THE AUSTRAL BRICK COMPANY PTY LIMITED

ABN: 52 000 005 550

Air Quality Management Plan

for the

New Berrima Clay/Shale Quarry

PA08_0212

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

September 2018

Approved by

the Secretary's nominee, Megan Dawson,

on 28 September 2018

Air Quality Management Plan

for the

New Berrima Clay/Shale Quarry

PA08_0212

Prepared for:

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Next Review Due		Following Approval of the Annual Review for 2018			

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COMMONLY USED ACRONYMS

AHD	Australian Height Datum
AS	Australian Standard
CCC	Community Consultative Committee
DPE	Department of Planning and Environment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	Environment Protection Authority
EPL	Environment Protection Licence
NATA	National Association of Testing Authorities
NPI	National Pollution Inventory
PA	Project Approval

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1. INTRODUCTION

This *Air Quality Management Plan* (the AQMP) has been prepared by R W Corkery & Co Pty Limited on behalf of The Austral Brick Company Pty Ltd (Austral) for the New Berrima Clay/Shale Quarry (the Quarry). The Quarry is located within the "Mandurama" property approximately 1.5km east of New Berrima in the Southern Highlands of NSW (**Figure 1**). For the purposes of this document, the area of the approved quarry is referred to as "the Quarry Site".

This AQMP represents the second revision of the AQMP and has been prepared in satisfaction of *PA Conditions 3(11)* and *5(3)* of Project Approval (PA) 08_0212[1]. The Environment Protection Agency (EPA) and three surrounding landholders have also previously been consulted in relation to the AQMP and in relation to the air quality monitoring locations (see Section 9.1).

This AQMP forms part of the Quarry's overall Environmental Management System which includes the preparation and implementation of the following management plans.

- Environmental Management Strategy.
- Transport Management Plan.
- Noise Management Plan.
- Water Management Plan.
- Landscape Management Plan.
- Aboriginal Heritage Management Plan.

2. APPROVED ACTIVITIES AND STAGED OPERATIONS

2.1 APPROVED ACTIVITIES

The principal activities approved at the Quarry (**Figure 2**) comprise the following.

- Construction of visibility barriers to provide visual screening for the quarry operations.
- Extraction and stockpiling of clay/shale from the extraction area using standard ripping, pushing and loading techniques.
- Transportation of up to 150 000t per year of quarry products via Berrima Road using articulated and rigid trucks not exceeding 19m in length.

The relevant limitations upon the approved activities nominated in Conditions within PA 08_0212 are as follows.

- "The Proponent must not carry out any development in the extraction area below a level of 640m AHD" *PA Condition 2(6).*
- "The Proponent must not extract more than 150 000 tonnes of extractive materials from the site in any calendar year" *PA Condition 2(7).*

[1] All conditions in Project Approval 08_0212 are referred to as the schedule number followed by the condition number in brackets, e.g. *PA Condition 3(11).*

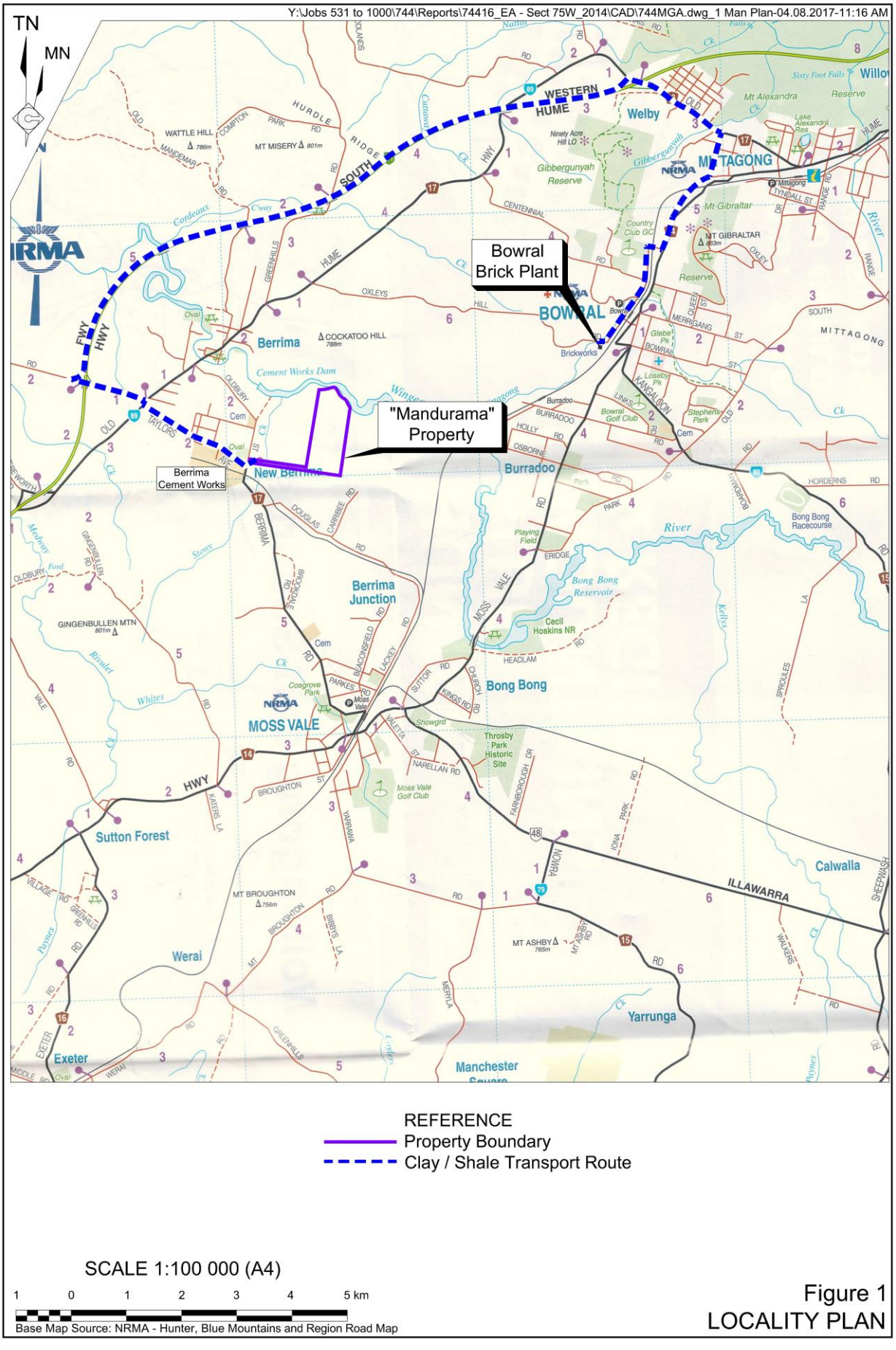


Figure 1
LOCALITY PLAN

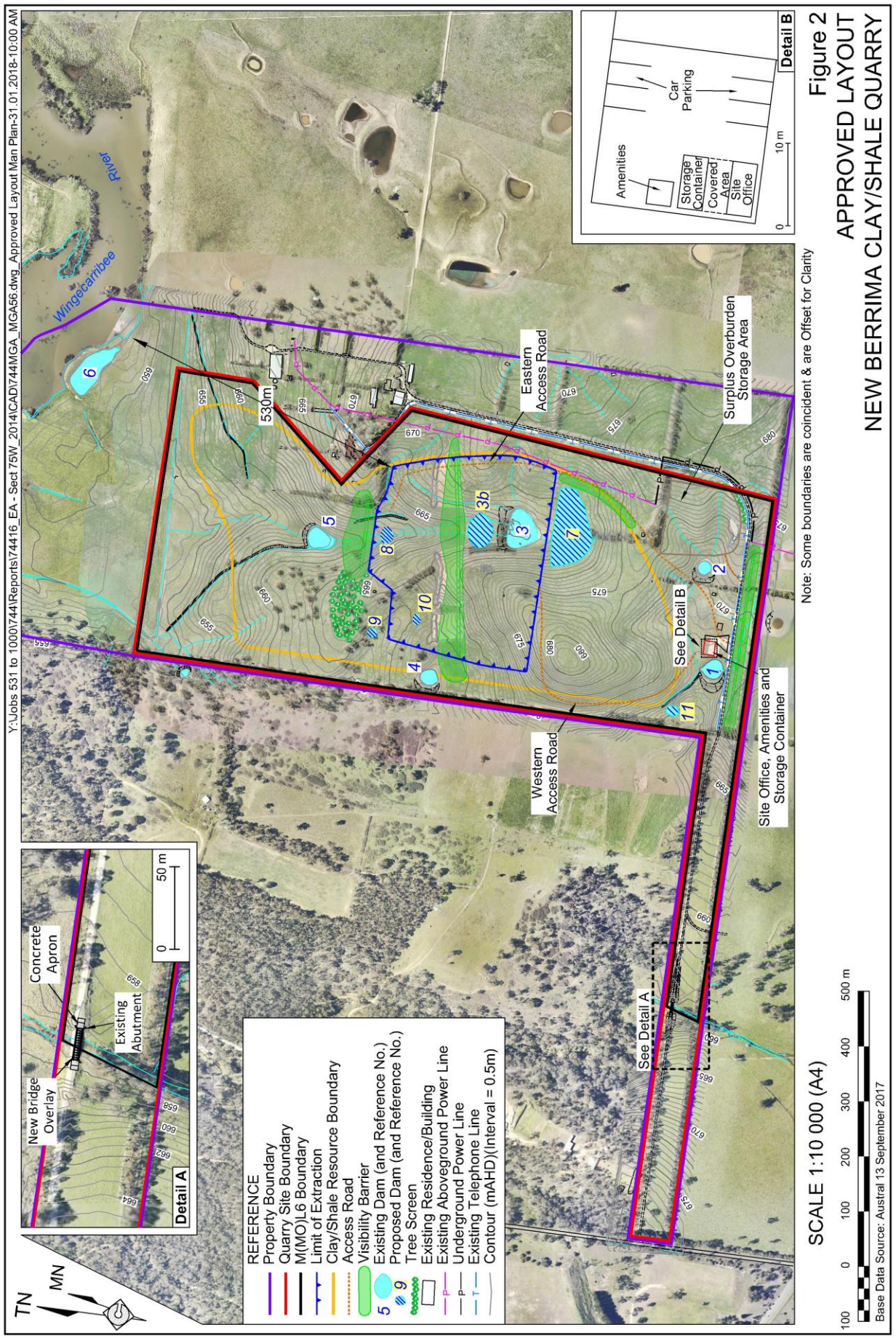


Figure 2
APPROVED LAYOUT
NEW BERRIMA CLAY/SHALE QUARRY
Y:\Jobs 531 to 1000\744\Reports\74416_EA - Sect 75W_2014\CAD\744MGA_MGA56.dwg, Approved Layout Man Plan-31.01.2018-10:00 AM
Note: Some boundaries are coincident & are Offset for Clarity
SCALE 1:10 000 (A4)
Base Data Source: Austral 13 September 2017
REFERENCE
Property Boundary
Quarry Site Boundary
M(MO)L6 Boundary
Limit of Extraction
Clay/Shale Resource Boundary
Access Road
Visibility Barrier
Existing Dam (and Reference No.)
Proposed Dam (and Reference No.)
Tree Screen
Existing Residence/Building
Existing Aboveground Power Line
Underground Power Line
Existing Telephone Line
Contour (mAHD)(Interval = 0.5m)
Detail A
Concrete Apron
Existing Abutment
New Bridge Overlay
Detail B
Amenities
Car Parking
Storage Container
Covered Area
Site Office
Western Access Road
Eastern Access Road
Surplus Overburden Storage Area
Site Office, Amenities and Storage Container
See Detail A
See Detail B
530m
Wingecarribee River
TN
MN

- "The Proponent must not transport more than:
  a) 150,000 tonnes of product from the site in any calendar year;
  b) 68 laden trucks from the site in a day; and
  c) 8 laden trucks from the site in an hour.

The approved quarry life is until 31 December 2045 and the approved hours of operation are outlined in **Table 1**.

Table 1
Hours of Operation

Day	Construction & Extraction Operations	Clay/Shale Transportation
Monday – Friday	7:00am to 5:00pm	7:00am to 4:00pm
Saturday	8:00am to 1:00pm	8:00am to 1:00pm
Sundays and Public Holidays	None	None

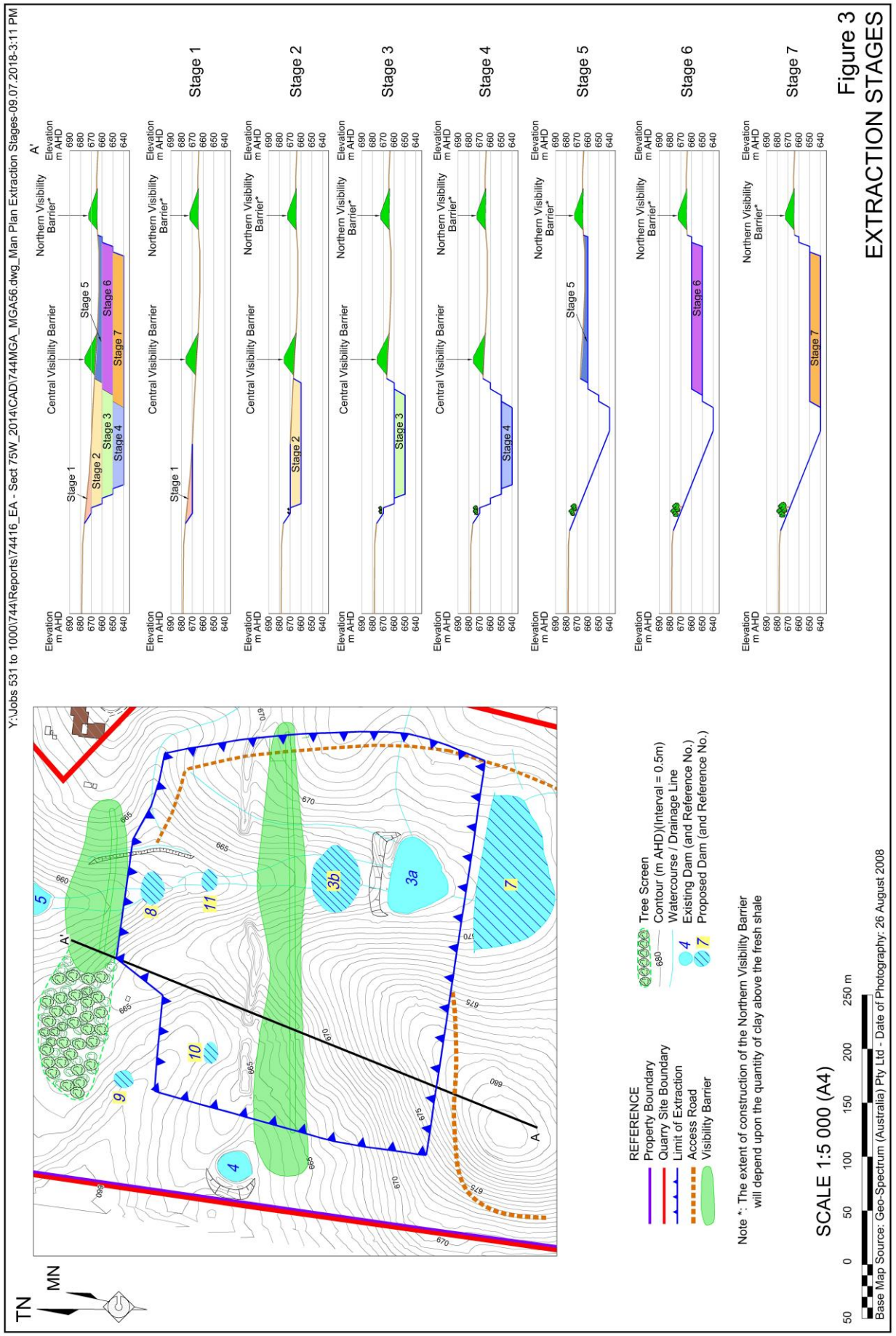
2.2 STAGED OPERATIONS

Figure 3 displays the staging sequence throughout the life of the Quarry. The southern section would be extracted in four stages, namely Stages 1 to 4. Once extraction ceases in the southern section, extraction would commence in the northern section with extraction undertaken in three stages, namely Stages 5 to 7. It is noted that, whilst the stages will progress sequentially, the actual timing for each stage will be largely dependent on the raw material requirements at the Bowral Brick Plant.

3. LEGAL AND OTHER REQUIREMENTS

3.1 PROJECT APPROVAL 08_0212

Austral was granted PA 08_0212 by the Director-General of Planning and Infrastructure on 7 July 2012 pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Modification 1 of PA 08_0212 was issued on 15 December 2015 to incorporate modifications to the Quarry associated with an alternate extraction area boundary. Modification 2 of PA 08_0212 was approved on 06 July 2017 to incorporate modifications to the Quarry associated with the construction of a new bridge over Stony Creek, the realignment of the western access road, the repositioning of the site office, amenities and storage container, and the installation of underground power and removal of a section of overhead power line. PA 08_0212 includes the air quality criteria that Austral needs to comply with and sets out the matters that need to be addressed within this AQMP.


Y:\Jobs 531 to 1000\744\Reports\74416_EA - Sect 75W_2014\CAD\744MGA_MGA56.dwg_Man Plan Extraction Stages-09.07.2018-3:11 PM
Stage 1
Stage 2
Stage 3
Stage 4
Stage 5
Stage 6
Stage 7
Northern Visibility Barrier*
Central Visibility Barrier
Elevation m AHD
A
A'
TN
MN
REFERENCE
Property Boundary
Quarry Site Boundary
Limit of Extraction
Access Road
Visibility Barrier
Tree Screen
Contour (m AHD)(Interval = 0.5m)
Watercourse / Drainage Line
Existing Dam (and Reference No.)
Proposed Dam (and Reference No.)
Note *: The extent of construction of the Northern Visibility Barrier will depend upon the quantity of clay above the fresh shale
SCALE 1:5 000 (A4)
50 0 50 100 150 200 250 m
Base Map Source: Geo-Spectrum (Australia) Pty Ltd - Date of Photography: 26 August 2008
Figure 3
EXTRACTION STAGES

Relevant air quality-related conditions in PA 08_0212 are reproduced in **Tables 2** and **3** with a reference provided to the section(s) of this document where each condition is addressed.

Table 2
Project Approval Requirements Relating to Air Quality

<table>
<tr><th>Cond No.</th><th>Requirement</th><th>Plan Section</th></tr>
<tr><td colspan="3">Air Quality</td></tr>
<tr><td>3(9)</td><td>The Proponent must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated on site do not exceed the criteria in Table 3, Table 4 and Table 5 at any residence on privately-owned land, or on more than 25% of any privately-owned land.
Table 3 - Long-term criteria for particulate matter
<table>
<tr><th>Pollutant</th><th>Averaging period</th><th>[d]Criterion</th></tr>
<tr><td>Total suspended particulate (TSP) matter</td><td>Annual</td><td>[a]90 µg/m^3</td></tr>
<tr><td>Particulate matter < 10 µm (PM_{10})</td><td>Annual</td><td>[a]30 µg/m^3</td></tr>
</table>
Table 4 - Short term criterion for particulate matter
<table>
<tr><th>Pollutant</th><th>Averaging period</th><th>[d] Criterion</th></tr>
<tr><td>Particulate matter < 10 µm (PM_{10})</td><td>24 hour</td><td>[a] 50 µg/m^3</td></tr>
</table>
Table 5 - Long term criteria for deposited dust
<table>
<tr><th>Pollutant</th><th>Averaging period</th><th>Maximum increase in deposited dust level</th><th>Maximum total[f] deposited dust level</th></tr>
<tr><td>[c]Deposited dust</td><td>Annual</td><td>[b]2 g/m^2/month</td><td>[a]4 g/m^2/month</td></tr>
</table>
Notes for Tables 3-5:
• [a]Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to other sources);
• [b] Incremental impact (i.e. incremental increase in concentrations due to the project on its own);
• [c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and
• [d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents, illegal activities or any other activity agree to by the Director-General in consultation with EPA.</td><td>Section 8.2</td></tr>
<tr><td rowspan="5">3(10)</td><td>The Proponent must:
(a) implement best management practice to minimise the dust emissions of the project;</td><td>Section 8.2</td></tr>
<tr><td>(b) regularly assess air quality monitoring data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this approval,</td><td>Sections 8, 9 & 11</td></tr>
<tr><td>(c) minimise the air quality impacts of the project during adverse meteorological conditions and extraordinary events (see Note under Table 5 above);</td><td>Section 8.2</td></tr>
<tr><td>(d) minimise any visible off-site air pollution; and</td><td>Section 8.2</td></tr>
<tr><td>(e) minimise the surface disturbance of the site generated by the project.</td><td>Section 8.2</td></tr>
<tr><td rowspan="5">3(11)</td><td>The Proponent must prepare and implement an Air Quality Management Plan for the project to the satisfaction of the Secretary. This plan must:</td><td></td></tr>
<tr><td>(a) be prepared in consultation with the EPA, and submitted to the Secretary for approval prior to the construction of the visibility barriers;</td><td>Section 1</td></tr>
<tr><td>(b) describes the measures that would be implemented to ensure:
- best management practice is employed;
- the air quality impacts of the project are minimised during adverse meteorological conditions and extraordinary events; and
- compliance with the relevant conditions of this approval;</td><td>Sections 8.1 & 10</td></tr>
<tr><td>(c) describes the proposed air quality management system; and</td><td>Sections 8, 10 & 11</td></tr>
<tr><td>(d) includes an air quality monitoring program that:
- is capable of evaluating the performance of the project;
- Includes a protocol for determining any exceedances of the relevant conditions of approval;
- adequately supports the air quality management system; and
- evaluates and reports of the adequacy of the air quality management system.</td><td>Section 10
Sections 10 & 11
Section 10
Sections 10 & 14</td></tr>
</table>

Table 2 (Cont'd)
Project Approval Requirements Relating to Air Quality

Cond No.	Requirement	Plan Section
Air Quality (Cont'd)		
3(12)	During the life of the project, the Proponent must ensure that there is a suitable meteorological station in the vicinity of the site that complies with the requirements in the "Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales" guideline.	Section 9.6
4(1)	As soon as practicable after obtaining monitoring results showing an:	
	(a) exceedance of any relevant criteria in schedule 3, the Proponent must notify affected landowners in writing of the exceedance, and provide regular monitoring results to each of affected landowner until the project is again complying with the relevant criteria.	Sections 10 and 13
	(b) an exceedance of the relevant air quality criteria in schedule 3, the Proponent must send a copy of the NSW Health fact sheet entitled "*Mine Dust and You*" (as may be updated from time to time) to the affected landowners and/or existing tenants of the land.	Section 11
5(3)	The Proponent must ensure that the Management Plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
	(a) detailed baseline data;	Section 7.3
	(b) a description of:	
	- the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 3
	- any relevant limits or performance measures/criteria; and	Section 9.3
	- the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;	Section 9.3
	(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 8.2
	(d) a program to monitor and report on the:	
	- impacts and environmental performance of the project; and	Section 9
	- effectiveness of any management measures (see (c) above);	Section 10
	(e) a contingency plan to manage any unpredicted impacts and their consequences;	Sections 10 & 11
	(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Sections 10 & 11
	(g) a protocol for managing and reporting any:	
	- incidents;	Section 13
	- complaints;	Section 12
	- non-compliances with statutory requirements; and	Sections 10, 11 & 13
	- exceedances of the impact assessment criteria and/or performance criteria; and	
	(h) a protocol for periodic review of the plan.	Section 15
	Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.	
5(4)	By the end of December 2016, and annually thereafter, the Proponent must review the environmental performance of the project to the satisfaction of the Secretary. This review must:	
	(a) describe the development (including rehabilitation) that was carried out in the previous calendar year, and the works that are proposed to be carried out over the next year;	Section 14
	(b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against:	
	- the relevant statutory requirements, limits or performance measures/criteria;	Section 14
	- the monitoring results of previous years; and	
	- the relevant predictions in the documents listed in condition 2 of Schedule 2;	

Table 2 (Cont'd)
Project Approval Requirements Relating to Air Quality

Cond No.	Requirement	Plan Section
Air Quality (Cont'd)		
5(4) Cont'd	(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	Section 14
	(d) identify any trends in the monitoring data over the life of the project;	Section 14
	(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and	Section 14
	(f) describe what measures will be implemented over the next year to improve the environmental performance of the project.	Section 14
5(7)	The Proponent must notify, at the earliest opportunity, the Secretary and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the project, the Proponent shall notify the Secretary and any other relevant agencies as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.	Section 13
5(8)	The Proponent must provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval.	Section 14

Table 3
Statement of Commitments Relating to Air Quality

Commitment			Plan Section
Limit the generation of dust and other emissions from Site activities.	8.1	Construct vegetated visibility barriers to provide barriers to minimise the spread of dust from the Quarry Site.	Section 8.2
	8.2	Commence progressive rehabilitation of all disturbed areas as soon as possible after the completion of excavation in that area.	
	8.3	Use water truck to routinely spray unsealed roads, tracks and stockpile areas.	
	8.4	Cover and effectively seal tailgates of trucks leaving the Project Site.	
	8.5	Prohibit all vehicles and machinery from idling unnecessarily.	
	8.6	Maintain all vehicles and machinery in accordance with manufacturers' specifications.	
	8.7	Amend extraction practices as required during adverse wind conditions to minimise the generation and spread of dust from the Project Site.	
	8.8	Minimise drop heights between front-end loader buckets and truck trays through operator training and education on the management of dust.	
	8.9	Apply dust suppressants (e.g. Gluon or TerraControl) on unsealed roads used for product transport, if required.	

3.2 OTHER APPROVALS, LEASES AND LICENCES

Other approvals and licences relevant to the site include Mining (Mineral Owners) Mining Lease 6 which was granted by the Department of Planning and Environment, Division of Resources and Geoscience on 27 June 2017 for the area displayed on **Figure 2** and Environment Protection Licence (EPL) 20377 issued by the Environment Protection Authority on 1 August 2016.

Mining (Mineral Owners) Mining Lease 6 does not contain any specific requirements relevant to this AQMP. EPL 20377 contains requirements relevant to this AQMP which are summarised in **Table 4** with a reference to the section(s) in this document where the requirement is addressed.

Table 4
EPL 20377 Requirements Relating to Air Quality

<table>
<tr><th>Cond No.</th><th colspan="5">Requirement</th><th>Plan Section</th></tr>
<tr><td rowspan="5">P1.1</td><td colspan="5">The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.</td><td rowspan="4">9.1</td></tr>
<tr><td>EPA No.</td><td colspan="2">Type of Monitoring Point</td><td colspan="2">Location Description</td></tr>
<tr><td>1</td><td colspan="2" rowspan="3">Dust Deposition Monitoring</td><td colspan="2">North of the quarry void and labelled A1 on map titled "Environmental Monitoring Locations" dated 20 November 2015 (DOC16/206245).</td></tr>
<tr><td>2</td><td colspan="2">East of the quarry void and labelled A2 on map titled "Environmental Monitoring Locations" dated 20 November 2015 (DOC16/206245).</td></tr>
<tr><td>3</td><td colspan="2">Southeast of the quarry void and labelled A3 on map titled "Environmental Monitoring Locations" dated 20 November 2015 (DOC16/206245).</td></tr>
<tr><td rowspan="4">M2.2</td><td colspan="5">Air Monitoring Requirements Point 1,2, 3</td><td rowspan="4">9</td></tr>
<tr><td colspan="2">Pollutant</td><td>Units of Measure</td><td>Frequency</td><td>Sampling Method</td></tr>
<tr><td colspan="2">Ash</td><td rowspan="2">grams per square metre per month</td><td rowspan="2">Monthly</td><td rowspan="2">Australian Standard 3580.10.1-2003</td></tr>
<tr><td colspan="2">Insoluble solids</td></tr>
</table>

4. ROLES AND RESPONSIBILITIES

Table 5 presents the roles and responsibilities for the implementation of this Plan.

Table 5
Roles and Responsibilities

Roles*	Responsibilities
NSW Manufacturing Manager	• Ensure all documentation is reviewed, as required. • Ensure adequate resources are available to enable implementation of the AQMP.
Raw Materials & Mining Manager	• Implementation of all air quality controls outlined in Section 8.2.
Compliance & Environmental Coordinator	Manage the implementation of the following components of this AQMP. • Air Quality monitoring as outlined in Section 9 • Evaluation of compliance as outlined in Section 10 and related follow-up actions. • Complaints handling and response as outlined in Section 12. • Incident reporting as outlined in Section 13. • Coordinate Environmental Monitoring and publishing data as outlined in Section 14. • Review of this AQMP as outlined in Section 15. • Conduct environmental component of site induction for all employees and contractors.
All personnel	• Ensure training and awareness induction has been undertaken. • Compliance with this AQMP.
*Or equivalent position delegated these responsibilities.	

5. COMPETENCE TRAINING AND AWARENESS

All Company personnel and contractors and their employees will undergo Company and site-specific inductions, incorporating air quality management awareness training. The Compliance & Environmental Coordinator or delegate will be responsible for ensuring that all relevant employees and contractors are appropriately inducted prior to undertaking any on-site operational activities and are re-inducted on at least a 2-yearly basis.

6. SURROUNDING RESIDENCES

Figure 4 displays the location of residences surrounding the Quarry.

7. EXISTING ENVIRONMENT

7.1 INTRODUCTION

The following sections provide a summary of the ambient air quality baseline and predicted air quality levels that were assessed for the Quarry. These predictions are sourced from the following air quality assessments.

- Heggies (2010) Air Quality Assessment, prepared to support the 2010 *Environmental Assessment* in application for PA 08_0212.
- SLR (2015) Air Quality Assessment, prepared as part of the application for Modification 1 to PA 08_0212.

7.2 WIND ENVIRONMENT

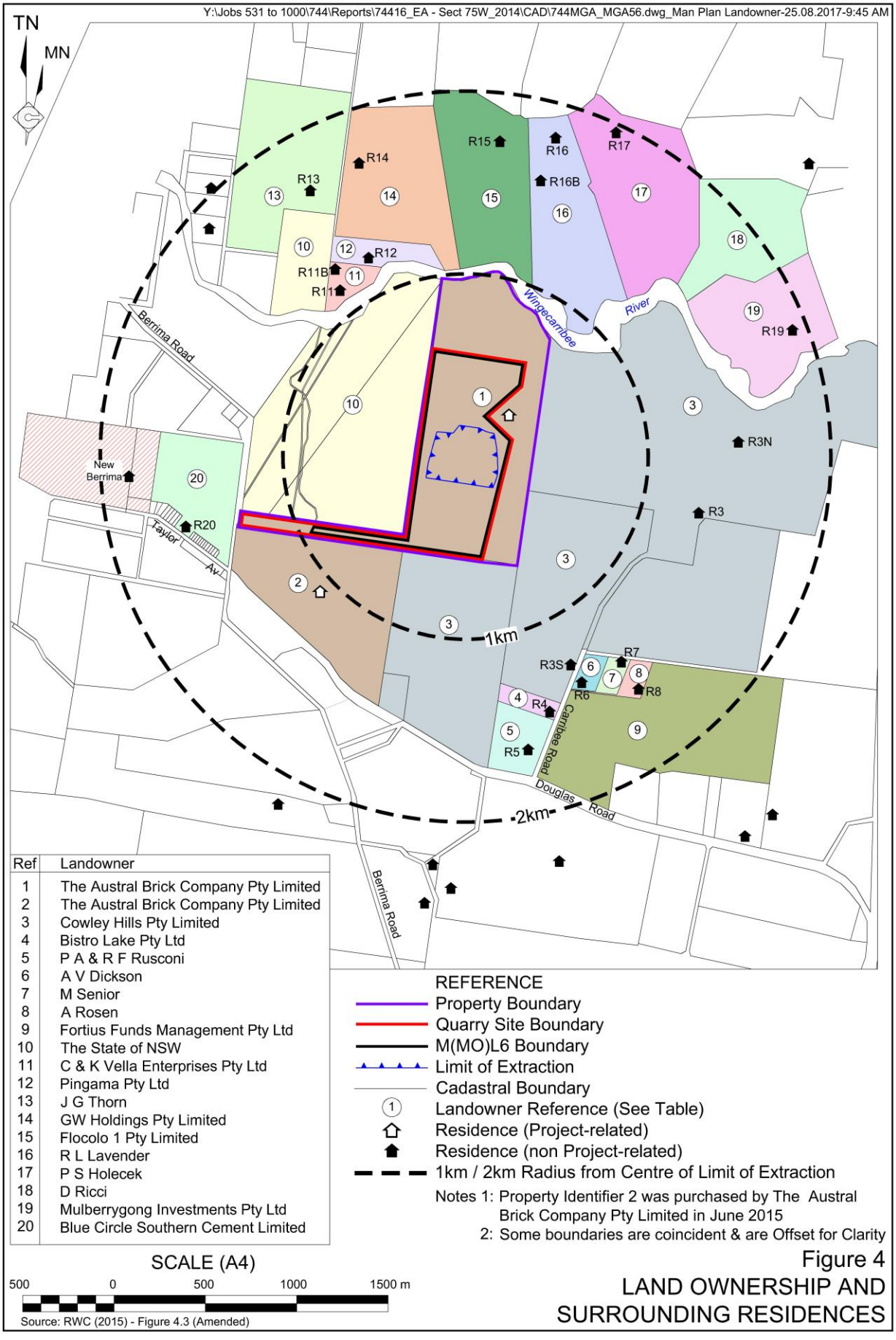
Annual and seasonal wind roses displaying wind speed and directions at Moss Vale are shown in **Figure 5**. Winds are predominantly from the west in autumn, winter and spring, with strong winds over 10m/s originating mainly from the west. Somewhat lighter winds are predicted in summer, ranging from the north to the east and chiefly from the north-northeast.

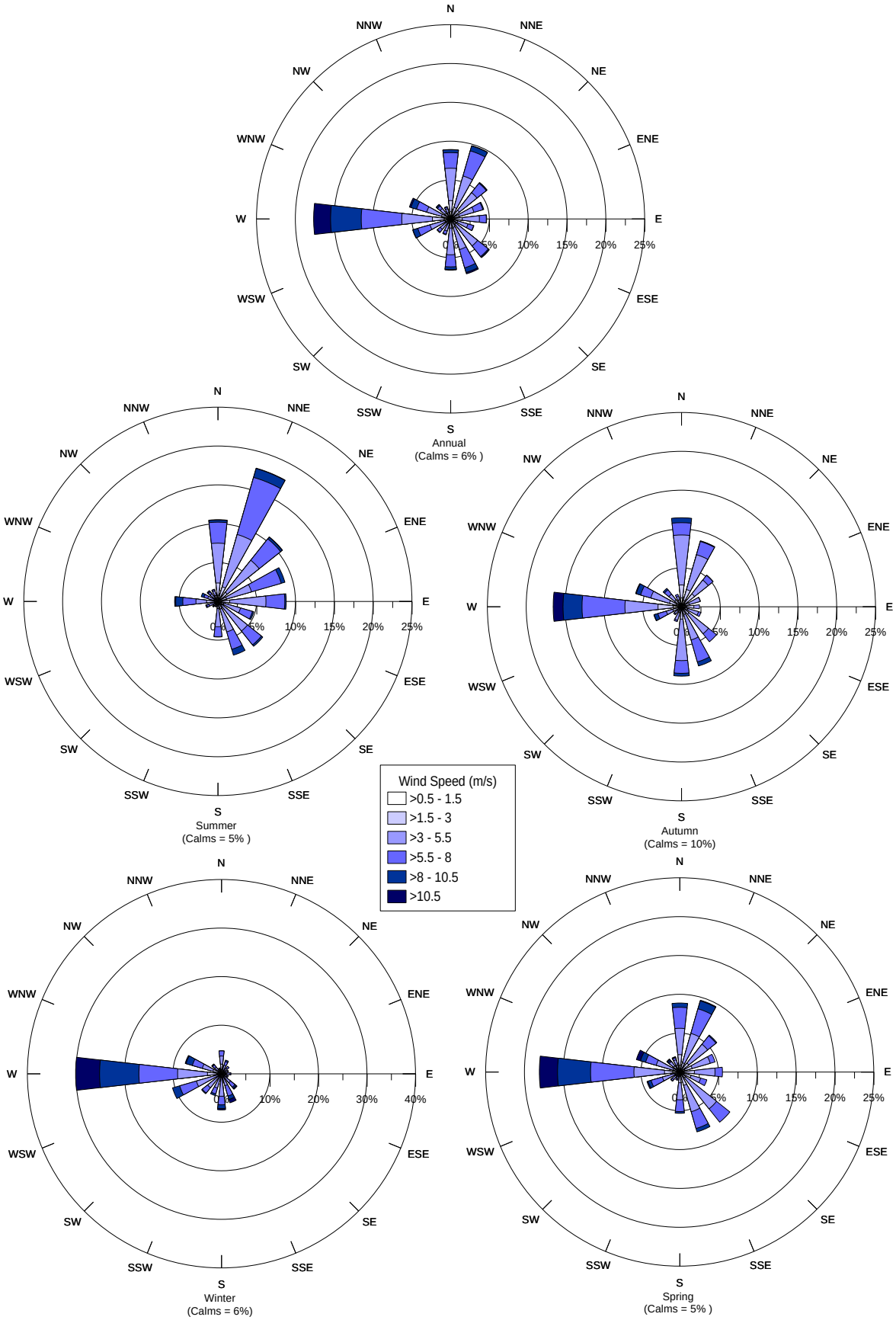
7.3 BASELINE AIR QUALITY

7.3.1 Surrounding Sources of Pollutants

The Quarry is situated in a semi-rural area dominated by agriculture and livestock operations. These operations are unlikely to generate significant levels of the key pollutants expected to be associated with the Quarry. However, following a review of the local area and the National Pollution Inventory (NPI) database, a number of industrial operations are currently established.

Of note are the Berrima Cement Works and the Bowral Brickworks Plant, located approximately 2.3km to the west-southwest and 5.1km to the east-northeast of the Quarry respectively. **Figure 1** illustrates the proximity of these operations to the Quarry.


Y:\Jobs 531 to 1000\744\Reports\74416_EA - Sect 75W_2014\CAD\744MGA_MGA56.dwg_Man Plan Landowner-25.08.2017-9:45 AM
TN
MN
R11
R11B
R12
R13
R14
R15
R16
R16B
R17
R19
R20
R3
R3N
R3S
R4
R5
R6
R7
R8
New Berrima
Berrima Road
Taylor Av
Wingecarribee River
Cantbee Road
Douglas Road
1km
2km
Ref
Landowner
1 The Austral Brick Company Pty Limited
2 The Austral Brick Company Pty Limited
3 Cowley Hills Pty Limited
4 Bistro Lake Pty Ltd
5 P A & R F Rusconi
6 A V Dickson
7 M Senior
8 A Rosen
9 Fortius Funds Management Pty Ltd
10 The State of NSW
11 C & K Vella Enterprises Pty Ltd
12 Pingama Pty Ltd
13 J G Thorn
14 GW Holdings Pty Limited
15 Flocolo 1 Pty Limited
16 R L Lavender
17 P S Holecek
18 D Ricci
19 Mulberrygong Investments Pty Ltd
20 Blue Circle Southern Cement Limited
REFERENCE
Property Boundary
Quarry Site Boundary
M(MO)L6 Boundary
Limit of Extraction
Cadastral Boundary
Landowner Reference (See Table)
Residence (Project-related)
Residence (non Project-related)
1km / 2km Radius from Centre of Limit of Extraction
Notes 1: Property Identifier 2 was purchased by The Austral Brick Company Pty Limited in June 2015
2: Some boundaries are coincident & are Offset for Clarity
SCALE (A4)
500 0 500 1000 1500 m
Source: RWC (2015) - Figure 4.3 (Amended)
Figure 4
LAND OWNERSHIP AND SURROUNDING RESIDENCES



(Source: 2010 Environmental Assessment Air Quality Assessment [Heggies] – 2007 Seasonal Wind Roses)

Figure 5
ANNUAL AND SEASONAL WIND ROSES

7.3.2 OEH Air Quality Monitoring Stations

OEH maintains a network of air quality monitoring stations across NSW. No air quality monitoring was conducted in the area surrounding the Quarry prior to the issue of PA08_0212.

The nearest OEH air quality monitoring station to the Quarry is located at Bargo on the outskirts of the Sydney Metropolitan Basin, approximately 30km to the northeast of the Quarry. This station currently monitors the following parameters.

- Oxides of Nitrogen (NO, NO_2 and NO_X).
- Ozone (O_3).
- Sulphur Dioxide (SO_2).
- Meteorological Parameters (Wind Speed, Wind Direction, Temperature, etc.).

However, the nearest and most representative OEH air quality monitoring station to the Quarry that currently monitors fine particulates (PM_{10}) is located at Oakdale, approximately 50km to the north-northeast. While it is noted that the OEH station located at Albion Park is closer, approximately 40km east-southeast of the Quarry, the setting of the Quarry is more comparable with that of the Oakdale station (semi-rural region, inland setting and comparable elevation).

The OEH-recorded monitoring data from Oakdale (PM_{10}) will be used in this report to provide a suitable representation of the baseline air quality environment surrounding the Quarry.

7.3.3 Background Particulate Matter Environment

The verified data for 2007 showing 24-hour average PM_{10} concentrations at the Oakdale OEH monitoring station is presented in **Figure 6**.

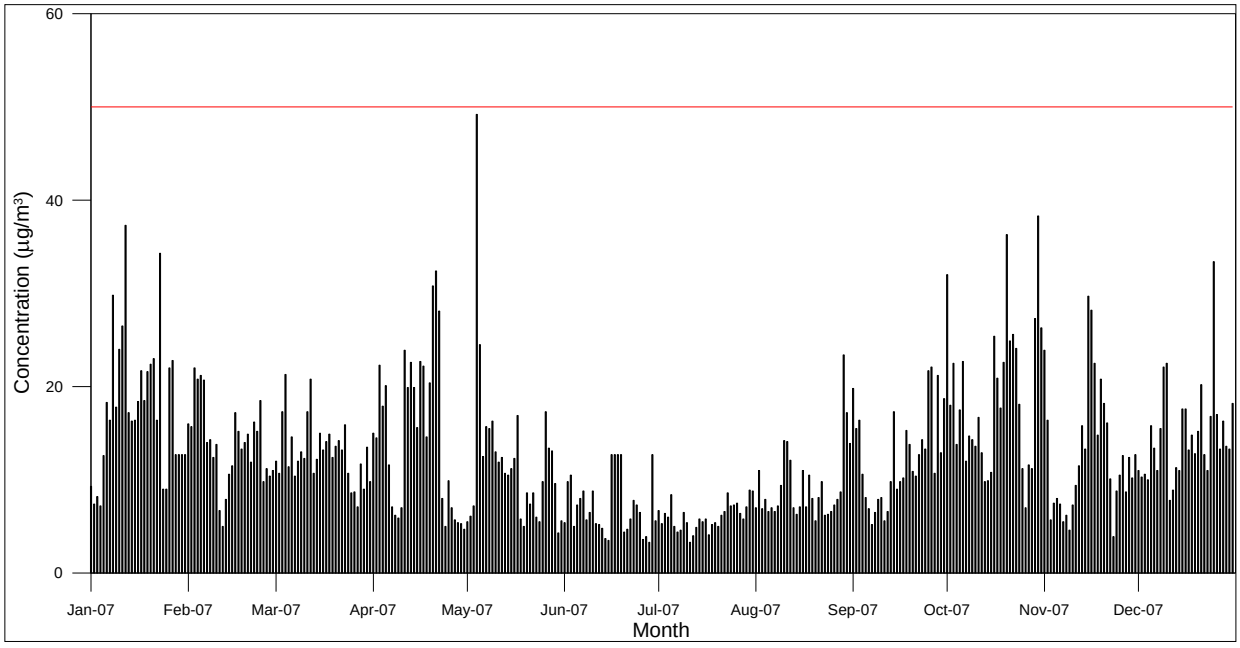


Figure 6
OEH PM_{10} (24-HOUR AVERAGE) MONITORING RESULTS FOR OAKDALE, 2007

The results indicate that the highest 24-hour average PM_{10} concentration at the Oakdale monitoring site was 49.2µg/m^3, recorded on 4 May 2007. The annual average PM_{10} concentration for 2007, recorded at the OEH Oakdale monitoring site was 12.8µg/m^3.

It is noted that the PM_{10} sub-set is typically approximately 50% of TSP in the ambient air in regions where road traffic is not the dominant particulate source, such as rural areas (US EPA, 2001). Consequently, the annual average TSP criterion of 90µg/m^3 is consistent with an annual average PM_{10} criterion of approximately 45µg/m^3.

In the interest of conservatism, annual average TSP concentrations have been assumed to be 1.5 times the annual average PM_{10} concentrations. This equates to 19.2µg/m^3.

7.3.4 Background Dust Deposition Environment

Dust deposition monitoring data for the area surrounding the Quarry was not available prior to the issue of PA08_0212. Notwithstanding this, deposited dust levels in rural areas are typically below an average of 2g/m^2/month.

7.3.5 Summary of Adopted Ambient Air Quality

Table 6 provides a summary of the ambient background air quality levels that have been adopted for the Quarry.

Table 6
Ambient Air Quality Levels

Parameter	Averaging Period	Assumed Background Level
PM_{10}	24-hours	Daily varying[1]
	Annual	12.8µg/m^3
TSP[2]	Annual	19.2µg/m^3
Deposited Dust	Annual	2g/m^2/month
Note 1: Daily varying 24-hour average PM_{10} concentrations were used for modelling purposes. Note 2: Total Suspended Particulates		
Source: Heggies, 2010 Modified Table 4.3		

8. EMISSION SOURCES AND CONTROL MEASURES

8.1 POTENTIAL EMISSION SOURCES

Potential sources of emissions from the approved operations are as follows.

- Excavation and extraction – topsoil stripping, overburden excavation, extraction of the clay/shale product.
- Visibility barrier construction – placement of overburden and topsoil.
- Transportation – dust emissions from the materials being loaded and transported within the Quarry Site.
- Road dust – dust emissions from the internal roads as vehicles travel along them.

- Stockpiles – dust emissions from bare stockpiles and barriers prior to revegetation.
- Exhaust and greenhouse gas emissions from earthmoving equipment and product trucks.

8.2 AIR QUALITY CONTROL PROCEDURES

Table 7 presents the air quality control measures that will be implemented to reduce potential emissions.

Table 7
Air Quality Control Measures

Page 1 of 2

Emission Source	**Control Procedures**	**Personnel Responsible***
General	• Visually inspect operations for visible dust, report excessive visible dust to relevant supervisor / manager and adjust operations to reduce visible dust.	All personnel
Clearing Operations	• Disturb only the minimum area necessary for quarrying and related operations. • Maintain water sprays/water truck on stockpiles to minimise the generation of dust, as required.	Raw Materials & Mining Manager and Equipment Operators
Soil Stripping	• Utilise water sprays/water truck to moisten soil, if required, to minimise the generation of visible dust. *[soil to be slightly moistened only, not wet, to avoid compaction]*	Raw Materials & Mining Manager and Equipment Operators
Topsoil Stockpiles	• Revegetate long term topsoil stockpiles.	Raw Materials & Mining Manager
Product Stockpiles	• Maintain product handling areas / stockpiles in a moist condition as required to minimise wind-blown and traffic-generated dust.	Raw Materials & Mining Manager
Loading of clay/shale	• Minimise the drop heights between front-end loader buckets and truck carrying quarry materials.	Equipment Operators
Internal Roads	• All unsealed roads and trafficked areas will be watered, as required, to minimise the generation of visible dust.	Raw Materials & Mining Manager
	• All internal roads will have edges clearly defined with marker posts or equivalent to define their locations.	Raw Materials & Mining Manager
	• Development of minor roads or tracks will be limited and the locations of these clearly defined.	Raw Materials & Mining Manager
	• Obsolete roads will be ripped and re-vegetated.	Raw Materials & Mining Manager
	• Apply dust suppressants (e.g. Gluon or TerraControl) on unsealed roads used for product transport in the event that sufficient water is not available on site for dust suppression.	Raw Materials & Mining Manager
Transportation of Extracted Clay/Shale	• Cover all loads prior to leaving the Quarry.	Truck Drivers
	• Prohibit all vehicles and machinery from idling unnecessarily.	All personnel
*Or equivalent position delegated these responsibilities.		

Table 7 (Cont'd)
Air Quality Control Measures

Emission Source	Control Procedures	Personnel Responsible
Visibility Barriers	• Ensure construction of visibility barriers as soon as possible to reduce dust emissions from extraction operations.	Raw Materials & Mining Manager
	• Revegetate visibility barriers as soon as possible and progressively, if feasible.	Raw Materials & Mining Manager
	• Seal 400m of the Quarry access road (i.e. between Berrima Road and the Stony Creek bridge crossing).	Raw Materials & Mining Manager
Rehabilitation	• Establish the interim or final landform as soon as practicable after areas become available for rehabilitation.	Raw Materials & Mining Manager
	• Revegetate interim or final landforms as soon as conditions are favourable.	Raw Materials & Mining Manager
	• Apply dust suppressants / soil binder if conditions are not favourable for the establishment of vegetation.	Raw Materials & Mining Manager
*Or equivalent position delegated these responsibilities.		

In addition to these measures, during site establishment and construction activities and during extraction campaigns, prior to the commencement of daily operations, the earthmoving contractor will review the weather forecast to determine if any adverse (i.e. dry and windy) conditions are predicted. If adverse conditions are predicted, the activities planned for the day will be assessed to determine if further control procedures will be required. If the air quality control measures are / become ineffective, activities will either be modified or temporarily suspended until conditions improve.

9. AIR QUALITY MONITORING

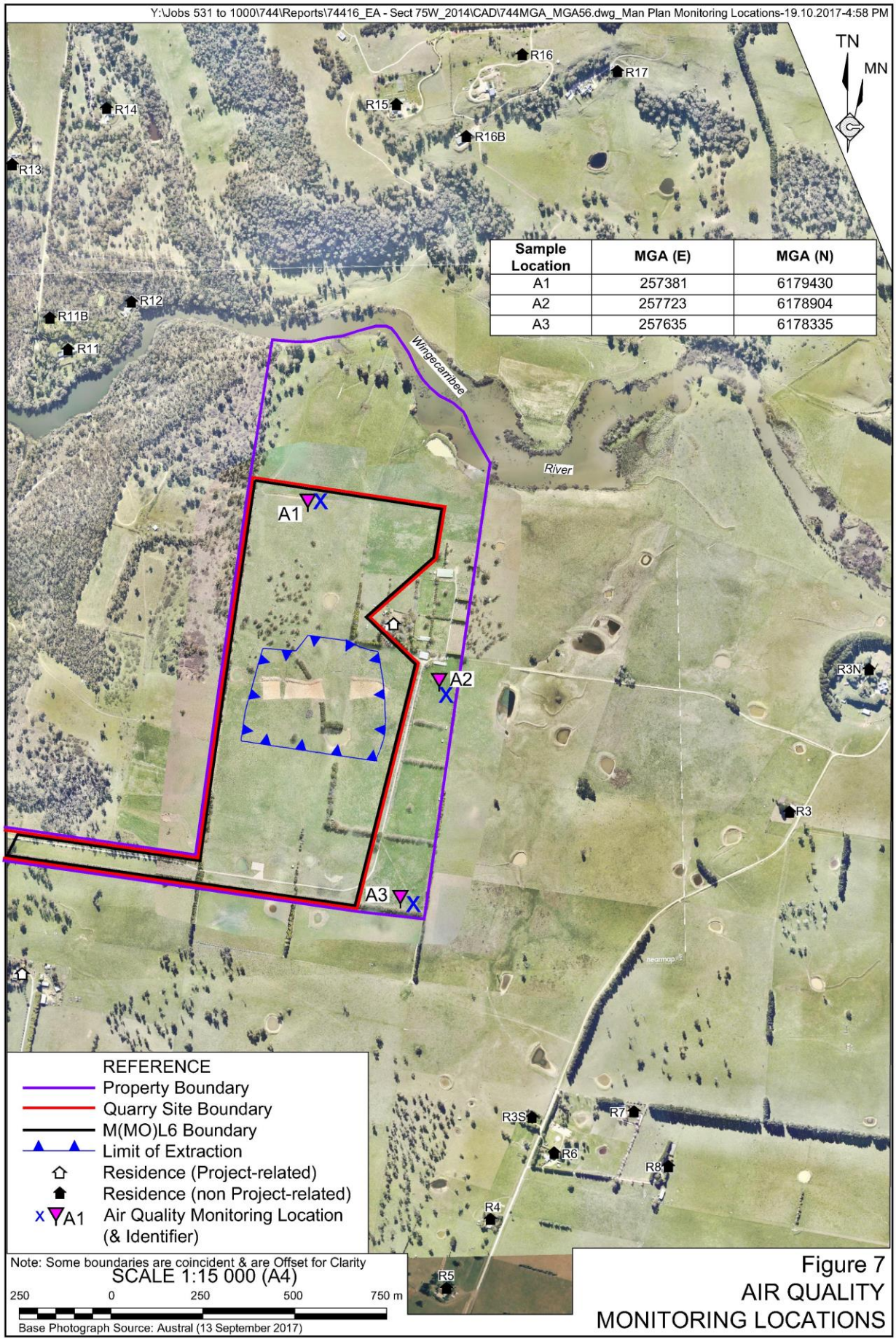
9.1 MONITORING LOCATIONS

Dust gauges have been installed at three locations near the Quarry Site boundary (to the north, east and southeast) to measure compliance with the Quarry deposited dust criteria. **Figure 7** displays the three air quality monitoring locations whilst **Plates 1, 2** and **3** display photographs of the three deposited dust gauges and **Plate 4** displays the meteorological station.

It is noted that, in order to minimise disturbance and inconvenience for surrounding land owners, air quality monitoring locations are within the Quarry Site boundary between the proposed extraction area and the respective representative residences. The EPA has agreed that demonstration of compliance at those locations will satisfy the requirements of *PA Conditions 3(4), 3(5)* and *3(9).*

9.2 MONITORING EQUIPMENT

Deposited dust monitoring is proposed as a surrogate for demonstration of compliance with the PM_{10} and TSP criteria in **Table 8**. If exceedances of deposited dust criteria are attributed to activities related to the Quarry PM_{10} monitoring will be introduced to quantify PM_{10} contributions from the Quarry.



Sample Location	MGA (E)	MGA (N)
A1	257381	6179430
A2	257723	6178904
A3	257635	6178335

Plate 1 Deposited Dust Gauge A1 – view to the North (E744Q_058)

Plate 2 Deposited Dust Gauge A2 – view to the West (E744Q_066)

Plate 3 Deposited Dust Gauge A3 – view to the North (E744Q_037)

Plate 4 Meteorological Station – view to the South (E744Q_014)

Dust monitoring equipment will be installed in accordance with the following standards and guidelines.

- *AS/NZS 3580.10.1:2016 Methods for Sampling and Analysis of Ambient Air, Determination of Particulate Matter— Deposited Matter—Gravimetric method.*
- AS 3580.1.1:2016 *Methods for sampling and analysis of ambient air Guide to siting air monitoring equipment.*
- NSW EPA *Approved methods for the sampling and analysis of air pollutants in NSW* (DECC, 2006).

9.3 PARAMETERS AND ASSESSMENT CRITERIA

Table 8 presents the relevant air quality assessment criteria that apply to the Quarry at surrounding residences in accordance with *PA Condition 3(18).*

Table 8
Background Air Quality Environment for Assessment Purposes

Air Quality Parameter	Averaging Period	Assessment Criteria
PM_{10}	24-hour	50
	Annual	30
TSP	Annual	90
Deposited Dust	Annual	4 g/m^2/month

Whilst placement of deposited dust gauges on or near the boundary of the "Mandurama" property (in the direction of surrounding residences) is an accepted method to assess compliance for deposited dust, insufficient information is currently available to set a criterion at each gauge. In order to more accurately establish a criterion at each gauge, SLR Consulting Australia Pty Ltd has proposed the following method.

"In the event that the dust deposition gauge monitoring on or near the boundary of the "Mandurama" property exceeds the $4g/m^2$/month criterion during three successive months (and a wind direction analysis indicates that the elevated levels could be attributable to the Quarry), dispersion modelling will be undertaken for the relevant monthly sampling periods using meteorological data gathered on site. The dust deposition rates predicted at the monitoring location and the nearest sensitive receptor will be used to derive a scaling factor that is then applied to the standard $4g/m^2$/month criterion to provide an alternative criterion for the monitoring result specific for the conditions experienced during the sampling period."

The adoption of this method would provide an opportunity to establish a site specific criterion for dust deposition at the boundary. In the event the deposited dust level at the gauges remains below $4g/m^2$/monthly, compliance will be achieved at the more distant residences.

9.4 MONITORING FREQUENCY

Dust deposition gauges are to be sampled monthly in accordance with *AS/NZS 3580.10.1:2016*, i.e. samples will be collected/changed over to provide a sample period of 30 $\pm$ 2 days.

9.5 DEPOSITED DUST MONITORING PROCEDURE

9.5.1 Introduction

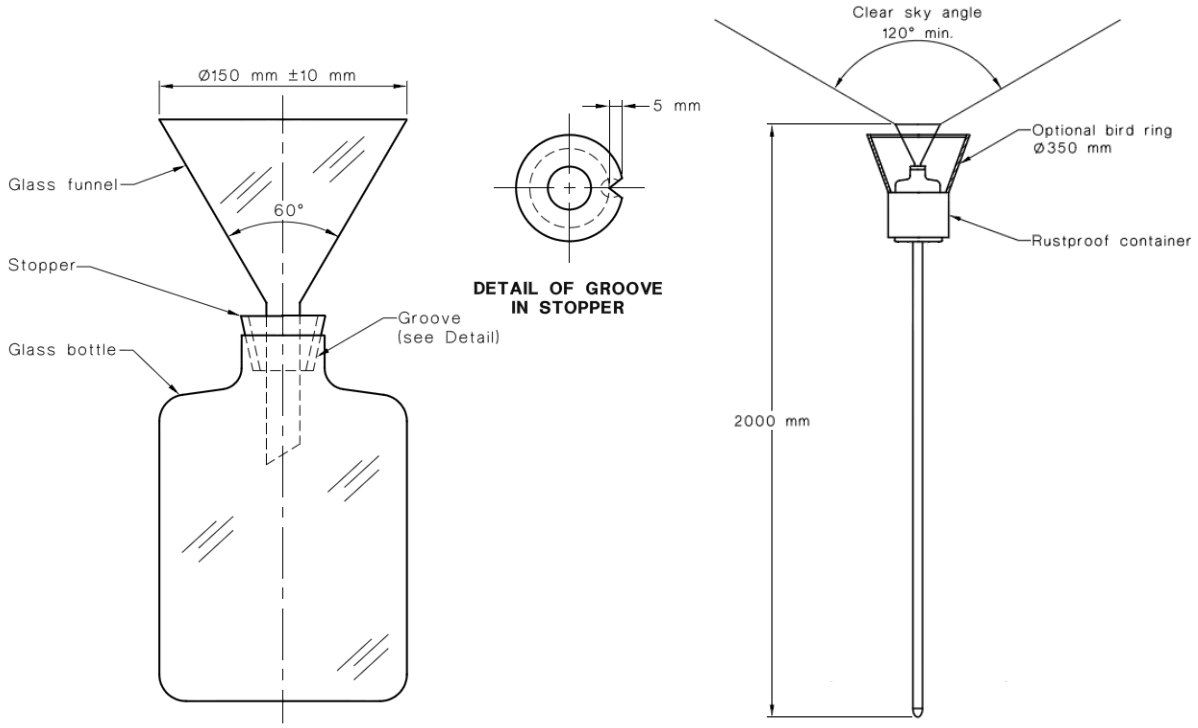
Deposited dust sampling is undertaken in accordance with the standards and guidelines listed in Section 9.2. The following presents the sampling procedures that have been implemented for sampling of dust deposition.

9.5.2 Sampling Equipment

Each deposited dust gauge comprises the following components.

- A 2.4m steel post.
- A plastic sample holder.
- A glass sample container/bottle (2 litres).
- A 150mm diameter glass funnel (and rubber stopper).

The deposited dust gauges have been installed in accordance with *AS 3580.10.1-2016* which requires the top of the glass funnel to be 2.0m + 0.1m above the surrounding ground level. It is also a requirement that the angle between the top of the gauge and surrounding vegetation is less than 30^{o}. **Figure 8** displays an assembled gauge.



Source: AS 3580.10.1-2003 Methods for sampling and analysis of ambient air.

Figure 8
TYPICAL DEPOSITED DUST GAUGE

9.5.3 Sample Collection Equipment

Deposited dust samples are collected monthly and within 2 days of the first day of each month. The following equipment will be required during the monthly sample changeover.

- Deposited dust monitoring sheet and chain of custody form.
- Crate/container for sample container.
- 3 x glass sample containers (with copper sulphate $CuSO_4$ added at laboratory).
- Marker pen/ink pen.
- 50mL wash bottle.
- 1 x container of distilled water.
- Clean cotton cloth.
- Narrow bottle brush.
- Spares kit:
  - glass funnel;
  - rubber stopper;
  - 1 litre bottle of $CuSO_4$ solution (available from laboratory); and
  - marker pen/ink pen.

9.5.4 Office Procedures

The following procedures are to be undertaken prior to commencing the sampling program.

1. Check all new sample containers have the required quantity of copper sulphate added.
2. Check all equipment for use in the sample collection/changeover (Section 9.5.3) is present and functional.

9.5.5 Field Procedures

The following procedure is implemented during collection/changeover of sample bottles.

1. Carefully remove the sample bottle and funnel from the sample holder (be careful of spiders, etc.).
2. Wash down the inside surface of the funnel with approximately 50mL of distilled water into the sample bottle using the bottle brush to loosen any deposited dust.
3. Remove the stopper and funnel from the sample bottle, taking care not to break the neck of the funnel and immediately place a cap on the sample bottle.
4. Complete the labelling of the sampling time and period on the sample flagon bottle by placing the date of collection on the bottle (see example below).

   New Berrima Quarry
   A1
   Sampling Period: 01/06/16 - 01/07/16
   Collection Time: 11:00am

5. Place the stopper and cleaned funnel on the new bottle.
6. Ensure that the new bottle is properly numbered and the commencement date of the sampling period is recorded on the bottle (see example below).

   New Berrima Quarry
   A1
   Sampling Period: 01/07/16 -
   Collection Time:
7. Replace the new bottle and funnel in the sample holder ensuring the top of the funnel is horizontal.
8. Ensure all relevant data and comments are written on the deposited dust monitoring sheet and chain of custody form before leaving each monitoring site (including the date, time, site number and name of the sample collector).

It is always important to note whether there have been any changes in land use immediately adjacent to the gauge since the last collection period. Some changes may be slow, e.g. increasing height of nearby vegetation. It is also important to note if the sample has been contaminated by extraneous material including vegetation, bird droppings, insects, etc. This information needs to be recorded on the monitoring sheet and chain of custody form.

9.5.6 Sample Despatch

All samples despatched to the laboratory need to be accompanied by a deposited dust monitoring sheet and chain of custody form. It is important to establish a chain of custody for all documentation relating to the samples and the supply of the results, i.e.

- laboratory formally acknowledges receipt of samples and planned date for issue of draft results (if not received then follow up to check samples have not gone astray);
- draft results provided by laboratory (to be checked by the Compliance & Environmental Coordinator that they are appropriate and no obvious laboratory errors have occurred); and
- receipt of final results (in a timely manner).

9.5.7 Data Recording and Reporting

Upon receipt of the laboratory results, the following will be undertaken.

- The results will be entered into a spreadsheet and compared with the guideline level of 4g/m^2/month and with previous results to identify any inconsistent results or trends in monitoring data.
- Download monthly wind speed and direction data from the meteorological station for the period of sampling.

- In the event there are any excessive deposited dust levels, these need to be compared with the recorded wind speed and direction data (see Section 9.6) and any comments recorded during sample bottle changeover to potentially ascertain the source/s of the excessive levels. It is also worth reviewing the ash content on samples recording high total insoluble solid levels as low ash values indicate the dust to be of organic origin (e.g. pollen).

9.6 METEOROLOGICAL MONITORING

Austral established an on-site meteorological station in September 2016 to record:

- temperature;
- rainfall;
- wind speed and direction;
- solar radiation; and
- barometric pressure.

This data can be accessed, as required, through mobile telemetry.

10. EVALUATION OF COMPLIANCE

The air quality monitoring results will be reviewed and tabulated by the Compliance & Environmental Coordinator within 14 days of the receipt of data. The tabulated data will include an assessment of the monitoring results against the criteria identified in *PA Conditions 3(9).* A copy of the tabulated data will be included within each Annual Review.

In the event that the monitoring results exceed the criteria identified in *PA Condition 3(9)*, the Raw Materials & Mining Manager or Compliance & Environmental Coordinator will initiate incident reporting procedures and undertake the review process as outlined in Sections 11 and 13.

11. CORRECTIVE AND PREVENTATIVE ACTIONS

In the event that a single monthly air quality monitoring identifies an exceedance of the annual average monthly air quality criteria identified in *PA Condition 3(9)*, the exceedance will be investigated to determine the likely cause. The investigation will seek to determine:

- the date(s) and period of the exceedance and the wind speed and direction data during the monitoring period;
- whether the exceedance of the criteria was directly related to one or more air quality sources associated with the Quarry or if any other factors contributed to the exceedance;
- the primary cause(s) of the exceedance;

- any contributing factor(s) which led to the exceedance;
- whether appropriate controls were implemented to prevent the exceedance; and
- the most appropriate corrective and preventative measures that need to be implemented to prevent a recurrence of the incident.

Corrective and/or preventative actions will be assigned to relevant Company personnel and communicated, for example, through planning meetings and toolbox talks. The implementation and effectiveness of the corrective actions will be monitored for their effectiveness through the ongoing deposited dust monitoring.

If it has been identified that the criteria have been exceeded as a result of activities within the Quarry Site, and these exceedances occur for three successive months, in addition to the implementation of corrective actions, as outlined in Section 9.3, dispersion modelling will be undertaken for the relevant sampling period and using the on-site meteorological data. The dust deposition rates predicted at the monitoring location and the nearest sensitive receptor will be then be used to derive a scaling factor that is applied to the standard 4g/m^2/month criterion to provide an alternative criterion for the monitoring result specific for the conditions experienced during the sampling period.

The results of these investigations will be reported through the Annual Review.

Should the annual average monthly criteria be exceeded (based on the rolling monthly annual average), Austral will report and investigate the exceedance in accordance with the incident reporting procedure outlined in Section 13. A copy of NSW Health's fact sheet "*Mine Dust and You*" (as may be updated from time to time) would also be supplied to the affected landowners and/or existing tenants of the land.

12. COMPLAINTS HANDLING AND RESPONSE

Complaints may be received via one of the following methods.

- Directly via the 24-hour, 7 day per week Community Information Line (1800 635 620) or via the Bowral Brick Plant phone line (02 4862 1062).
- Directly via a dedicated email address *compliance-ab@australbricks.com.au* which is advertised in a similar manner to the Community Information Line.
- Indirectly via a local or state government agency.

Following receipt of any air quality-related complaint, Austral will implement the following procedure.

1. The complaint will be reviewed by the Compliance & Environmental Coordinator or their delegate to determine (and record) the nature, date and time of the alleged air quality emission.
2. Relevant monitoring data will be reviewed, including meteorological and deposited dust data.
3. Should the air quality monitoring report indicate that no exceedance of the criteria identified in *PA Condition 3(9)*, the Compliance & Environmental Coordinator will continue to consult with the complainant in relation to managing air quality emissions within the Quarry.

4. Should the air quality monitoring report indicate that an exceedance of the criteria identified in *PA Condition 3(9),* the Compliance & Environmental Coordinator will notify the NSW Department of Planning and Environment (DPE) and Environment Protection Authority (EPA) and will implement the procedures identified in *PA Condition 5(7)*. In addition, the Compliance & Environmental Coordinator will continue to consult with the complainant, as required, in relation to the complaint.

In the event that two complaints are received from the same person(s) and Austral can demonstrate compliance with the criteria identified in *PA Conditions 3(9)* in each case, no further follow up will be undertaken.

All complaints would be recorded using Austral's proforma complaints record sheet.

13. INCIDENT REPORTING

In the event that air quality monitoring records an exceedance of an air quality criterion (note: deposited dust criteria is for the annual average monthly level), the exceedance will be reported in accordance with the Incident Reporting Procedure outlined within the Environmental Management Strategy for the Quarry (prepared in accordance with *PA Condition 5(1)*). Additionally, the affected landowners will be notified in writing and a copy of the air quality monitoring results provided to the landowners until monitoring confirms a return to compliance.

14. PUBLICATION OF MONITORING INFORMATION

Austral will place a summary of all air quality monitoring results on Austral's website.

In addition, Austral will include a summary of all air quality monitoring data within each *Annual Review* for the period ending 31 December each year and address the relevant requirements of *PA Condition 5(4)*. That document, once approved by the relevant government agency, will also be published on Austral's website.

15. PLAN REVIEW

In accordance with *PA Condition 5(5),* this AQMP will be reviewed and, if required, revised within 3 months of:

- the submission of an annual review under *PA Condition 5(4);*
- the submission of an incident report under *PA Condition 5(7);*
- the submission of an independent environmental audit report under *PA Condition 5(9)*; and
- any modification to the conditions of PA08_0212.

16. REFERENCES

Heggies Pty Ltd, 2010. *Environmental Assessment: Air Quality Assessment* prepared on behalf of The Austral Brick Company Pty Limited.

SLR Consulting Australia Pty Ltd (SLR) (2015), *Air Quality Assessment* prepared on behalf of The Austral Brick Company Pty Limited.