- greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided.

- **Clause 15:** Resource recovery.

This clause requires the efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, be considered.

- **Clause 16:** Transportation.

Consideration must be given to alternative means of product transportation other than by road and that a code of conduct for the transport of materials on public roads is prepared.

- **Clause 17:** Rehabilitation.

The rehabilitation of the land affected by the development must be considered including:

- the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated;
- the appropriate management of waste generated by the development;
- remediation of any soil contaminated as a result of the development; and
- the steps to be taken to ensure that the state of the land does not jeopardize public safety, while being rehabilitated or at the completion of rehabilitation.

Each of the considerations presented in Clauses 12 to 17 is addressed in the relevant sections of this document.

State Environmental Planning Policy No. 33 (SEPP 33) – Hazardous and Offensive Developments

A risk assessment process in accordance with DUAP (1997) has previously been completed for the Werris Creek Coal Mine. Based on this risk assessment the mine does not represent a potentially hazardous or offensive industry. As there would be no change to the use, storage or transport of potentially offensive or hazardous materials as part of the proposed modification, the original assessment remains valid and SEPP 33 is not considered further.



State Environmental Planning Policy No. 44 (SEPP 44) – Koala Habitat Protection

The former Quirindi and Parry Local Government Areas (LGAs), now part of the Liverpool Plains and Tamworth Regional LGA's are identified in Schedule 1 of SEPP 44 as an area that could provide habitat for Koalas. The policy requires an investigation be carried out to determine if core or potential Koala habitat is present on the Mine Site and likely to be disturbed. Core Koala habitat comprises land with a resident population of Koalas whereas potential Koala habitat comprises land with native vegetation with known koala feed trees constituting at least 15% of the total number of trees present on a site.

3.2 TOPOGRAPHY

3.2.1 Regional Topography

The Werris Creek Coal Mine lies within the Namoi River Basin in an area characterised by the transition from 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 3.1**). Natural slopes within the region range from less than 1° along the flood plains of the Namoi River, Mooki River and Quipolly Creek to in excess of 30° within areas of the Liverpool Ranges and Great Dividing Range and in excess of 45° within the Nandewar Range.

Elevations in the region range from 240m AHD within the Namoi River valley to in excess of 1 000m AHD within the Liverpool and Great Dividing Ranges to the south and east of the Mine Site.

3.2.2 Local Topography

The Werris Creek Coal Mine is located between two north-south trending ridgelines extending from Werris Creek in the north to Quipolly Creek in the south (see **Figure 3.2**). The proposed limit of mining and northern-most section of the out-of-pit overburden emplacement would extend into a smaller north-south trending ridgeline within the Mine Site itself.

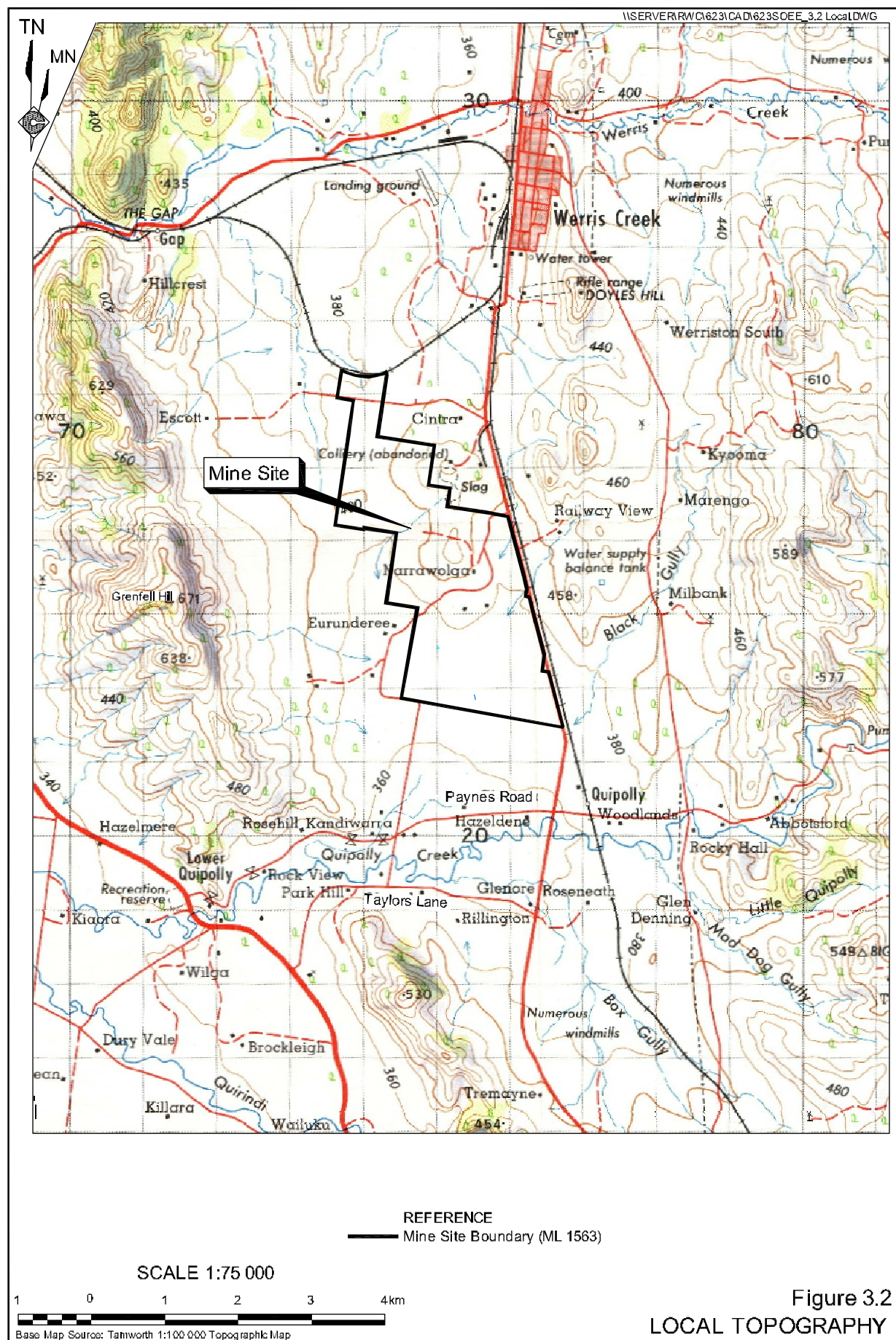
Elevations within the area effectively bounded by the north-south oriented ridgelines and Werris and Quipolly Creeks range from approximately 340m on the banks of Werris Creek to 670m on Grenfell Hill, 3.5km west of the Werris Creek Coal Mine.

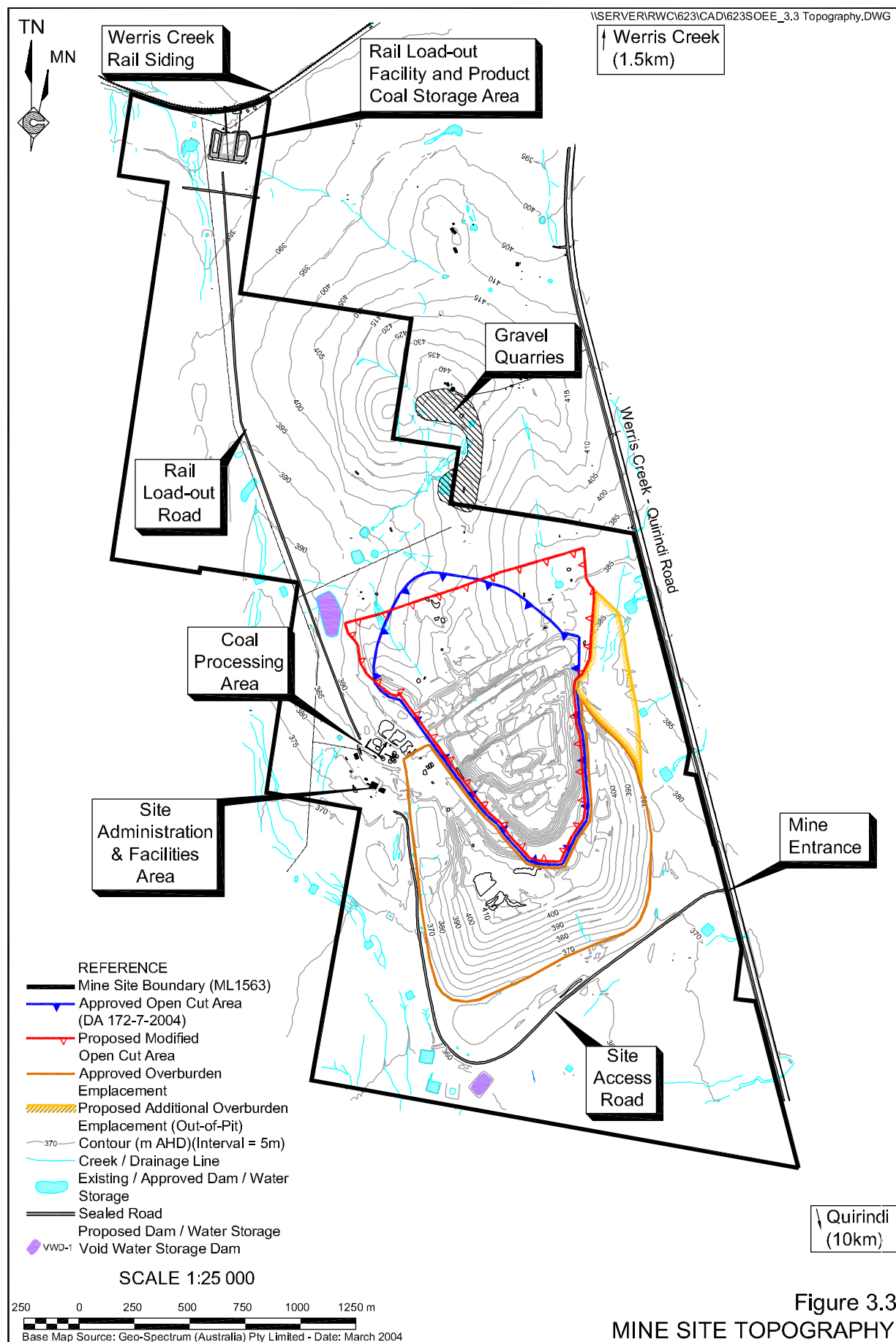
3.2.3 Mine Site Topography

The pre-mining topography of the Mine Site comprised a central ridge trending almost north-south with side slopes of 7° to 10° decreasing to less than 1° on the surrounding near flat cropping land. At its highest point, the central ridge reaches 425m AHD, with elevation decreasing to 380m AHD with the coal product storage area to the north and 360m AHD on the flatter cropping land at the southern end of the Mine Site.









The topography of the Mine Site has been significantly modified by the mining operations that have been completed to date. The out-of-pit overburden emplacement has been constructed around the extremity of the active mining operations creating a horse-shoe shaped extension of the central ridge with a large void created by mining down to 320m AHD. Flat hard stand surfaces and numerous water storages have also been constructed modifying the original Mine Site topography.

3.3 METEOROLOGY

3.3.1 Introduction

This sub-section provides a summary of the meteorological data relevant to the Mine 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 sub-section has been presented to provide an overview of meteorological conditions within and surrounding the Mine Site.

3.3.2 Source of Data

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

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

Station 055049: temperature, rainfall, relative humidity, fog and frost frequency and wind speed.

Station 055054: temperature, rainfall, relative humidity, evaporation, fog and frost frequency and wind speed.

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 (2009). With the exception of wind data, all meteorological data is presented in **Table 3.1**.

3.3.3 Temperature

Average daily maximum and minimum temperatures recorded at Quirindi and Tamworth are presented in **Table 3.1**. December, January and February are the warmest months at each location with mean daily maxima of between 31°C and 32°C. Periods of high summer temperatures are largely due to northwesterly winds blowing hot dry continental air from Central Australia. July is the coldest month for both the Quirindi and Tamworth stations with mean daily minima of 1.6°C and 2.9°C respectively. Mean diurnal temperature variations at both stations are relatively constant throughout the year at approximately 15°C. Within the region, autumn and spring are generally mild.



Table 3.1
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	24.8	20	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 055049 QUIRINDI POST OFFICE													
Mean Maximum	32.1	31.2	29.3	24.8	20.4	16.5	15.9	17.9	21.4	25.2	28.4	31.2	
Mean Minimum	16.3	16.0	13.4	8.9	5.1	2.8	1.6	2.4	4.9	8.6	11.8	14.7	
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 055049 QUIRINDI POST OFFICE													
Mean	81.6	65.0	53.5	42.3	45.5	50.3	48.1	45.7	46.3	61.2	64.2	79.5	683.1
Mean Rain Days	6.9	5.7	4.9	4.8	5.6	7.2	7.2	7.0	6.3	7.2	7.1	7.0	76.9
Highest	278	335	293	183	157	235	187	137	160	168	220	244	
Lowest	0.0	0.0	0.0	0.0	0.3	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 055049 QUIRINDI POST OFFICE													
Mean 9:00am	61	66	64	65	77	83	80	72	63	57	58	57	66.8
Mean 3:00pm	39	42	40	39	47	56	49	45	44	40	34	31	42.2
Source: Bureau Of Meteorology Tamworth Airport Station (No. 055054) and Bureau Of Meteorology Quirindi Post Office Station (No. 055049)													

3.3.4 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 3.1** and are based on 125 and 118 years of records respectively. The average annual rainfall is approximately 683mm at Quirindi and 673mm at Tamworth.

Highest monthly rainfalls within the Quirindi/Tamworth area occur in the period between November and February, with January recording the highest mean monthly rainfall. July to September are typically the driest months of the year. On average, the local area has 77 to 82 rain days per year or approximately 6.5 rain days per month.

3.3.5 Wind

Heggies (2009) assessed wind data collected at the mine site for one year between September 2007 to August 2008 and determined that prevailing winds are predominantly light to moderate (between 1.5m/s and 8m/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 0.5m/s) were recorded approximately 8.6% of the time throughout the data set.

Figure 3.4 presents seasonal wind conditions measured on the mine site for the period September 2007 to August 2008. The seasonal wind roses indicate that:

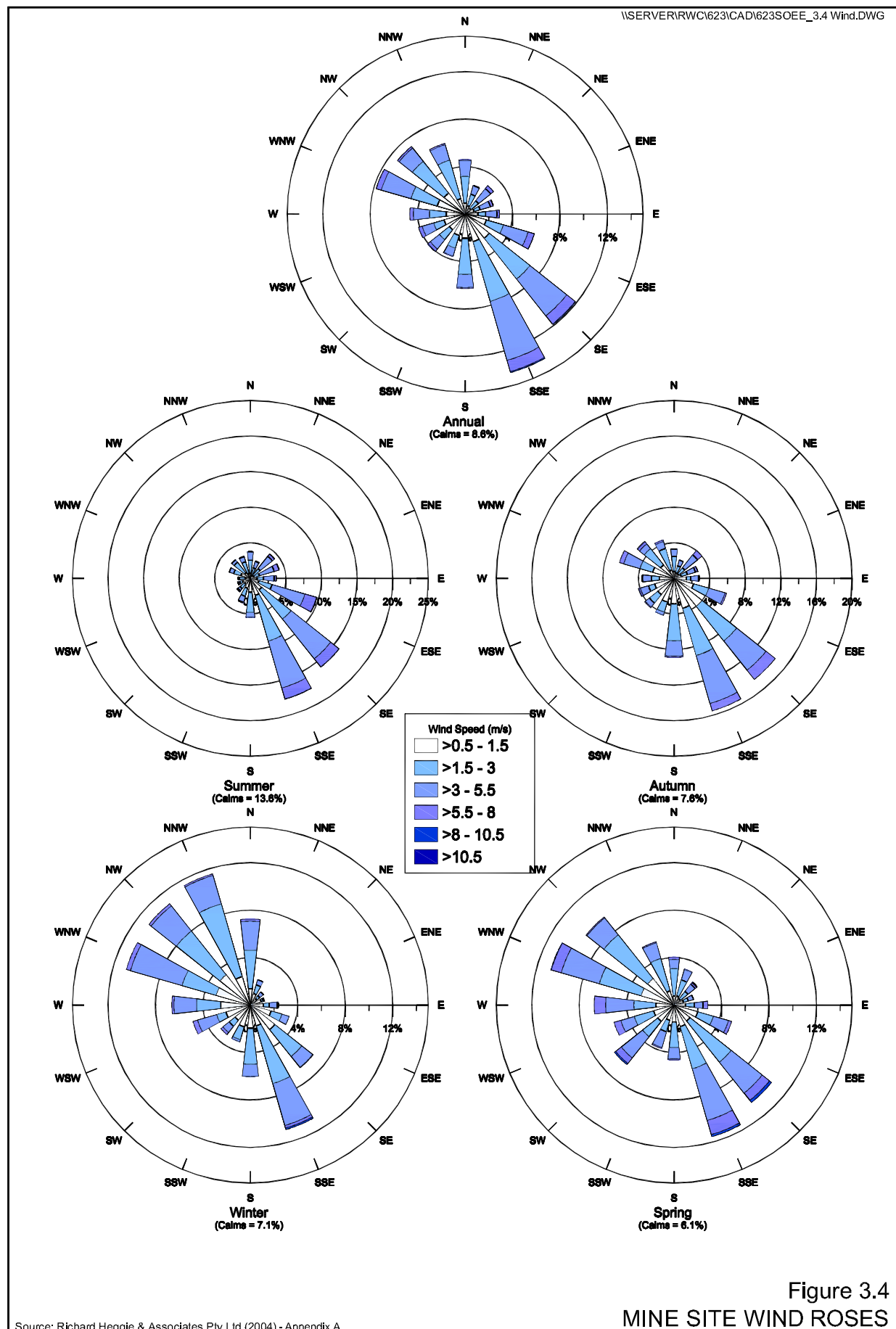
- in spring, light to moderate winds are experienced predominantly from the southeast to south-southeast (approximately 22% combined) and west to northwest (approximately 27% combined);
- in summer, light to moderate winds are experienced predominantly from the east-southeast to south-southeast (approximately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

3.3.6 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.

Temperature inversions are observed regularly during the cooler months at the Werris Creek Coal Mine, particularly in the months of May and June.





3.4 LAND OWNERSHIP, LAND USE AND SURROUNDING RESIDENCES

3.4.1 Introduction

In order to assess the impact of the proposed modification on the surrounding biological, physical and social environment, an understanding of the number and location of surrounding landholdings and residences and the current and potential future land uses is required. This sub-section identifies the landholdings surrounding the Mine Site, presents their proximity to the proposed areas of activity and provides an overview of the land uses both in the local area and surrounding the Mine Site.

3.4.2 Land Ownership and Surrounding Residences

Figure 3.5 presents the land ownership and location of residences on and surrounding the Mine Site. As illustrated, with the exception of the “Cintra” property to the north, the Applicant owns a substantial area of freehold property between Escott Road and Paynes Lane. These properties and the associated residences are considered “project related” for the purposes of the assessment as they are either owned by or contracted for sale to Werris Creek Coal Pty Limited or associated companies.

Table 3.2 lists these residences as well as presenting their proximity to the proposed mining and processing activities in both Year 1 and the final year of proposed operations and rail load-out.

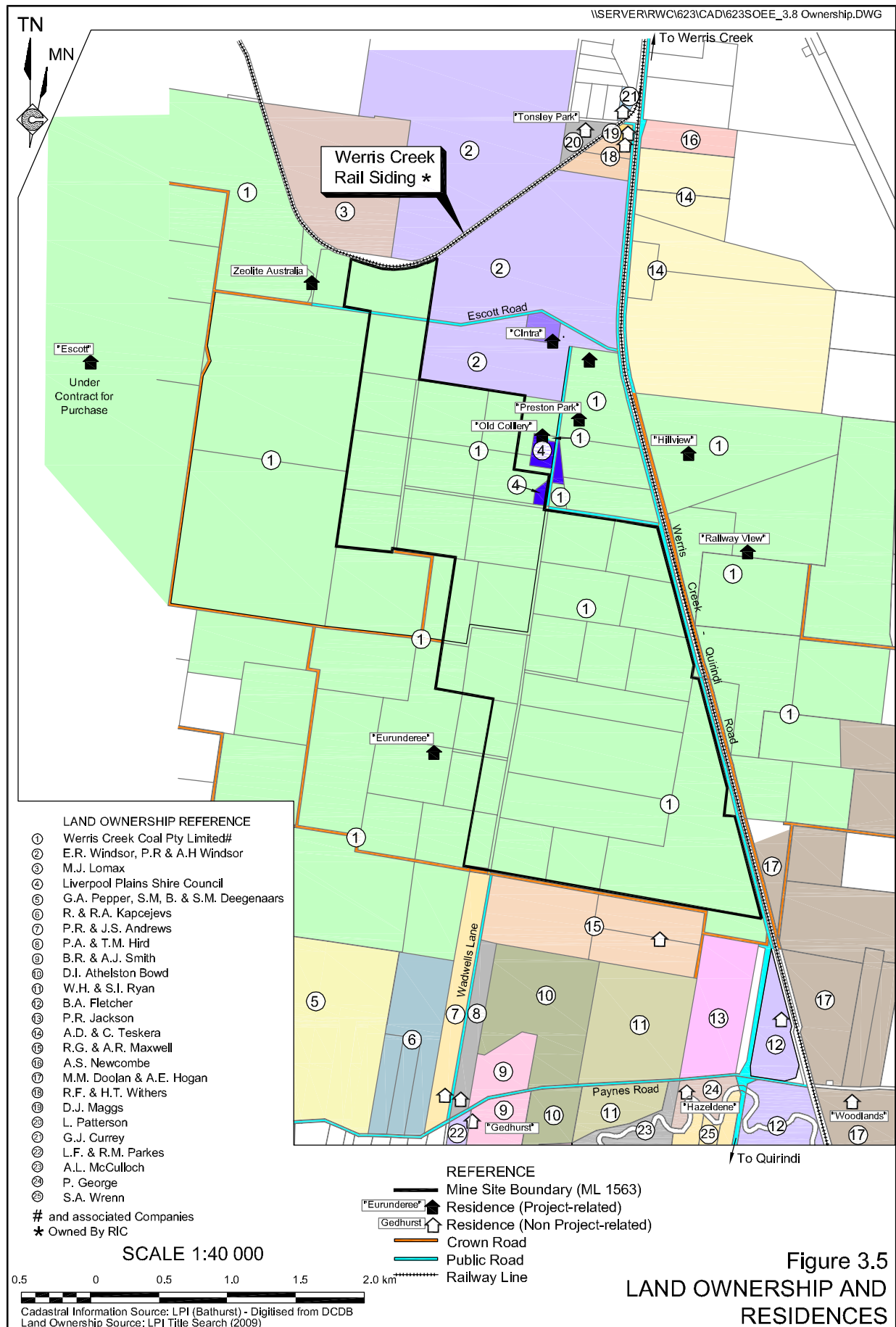
Table 3.2
Proximity of Surrounding Residences

Property Name	Project Related	Distance from Mining/Processing Activity		Distance from Rail Load-out Facility
		Year 5 (Year 1 of the proposed modification)	Year 7 (Year3 of the proposed modification)	
Zeolite Australia	Y*	2.6km NW	2.5km NW	0.9km W
“Cintra”	N	1.7km N	1.5km N	1.1km ESE
“Gedhurst”	N	2.5km S	2.3km S	6.0km S
“Tonsley Park”	N	3.1km N	3.0km N	1.6km NE
“Marengo”	Y	2.5km E	2.5km E	4.4km E
“Woodlands”	N	2.8km SE	3.3km SE	6.8km SE
“Hazeldene”	N	2.3km S	3.0km S	6.3km SE
“Mountain View”	N	3.0km S	3.2km S	6.1km S
“Park Hill”	N	3.5km SW	3.7km SW	6.4km S
Notes: * The manger’s residence and manufacturing plant are located on the “Escott” property which is now under contract for purchase to WCC.				

3.4.3 Land Use

Land use in the Werris Creek area is best described as smaller scale mixed farming trending to larger more intensive agriculture further onto the Liverpool Plains. This mixed farming involves a combination of cropping (generally wheat, oats or lucerne) and cattle grazing.





This mixed farming approach has been maintained on several of the properties owned by the Applicant, including “Eurunderee”, “Hill View” and “Narrawolga”, through lease agreement with the residents. To the south of the Mine 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.

Within this general environment of mixed farming are several other current or previous land uses. These include:

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

3.5 BUSHFIRE HAZARD

In order to assess the potential bushfire hazard of the Mine Site, bushfire hazard maps of the former Parry and Quirindi Councils were consulted. Of the area covered by the Mine Site the majority has been cleared for agricultural purposes and, as would be expected, is presented as exhibiting a low bushfire hazard on the maps. Areas along the north-south oriented ridge which have not been cleared and retain an open woodland structure are presented as having a low-medium hazard rating.

By adopting a Type A assessment for bushfire prone areas (NSW Rural Fire Service, 2000) and assuming the Mine Site as an open woodland (despite the fact the majority has been cleared) with level (0-5°) to hilly (5-15°) terrain, the Mine Site can be described as exhibiting a low hazard rating. This confirms the hazard rating of the Council hazard maps and, as such, a development control plan (DCP) would not be required.

