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4A.2 METEOROLOGY

4A.2.1 Introduction

The Namoi River Valley is situated between the tropical and temperate climatic zones, ie. between the belts of the sub-tropical highs and the zone of mid-latitude westerlies. In summer, synoptic highs dominate the climate. Low pressure systems pass at regular intervals bringing milder temperatures and winds from the southerly quadrant. The climate is also influenced by substantial mountain ranges located to the east and south, and to a lesser extent to the west.

4A.2.2 Sources of Data

Meteorological data has been sourced from a number of sources to establish the local meteorological conditions of the Mine Site. The following provides a summary of the data sources used.

Temperature, Relative Humidity and Wind Speed

Records of local temperature have been collected for the last 41 years by the Bureau of Meteorology at the Narrabri West Post Office (Station No. 053030), located approximately 25km northwest of the Pit Top Area. Temperature data has also been collected from an on-site meteorological station established in June 2006. To date, the data collected reflects similarities with the longer term data used for the various impact assessments throughout this document.

Rainfall and Evaporation

Rainfall and evaporation data for the Mine Site was sourced from WRM Water and Environment Pty Ltd (2009) – see Part 3 of the *Specialist Consultant Studies Compendium*. The rainfall data listed in **Table 4A.1** was obtained from interpolated data assembled by the Queensland Department of Natural Resources and Mines (NR&M) Data Drill (Database), for the 119 year period 1889 to 2008. The Database takes into consideration the spatial difference in rainfall between the nearest rainfall station at Narrabri and the Mine Site. The data set also contains no gaps in record and as such is preferable to raw rainfall data.

Wind Direction (and Speed)

Annual and seasonal wind roses (displaying wind speed and direction) which were compiled by Heggies Pty Ltd (see Part 7 of the *Specialist Consultant Studies Compendium*) using The Air Pollution Model (TAPM) software developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). In a similar manner to the rainfall data, the TAPM software uses measured data and adjusts it to provide the most accurate wind conditions for the Mine Site.

4A.2.3 Summary of Meteorological Conditions

Table 4A.1 summarises average monthly temperature, relative humidity and wind speed at Narrabri West Post Office based on data acquired over varying time spans.



Table 4A.1
Mean Monthly Meteorological Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	No. Years Data
TEMPERATURE (°C) – Narrabri West Post Office														
Mean Maximum	33.8	33.2	31.2	27.3	22.5	18.7	<u>18.0</u>	19.8	23.4	27.1	30.1	33.0	26.5	40
Mean Minimum	19.3	19.1	16.4	11.9	8.3	5.2	<u>3.7</u>	4.6	7.6	11.7	14.8	17.7	11.7	40
RAINFALL (mm) – WRM Water and Environment Pty Ltd (2009)														
Ave. Monthly Rainfall	78.8	59.4	50.1	<u>34.5</u>	43.5	46.1	41.8	37.6	37.5	50.4	56.6	63.1	599.1	119
POTENTIAL EVAPORATION (mm) – WRM Water and Environment Pty Ltd (2009)														
Ave. Monthly Potential Evaporation	199.3	165.0	151.7	104.8	73.6	<u>53.0</u>	57.9	76.6	104.7	145.7	173.2	198.7	1 504.2	119
RELATIVE HUMIDITY (%)– Narrabri West Post Office														
Mean 9:00am	61	65	64	66	78	84	82	73	65	<u>57</u>	59	59	68	17
Mean 3:00pm	38	40	39	42	49	52	50	42	39	<u>37</u>	39	<u>37</u>	42	17
WINDS (km/hr) – Narrabri West Post Office														
Mean 9:00am Wind Speed	17.1	17.6	17.1	14.7	12.9	12.6	<u>11.7</u>	13.1	16.3	18.5	18.3	18.8	15.7	38
Mean 3:00pm Wind Speed	16.9	17.1	17.4	16.4	<u>15.4</u>	16.8	17.3	18.5	19.7	19.2	19.2	19.0	17.7	38
Source: Bureau of Meteorology Station No. 053030 and WRM (2009)														
Bold = maximum <i>Italics</i> = minimum														

The meteorological data listed in **Table 4A.1** provides the following profile of the climate in the Narrabri area.

- Seasonal temperature fluctuations are typical for the region with the average maximum daily temperatures being recorded in the summer months of December, January and February (33.0°C to 33.8°C) and the average lowest daily temperatures being recorded in the winter months of June, July and August (17.7°C to 19.3°C).
- The average annual rainfall at the Mine Site is estimated at 599mm with the median annual rainfall calculated at 562mm. The annual rainfalls on the Mine Site can vary considerably from year to year. Based on the 119 years of records, the 10% and 90% annual rainfalls at the Mine Site are estimated at 397mm and 839mm respectively.
- The average monthly rainfalls at the Mine Site vary during the year from a low of 34.5mm in April to a high of 78.8mm in January. The summer average month rainfalls (50.1mm to 78.8mm) are generally higher than the equivalent winter monthly rainfalls (34.5mm to 46.1mm).
- The average annual potential evaporation at the Mine Site is estimated at 1504mm. Evaporation varies seasonally, with high evaporation rates occurring between October and March. The values in **Table 4A.1** indicate that the potential evaporation rate during the summer months is greater (approximately 2.5 times) than the evaporation rate during the winter months.



- The average potential evaporation exceeds average rainfall for all months of the year. The annual deficit between mean rainfall and evaporation levels is 905mm.
- The average relative humidity recorded at 9:00am varies between 57% and 84% throughout the year. The relative humidity is highest during the winter months and lowest during the summer months.
- The wind speed follows similar seasonal patterns to temperature with the highest values recorded in the summer months and the lowest values recorded in the winter months.

The wind roses compiled from the TAPM data are presented in **Figure 4A.3**. The annual wind rose indicates that the Mine Site would tend to experience light to fresh winds (average wind speed of between 1.5m/s and 10.5m/s) from the east-southeast to south-southwest (approximately 38% combined) and from the west to the northwest (approximately 22% combined). Seasonal variations include the following.

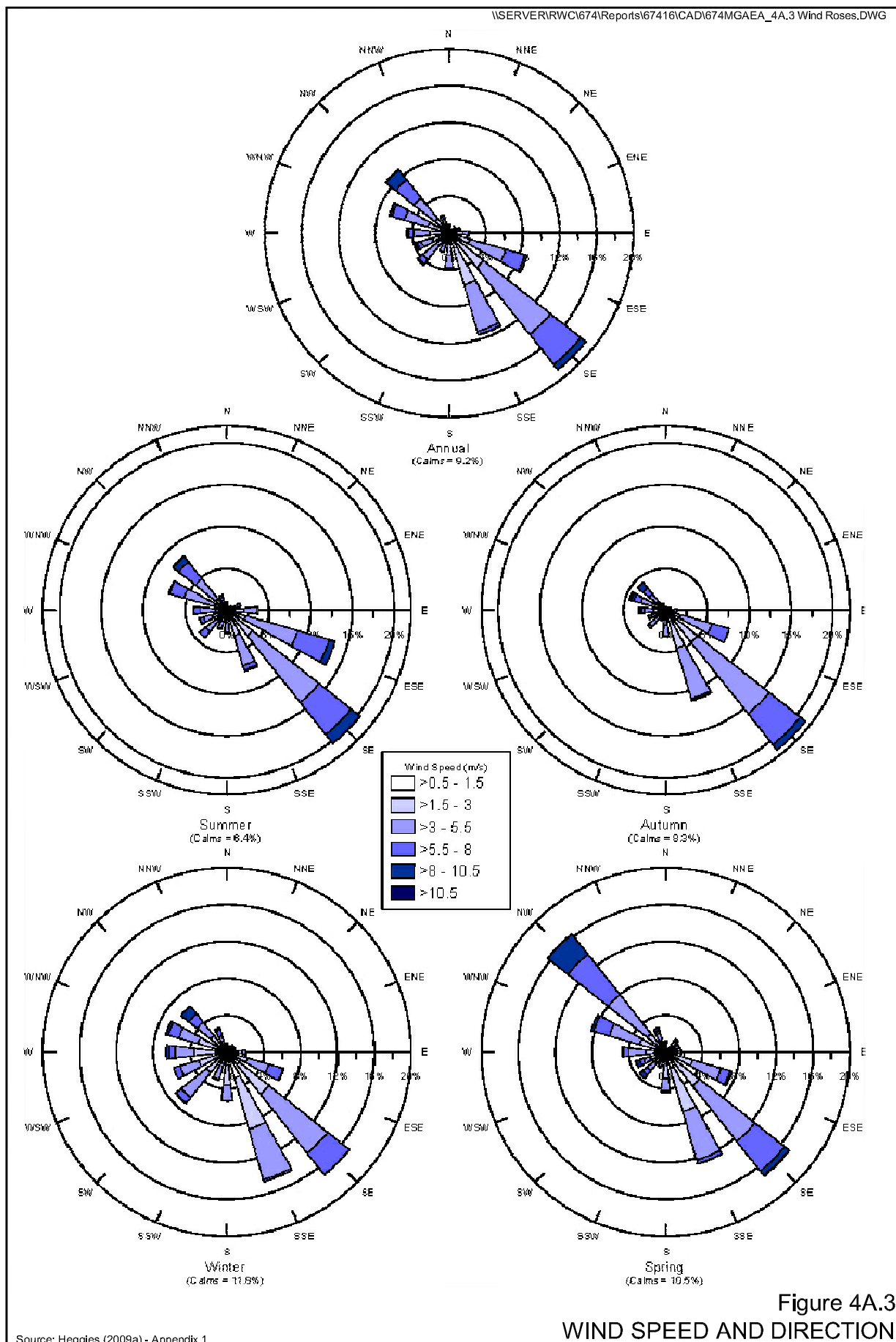
- In spring, light to fresh winds are experienced predominantly from the east-southeast to south-southeast (approximately 36% combined) and west to northwest (approximately 29% combined);
- In summer, light to fresh winds are experienced predominantly from the east-southeast to south-southeast (approximately 42% combined);
- In autumn, light to fresh winds are experienced predominantly from the east-southeast to south-southeast (approximately 40% combined); and
- In winter, light to moderate winds (between 1.5 m/s and 8 m/s) are experienced from the east-southeast to south (approximately 43% combined) and light to fresh winds from the southwest to northwest (approximately 34% combined).

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

4A.3.1 Introduction

In order to assess the impact the Longwall 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 identifies the landholdings and the proximity of surrounding residences to the main proposed areas of activity. An overview is provided of the land uses both in the local area and immediately surrounding the Mine Site.





4A.3.2 Land Ownership and Surrounding Residences

Figure 4A.4 presents the ownership details within and immediately surrounding the Mine Site. The Proponent has purchased nine properties, and a section of a further three properties, on the Mine Site covering an area of 3 825ha. The landholdings surrounding those owned by the Proponent vary in size from 830ha to 70ha with an average size of 250ha.

Figure 4A.4 also shows the locations of 19 residences within and immediately surrounding the Mine Site. Eight of the residences, namely those on “Claremont”, “Turrabaa”, “Willarah”, “Matoppo”, “Mayfield”, “Mayfield Cottage”, “Westhaven” and “Rosedale” are owned by the Proponent and hence classified as project-related. The distances from each of the surrounding residences to the main proposed areas of activity within the Pit Top Area and initial Ventilation Shaft Area are listed in **Table 4A.2**. The Jacks Creek and Pilliga East State Forests are located within and beyond the western boundary of the Mine Site.

Table 4A.2
Proximity of Residences to Project Activity Areas (m)

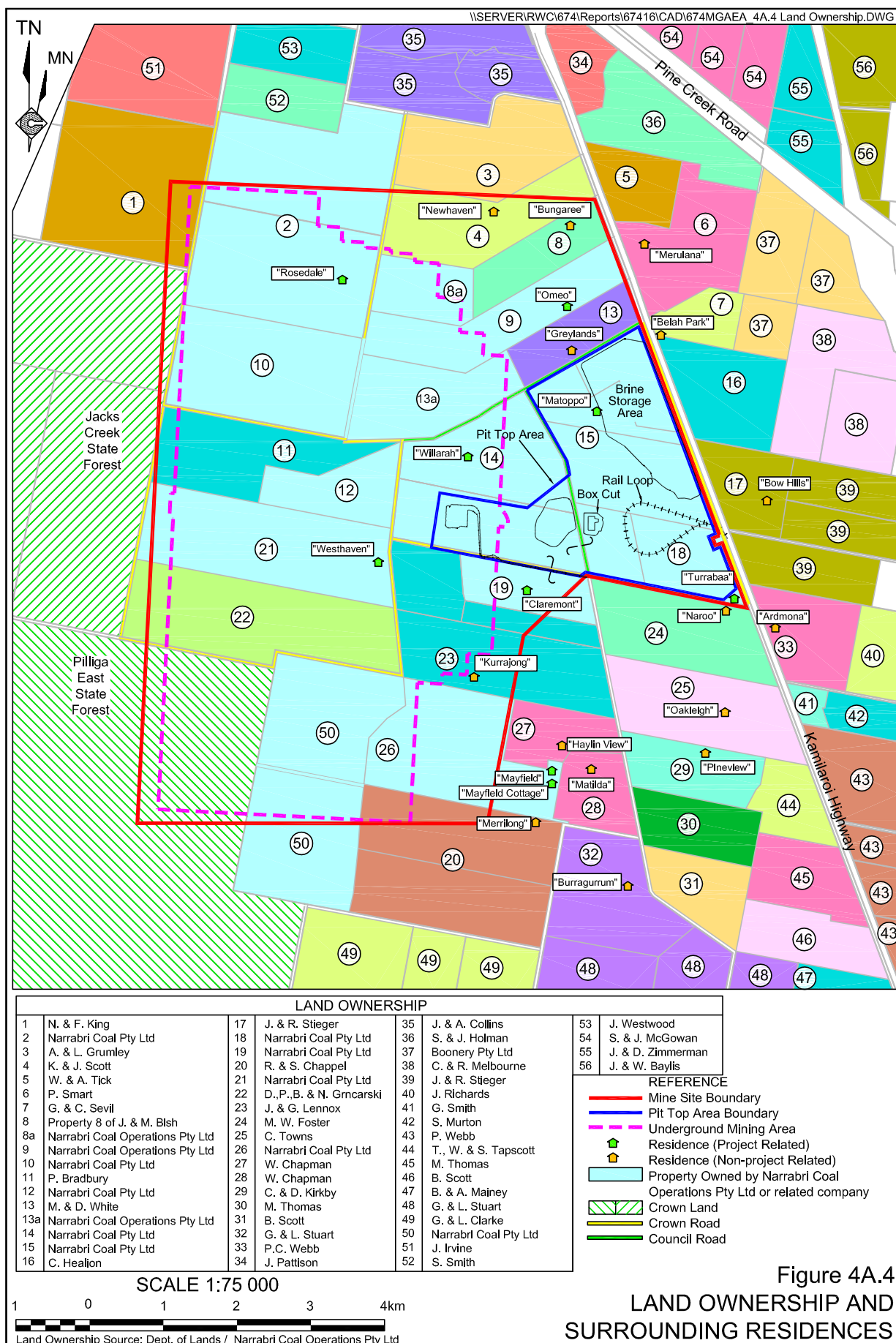
Residence	Coal Preparation Plant	Reject Emplacement Area	Initial Ventilation Shaft Area	Rail Loop (Cutting/Embankment)*	Mine Access Road
“Ardmona”	2 615	3 015	4 510	1 490 (+2.0m)	1 330
“Belah Park”	2 650	2 530	3 950	2 270 (+1.5m)	2 840
“Bow Hills”	2 120	2 600	4 280	705 (+2.0m)	750
“Bungaree”	4 220	3 810	4 080	3 920 (-0.6m)	4 770
“Burragurum”	4 890	4 720	5 400	4 480 (-3.4m)	4 450
“Claremont”**	1 460	675	1 190	1 560 (-6.0m)	1 170
“Greylands”	2 440	2 000	3 030	2 240 (-0.6m)	2 590
“Haylin View”	3 050	2 700	3 130	2 800 (-3.4m)	2 700
“Kurrajong”	2 760	2 040	1 740	2 800 (-6.0m)	2 550
“Matilda”	3 310	3 050	3 610	2 980 (-3.4m)	2 920
“Matoppo”**	1 560	1 230	2 620	1 340 (-0.6m)	1 730
“Mayfield Cottage”**	3 580	3 225	3 530	3 330 (-3.4m)	3 240
“Mayfield”**	3 400	3 045	3 360	3 170 (-3.4m)	3 080
“Merrilong”	4 150	3 745	3 970	3 890 (-3.4m)	3 820
“Merulana”	3 840	3 590	4 340	3 530 (+1.5m)	4 380
“Naroo”	1 920	2 300	3 790	1 080 (+2.0m)	980
“Newhaven”	4 550	3 970	4 040	4 400 (-0.6m)	4 720
“Oakleigh”	2 960	3 200	4 240	2 380 (+2.0m)	2 230
“Omeo” **	3 020	2 585	3 520	2 810 (-0.6m)	3 180
“Pineview”	3 340	3 460	4 450	2 750 (-3.2m)	2 680
“Rosedale”	4 900	4 090	3 515	4 960 (-2.2m)	5 150
“Turrabaa”**	1 800	2 350	3 760	730 (+2.0m)	640
“Westhaven”**	3 220	2 150	1 070	3 390 (-7.6m)	3 070
“Willarah” **	2 170	1 220	1 160	2 250 (-5.6m)	2 150

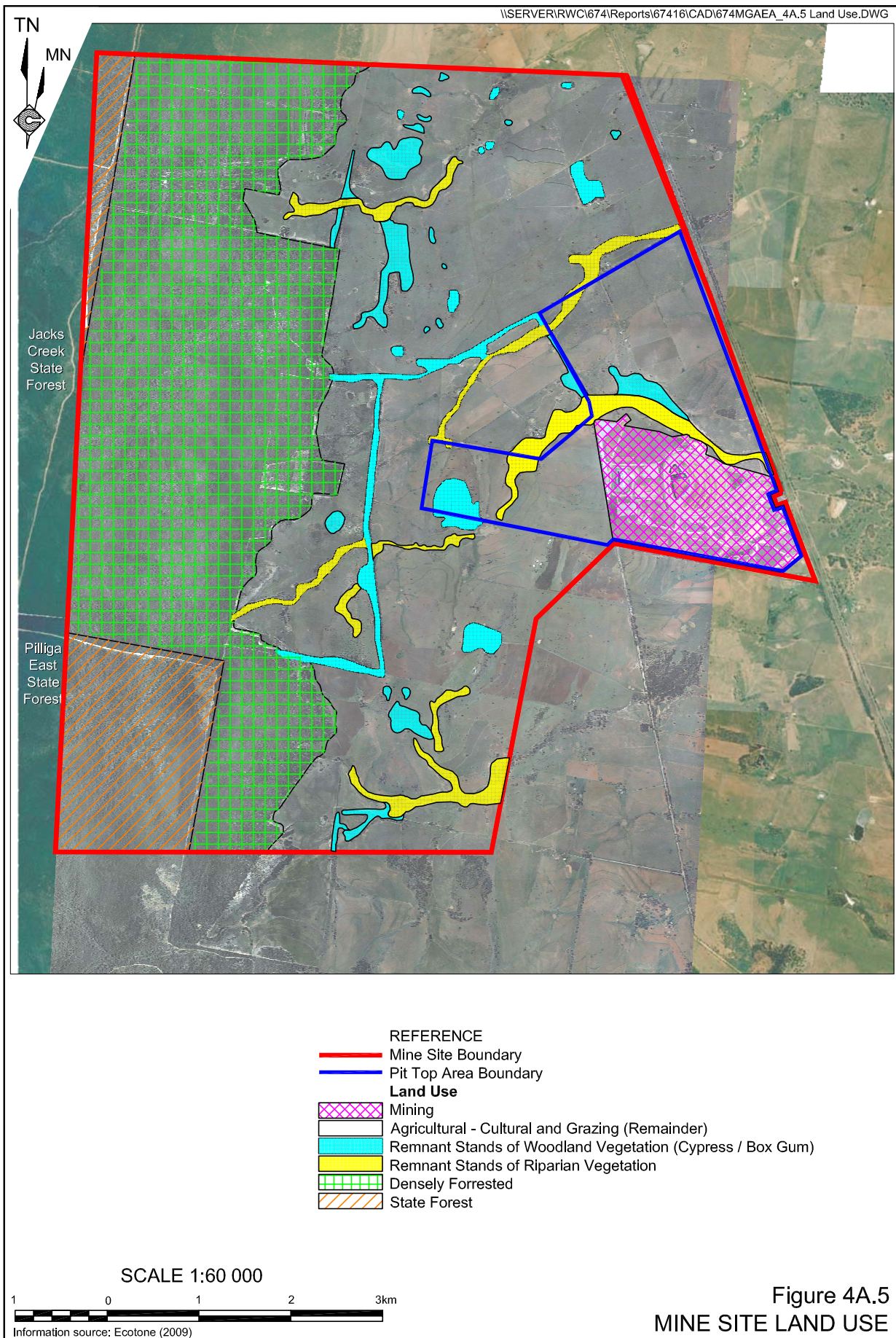
* Depth of Cutting expressed as –m / Embankment height above natural ground level expressed as +m
** Project-related residence

4A.3.3 Land Use

On the Mine Site itself and other properties to the north, south and east, agricultural land uses involving primarily grazing and cereal cropping are most common. **Figure 4A.5** illustrates the land use within and immediately surrounding the Mine Site.







The eastern half of the Mine Site is predominantly cleared for grazing (cattle, sheep and horses) with some cereal crops grown, particularly wheat. Small patches of remnant native vegetation remain within the agricultural areas, along creeks, Crown roads or as isolated areas. The remaining western half of the Mine Site is predominantly forested with woodlands dominated by cypress pine and box gum trees. The southwestern corner of the Mine Site is located within the Pilliga East State Forest.

The native vegetation extends well beyond the western boundary of the Mine Site within the Pilliga East State Forest and Jacks Creek State Forest. The eastern boundary of the Mine Site lies adjacent to the Kamilaroi Highway and the North Western Branch Railway Line. Beyond the transport corridor to the east, the land is used predominantly for cropping given most of the land lies within the Namoi River Floodplain. A small quarry is present on the “Bow Hills” property approximately 350m east of the Kamilaroi Highway.

