



Section 4

Environmental Setting

PREAMBLE

This section describes the environmental setting within and surrounding the Quarry Site.

Emphasis is placed in this section on providing information about the environmental features that would contribute to or influence the assessment of a wide range of other environmental parameters. Information is provided on the regional and Quarry Site topography, meteorology, land ownership and land uses.

Other features of the surrounding environment that would or may be affected by the Proposal are detailed in Section 5 in conjunction with the design and operational safeguards and impact assessment for those features.



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4.1 Topography and Drainage

The Quarry Site is located to the west of the Great Dividing Range within the NSW South Western Slopes Bioregion (NPWS, 2003). This region predominantly comprises the foothills and ranges at the western extent of the Great Dividing Range with topography generally falling to the west. Topography is largely controlled by the underlying geology with hilly landscapes typically associated with structural features (e.g. faults, bedding) and more resistant rock types. Granitic landscapes are common throughout the region and commonly present as basins surrounded by steep hills or topographic highs. The Quarry Site is located at the western extent of the South Western Slopes Bioregion where the alluvial fans of the Riverine Plain have largely buried the bedrock.

Figure 4.1 presents the regional topography and drainage features surrounding the Quarry Site. The Quarry Site is located within the Murrumbidgee River Catchment with the Murrumbidgee River located approximately 4.5km to the northeast at its closest point. Minor natural drainage features, including Sandy Creek (approximately 3km to the east), generally flow towards the Murrumbidgee River to the northwest or dissipate in the surrounding landscape. A network of artificial irrigation canals also span the broader region, with these canals typically originating from the Murrumbidgee River or one of its tributaries.

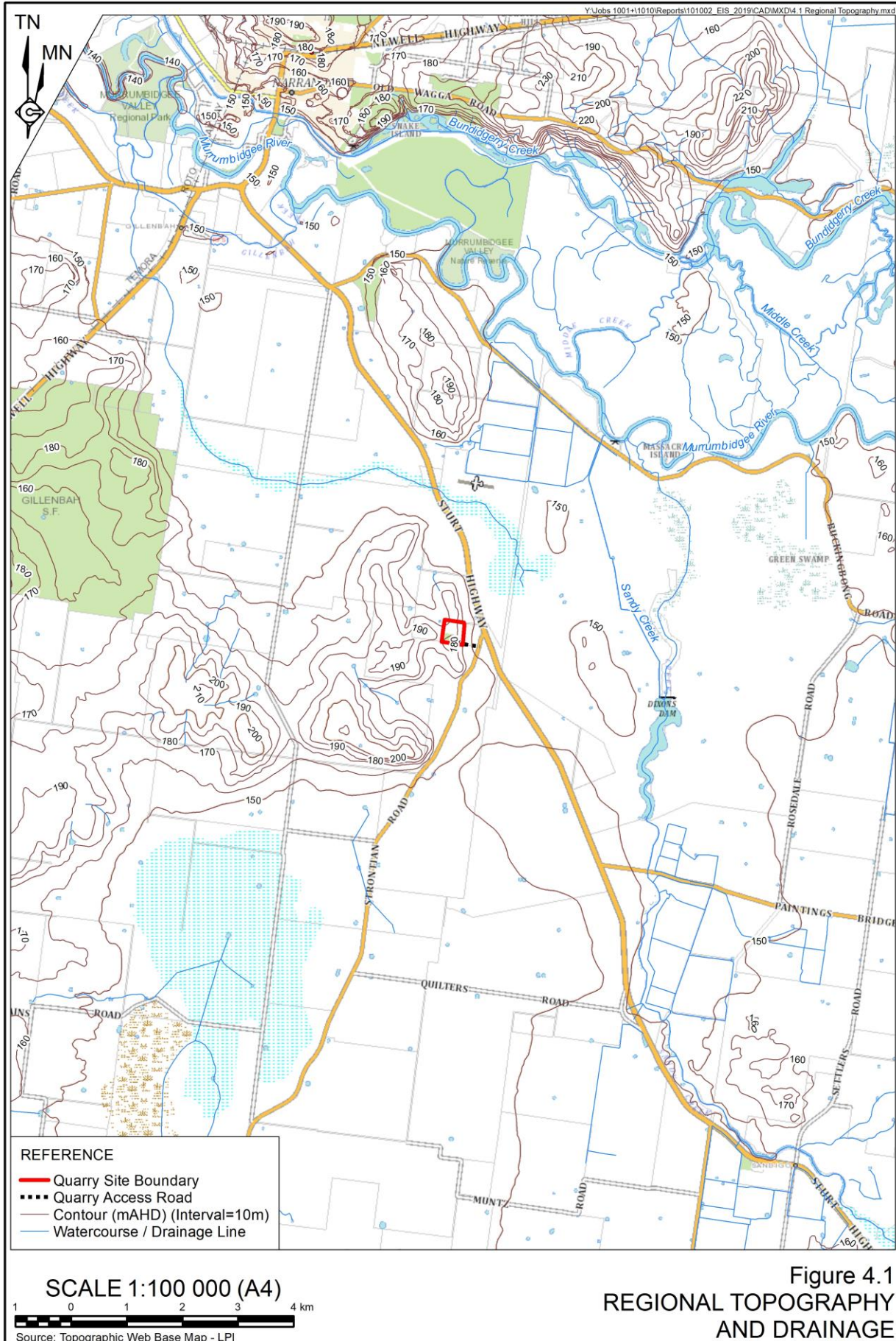
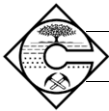
Figure 4.2 presents the topography and drainage within the Quarry Site. The Quarry Site is located on a topographic high point which comprises part of the outcropping Womboyne Formation. This topographic feature reaches a maximum elevation of approximately 185m AHD at the southern extent of the Quarry Site and is marked by the Buckingbong Trig Station. The natural topography within the Quarry Site generally slopes gently to the northwest within the western catchment and moderately to the east within the eastern catchment. A minimum elevation of approximately 155m AHD is reached at the northeastern extent of the Quarry Site. There are no mapped watercourses or drainage features within the Quarry Site.

The natural landform within the Quarry Site has been significantly modified through the existing extractive operation. The existing extraction area is located within the southern part of the Quarry Site and covers an area of approximately 1.7ha. The floor of the existing extraction area was originally developed at approximately 176m AHD with extraction operations currently progressing from north to south approximately 8m below this level. This has resulted in two tiers within the extraction area with the southern tier at 168m AHD and the northern tier at 176m AHD. The existing extraction area is internally draining with surface water runoff collecting on the floor of the quarry during periods of heavy rainfall.

4.2 Meteorology

4.2.1 Introduction

Meteorological conditions have the potential to influence a range of Proposal-related impacts on surrounding residences and the environment. This subsection provides a brief overview of the meteorological conditions surrounding the Quarry Site, focusing particularly on those aspects of the climate that are likely to influence the potential Proposal-related environmental impacts.



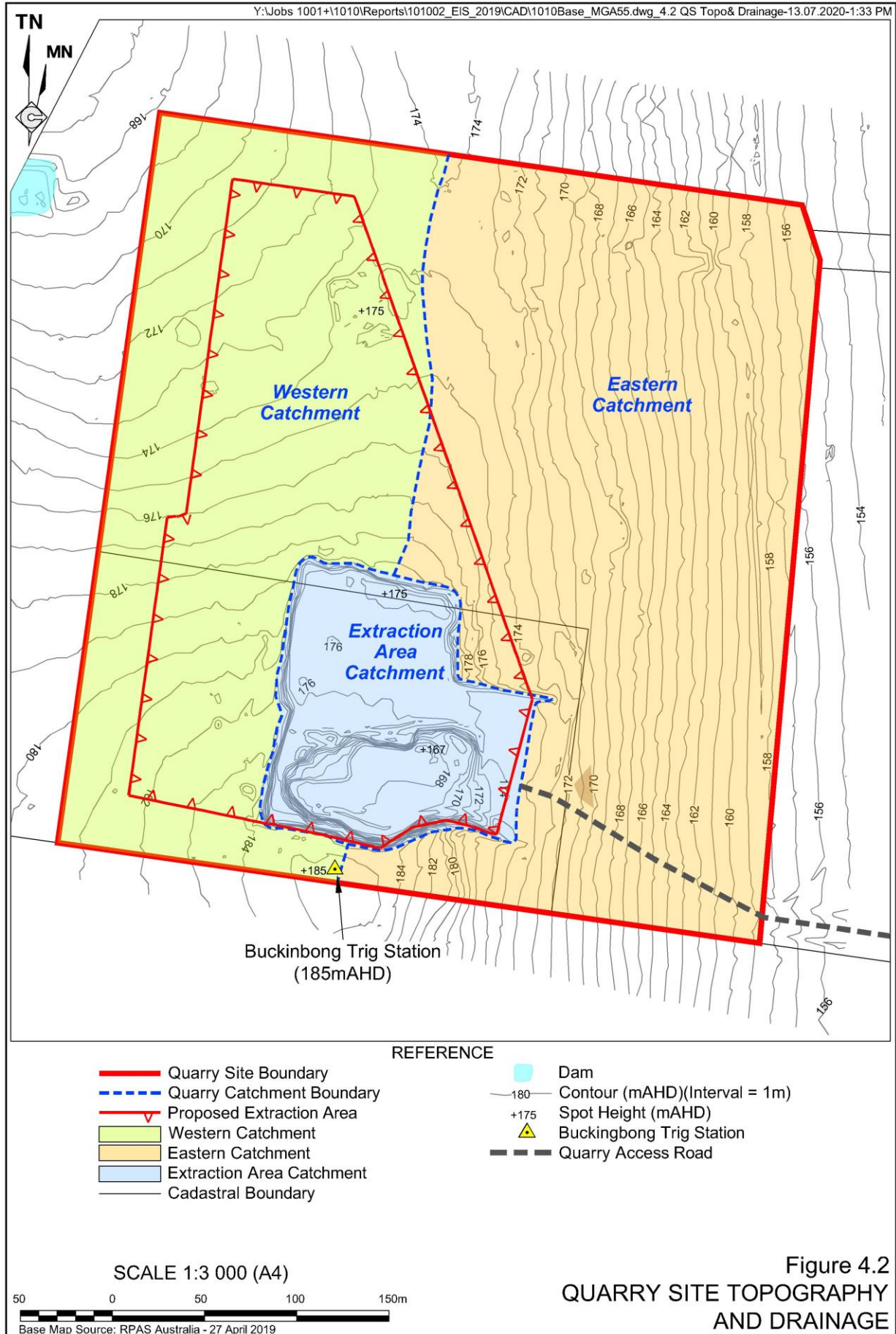


Figure 4.2
**QUARRY SITE TOPOGRAPHY
AND DRAINAGE**



Meteorological data was processed using information sourced from the Scientific Information for Landowners (SILO) database, managed by the Queensland Department of Environment and Science (DES). The program uses historical Bureau of Meteorology datasets and interpolation techniques to generate continuous daily time step synthetic climate data for any given location in Australia. The SILO dataset for the period 1889 to the present was generated for the Quarry Site on 18 February 2020.

Table 4.1 provides a summary of the climate data which is discussed further in the following subsections.

Table 4.1
Climate Data Summary – SILO (1889 to Present)

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Temperature (C°)													
Mean maximum	32.8	32.2	28.7	23.4	18.5	14.7	13.9	15.9	19.4	23.6	27.7	31.0	23.4
Mean minimum	17.1	17.1	14.2	9.8	6.5	4.2	3.2	4.2	6.2	9.1	12.4	15.2	9.9
Rainfall (mm)													
Mean rainfall	34.7	29.7	32.5	34.5	39.9	46.0	38.4	40.5	36.3	42.2	32.8	31.6	439.0
Highest monthly rainfall	156.6	161.8	243.3	195.7	153.4	162.8	140.9	94.2	144.1	156.4	144.0	142.4	856.8
Lowest monthly rainfall	0.0	0.0	0.0	0.0	0.0	0.3	1.4	1.9	0.0	0.0	0.0	0.0	185.9
Mean number of rain days	4.0	3.6	4.1	4.6	5.9	7.4	7.8	7.8	6.5	6.3	4.7	4.5	67.3
Highest daily rainfall	81.0	56.1	179.5	57.4	70.4	67.8	60.6	50.9	35.5	53.9	66.7	70.5	179.5
Evaporation (mm)													
Mean monthly evaporation	285.1	231.3	188.0	108.4	61.1	38.4	40.5	62.3	94.2	149.1	207.5	269.4	1735.3
Source: SILO climate database													

4.2.2 Temperature

Temperature patterns follow seasonal expectations with higher mean temperatures during the summer months of December to February and lowest temperatures during winter. The mean maximum temperature varies between 13.9°C and 32.8°C while the mean minimum temperature varies between 3.2°C and 17.1°C.

4.2.3 Rainfall and Evaporation

Mean annual rainfall is 439.0mm, with rainfall distributed relatively evenly throughout the year with no distinct dry season. Mean monthly rainfall varies between a maximum of 46.0mm in June and a minimum of 29.7mm in February. Rainfall is typically infrequent with more rain days experienced during winter months. Rainfall can be variable, with infrequent, high intensity rainfall events occurring throughout the year with rainfall received generally being equivalent to between approximately one to three times the average monthly rainfall.

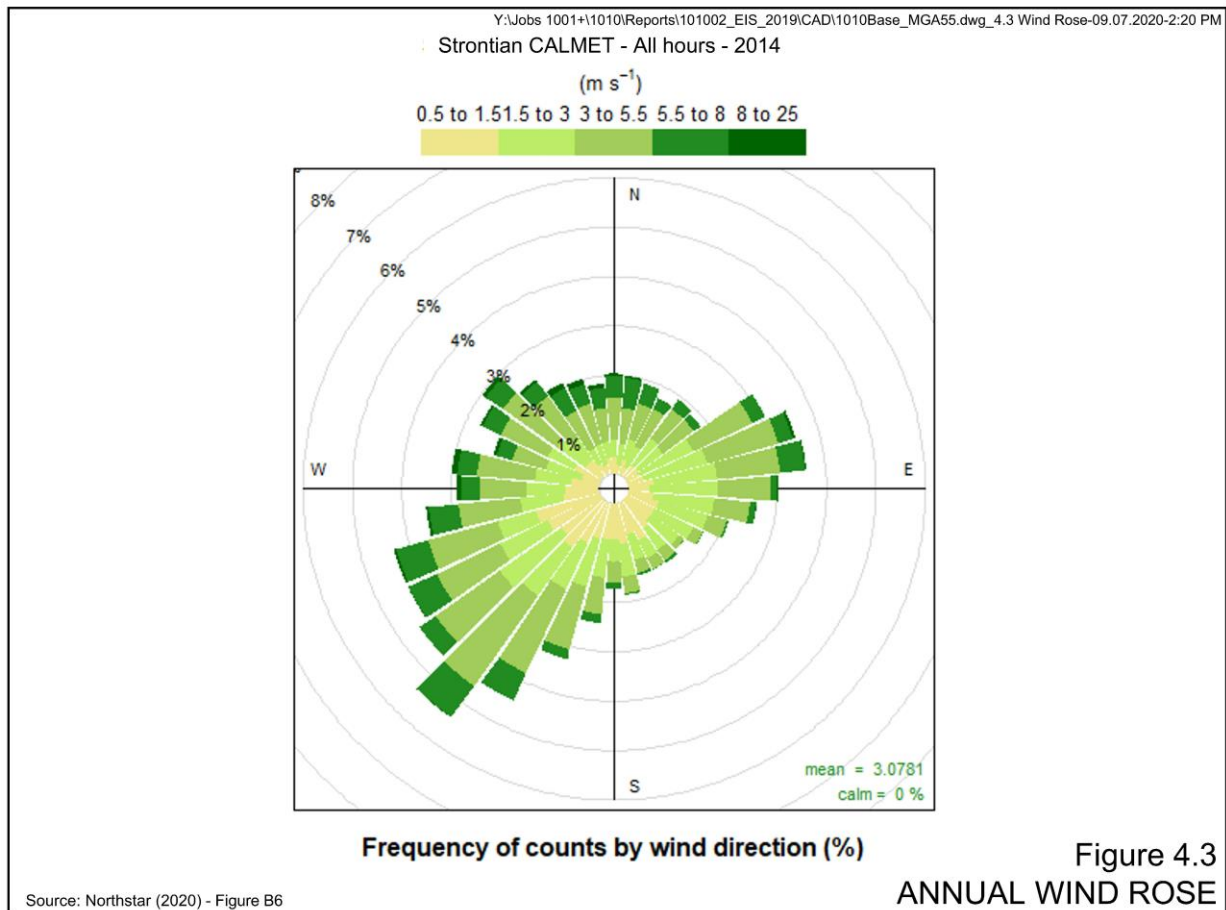
The estimated mean evaporation at the Quarry Site is approximately 4.8mm per day throughout the year or 1 735.3mm per year. Mean daily evaporation varies between 9.2mm per day in January and 1.3mm per day in June. The estimated mean monthly evaporation is higher than mean monthly rainfall in all months except June resulting in an annual moisture deficit.



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4.2.4 Wind

CSIRO prognostic meteorological model TAPM was configured for five complete years between 2014 and 2018 to review prevailing annual wind conditions at the Quarry Site for the purpose of predicting dust dispersion patterns. **Figure 4.3** displays the wind rose predicted by the model for 2014 which is considered representative of the general wind trend across the five-year period.



Prevailing winds experienced at the Quarry Site predominantly originate from the southwestern and northeastern quadrants with wind speeds most frequently ranging between 3.0m/s and 5.5m/s.

4.3 Land Ownership and Surrounding Residences

4.3.1 Land Ownership

The Quarry Site is located on Crown Land which is leased to PA Woods & Co Pty Ltd under an indefinite licence. The Quarry Access Road traverses freehold land owned by PA Woods & Co Pty Ltd prior to entering the Quarry Site. **Figure 4.4** displays the land ownership within and surrounding the Quarry Site. The distances to the closest privately-owned residences in the vicinity of the Quarry Site are presented in **Table 4.2**.

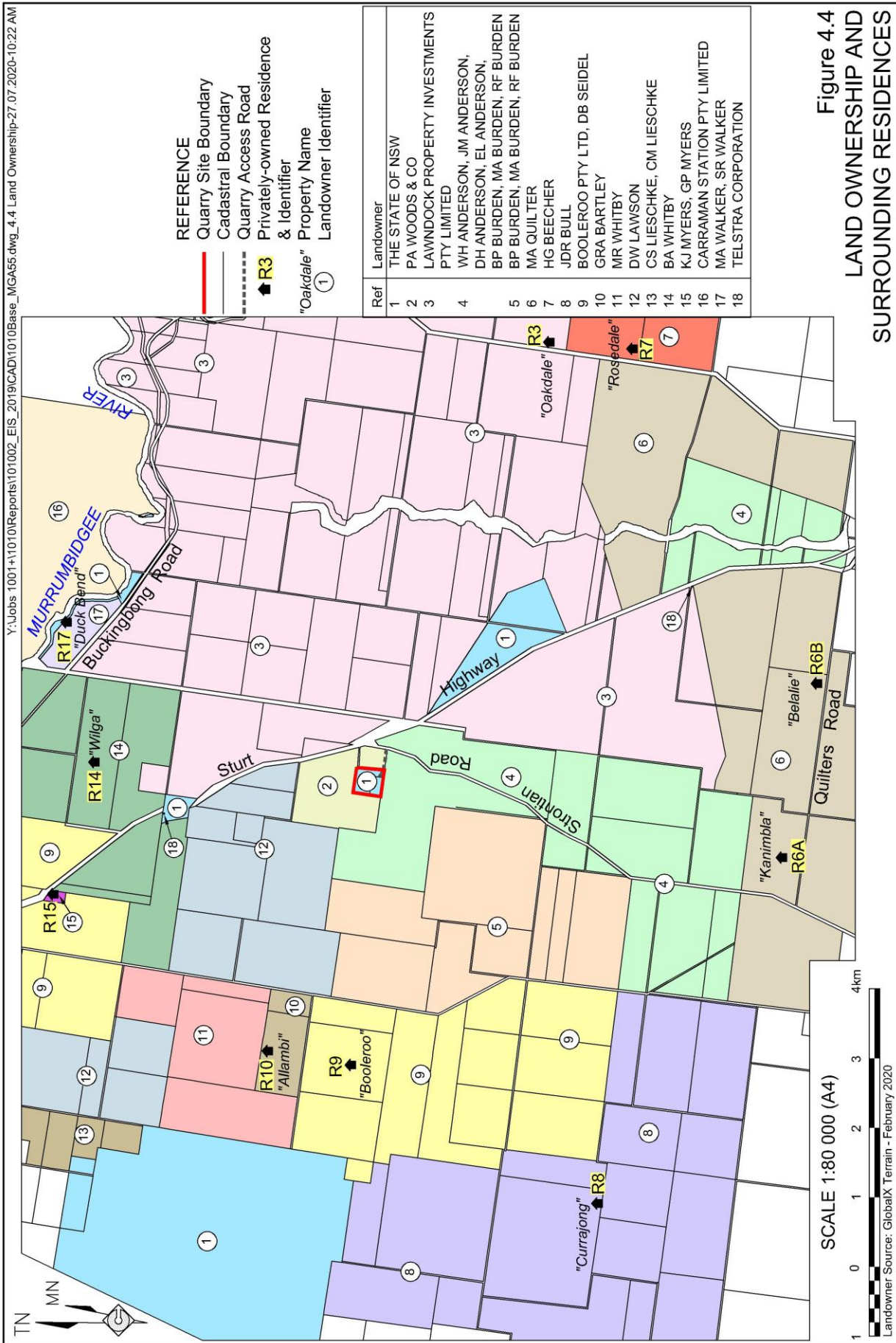
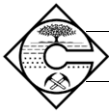


Figure 4.4
LAND OWNERSHIP AND SURROUNDING RESIDENCES



Table 4.2
Closest Private Residences to the Quarry Site

Residence Identifier	Owner	Distance
R3	Lawndock Property Investments Pty Limited	6.6km
R6A	MA Quilter	5.8km
R6B	MA Quilter	6.3km
R7	HG Beecher	7.0km
R8	JDR Bull	6.6km
R9	Booloroo Pty Ltd, DB Seidel	3.9km
R10	GRA Bartley	3.9km
R14	BA Whitby	3.7km
R15	KJ Myers, GP Myers	4.5km
R17	MA Walker, SR Walker	4.6km

4.3.2 Land Uses

The Quarry Site is used principally for the extraction and processing of the targeted indurated sandstone resource.

Land uses immediately surrounding the Quarry Site predominantly comprise land used for grazing and dryland cropping. Irrigated cropping and horticulture are also undertaken within the broader region with a network of irrigation canals extending from the Murrumbidgee River. Some of the major agricultural enterprises within the area include hazelnuts and citrus although a wide variety of crops are grown.

The Gillenbah State Forest is located approximately 5.2km to the west of the Quarry Site.

4.4 Bush Fire Hazard

The Rural Fire Service (RFS) mapping tool, accessed on 11 February 2020, identifies that the Quarry Site is not located within a designated bush fire prone area. As the Quarry Site is not located within a designated bush prone area, an assessment of bush fire risk is not required under Section 4.14 of the EP&A Act 1979.

4.5 Services

A “Dial Before You Dig” search, conducted on 19 February 2020, identified that there are no services or utilities located within the Quarry Site.



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