Teralba Quarry

2016 Annual Review

Project Approval PA10_0183

Prepared in conjunction with:

R.W. CORKERY & CO. PTY. LIMITED

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2016 Annual Review

Project Approval PA10_0183

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March 2017

R.W. CORKERY & CO. PTY. LIMITED

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COMMONLY USED ACRONYMS

AHD	Australian Height Datum
ANZECC	Australia and New Zealand Environment and Conservation Council
DPE	Department of Planning and Environment (formerly DP&I)
DP&I	Department of Planning and Infrastructure
DRE	Division of Resources and Energy (within the Department of Industry)
EA	Environmental Assessment
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	Environment Protection Authority
EPL	Environment Protection Licence
LMCC	Lake Macquarie City Council
PA	Project Approval
POEO Act	Protection of the Environment Operations Act 1997
RWC	R.W. Corkery and Co. Pty Limited

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1. INTRODUCTION

1.1 SCOPE

This report has been prepared by Metromix Pty Ltd (Metromix) in conjunction with R.W. Corkery and Co Pty Limited (RWC), in accordance with *Condition 5(4)* of Project Approval PA10_0183, to record the activities and environmental monitoring undertaken within and surrounding the Teralba Quarry ("the Quarry") during the period 1 January 2016 to 31 December 2016 (the "reporting period"). This document also outlines the activities and environmental monitoring planned to be undertaken by Metromix within and surrounding the Quarry in 2017. **Figure 1.1** displays the location of the Quarry with **Appendix 1** providing a full copy of PA10_0183.

Condition 5(4) requires the preparation of an Annual Report that contains the following.

- A description of the activities (including preparatory activities, extraction, processing and rehabilitation) that were carried out throughout 2016 (see Section 2), and the activities that are proposed to be carried out throughout 2017 (see Section 6).
- A summary of community relations between Metromix and the surrounding community (see Section 3) including:
  - Community Consultative Committee meeting minutes;
  - community complaints and follow-up actions; and
  - local community involvement projects.
- A comprehensive review of the environmental monitoring results for 2016 (see Section 4), including a comparison of these results against:
  - the relevant statutory requirements, limits or performance measures/criteria;
  - the monitoring results of previous years;
  - the identification of any trends in the monitoring data; and
  - the relevant predictions in the EA.
- An assessment of compliance throughout the reporting period with the conditional requirements of PA10_0183, and a description of what actions were (or are being) taken to ensure compliance, where necessary (see Section 5).
- A list of discrepancies between the predicted and actual impacts of the Quarry's operations, and an analysis of the potential cause of any significant discrepancies (see Section 5).
- A description of the measures that will be implemented throughout 2017 to improve the environmental performance of the Quarry (see Section 6).

Throughout this document, the land on which the Teralba Quarry is situated upon (Lots 1 and 2 DP 224037) is referred to as the "Quarry Site".

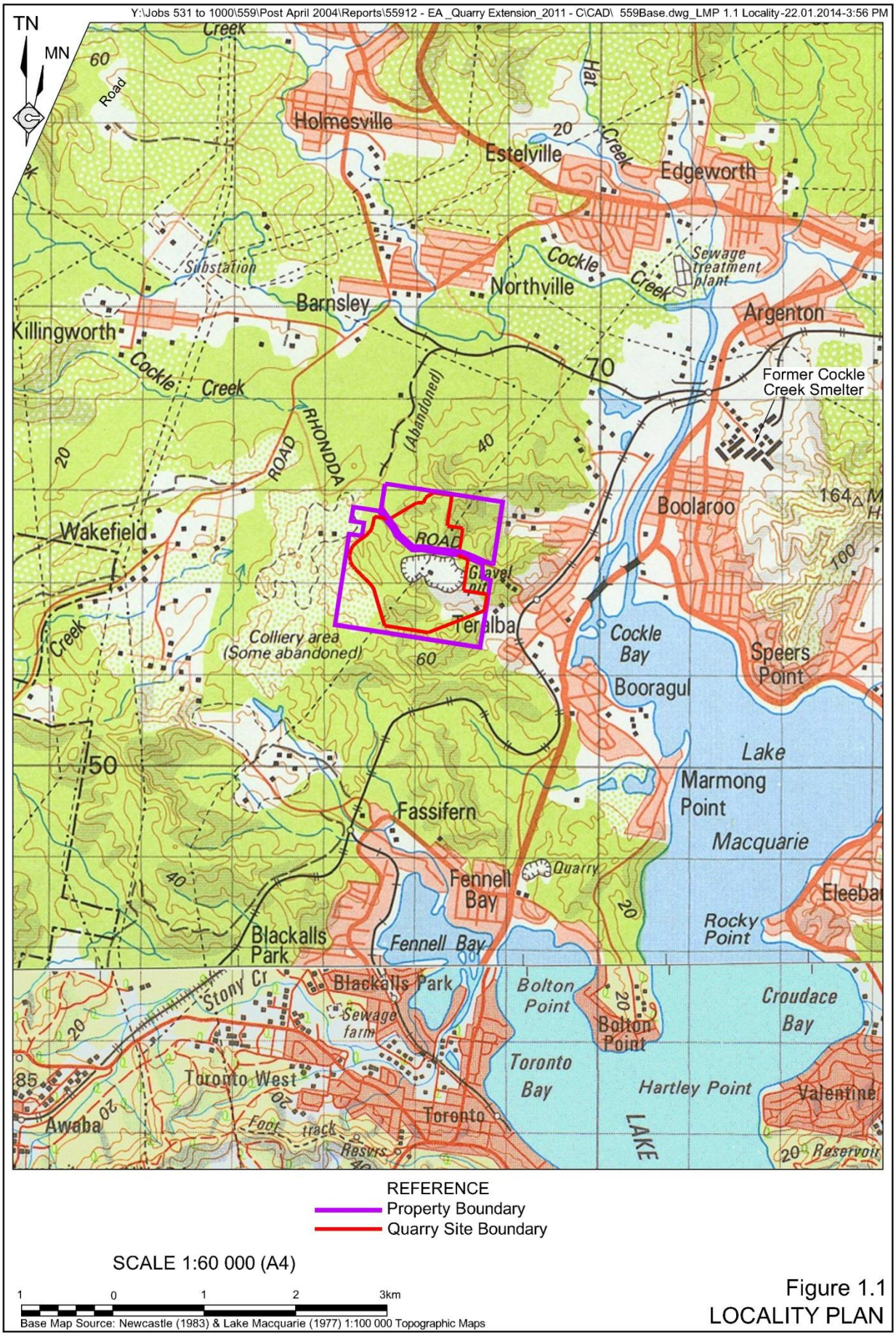

Figure 1.1
LOCALITY PLAN

1.2 STANDARDS AND PERFORMANCE MEASURES

The owner and operator of the Teralba Quarry, Metromix Pty Ltd (Metromix) is required to operate the approved activities within the Quarry Site in accordance with PA10_0183 and licences listed in **Table 1.1**.

Table 1.1
Teralba Quarry – Approvals and Licences

Approval/Licence	Original Issue Date	Current Version Issue Date	Expiry Date	Scheduled Activities
Project Approval PA10_0183	22 February 2013	22 February 2013	31 December 2038	Extracting, processing product despatch and ancillary activities
Environment Protection Licence No 536	25 September 2000	13 November 2015	01 June*	Crushing, grinding or separating; Extractive activities
Environment Protection Licence No 13015	17 July 2015	14 October 2015	17 July*	Resource recovery; Waste storage
Water Access Licence No. 20BL173206	12 October 2012	12 October 2012	No Expiry	Recovery and use of water from Dam A
* Licence Anniversary Date				

Relevant conditions within Project Approval PA10_0183 which nominate specific environmental criteria are as follows with **Appendix 2** providing the complete records of all measurements.

- *Condition 3(5):* noise emissions (day shoulder, day, evening and night).

  Each of the relevant noise criteria and frequencies are presented in Section 4.2.

- *Condition 3(9):* blasting overpressure and ground vibration emissions.

  Each of the relevant blasting criteria are presented in Section 4.3 in conjunction with the assembled monitoring results.

- *Condition 3(17):* air quality emissions (deposited dust and particulate matter).

  Each of the relevant air quality criteria are presented in Section 4.4 in conjunction with the assembled monitoring results.

- *Condition 3(23):* all surface water discharges from the site comply with the discharge limits in any EPL which regulates water discharges from the site.

  Each of the relevant water criteria are presented in Section 4.1 in conjunction with the assembled monitoring results.

In addition to the specific environmental criteria, the following conditions within PA10_0183 specifically request further information be included in each Annual Review.

- *Condition 2(20b): Production Data – the Proponent shall include a copy of this data in the Annual Review (see Section 2.2 and **Appendix 2**).*

- *Condition 5(11a): Access to Information – the Proponent shall make copies of the annual review available on its website (over the last five years).*

- *PA10_0183 Appendix 3 – Action 6.6 – Ensure all groundwater monitoring data is incorporated into each Annual Review for the Teralba Quarry (see Section 4.1)*
- *PA10_0183 Appendix 3 – Action 12.5 – Include annual photographs of the progressive rehabilitation of quarry benches in each Annual Review. (see Section 4)*

In addition, *Condition 3(21)* requires Metromix to ensure a suitable meteorological station is operational in the vicinity of the Quarry, complying with the requirements outlined in *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (DECCW, 2007) and is capable of continuous real-time measurement of temperature lapse rate, in accordance with the *NSW Industrial Noise Policy* (EPA, 2000), or as otherwise approved by EPA. Metromix operates a comprehensive meteorological station in an elevated area adjacent to the Mid Pit Extraction Area (see **Figure 2.1**).

1.3 SITE MANAGEMENT AND RESPONSIBILITIES

The management of the Teralba Quarry, to ensure all conditional requirements are satisfied, is the responsibility of the Manager Quarries, Mr Bill Sanderson. Day to day responsibility for Quarry Operations, including environmental monitoring and rehabilitation rests with the Quarry Manager, Mr Nick James.

Metromix employs a part-time Compliance Officer responsible for data collection, deposited dust and water sample collection, daily checks and compilation of quarry-related documentation and monitoring data.

Personnel from Carbon Based Environmental Pty Ltd assist with management of the on-site meteorological station, air quality analyses and calibration of the HVAS.

1.4 DOCUMENT PREPARATION

The following information and data for this report has been drawn from documents commissioned or held by Metromix.

- *Environmental Assessment for the Teralba Quarry Extensions – Major Project Application No. 10_0183 (2013). R.W. Corkery and Co Pty Limited 2013.*
- *Teralba Quarry Environmental Monitoring Folders, specifically Air, Waste, Water, Blasting, Non Compliances, Community Complaints and CCC Minutes.*

This document has been assembled by Mr Rob Corkery, M.Appl.Sc., B.Sc (Hons), Principal of R.W. Corkery & Co. Pty Limited (RWC) and Mr Nick Warren (M.Env.Sc., M.Bus (Marketing), B.Sc., Environmental Consultant with the same company.

2. OPERATIONS DURING THE REPORTING PERIOD

2.1 INTRODUCTION

Table 2.1 lists the principal activities / milestones that occurred at the Teralba Quarry throughout the reporting period with activities undertaken as part of those approved under PA10_0183.

Operational areas within the Teralba Quarry are referred to in the same manner as described in the 2011 *Environmental Assessment* (RWC, 2011) i.e. Northern Extension, Mid Pit Extraction Area, Southern Extraction Area and Southern Extension.

Figure 2.1 presents the location(s) of the activities described, including activities shown within **Plates 1** to **8**.

Table 2.1
Principal Activities / Milestones throughout 2016

Quarter 1 (January – March)	• Works to extend silt dam walls (Cells 8 and 9)
Quarter 2 (April – June)	• Extension of silt pipeline, installation of Y junction to allow pumping into Silt Cell 7 • Planted native seedlings in the area above the old Silt Cell 1
Quarter 3 (July – September)	• 60m x 10m area of roadway concreted at the Pugmill exit road to reduce fines trafficking • Increased usage of Council street sweeper during poor weather periods in July and August
Quarter 4 (October – December)	• 65m x 7.5m area of roadway concreted prior Top Gate wheel wash to reduce fines trafficking • Dam D – installed fabric liner to reduce seepage through dam wall • Extension of silt pipeline • Additional works on Silt Dam walls (Cell 9) • Began preparation at the extraction limit around Stage 1B for rehabilitation to take place in April 2017

2.2 EXTRACTION OPERATIONS

Extraction operations continued within Stages 1A and Stage 1B of the Southern Extension in 2016 under PA10_0183, as displayed on **Figure 2.1**. Additional clearing activities undertaken in Stage 1B were undertaken following the translocation of 40 *Tetratheca juncea* plants from Stage 1B in 2015. A total of 39 blasts were initiated in 2016. **Plates 1** and **2** display a view of the Southern Extraction Area and Extension from both the north and south.

2.3 PROCESSING OPERATIONS

Processing operations occurred continuously throughout the reporting period, producing washed products and road pavement products. **Plate 5** displays the status of the processing plant. Fill materials were not processed through the processing plant.

The only change during the reporting period when compared to 2015 was that the processing plant operated in the "wet" mode for approximately 58% of sales, compared to approximately 68% in 2015. The remaining 42% of the total products comprised of road pavement products (19%) and fill materials (23 %) respectively.

2.4 RECYCLING OPERATIONS

Of the recycled concrete that had been previously crushed and stockpiled, 22 050 tonnes of crushed concrete was despatched/sold during 2016.

2.5 SALES

Table 2.2 records the monthly/annual sales of the various products produced at the Quarry during 2016. This data is drawn from information provided to the Division of Resources & Energy (DRE) of the Department of Industry in accordance with the requirements of *Condition 2(20)*. A copy of the annual return for extractive materials to DRE for 2015/2016 is included within **Appendix 2**.

Table 2.2
Teralba Quarry Sales – 2016

2016 Month	Washed Products (t)	Road Pavement (t)	Other (t)	Total (t)
January	21,457	4,921	473	26,851
February	41,170	8,114	427	49,711
March	46,508	6,768	1,041	54,317
April	39,452	21,054	36,220	96,726
May	47,275	9,718	57,241	114,234
June	39,066	8,084	21,045	68,195
July	39,630	11,500	49,467	100,597
August	40,983	10,006	20,319	71,308
September	41,352	13,788	12	55,1525
October	38,404	20,702	834	59,940
November	46,734	31,537	95	78,366
December	32,016	12,863	86	44,965
Total	**474,047**	**159,055**	**187,260**	**820,362**
Source: Metromix				

2.6 OVERBURDEN AND SILT MANAGEMENT

In 2016, approximately 35,000t of overburden/fill was removed within the existing Southern Extraction Area and Southern Extension, all of which was used for either capping Silt Cell 1 or for landform construction.

All silt produced from the processing plant was initially pumped to Silt Cell 2 with overflow into Silt Cells 3, 4, 5 and 6. An extension and Y junction was installed in June 2016 to allow pumping into Silt Cells 4 and 7, with respective overflows. Pipework was further extended in December 2016 to pump into Silt Cells 6 and 9 directly. **Plate 2** displays the status of the silt cells.

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TN MN

Newtech Pistol Club
Northern Extension
Revegetation Completed
Ongoing Road Maintenance across the Quarry Site
Mid Pit Extraction Area
Progressive Covering and Revegetation of Silt Cell 1
Upgrade to Boundary Fence
On-site Meteorological Station
Use of Pugmill
Top Gate
Road
Top Wheel Wash
Constructed Concrete Pavement
Additional Silt Cell Construction
Ongoing Operation of Downer EDI Asphalt Plant
Off-road Vehicle Parking Area
Quarry Vehicle Parking Area
Operation of the Processing Plant
Current Administration & Weighbridge
Existing Southern Extraction Area
Bottom Wheel Wash
Placement of Silt in Silt Cells 3, 4, 5 & 6
Bottom Gate
Dam G
Dam H
Dam F
Dam E
Stage 1B (North)
Stage 1A
Dam D
Dam C
Dam B
Mine Adit Dam
Active Extraction Area
Southern Extension
Stage 1A Access Road
Fabric Liner installed within Dam D (Lower Upstream Section)
Product Truck Parking Area
Tetratheca juncea translocation Area
Haul Road
Rhondda Road
Coal Pit Road

REFERENCE
- Quarry Site Boundary
- Extraction Area Boundary
- Extension Area Boundary
- Activity Name / Location
- Water Pipeline
- Silt Pipeline
- Dam
- Water Cart Fill Point

2016 Quarry Activities
- Extraction Activities
- Silt Placement
- Rehabilitation / Revegetation
- Product Stockpiles
- Topsoil / Subsoil Storage
- Upgrade Activities
- Plate Number and Direction

SCALE 1:7 500 (A3)
100 0 100 200 300 400m
Aerial Photograph Source: AAM Pty Ltd - September 2016

Figure 2.1
2016 REPORTING PERIOD
ACTIVITIES AND OPERATIONS

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Plate 1: View towards Stage 1B extraction from the Pugmill Stockpile Area
(Ref: E559AF_10)

Plate 2: Stage 1B and Silt Cells
(Ref: E559AF_03)

Plate 3: Rehabilitation Area adjacent to Silt Cell
(Ref: E559AF_23)

Plate 4: Dam K Mid Pit
(Ref: E559AF_19)

Plate 5: View of Crushing, Screening and Wash Plant from Stage 1A
(Ref: E559AF_31)

Plate 6: View of Pugmill Stockpile Area from Stage 1A
(Ref: E559AF_33)

Plate 7: View from Stage 1A of Pugmill exit road and haul road to ROM Pad
(Ref: E559AF_21)

Plate 8: Concrete Pavement on Pugmill Exit Road
(Ref: E559AF_01)

2.7 WASTE MANAGEMENT

Silt produced as a result of processing within the processing plant is placed in the silt cells within the Southern Extraction Area as part of the Quarry final landform construction program and is consequently not classified as production waste. No other wastes produced at the Quarry are classified as production wastes.

The following non-production wastes (and quantities) were produced at the Quarry during the reporting period.

- general waste (1 x 4m^3 bin per week)
- waste oil (12,200L)
- co-mingled recyclables (2 x 200L bins per fortnight)
- oily water (4 000L)
- paper and cardboard (20 x 3m^3)
- scrap steel (22.96 tonnes)
- batteries (minor)

All waste produced at the Quarry was removed by licenced contractors. All general waste (putrescible) was disposed of at the Awaba Waste Facility, the closest licenced facility, with the remaining industrial waste (not defined as general (putrescible)), was removed and disposed of by contractors at appropriately licenced facilities.

2.8 SITE INFRASTRUCTURE AND SERVICES

During the reporting period, a 60m section of the access road from the pugmill was resurfaced with concrete. The concrete pavement on the exit road from the pugmill is displayed on **Plate 8**. Another 65m section of road approaching the Downer roundabout prior to the asphalt pavement before the top gate truck wheel wash was resurfaced with concrete in 2016.

2.9 WATER MANAGEMENT

An amended Surface Water Management Plan for the Teralba Quarry was approved by DPE on 20 December 2016.

The surface water management system of the Quarry comprising Dams A to G continued to operate efficiently, although Dam A (Mine Adit Dam) overflowed during the first week of January 2016 following the a major rainfall event in which 290 mm of rain was received over 4 days. The overflow caused water to flow into Dam B which in turn discharged through the licenced discharge point. The maximum volume of water that overflowed from Dam A (Mine Adit Dam) through the Dam B discharge point was 8 380m³ in a 24 hour period (the volume limit in EPL 0536 is 2 000m³ per day). This was unavoidable given that Dam B is located near the former coal mine adit, the outflow of which is beyond Metromix's control. The practice of pumping from Dam H to Dam G continued to reduce the quantity of water reporting to Dam D. The condition of Dam K is displayed on **Plate 4**.

Dam D had a fabric liner installed in December 2016 to limit seepage from the dam.

All water pumped or transferred around the Quarry was measured throughout the reporting period with a series of flow meters. No other changes to water management infrastructure occurred during 2016.

2.10 BUSHFIRE MANAGEMENT

There were no bush fire incidents within the Quarry Site nor in the vicinity of the Quarry Site that required management during the reporting period.

2.11 HAZARDOUS MATERIAL MANAGEMENT

Hazardous materials within the Quarry Site are appropriately managed with diesel fuel stored in above ground tanks with roofing and appropriate bunding (110% of the total diesel tank capacity).

Aerosols and paints continued to be stored within the designated hazardous material cabinets within the workshop area.

Hazardous waste materials such as batteries, oily rags and oil filters were stored as outlined within Metromix's waste management procedure and removed by a licenced contractor and disposed of at an appropriate waste facility.

2.12 PRODUCT TRANSPORTATION

The transportation of products from the Quarry is limited under *Condition 2(8)* and *2(9)* of PA10_0183 to include the following transportation constraints.

Condition 2(8) - The Proponent shall not:

a) transport more than 1 million tonnes of quarry products from the site in any calendar year;

b) dispatch more than 326 laden trucks from the site on any day;

c) dispatch more than 241 laden trucks per day or 20 per hour westwards along Rhondda Road;

d) dispatch more than 85 laden trucks per day or 8 per hour eastwards through Teralba;

e) dispatch laden trucks for travel through Teralba between 6 pm and 6 am; and

f) receive unladen trucks via the railway street entrance between 6 pm and 7 am.

Condition 2(9) - The Proponent shall limit the total hourly truck dispatch rates from the site to the levels shown in Table 1.

Table 1 – Truck Dispatch Hours

Dispatch Period	***Maximum Hourly Dispatch Rate***
6:00 am – 7:00 am	*Up to 28 loaded trucks*
7:00 am – 6:00 pm	*Up to 20 loaded trucks*
6:00 pm – 5:00 am	*Up to 6 loaded trucks*
5:00 am – 6:00 am	*Up to 12 loaded trucks*

The approved transport corridors are displayed on **Figure 2.2** and summarised below.

Route 1 – Northwestern Corridor
Westwards along Rhondda Rd, and then northwards along Wakefield Rd and Northville Rd to George Booth Drive.

Route 2 – Southwestern Corridor:
Westwards along Rhondda Rd, and then southwards along Wakefield Rd to the M1 Freeway.

Route 3 – Northeastern Corridor:
Northeast along Railway St Teralba, crossing the railway line, then southwards along York St Teralba, then northeasterly along Five Islands Road to either The Esplanade (to the east) or Lake Road (to the north).

Route 4 – Southeastern Corridor:
Northeast along Railway St Teralba, crossing the railway line, then southwards along York St Teralba and Toronto Road.

The monitoring records of truck movements between January 2016 and December 2016 are collated in **Appendix 2**. **Table 2.3** provides a summary of the occurrences outside these conditions that occurred for the period from January 2016 to December 2016. A review of these results indicates that the maximum daily average for each conditional requirement is well below the approved limits in *Conditions 2(8*) and *2(9*). A further overview of non-compliances is provided in **Table 2.4** including a discussion of the circumstances leading to each non-compliance.

Three departures with the Teralba Driver's Code of Conduct for contractors operating between the hours of 6:00am and 6:00pm were recorded during the reporting period as a result of three trucks arriving at the Quarry from the direction of Northville Road earlier than 6:00am. While not a non-compliance with the conditions of PA10_0183 that permit truck movements on this route between the hours of 6:00pm and 6:00am, this operational commitment was made over-and-above the requirements of project approval. The contractors responsible for the departures were disciplined at the time of their arrival. This occurrence represents three out of 32 657 trucks arriving at the Quarry during 2016 or <0.01% of the trucks arriving at the Quarry during the reporting period. Notwithstanding this very low percentage, Metromix consider this a departure from its commitments. It should be noted that, despite these departures, no complaints were received regarding truck movements throughout the entire 2016 reporting period, as a number of other trucks travel the four routes during the same period.

2.13 VENM IMPORTATION MANAGEMENT

No Virgin Excavated Natural Material (VENM) was imported to the Quarry Site for fill purposes during the reporting period.

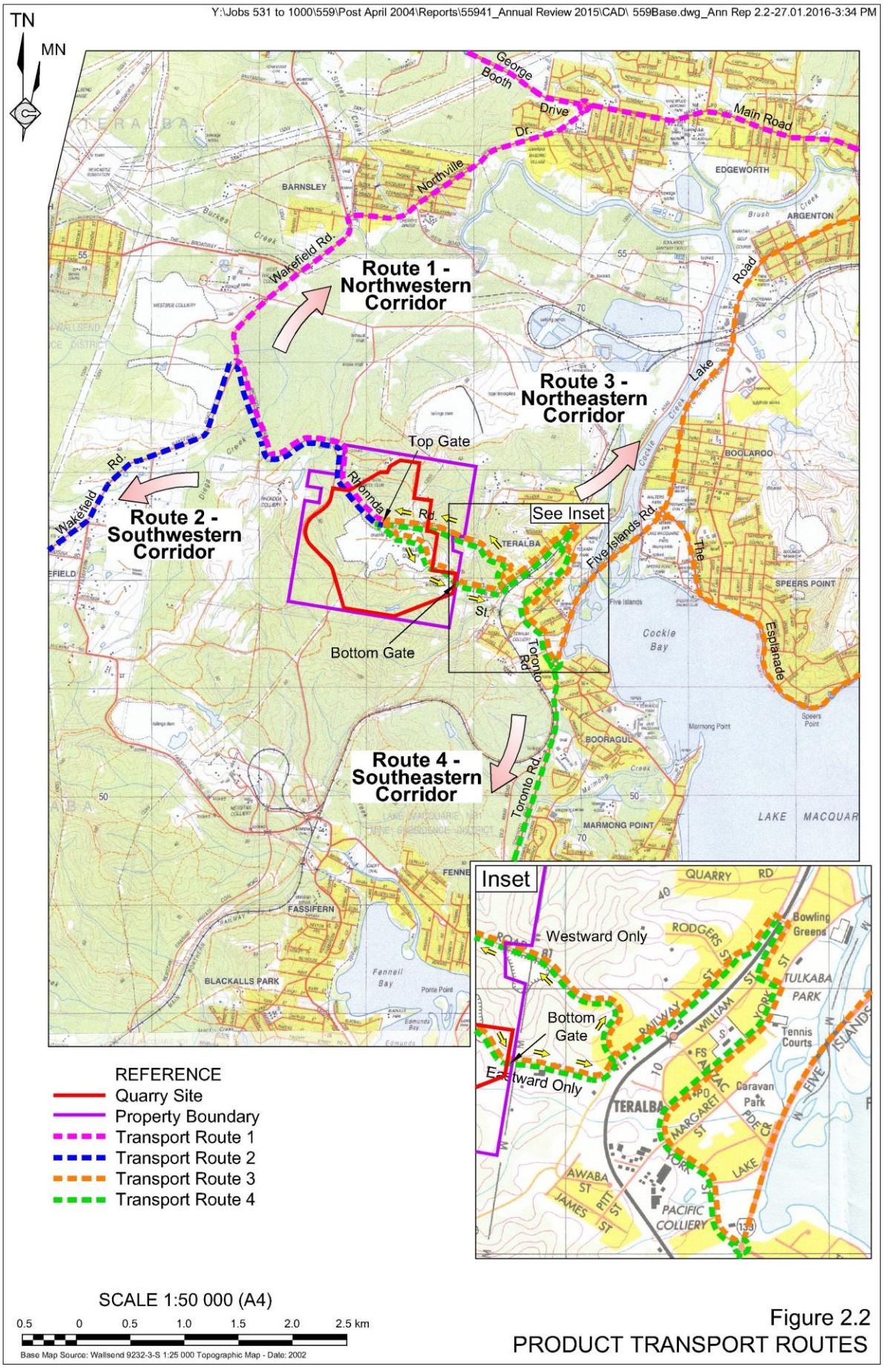


Figure 2.2
PRODUCT TRANSPORT ROUTES

Table 2.3
Summary of Transportation Limit Compliance
– January 2016 to December 2016

Condition Description			Maximum Record for 2016											
Time Period	**Condition**	**Approved Limits**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Annual	Annual Product Despatch	1 million tonnes	842 412											
Daily	Total trucks per day	326 trucks/day	136	151	211	271	205	205	246	226	139	193	200	174
Daily	Westwards trucks per day	241 trucks /day	97	104	164	225	180	158	203	179	97	117	152	121
Daily	Eastwards trucks per day	85 trucks /day	59	59	62	69	61	74	66	73	65	78	73	57
6:00am to 7:00am	Cumulative Max Hourly	28 trucks /hour	10	11	28	28	25	23	27	27	13	14	14	14
7.00 am to 6.00pm	Cumulative Max Hourly	20 trucks /hour	20	20	20	20	20	20	20	20	20	**2**0	20	20
6:00am to 7:00am	Westwards Max Hourly	28 trucks /hour	9	8	23	27	25	18	24	24	10	8	11	14
7.00 am to 6.00pm	Westwards Max Hourly	20 trucks /hour	12	16	19	19	20	18	20	20	12	14	17	15
6:00am to 6:00pm*	Eastwards Max Hourly	8 trucks /hour	8	8	8	5	8	8	8	8	8	8	8	8
6:00pm to 5:00am	Westwards Max Hourly	6 trucks /hour	6	6	6	6	6	6	6	6	6	6	6	5
5:00am to 6:00am	Westwards Max Hourly	12 trucks /hour	4	5	5	5	4	6	8	6	5	5	8	5
	Compliance with approved limits													
	Exceedance of approved limits													
* Transport eastwards is not permitted between the hours of 6:00pm and 6:00am														
Source: Metromix														

Table 2.4
Departures from the Teralba Quarry Code of Conduct – January 2016 to December 2016

Date	Departures	Reason
July	Two trucks entered the Quarry prior to 6.00am from the direction of Northville Road (west of the Quarry).	The two contractors in question stated that they had confused the Quarry operating hours with those of another Quarry they contract to.
November	One truck entered the Quarry prior to 6.00am from the direction of Northville Road (west of the Quarry).	The driver had not been to Teralba Quarry before and was unaware of the operating hours.
Source: Metromix		

Metromix and Council have finalised the Voluntary Planning Agreement for the maintenance of the roads used by trucks travelling to and from Teralba Quarry i.e. in accordance with *Condition 3(16)*. The agreement will be registered to the title in the first half of 2017

2.14 REHABILITATION

Limited opportunities were available for rehabilitation activities during 2016 as:

- silt was actively being placed in Silt Cells 3, 4, 5 and 6 and therefore the construction of these silt cells had not yet progressed sufficiently for rehabilitation activities to occur within this area;
- the active extraction areas have not yet reached a point where rehabilitation activities can occur, including quarry benches;
- all available areas for interim rehabilitation within the Mid Pit Extraction Area have been revegetated; and
- the remainder of the previously disturbed area within the Quarry Site that is not required for operational purposes has been previously rehabilitated.

The status of land under rehabilitation in the former Silt Cell 1 is provided in **Plate 3**. The majority of rehabilitation works undertaken during the reporting period occurred within the Biodiversity Offset Area and non-operational areas in the form of weed reduction eradication programs. **Figure 2.3** identifies the location of weeding activities undertaken within the reporting period.

T.E.N.T.A.C.L.E. Inc. prepared a progress report of the regeneration works undertaken during 2016 on behalf of Metromix, summarising the aims, methods and results of the rehabilitation works. A variety of methods were used including the removal of target weed species through both manual and chemical controls such as cut/scrape and paint or splatter gun application of herbicide, hand removal or seed head removal. The majority of weed management activity has focussed upon *Lantana camara*, although dense stands remain in some areas.

In 2015, a total of 40 endangered *Tetratheca juncea* were translocated with a survival rate of 80% being reported four months after translocation. Officers of T.E.N.T.A.C.L.E. Inc. revisited the translocation area during 2016 and reported that 75% of the original population survived over the past 12 months.

A total of 190 tree saplings were planted in 2015 on a completed section of the final landform in the northwestern corner of the Southern Extraction Area (see **Plate 3** and **Figure 2.3**). The species planted included *Angophora costata, Corymbia maculate, Eucalyptus robusta* and *E. punctata*. Officers of T.E.N.T.A.C.L.E. Inc. revisited the replanting areas and reported that the plants are successfully establishing in the area, and contributed to stabilisation of the area. Revegetation has been assisted by natural revegetation of other native plants.

A copy of the progress report by T.E.N.T.A.C.L.E Inc. is reproduced in **Appendix 7**.

Metromix and its consultants continued to liaise with DPE and OEH during 2016 to finalise the mechanism for securing the Biodiversity Offset Area (BOA) for the Quarry. It was agreed that the BOA would be secured following the expected change to legislation that governs biodiversity conservation in NSW. Metromix will resume consultation with DPE and OEH in July 2017 to secure the BOA.

During 2016, preliminary activities began around the extraction limit of Stage 1B to prepare the land for rehabilitation, which is expected to commence in April/May 2017.

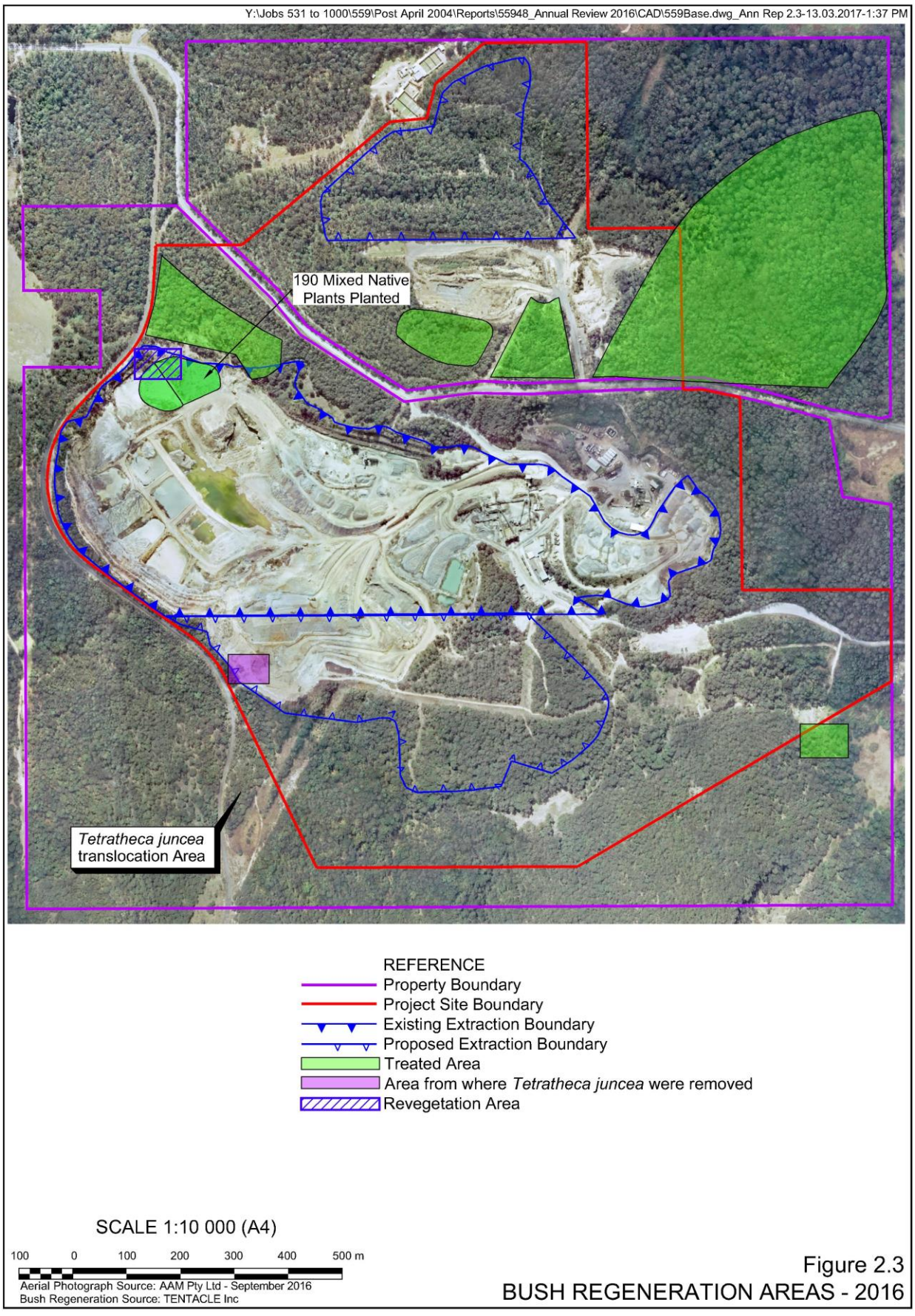


Figure 2.3
BUSH REGENERATION AREAS - 2016

2.15 NON-METROMIX OPERATIONS

The two non-Quarry-related commercial operations located within the Quarry Site boundary, the Newtech Pistol Club and the Downer EDI asphalt plant, continued to operate independently of all quarry-related operations. Civilake previously operated a pugmill on the northern side of the Southern Extraction Area. The plant is now owned by Metromix. The EPL for this operation was transferred from Civilake to Metromix in July 2015. A view of the pugmill stockpile area is displayed on **Plate 6** and the pugmill exit road and haul road on **Plate 7**.

In line with the commercial agreements with Metromix to operate within the Quarry Site, regular meetings, particularly with Downer EDI, were held to discuss the ongoing operation of the Quarry and to limit interactions between the two operations. During the reporting period, a number of informal meetings were held between Metromix and Downer EDI with no follow-up actions arising from these meetings.

No coal was hauled on the Coal Haul Road to Eraring during 2016.

Metromix maintains an open door policy with the Newtech Pistol Club with no formal discussions taking place during the reporting period.

3. COMMUNITY RELATIONS

3.1 SURROUNDING COMMUNITY

Figure 3.1 displays the land ownership and residences surrounding the Quarry. During the reporting period, it is understood that there were no changes to the land ownership surrounding the Quarry. Metromix maintained contact with its closest neighbours throughout 2016 through informal discussions and involvement with the Community Consultative Committee.

3.2 COMMUNITY CONSULTATIVE COMMITTEE MEETINGS

Two meetings of the Teralba Quarry Community Consultative Committee (TQCCC) were held during the reporting period on the following dates.

- 20 April 2016.
- 9 November 2016

The minutes of these meetings is provided as **Appendix 5**. A brief overview of these meetings is provided below.

20 April 2016 CCC Meeting

The meeting of the TQCCC involved the tabling of the Teralba Quarry 2015 Annual Report by Mr Bill Sanderson. The report contained key points relating to past and planned activities relevant to the CCC. No follow-up actions were required.

9 November 2016 CCC Meeting

Mr Bill Sanderson presented a report on the activities undertaken for the year to date. Four complaints had been received and two departures from the Drivers Code of Conduct relating to truck movements had occurred. The results of the monitoring activities were discussed as part of that report. No follow-up actions were required.

3.3 ENVIRONMENTAL COMPLAINTS

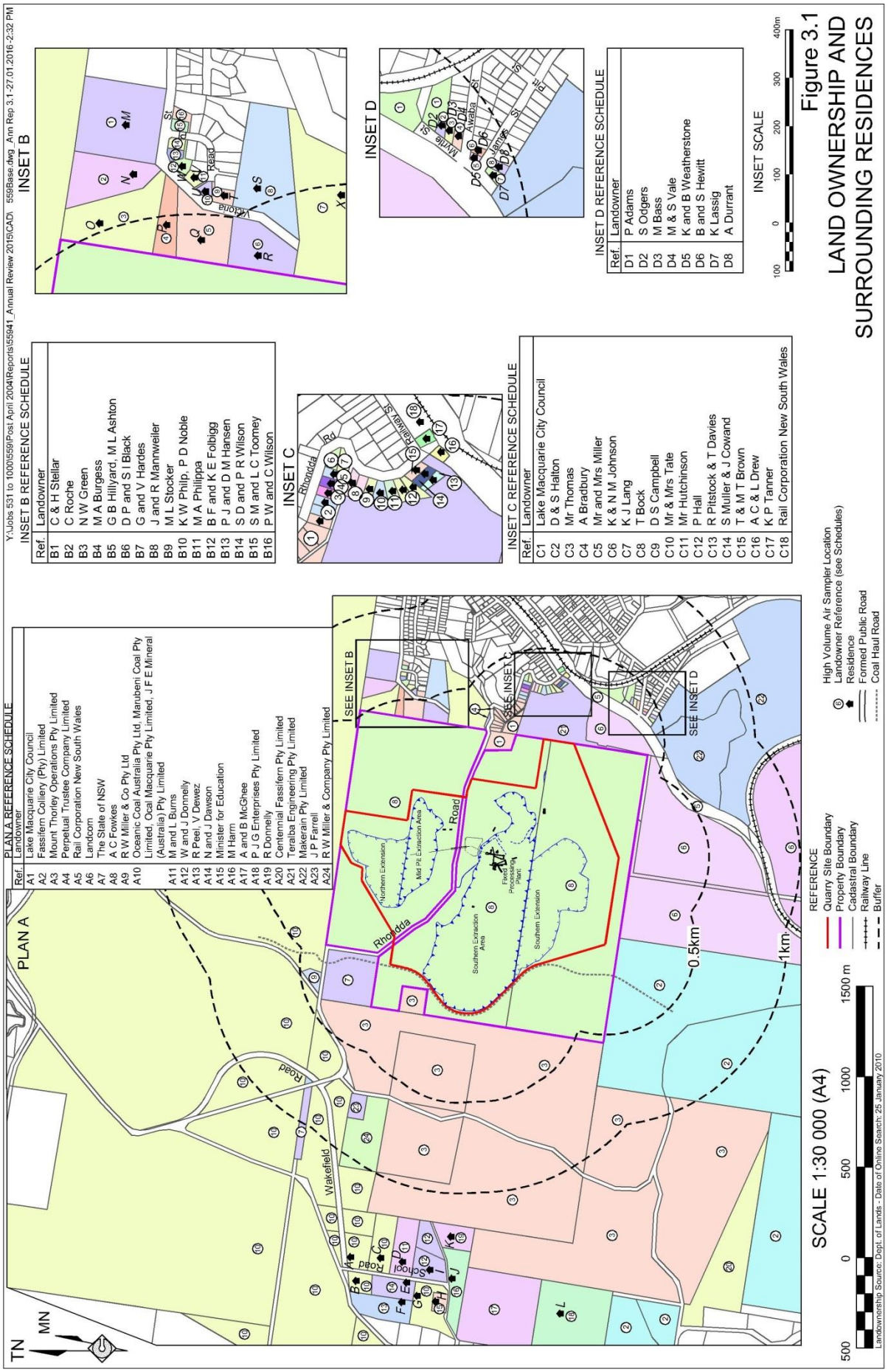
Metromix received four complaints as a result of its activities in 2016 with a summary of each provided below. A copy of the complaints record is provided in **Appendix 6**. The third complaint was received by the EPA from Council.

May 2016

A community member complained that a truck had pulled out in front of them onto Wakefield Road and they had to brake. The community member believed the truck driver had ample time to see them approaching the intersection.

May 2016

A community member complained their car was sprayed with rocks from a truck travelling along Rhondda Rd into the Quarry (on the sweeping bend after the Pistol Club entrance).


Y:\Jobs 531 to 1000\559\Post April 2004\Reports\559#1_Annual Review 2015\CAD\ 559Base.dwg, Ann Rep 3.1-27.01.2016 -2:32 PM
PLAN A REFERENCE SCHEDULE
Ref. Landowner
A1 Lake Macquarie City Council
A2 Fassifern Colliery (Pty) Limited
A3 Mount Thorley Operations Pty Limited
A4 Perpetual Trustee Company Limited
A5 Rail Corporation New South Wales
A6 Landcom
A7 The State of NSW
A8 A C Fowkes
A9 R W Miller & Co Pty Ltd
A10 Oceanic Coal Australia Pty Ltd, Marubeni Coal Pty Limited, Ocal Macquarie Pty Limited, J F E Mineral (Australia) Pty Limited
A11 M and L Burns
A12 W and J Donnelly
A13 R Peel, V Dewez
A14 N and J Dawson
A15 Minister for Education
A16 M Harm
A17 A and B McGhee
A18 P J G Enterprises Pty Limited
A19 R Donnelly
A20 Centennial Fassifern Pty Limited
A21 Teralba Engineering Pty Limited
A22 Makerain Pty Limited
A23 J P Farrell
A24 R W Miller & Company Pty Limited
PLAN A
TN
MN
Rhondda Road
Wakefield Road
School Road
Northern Extension
Mild Pit Extraction Area
Southern Extraction Area
Fixed Processing Plant
Southern Extension
SEE INSET B
SEE INSET C
SEE INSET D
0.5km
1km
INSET B
Victoria Road
INSET B REFERENCE SCHEDULE
Ref. Landowner
B1 C & H Stellar
B2 C Roche
B3 N W Green
B4 M A Burgess
B5 G B Hillyard, M L Ashton
B6 D P and S I Black
B7 G and V Hardes
B8 J and R Mannweiler
B9 M L Stocker
B10 K W Philp, P D Noble
B11 M A Philippa
B12 B F and K E Folbigg
B13 P J and D M Hansen
B14 S D and P R Wilson
B15 S M and L C Toomey
B16 P W and C Wilson
INSET C
Rhondda Rd
Railway St
INSET C REFERENCE SCHEDULE
Ref. Landowner
C1 Lake Macquarie City Council
C2 D & S Halton
C3 Mr Thomas
C4 A Bradbury
C5 Mr and Mrs Miller
C6 K & N M Johnson
C7 K J Lang
C8 T Bock
C9 D S Campbell
C10 Mr & Mrs Tate
C11 Mr Hutchinson
C12 P Hall
C13 R Pitstock & T Davies
C14 S Muller & J Cowand
C15 T & M T Brown
C16 A C & L Drew
C17 K P Tanner
C18 Rail Corporation New South Wales
INSET D
Myrtle St
Alexia St
James St
INSET D REFERENCE SCHEDULE
Ref. Landowner
D1 P Adams
D2 S Odgers
D3 M Bass
D4 M & S Vale
D5 K and B Weatherstone
D6 B and S Hewitt
D7 K Lassig
D8 A Durrant
INSET SCALE
100 0 100 200 300 400m
REFERENCE
Quarry Site Boundary
Property Boundary
Cadastral Boundary
Railway Line
Buffer
High Volume Air Sampler Location
Landowner Reference (see Schedules)
Residence
Formed Public Road
Coal Haul Road
SCALE 1:30 000 (A4)
500 0 500 1000 1500 m
Landownership Source: Dept. of Lands - Date of Online Search: 25 January 2010
Figure 3.1
LAND OWNERSHIP AND SURROUNDING RESIDENCES

May 2016

EPA received a complaint from Council about the tracking of clay fines onto Rhondda Rd from the top exit gate.

October 2016

A community member who lives in Wakefield complained about trucks travelling along Wakefield Rd waking his family from 2am onwards.

3.4 COMMUNITY INVOLVEMENT

Throughout the reporting period, Metromix sponsored one annual event at the Teralba Bowling Club and donated over $12,000 to the Teralba Public School. Metromix also supported the Variety Club Bash.

4. ENVIRONMENTAL MONITORING

4.1 WATER QUALITY

4.1.1 Introduction

Monitoring of surface water was undertaken on a monthly basis throughout the reporting period in accordance with the *Water Management Plan* for the Quarry.

It should be noted that the water monitoring program relates principally to surface water, although monitoring of water in Dam A (hereafter referred to as "Mine Adit Dam") effectively relates to groundwater, as this water reaches the surface via a former mine adit associated with historic underground coal workings beneath the Quarry. No other groundwater monitoring is undertaken at the Quarry and based upon this, all water monitoring within this document relates only to surface water monitoring.

4.1.2 Water Quality Location, Sampling and Frequency

Water quality monitoring is required to be undertaken at EPA Point 4 (Mine Adit Dam overflow), EPA Point 5 (Discharge off site from Dam B), EPA Point 6 (Northwestern boundary into unnamed creek) and EPA Point 7 (Northeastern boundary to unnamed creek) with these locations shown on **Figure 4.1**.

Table 4.1 presents the required frequency and method of monitoring to be undertaken at the nominated EPA points, i.e. in the event water is flowing at the nominated locations.

Table 4.1
Surface Water Monitoring Requirements

EPA Point	Frequency	Monitoring for:	Method
4	Monthly	pH, Total suspended solids (TSS), Electrical Conductivity (EC), oil and grease	Grab sample
5	Monthly and daily during discharge	pH, TSS, EC, oil and grease	Grab sample
6 and 7	Within 8 hours of discharge and weekly during discharge	pH, EC, TSS	Grab sample
4 and 5	Continuous (during discharge from monitoring point 4 – Dam B)	Flow	Flow meter/ continuous logger
4 and 5(1)	Monthly during discharge	aluminium, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, lithium, magnesium, mercury, molybdenum, nickel, selenium, silver, silica, tin, titanium, vanadium, zinc, calcium, electrical conductivity, nitrogen, phosphorus, potassium and sulphur	Grab sample

(1) Required as part of an EPA requested "pollution study". Metromix will make an assessment of metals in the discharge, in accordance with the ANZECC water quality guidelines and provide this to the EPA.

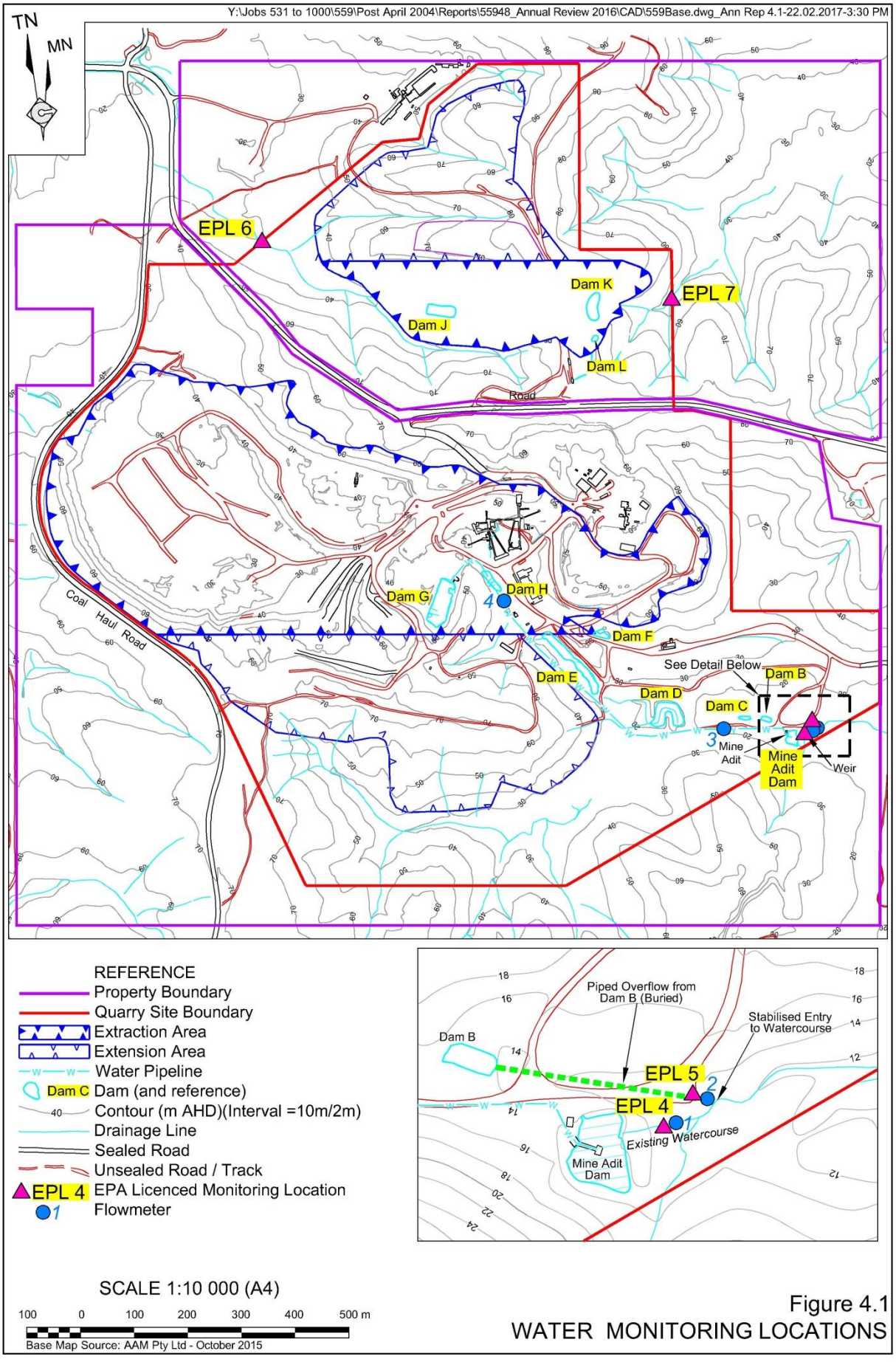


Figure 4.1
WATER MONITORING LOCATIONS

4.1.3 Water Quality Assessment Criteria and Results

Water quality is required to be monitored at all nominated locations for pH and total suspended solids (TSS) with Electrical Conductivity (EC) monitoring also required at EPA Points 6 and 7 in the event of water discharge from these locations. There is no requirement within EPL 536 to monitor for oil and grease, however, if oil and grease is observed during sampling on two successive monthly sampling events, a full hydrocarbon sampling suite will be conducted on the samples collected during the following monthly period. **Table 4.2** presents a summary of the results of the surface water quality monitoring program during the reporting period. The results of the entire surface water monitoring program are provided in full in **Appendix 2.**

Table 4.2
2016 Surface Water Monitoring Results

	pH	EC	TSS	Comments	Method
Units	pH Units	µs/cm	mg/L		-
EPL Criterion*	6.5-8.5	NA	<50		-
ANZECC Water Quality Limits	6.5-8.5	NA	<50		-
EPA Discharge Point 4 – Mine Adit Dam (Monthly)					
January	6.92	1710	12		Grab Sample
February	6.84	1790	35		
March	8.16	1880	<5		
April	8.09	1760	<5		
May	8.04	1900	<5		
June	8.13	1880	7		
July	8.08	1700	6		
August	8.20	2060	<5		
September	7.94	1890	5		
October	7.16	1900	30		
November	7.07	2080	21		
December	7.52	2230	21		
EPA Discharge Point 5 – Dam B (Daily during Discharge)					
January	7.48	940	<5		Grab Sample
February	No discharge				
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
EPA Discharge Point 6 – Northwestern Boundary to Creek (Within and Following Discharge					
There were no instances of water discharged from EPA Point 6 during the reporting period					
EPA Discharge Point 7 – Northeastern Boundary to Creek (Within and Following Discharge					
There were no instances of water discharged from EPA Point 7 during the reporting period					
* EPL 536 *Condition L1.1* nominates the licensee must comply with Section 120 of the Protection of the Environment Operations Act 1997. As such, the ANZECC water quality guidelines have been adopted.					
NA = Not Applicable		ND = Not Determined			NS = Not Sampled

Although the Quarry does not discharge water to the Mine Adit Dam, this dam naturally discharges to the downstream watercourse on a regular basis and, as it is located within the area of management for the Quarry, Metromix has committed to monitor the water quality and discharge volumes.

Reporting is currently only required for water pumped from the Mine Adit Dam to Dam G for Department of Primary Industries – Water and represents groundwater intercepted from the Mine Adit as well as water volumes leaving site from EPA Point 4 (Mine Adit Dam) and EPA 5 (Dam B) for reporting to the EPA. **Table 4.3** displays the water flow measurements monitored between the Mine Adit Dam to Dam G during the reporting period.

Table 4.3
2016 Surface Water Flow Measurements – Mine Adit Dam to Dam G

Date	Flow Meter Readings	Usage (ML)
4/1/2016	159934	
1/2/2016	227903	68.0
2/3/2016	339805	111.9
1/4/2016	446534	106.7
3/5/2016	549572	103.0
1/6/2016	658839	109.3
1/7/2016	768105	109.3
1/8/2016	885113	117.0
1/9/2016	1009980	124.9
4/10/2016	1114292	104.3
5/11/2016	1240927	126.6
2/12/2016	1328640	87.7
3/1/2016	1392482	63.8
Total		**1232.5**

The Mine Adit Dam overflowed into Dam B during a January 2016 record rainfall event with discharge through the Dam B discharge at EPA 5 as a result. This rainfall event commenced on the 3 January with 290mm of rainfall being recorded at Teralba Quarry's meteorological station over the subsequent 5 days. This rainfall volume represents almost two and a half times the median monthly January rainfall (118.5mm) at the nearest Bureau of Meteorology weather station (Bolton Point, BoM ID 61133) with January 2016 having the highest recorded January rainfall at this BoM monitoring station since recording began in 1962.

4.1.4 Discussion of Results

In comparison to the water quality limits nominated in **Table 4.2**, the following comments are relevant.

1. pH values within the Mine Adit Dam varied from 6.84 to 8.20 with a median pH of 7.99. Only a single discharge was required from Dam B, with the pH value near neutral at 7.48 which is within the EPL and ANZECC criterion of 6.5 to 8.5.
2. EC values were monitored within the Mine Adit Dam and recorded a range between 1 700µS/cm and 2 230µS/cm and a median value of 1 885µS/cm.

3. TSS values were within the EPL and ANZECC guideline levels, with the majority of samples returning levels below 7mg/L.

4.1.5 Pollution Study Results

In August 2013, Metromix committed to undertaking a 'pollution study' of water from the Mine Adit, a proportion of which eventually enters Lake Macquarie, to determine the levels of suspended and dissolved metals. The results of monitoring undertaken during 2016 at EPA Point 4 and EPA Point 5 as part of this 'pollution study' are provided in **Appendix 2**. During 2015, Metromix continued to monitor suspended and dissolved metals, with results regularly submitted to the EPA for review. **Table 4.4** contains a statistical presentation of the data collected at EPA Point 4 and EPA Point 5 for the reporting period. Only one sample was collected at EPA Point 5 during the reporting period (January 2016) as there was only one instance of discharge at this location.

The statistical methods employed for the presentation are in agreement with the Australian Guidelines for Water Quality Monitoring and Reporting (NWQMS, 2000) and ANZECC methodology for comparing test site data (e.g. EPA 4 and EPA 5) with trigger values. The trigger values utilised in this assessment were obtained from ANZECC and are for the protection of the aquatic ecosystem environmental value, as these trigger values offer the highest level of protection for the identified environmental values (aquatic ecosystem, visual amenity and secondary contact recreation), for the water type (waterway affected by urban development). This water type has previously been determined by the former Department of Environment, Climate Change and Water for the Lake Macquarie and Tuggerah Lakes catchments. The level of protection (95% of species), is that for a "slightly/moderately disturbed" system, in accordance with NSW policy.

The suggested approach to assessment of the program follows guidance contained in ANZECC, whereby the median value from sample concentrations collected as part of the program is compared with the relevant guideline value, published in Table 3.4.1 of ANZECC and applied at the 95% species protection level.

In September 2016, a report was submitted to the EPA summarising the monitoring records between September 2013 and August 2016. This report was prepared in accordance with *Conditions U1.3* of EPL 536 to complete Metromix's requirements for this program. A copy of this report including all monitoring results between September 2013 and August 2016 is included as **Appendix 3**. A response and feedback is awaited from the EPA regarding the results and the ongoing monitoring requirements. The monitoring for the pollution study was not undertaken during September and October 2016, however Metromix has determined to continue monitoring until a response is received from the EPA and a decision made on the future of the pollution study.

4.1.6 Conclusion

Water testing at Metromix's Teralba Quarry has demonstrated that the Quarry operations have not adversely impacted the water quality in the surrounding and downstream areas of the Quarry. This is consistent with the water monitoring results from 2014 and 2015 and indicates that the Quarry continues to operate with negligible impact to Lake Macquarie.

Table 4.4
Comparison of guideline trigger values and median values from pollution program sampling: January 2016 to December 2016

Location		EPA No 4	EPA No 4	EPA No 5	EPA No 5
Fraction		Dissolved (filtered)	Total (unfiltered)	Dissolved (filtered)	Total (unfiltered)
Period		Jan 16-Dec 16	Jan 16-Dec 16	Jan 16-Dec 16	Jan 16-Dec 16
Value	Guideline *	Median	Median	Median	Median
Analyte					
pH	6.5 to 8.5 units[a]	-	8.0	-	7.5
Conductivity	125 - 2200 µS/cm[b]	-	1 885	-	940
TSS	<50[a] mg/L[a]	-	16.5	-	<5
Oil and Grease	<10 mg/L[a]	-	<5	-	<5
Aluminium	<0.055 mg/L	0.04	**0.165**	<0.01	0.050
Ammonia	<0.02 mg/L[b]	ND	**0.045**	ND	**0.03**
Antimony	ID	<0.001	0.002	<0.001	<0.001
Arsenic	<0.013 mg/L	0.001	0.002	<0.001	<0.001
Barium	NA	0.0385	0.043	0.035	0.037
Beryllium	ID	<0.001	<0.001	<0.001	<0.001
Boron	<0.37 mg/L	0.17	0.18	0.08	0.11
Cadmium	<0.0002 mg/L	0.00015	0.0001	<0.0001	<0.0001
Calcium	NA	48	60	33	ND
Chromium	<0.001 mg/L	<0.001	**0.002**	<0.001	<0.001
Cobalt	ID	0.001	0.001	<0.001	<0.001
Copper	<0.0014 mg/L	<0.001	**0.003**	0.001	0.001
Iron	ID	0.06	0.185	<0.05	0.15
Lead	<0.0034 mg/L	<0.001	**0.0125**	<0.001	<0.001
Lithium	NA	0.035	0.0365	0.013	0.014
Magnesium	NA	49	50	35	35
Manganese	<1.9 mg/L	0.059	0.08	0.078	0.086
Mercury	<0.0006 mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	ID	0.002	0.003	0.001	0.002
Nickel	<0.011 mg/L	0.003	0.004	0.004	0.004
Phosphorous as P	<0.025 mg/L[c]	ND	0.020	ND	<0.01
Potassium	NA	8	8	5	ND
Selenium	<0.011 mg/L	<0.01	<0.01	<0.01	<0.01
Silicon as SiC_2	NA	15.6	16.2	15.8	14.2
Silver	<0.00005 mg/L	<0.001	<0.001	<0.001	<0.001
Sulfur as S	NA	74.5	ND	44	ND
Tin	ID	<0.001	0.002	<0.001	<0.001
Titanium	NA	<0.01	0.02	<0.01	<0.01
Vanadium	ID	<0.01	0.01	<0.01	<0.01
Zinc	<0.008 mg/L	0.008	0.007	0.006	<0.005

Key

*All values sourced from Table 3.4.1 ANZECC except where indicated

ID = Insufficient Data

NA = Not Applicable

ND = Not Determined

LOR = Limit of Reporting

[a] Environment Protection License 536

[b] Based on ANZECC Guidelines slightly disturbed lowland river ecosystems in south-east Australia (ANZECC 2000)

[c] Sourced from http://www.environment.nsw.gov.au/ieo/LakeMacquarie/report-03.htm#support1 (doi 20161404)

Values in **bold** type indicate exceedance of guideline values

With respect to suspended and dissolved metals, the results collected for the pollution study indicate virtually no exceedances of guideline trigger values over the course of the pollution study (see **Appendix 3**). The dissolved toxicant fraction is considered the most bioavailable and significantly influences the toxicity effects on aquatic biota arising from metals concentrations in waters (ANZECC). There were no exceedances of the trigger guideline values for dissolved toxicants during the reporting period.

The results of sampling and analyses for the total fraction of toxicants indicates some exceedances of guideline values. However, it should be noted that these results are derived from analyses of unfiltered samples and may be due to the presence of colloidal material. In addition, TSS results for all samples are well below the guideline values suggesting that, despite some exceedance of trigger values, it is doubtful that discharge from EPA 4 and EPA 5 significantly contribute to the total load of metals in the receiving system.

4.2 NOISE

4.2.1 Introduction

PA10_0183 – Appendix 3 (Statement of Commitments) details Metromix's commitment to commence noise monitoring within three months of operations beginning in the Southern and Northern Extensions. Noise monitoring surveys were undertaken in August 2016 and November 2016 by Spectrum Acoustics (Spectrum, 2016a and 2016b) and has been included in **Appendix 2**.

The *Noise Management Plan* prepared in accordance with *Condition 3(8)* of PA10_0183 and approved on 16 January 2014, details the locations and frequency of noise monitoring that is required to be undertaken at and surrounding the Quarry.

Table 4.5 lists the address and coordinates of each noise monitoring location.

Table 4.5
Noise Monitoring Locations

Noise Monitoring Locations*	Address	Easting	Northing
EPL-A	Awaba Street, Teralba	369080	3651470
EPL-B	Rhondda Road, Teralba	369250	6351915
EPL-C[1]	Rhondda Road, Teralba	369205	6352015
EPL-D	Rhondda Road, Teralba	369150	6352135
EPL-E[2]	Victoria Avenue, Teralba	369060	6352620
EPL-F[1]	Victoria Avenue, Teralba	369130	6352945
EPL-H	School Road, Wakefield	366210	6352520

* See **Figure 4.2**.

[1] Metromix has obtained permission for this monitoring location to be omitted

[2] Monitoring at these locations is only when quarrying activity is being undertaken north of Rhondda Rd

Independent monitoring at the nominated locations was required to be undertaken during the first 2 years of operations as prescribed under PA10_0183, at 6 monthly intervals coinciding with wind blowing in a predominantly easterly or westerly direction. Metromix commissioned two rounds of independent monitoring during the reporting period. The same practice will be adopted in 2017.

As the equipment fleet at the Quarry did not change during the reporting period, no monitoring of sound power levels was commissioned.

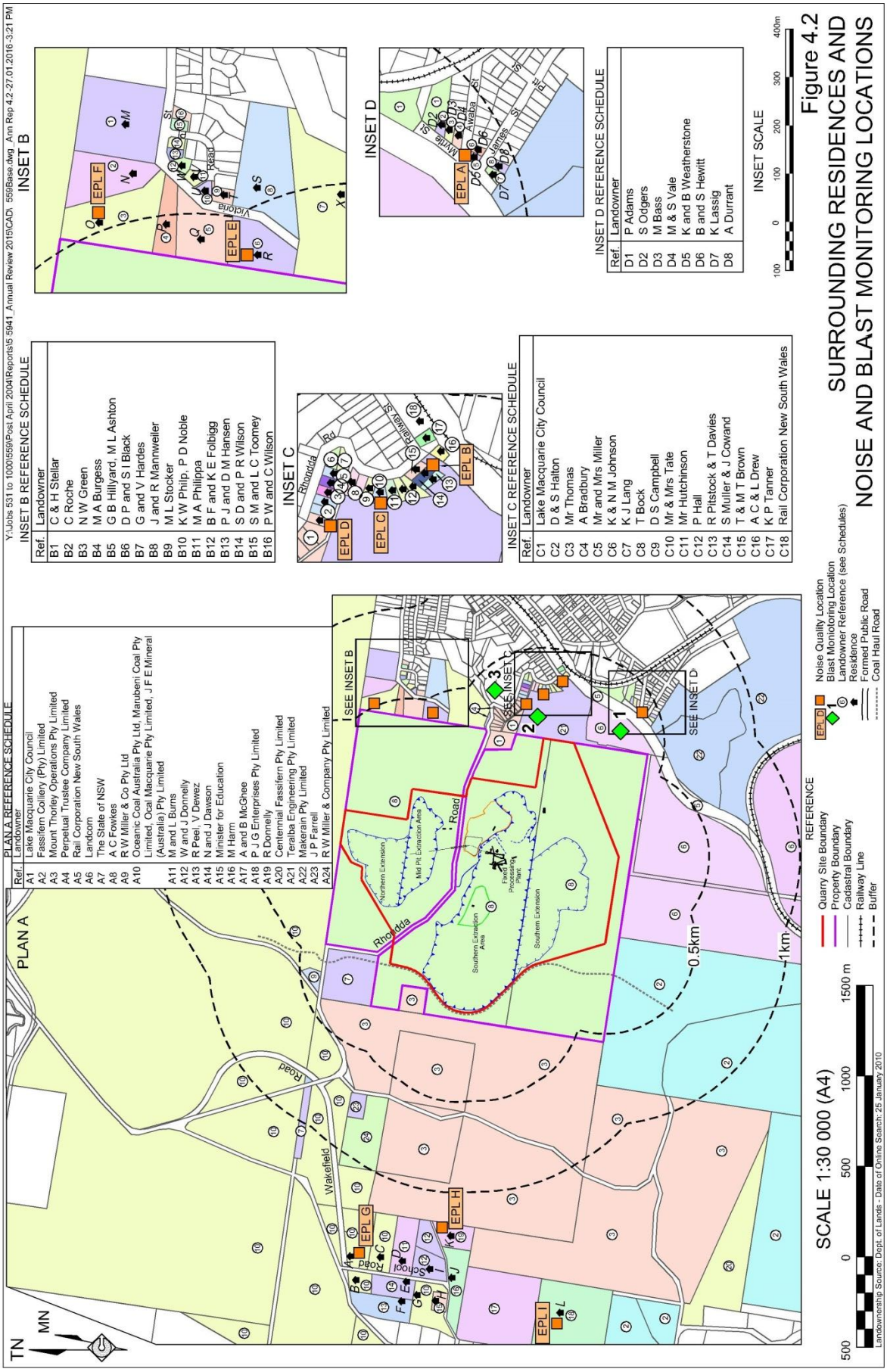


Figure 4.2
SURROUNDING RESIDENCES AND
NOISE AND BLAST MONITORING LOCATIONS
PLAN A
INSET B
INSET C
INSET D
PLAN A REFERENCE SCHEDULE
Ref. Landowner
A1 Lake Macquarie City Council
A2 Fassifern Colliery (Pty) Limited
A3 Mount Thorley Operations Pty Limited
A4 Perpetual Trustee Company Limited
A5 Rail Corporation New South Wales
A6 Landcom
A7 The State of NSW
A8 A C Fowkes
A9 R W Miller & Co Pty Ltd
A10 Oceanic Coal Australia Pty Ltd, Maruben Coal Pty Limited, Ocal Macquarie Pty Limited, J F E Mineral (Australia) Pty Limited
A11 M and L Burns
A12 W and J Donnelly
A13 R Peel, V Dewez
A14 N and J Dawson
A15 Minister for Education
A16 M Harm
A17 A and B McGhee
A18 P J G Enterprises Pty Limited
A19 R Donnelly
A20 Centennial Fassifern Pty Limited
A21 Teralba Engineering Pty Limited
A22 Makerain Pty Limited
A23 J P Farrell
A24 R W Miller & Company Pty Limited
INSET B REFERENCE SCHEDULE
Ref. Landowner
B1 C & H Stellar
B2 C Roche
B3 N W Green
B4 M A Burgess
B5 G B Hillyard, M L Ashton
B6 D P and S I Black
B7 G and V Hardes
B8 J and R Mannweiler
B9 M L Stocker
B10 K W Philp, P D Noble
B11 M A Philippa
B12 B F and K E Folbigg
B13 P J and D M Hansen
B14 S D and P R Wilson
B15 S M and L C Toomey
B16 P W and C Wilson
INSET C REFERENCE SCHEDULE
Ref. Landowner
C1 Lake Macquarie City Council
C2 D & S Halton
C3 Mr Thomas
C4 A Bradbury
C5 Mr and Mrs Miller
C6 K & N M Johnson
C7 K J Lang
C8 T Bock
C9 D S Campbell
C10 Mr & Mrs Tate
C11 Mr Hutchinson
C12 P Hall
C13 R Pitstock & T Davies
C14 S Muller & J Coward
C15 T & M T Brown
C16 A C & L Drew
C17 K P Tanner
C18 Rail Corporation New South Wales
INSET D REFERENCE SCHEDULE
Ref. Landowner
D1 P Adams
D2 S Odgers
D3 M Bass
D4 M & S Vale
D5 K and B Weatherstone
D6 B and S Hewitt
D7 K Lassig
D8 A Durrant
INSET SCALE
100 0 100 200 300 400m
SCALE 1:30 000 (A4)
500 0 500 1000 1500 m
Landownership Source: Dept. of Lands - Date of Online Search: 25 January 2010
REFERENCE
Quarry Site Boundary
Property Boundary
Cadastral Boundary
Railway Line
Buffer
Noise Quality Location
Blast Moniotoring Location
Landowner Reference (see Schedules)
Residence
Formed Public Road
Coal Haul Road
0.5km
1km
SEE INSET B
SEE INSET C
SEE INSET D
Rhondda Road
Wakefield Road
Northern Extension
Mid Pit Extraction Area
Southern Extension Area
Flexible Processing Plant
Southern Extension
Railway St
Victoria St
Awaba St
James St
EPL A
EPL B
EPL C
EPL D
EPL E
EPL F
EPL G
EPL H
EPL I
TN
MN

4.2.2 Noise Criteria

Table 4.6 presents the noise criteria for the Quarry during the specific time periods as nominated in *Condition 3(5)* of PA10_0183.

Table 4.6
Teralba Quarry – Noise Criteria

Residence*	Time Period				
	6:00am-7:00am	7:00am-6:00pm	6:00pm-10:00pm	10:00pm-6:00am	
Residence A					
Criterion	$L_{Aeq(15\ min)}$				$L_{A(1\ min)}$
	38	38	37	35	45
Residence B					
Criterion	$L_{Aeq(15\ min)}$				$L_{A(1\ min)}$
	42	46	36	35	45
Residence C					
Criterion	$L_{Aeq(15\ min)}$				$L_{A(1\ min)}$
	42	42	35	35	45
Residence D, E, G, H, I					
Criterion	$L_{Aeq(15\ min)}$				$L_{A(1\ min)}$
	35	35	35	35	45
Residence F					
Criterion	$L_{Aeq(15\ min)}$				$L_{A(1\ min)}$
	37	38	38	35	45

* See **Figure 4.2**.

4.2.3 Noise Monitoring Results and Discussion

Attended noise monitoring was conducted during daytime, evening, shoulder and night periods between 15 August 2016 and 17 August 2016 and the program repeated between 16 November and 18 November 2016 at monitoring locations EPL-A, B, D, E and H. These locations were selected as all quarrying operations were confined to the southern side of Rhondda Road, in which the defined 2016 monitoring locations were identified as being closest to the operational areas.

Based upon the location of active quarrying activities (i.e. only within the existing Southern Extraction Area and Southern Extension), it was determined that the nominated locations identified above would only be monitored. Locations EPL-C and EPL-F have been omitted from the monitoring program noise levels at these locations may be inferred from other nearby monitoring locations.

It was noted that at the time of noise measurements being undertaken, monitoring at EPL-B did not require a spotter to determine the number of quarry-related trucks from the overall truck movements, as it was possible to identify those trucks associated with quarry activities from this monitoring location. Noise emissions at EPL-B were indistinguishable from industrial noise and other traffic noise at this location.

The results of the attended noise monitoring surveys identified that noise from the Quarry was generally inaudible in the local setting and when quarry noise was audible and distinguishable from surrounding noise sources, $L_{Aeq(15\ min)}$ and $L_{A(1\ min)}$ noise emissions did not exceed the relevant criterion at any monitoring location.

Monitoring of $L_{A(1min)}$ was undertaken to assess potential sleep disturbance during the period from 10:00pm to 7:00am. Night time monitoring of $L_{A(1min)}$ was within the criteria of 45 dB(A) at all monitoring locations.

It is noted that the results of noise monitoring during 2016 are consistent with results recorded in 2014 and 2015, indicating that the Quarry remains generally inaudible in the local setting.

4.3 BLASTING

4.3.1 Introduction

All blasting during the reporting period occurred in either Stage 1A or Stage 1B, with blast monitoring undertaken for each blast initiated at the Quarry throughout 2016.

The *Blast Management Plan* prepared in accordance with *Condition 3(16)* of PA10_0183 and approved in October 2013, details the locations and frequency of blast monitoring that is required to be undertaken during blasts at the Quarry.

Blast monitoring continues to be undertaken at the locations nominated on **Figure 4.2** for each blast, i.e. at Sites 1 and 2 for blasts initiated south of Rhondda Road and Sites 2 and 3 for blasts initiated north of Rhondda Road. No blasts were initiated north of Rhonda Road during the reporting period.

4.3.2 Blasting Criteria

Table 4.7 presents the blasting criteria for the Quarry provided in PA10_0183 with all blasts required to occur between 10:00am to 4:00pm, Monday to Friday only.

Table 4.7
Teralba Quarry – Blasting Criteria

Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Any residence on privately owned land, or any public infrastructure	120	10	0%
	115	5	5% of the total number of blasts over a 12 month period

4.3.3 Blast Monitoring Results

Table 4.8 presents the result of blast monitoring undertaken throughout 2016 against the criteria for the Quarry. Airblast overpressure and ground vibration were not measured at Location 3 throughout 2016 as no blasting was undertaken in the Mid Pit Extraction Area during 2016.

None of the airblast overpressure and ground vibration results monitored throughout 2016 triggered a response from the monitor and therefore all blasts were below the nominated criteria. The trigger level for the blast monitor is 100dB for airblast overpressure and 1.0mm/s for ground vibration therefore it is inferred that no blasts exceeded these levels at the monitoring locations.

All blasting was undertaken between 10:04am and 2:08pm, i.e. within of the prescribed hours for blasting.

As the result of monitoring, Metromix has complied with all blasting criteria during the reporting period. It is worth noting that only one blast during 2015 triggered the blast monitor at a single location and air blast overpressure and ground vibration were recorded to be within the relevant assessment criteria at that time (November 2015).

4.4 AIR QUALITY

4.4.1 Introduction

Air quality monitoring is required to be undertaken in accordance with *Condition 3(17)* and the approved *Air Quality Management Plan* required under *Condition 3(20)* of PA10_0183.

Air quality monitoring at the Quarry has historically been undertaken for deposited dust only with *Condition (3)17* requiring that Total Suspended Particulates (TSP) and PM_{10} also be monitored through the ongoing use of a High Volume Air Sampler (HVAS). Following discussions with the EPA in 2013, it was determined that TSP was not required to be monitored as it is recognised that the concentration of PM_{10} particles is of greater importance given its nexus with potential health issues and background deposited dust levels (<4g/m^2/month). This is reflected in the current version of EPL 536 dated 13 November 2015. TSP was not monitored by Metromix during 2016 and is not reported in this document.

The HVAS required to monitor for PM_{10} is located at EPA Point 3, at the same location as the Rodgers Street deposited dust gauge.

Whilst supplementing monitoring data relating to Teralba Quarry it is noteworthy that the HVAS was only installed to increase the overall network of stations throughout the Hunter area to enable EPA to better understand the PM_{10} concentrations throughout the Hunter area. The comparative low deposited dust results for almost 10 years strongly indicate PM_{10} dust levels attributable to the Quarry will be well within the air operating goals and that the HVAS can be removed after this relationship is confirmed, with approval of the EPA.

Table 4.8
2016 Blast Monitoring Results

Blast Date	Blast Time	Location 1[1]		Location 2[1]		Location 3[1],[2]	
		Airblast Over pressure (dB(L))	Ground Vibration (mm/s)	Airblast Over pressure (dB(L))	Ground Vibration (mm/s)	Airblast Over pressure (dB(L))	Ground Vibration (mm/s)
22/1/2016	10.34am	NT	NT	NT	NT	NM	NM
5/2/2016	11:13am	NT	NT	NT	NT	NM	NM
18/2/2016	10:39am	NT	NT	NT	NT	NM	NM
26/2/2016	11:18am	NT	NT	NT	NT	NM	NM
1/3/2016	11:05am	NT	NT	NT	NT	NM	NM
4/3/2016	11:35am	NT	NT	NT	NT	NM	NM
11/3/2016	11:40am	NT	NT	NT	NT	NM	NM
17/3/2016	12:45pm	NT	NT	NT	NT	NM	NM
4/4/2016	12:21pm	NT	NT	NT	NT	NM	NM
23/3/2016	1:34pm	NT	NT	NT	NT	NM	NM
31/3/2016	12:03pm	NT	NT	NT	NT	NM	NM
19/4/2016	1.13 pm	NT	NT	NT	NT	NM	NM
28/4/2016	1.05 pm	NT	NT	NT	NT	NM	NM
3/5/2016	10.57 am,	NT	NT	NT	NT	NM	NM
13/5/2016	10.04 am	NT	NT	NT	NT	NM	NM
17/5/2016	11.39 am	NT	NT	NT	NT	NM	NM
25/5/2016	11.22am	NT	NT	NT	NT	NM	NM
9/6/2016	10.55am	NT	NT	NT	NT	NM	NM
17/6/2016	11.04am	NT	NT	NT	NT	NM	NM
22/6/2016	11.59am	NT	NT	NT	NT	NM	NM
1/7/2016	11.35am	NT	NT	NT	NT	NM	NM
7/7/2016	11.22am	NT	NT	NT	NT	NM	NM
15/7/2016	11.13am	NT	NT	NT	NT	NM	NM
22/7/2016	10.59am	NT	NT	NT	NT	NM	NM
28/7/2016	11.36am	NT	NT	NT	NT	NM	NM
8/8/2016	2.08 pm	NT	NT	NT	NT	NM	NM
12/8/2016	10.54 am	NT	NT	NT	NT	NM	NM
26/8/2016	11.05am	NT	NT	NT	NT	NM	NM
5/9/2016	12.32 pm	NT	NT	NT	NT	NM	NM
12/9/2016	11.30 am	NT	NT	NT	NT	NM	NM
26/6/2016	11.18 am	NT	NT	NT	NT	NM	NM
12/10/2016	11.41am	NT	NT	NT	NT	NM	NM
25/10/2016	11.09 am	NT	NT	NT	NT	NM	NM
4/11/2016	10.28 am	NT	NT	NT	NT	NM	NM
9/11/2016	10.37 am	NT	NT	NT	NT	NM	NM
24/11/2016	10.14 am	NT	NT	NT	NT	NM	NM
29/11/2016	10.44 am	NT	NT	NT	NT	NM	NM
5/12/2016	11.06 am	NT	NT	NT	NT	NM	NM
13/12/2016	10.47 am	NT	NT	NT	NT	NM	NM

Note: NT – Not Triggered, NM – Not Measured

[1] See **Figure 4.2.**

[2] Monitoring only undertaken at Location 3 when blasting is conducted in the Mid Pit Extraction Area.

[3] Two shots fired during blast event

4.4.2 Meteorological Station

Condition 3(21) requires that a meteorological station operate in the vicinity of the Quarry Site for the life of the Project. Metromix has installed a meteorological station (location shown on **Figure 2.1**), ensuring that the meteorological station complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline.

The meteorological station currently monitors the following parameters.

- Temperature (at 2m and 10m above ground level)
- Wind Speed and Direction
- Rainfall
- Humidity
- Solar Radiation
- Barometric Pressure
- Fire Danger Index
- Sigma Theta

Figures 4.3a and **4.3b** provides the monthly wind roses for the Quarry. Wind speed and direction during 2016 was generally consistent with records from 2015, except for a higher proportion from the south and southwest in the first half of 2016.

The requirement for the meteorological station to measure the continuous real-time measurement of temperature lapse rate is not warranted given the Quarry's close proximity to the coast and Lake Macquarie.

4.4.3 Air Quality Monitoring Locations and Frequency

The current air quality monitoring network consists of five deposited dust gauges and the HVAS (see **Figure 4.4**). **Table 4.9** provides the coordinates of each location and the date established / sampling frequency respectively. The HVAS was installed in April 2014.

The location of the air quality monitoring equipment (primarily to the east of the Quarry / west of Teralba) was deduced given the prevailing and dominant winds originate from the southwestern quadrant during Autumn and Winter. Northerly winds and winds from the northeastern quadrant dominate during Spring and Summer.

Table 4.9
Locations of Monitoring Equipment

Monitoring Location	Easting	Northing	Date Established	Sampling Frequency
Hillside	369422	6352680	June 2004	Monthly
Margaret	369622	6351763	April 2011	Monthly
Myrtle	369071	6351492	June 2004	Monthly
Rhondda	369240	6351972	June 2004	Monthly
Rodgers	369467	6352369	April 2011	Monthly
Weather Station	368413	6352751	March 2013	Continuous
HVAS	369467	6352369	April 2014	6 days

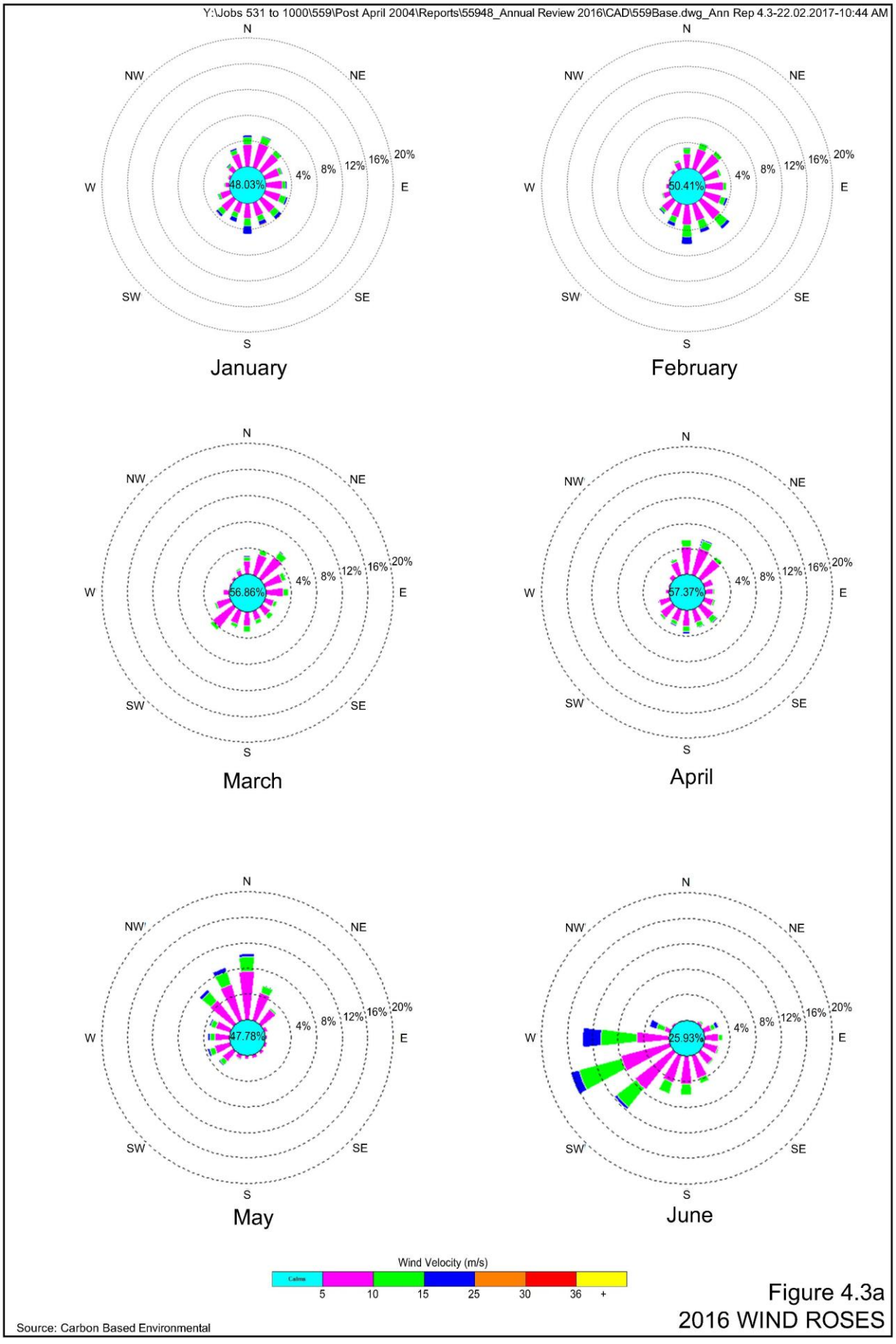


Figure 4.3a
2016 WIND ROSES

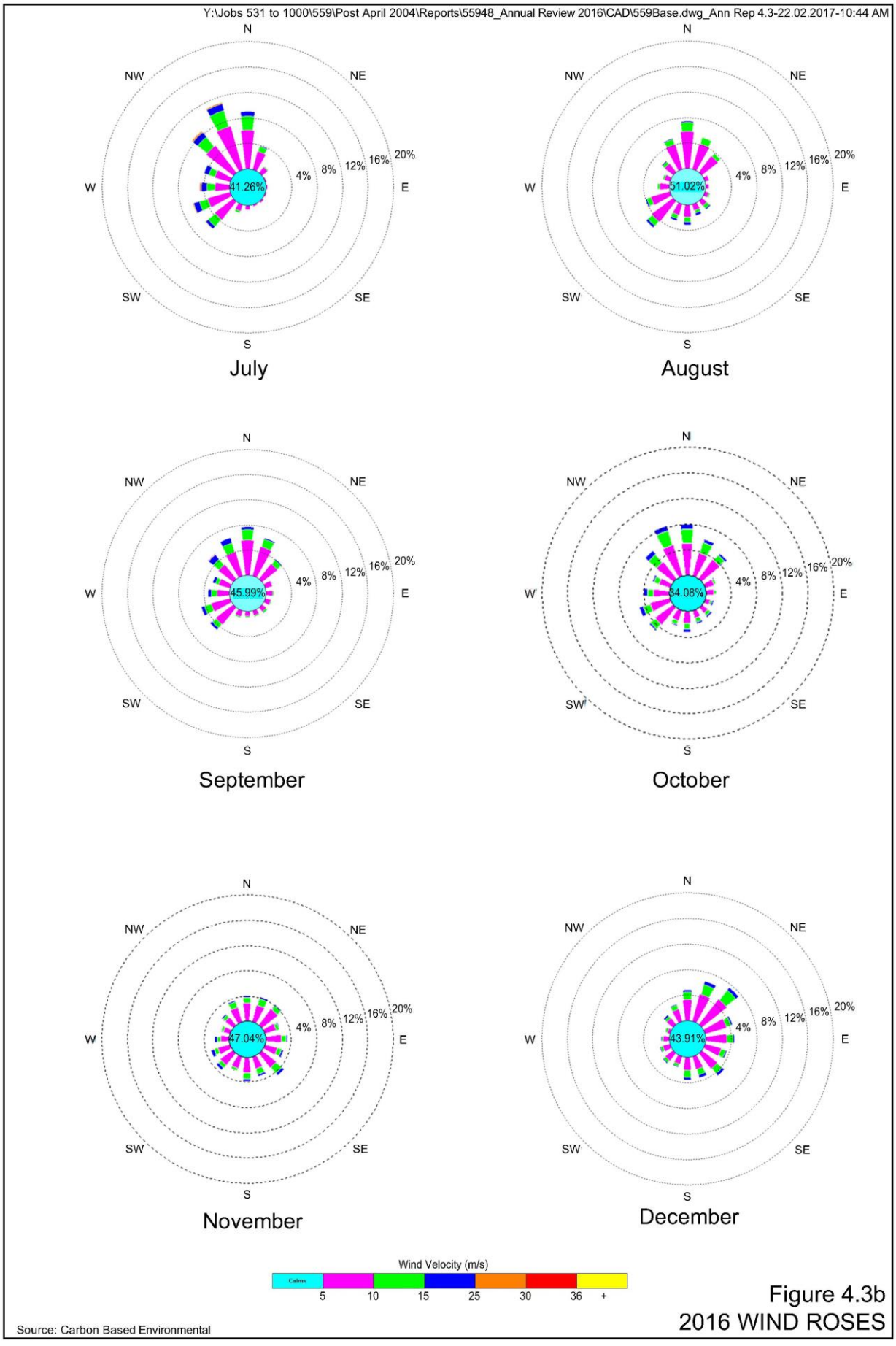


Figure 4.3b
2016 WIND ROSES

4.4.4 Air Quality Criteria

The air quality criteria for the Quarry, as outlined within *Condition 3(17)* of PA10_0183, are provided in **Table 4.10**.

Table 4.10
Air Quality Criteria

Pollutant	Criterion [d]	Averaging Period
Total suspended particulate matter (TSP)	90µg/m^3 [a]	Annual mean
Particulate matter <10µm (PM_{10})	50µg/m^3 30µg/m^3 [a] 50µg/m^3 [a]	24-hour maximum Annual mean (24-hour average, 5 exceedances permitted per year)
Deposited dust [c]	4 g/m^2/month [a] 2 g/m^2/month [b]	Annual mean Maximum Increase

[a] No longer required under Condition M2.2 EPL 536;
[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 3580010.1.2003: Methods for Sampling and Analysing Air-Determination of Particulate Matter – Deposited Matter – Gravimetric Method.
d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Director-General in consultation with EPA.

4.4.5 Air Quality Monitoring Results

Table 4.11 presents the results of the deposited dust monitoring program and **Table 4.12** presents the results of the PM_{10} monitoring which commenced in July 2014.

Table 4.11
2016 Deposited Dust Monitoring Results

	Deposited Dust Levels (g/m^2/month)				
Residence ID	Rhondda[1]	Myrtle[1]	Hillside[1]	Rodgers[2]	Margaret[2]
Criterion	4	4	4	4	4
Pre - 2016 Average*	1.1	1.1	1.4	1.2	1.1
2016 Results					
January	1.4	1.8	2.0	1.9	1.5
February	0.5	1.3	0.7	0.2	0.7
March	0.5	1.2	0.8	0.4	1.9
April	0.8	0.7	4.5	0.9	0.8
May	1.0	1.0	5.3	0.8	1.0
June	1.0	NA	1.1	0.5	1.6
July	0.7	0.8	1.2	0.6	0.9
August	1.0	0.9	0.7	1.0	0.9
September	0.7	1.0	2.0	1.6	0.8
October	0.9	1.4	0.8	1.0	1.1
November	1.0	0.9	1.8	0.8	1.3
December	1.1	1.0	1.4	0.6	0.8
Average	**0.9**	**1.1**	**1.9**	**0.9**	**1.1**

* Based upon available results for deposited dust collected prior to the reporting period.
[1] Installed and operated since 2004 [2] Installed and operated since 2011

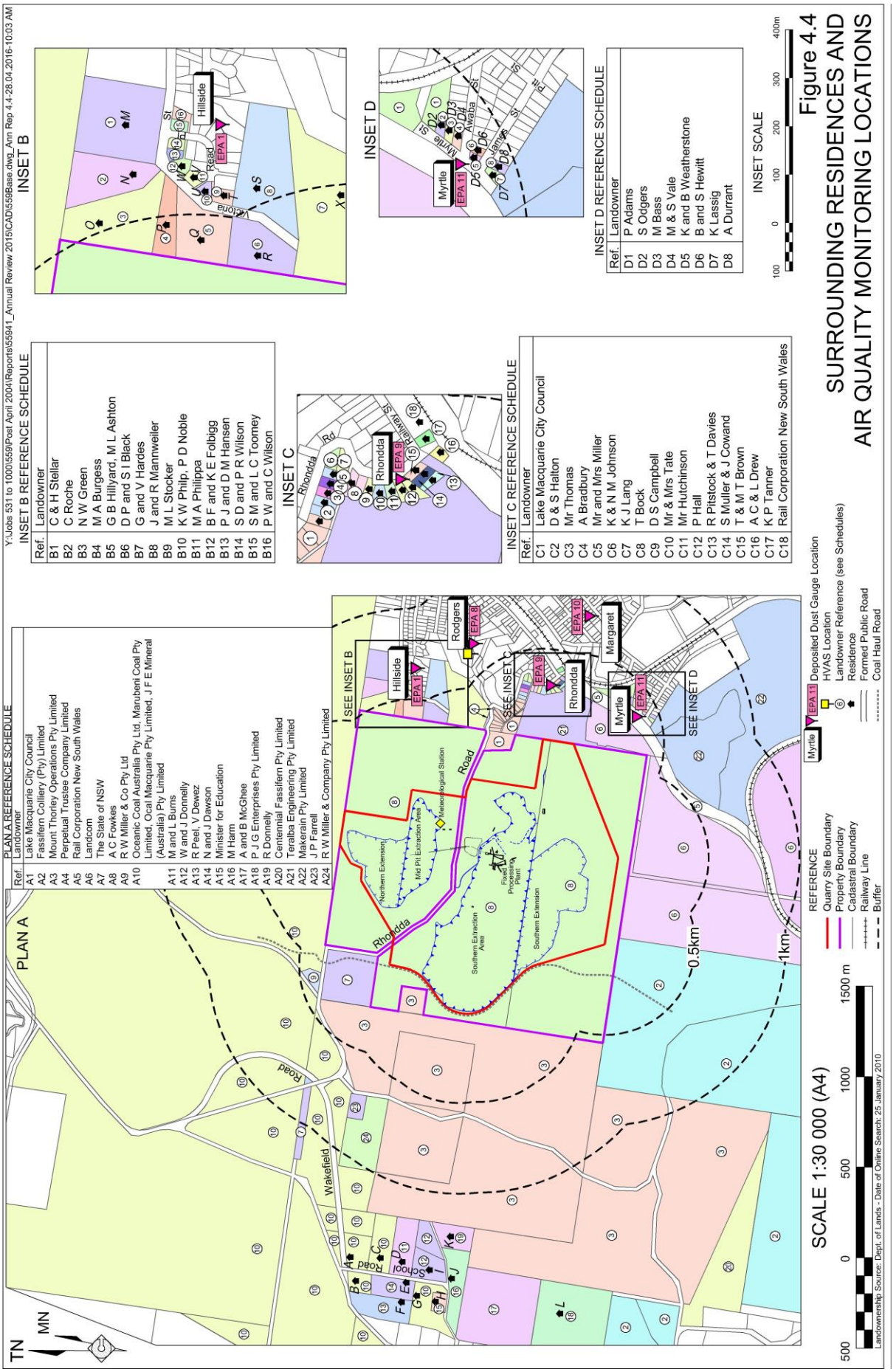

Y:\Jobs 531 to 1000\559\Post April 2004\Reports\55941_Annual Review 2015\CAD\559Base.dwg, Ann Rep 4-4-28.04.2016-10:03 AM
PLAN A
PLAN A REFERENCE SCHEDULE
Ref. Landowner
A1 Lake Macquarie City Council
A2 Fassifern Colliery (Pty) Limited
A3 Mount Thorley Operations Pty Limited
A4 Perpetual Trustee Company Limited
A5 Rail Corporation New South Wales
A6 Landcom
A7 The State of NSW
A8 A C Fowkes
A9 R W Miller & Co Pty Ltd
A10 Oceanic Coal Australia Pty Ltd, Marubeni Coal Pty Limited, Ocal Macquarie Pty Limited, J F E Mineral (Australia) Pty Limited
A11 M and L Burns
A12 W and J Donnelly
A13 R Peel, V Dewez
A14 N and J Dawson
A15 Minister for Education
A16 M Harn
A17 A and B McGhee
A18 P J G Enterprises Pty Limited
A19 R Donnelly
A20 Centennial Fassifern Pty Limited
A21 Teralba Engineering Pty Limited
A22 Makerain Pty Limited
A23 J P Farrell
A24 R W Miller & Company Pty Limited
INSET B
INSET B REFERENCE SCHEDULE
Ref. Landowner
B1 C & H Stellar
B2 C Roche
B3 N W Green
B4 M A Burgess
B5 G B Hillyard, M L Ashton
B6 D P and S I Black
B7 G and V Hardes
B8 J and R Mannweiler
B9 M L Stocker
B10 K W Philp, P D Noble
B11 M A Philippa
B12 B F and K E Folbigg
B13 P J and D M Hansen
B14 S D and P R Wilson
B15 S M and L C Toomey
B16 P W and C Wilson
INSET C
INSET C REFERENCE SCHEDULE
Ref. Landowner
C1 Lake Macquarie City Council
C2 D & S Halton
C3 Mr Thomas
C4 A Bradbury
C5 Mr and Mrs Miller
C6 K & N M Johnson
C7 K J Lang
C8 T Bock
C9 D S Campbell
C10 Mr & Mrs Tate
C11 Mr Hutchinson
C12 P Hall
C13 R Pitstock & T Davies
C14 S Muller & J Coward
C15 T & M T Brown
C16 A C & L Drew
C17 K P Tanner
C18 Rail Corporation New South Wales
INSET D
INSET D REFERENCE SCHEDULE
Ref. Landowner
D1 P Adams
D2 S Odgers
D3 M Bass
D4 M & S Vale
D5 K and B Weatherstone
D6 B and S Hewitt
D7 K Lassig
D8 A Durrant
INSET SCALE
100 0 100 200 300 400m
SEE INSET B
SEE INSET C
SEE INSET D
Hillside
Rodgers
Rhondda
Margaret
Myrtle
EPA 1
EPA 6
EPA 8
EPA 9
EPA 10
EPA 11
Road
Wakefield
Rhondda
Northern Extension
Mid Pit Extraction Area
Meteorological Station
Southern Extraction Area
Fixed Processing Plant
Southern Extension
0.5km
1km
TN
MN
SCALE 1:30 000 (A4)
500 0 500 1000 1500 m
Landownership Source: Dept. of Lands - Date of Online Search: 25 January 2010
REFERENCE
Quarry Site Boundary
Property Boundary
Cadastral Boundary
Railway Line
Buffer
Deposited Dust Gauge Location
HVAS Location
Landowner Reference (see Schedules)
Residence
Formed Public Road
Coal Haul Road
Figure 4.4
SURROUNDING RESIDENCES AND
AIR QUALITY MONITORING LOCATIONS

Table 4.12
2016 PM_{10} Air Quality Monitoring Results

Month	Samples (Run Dates)	Monthly Average Result ($\mu g/m^3$)	Daily 24hr PM_{10} Exceedance	2016 Annual Average ($\mu g/m^3$)
Criteria		**50**	**50**	**30**
January	5	18.4	No	
February	5	13.6	No	
March	5	16.2	No	
April	5	22.0	No	
May	5	15.6	No	
June	5	6.2	No	
July	5	9.2	No	
August	5	8.0	No	
September	5	7.4	No	
October	5	11.0	No	
November	6	24.2	Yes – 07/11 (55)	
December	5	15.5	No	
Annual Average				14.0

4.4.6 Analysis of Results

The annual average deposited dust levels were compliant throughout 2016, although monthly exceedances of $4g/m^2$/months were recorded at the Hillside St gauge in April ($4.5g/m^2$/month) and May ($5.3g/m^2$/month). An investigation of these elevated levels was undertaken by Metromix to establish possible sources arising from Metromix activities however, none could be identified. Monitoring throughout the remainder of the reporting period at this location was between $0.7g/m^2$/month and $2.0g/m^2$/month. As a result, no further actions were required by Metromix to reduce dust levels at this monitoring location, particularly given no complaints were submitted by the resident. It is noted that the results of deposited dust monitoring from 2016 are consistent with results recorded in 2015.

A single exceedance of the maximum 24-hour PM_{10} criteria was measured on 7 November 2016 and is considered to be representative of higher particulate matter levels resulting from bush fires in the vicinity over 6 and 7 November 2016. This was the only instance of PM_{10} levels measured above the maximum 24-hour PM_{10} criteria while the annual average PM_{10} results were $14.0\mu g/m^3$.

4.5 FAUNA HABITAT

4.5.1 Introduction

The installation of nest boxes for the following species as outlined within *Condition 3(50)* was completed in April and September 2014 with their location shown in **Figure 4.5**.

- *20 microbat nest boxes.*
- *20 Little lorikeet nest boxes.*
- *30 Squirrel glider nest boxes.*

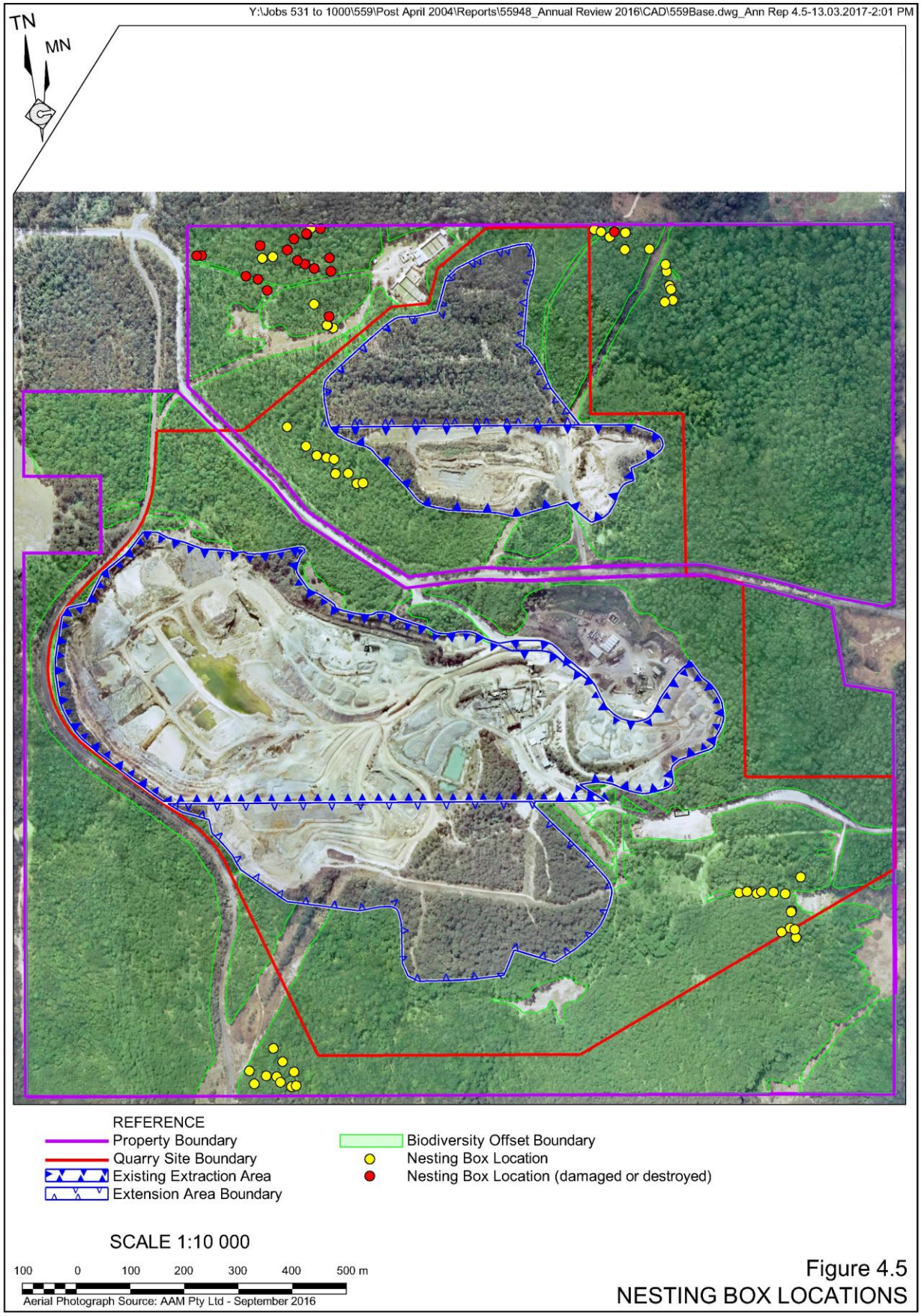


Figure 4.5
NESTING BOX LOCATIONS

The coordinates of nest boxes is presented in **Table 4.13** together with an update of usage by the targeted fauna species.

4.5.2 Nest Box Usage

In order to mitigate against the impact of loss of hollow-bearing trees, nest boxes have been installed to provide for replacement nesting sites for the targeted species. The nesting boxes were inspected in November 2016 by Kendall and Kendall Ecological Services, with the results presented in **Table 4.13**. In summary:

- no positive evidence of use by target species was found;
- a number of boxes had been frequented by common sugar gliders and several boxes had signs of nesting activity;
- a brown antechinus was observed in one of the boxes;
- two boxes previously colonised by feral bees had since been abandoned by the bees; and
- 18 boxes were missing or assumed destroyed during a bush fire that occurred in December 2015.

Table 4.13
Nesting Box Location and Usage Information

Page 1 of 2

Easting*	Northing*	Box Type	Tree Species	Observation/Usage
368741	6351863	Squirrel Glider	Grey Gum	Nil
368713	6351802	Squirrel Glider	Stringybark	Nil
368707	6351773	Squirrel Glider	Tallowwood	Leaves
368690	6351768	Squirrel Glider	Spotted Gum	Sugar Gliders (4)
368715	6351754	Squirrel Glider	Ironbark	Leaves
368715	6351769	Microbat	Spotted Gum	Nil
368715	6351804	Microbat	Stringybark	Nil
368708	6351837	Microbat	Stringybark	Leaves
368687	6351843	Squirrel Glider	Grey Gum	Leaves
368665	6351848	Microbat	Stringybark	Leaves
368656	6351846	Squirrel Glider	Tallowwood	Sugar Gliders (2)
368639	6351852	Microbat	Tallowwood	Nil
368624	6351852	Squirrel Glider	Tallowwood	Leaves
367677	6351671	Squirrel Glider	Stringybark	Nil
367682	6351646	Squirrel Glider	Bloodwood	Nil
367706	6351657	Microbat	Stringybark	Nil
367725	6351652	Squirrel Glider	Stringybark	Nil
367730	6351641	Microbat	Bloodwood	Nil
367749	6351630	Squirrel Glider	Bloodwood	Nil
367758	6351630	Microbat	Bloodwood	Nil
367758	6351656	Squirrel Glider	Stringybark	Nil
367740	6351678	Microbat	Bloodwood	Nil
367727	6351705	Squirrel Glider	Bloodwood	Nil
368011	6352763	Microbat	not recorded	Nil
368010	6352736	Microbat	not recorded	Nil
368033	6352733	Microbat	not recorded	Nil

Table 4.13 (Cont'd)
Nesting Box Location and Usage Information

Easting*	Northing*	Box Type	Tree Species	Observation/Usage
368046	6352712	Microbat	not recorded	Nil
368057	6352711	Microbat	not recorded	Nil
367998	6352768	Microbat	not recorded	Nil
367981	6352775	Microbat	not recorded	Nil
367964	6352795	Microbat	not recorded	Nil
367951	6352807	Microbat	not recorded	Nil
367935	6352836	Microbat	not recorded	Nil
368590	6353096	Microbat	not recorded	Nil
368662	6352953	Squirrel Glider	Ironbark	Leaves
368677	6352954	Squirrel Glider	Ironbark	Nil
368677	6352974	Squirrel Glider	Tallowwood	Bee hive
368675	6352981	Squirrel Glider	Tallowwood	Leaves
368674	6353021	Squirrel Glider	Ironbark	Leaves
368674	6353008	Squirrel Glider	Ironbark	Leaves
368649	6353054	Squirrel Glider	Stringybark	Leaves
368610	6353091	Squirrel Glider	Tallowwood	Bee hive
368604	6353060	Squirrel Glider	Ironbark	Sugar Glider (1)
368580	6353088	Squirrel Glider	Spotted Gum	Leaves
368566	6353100	Squirrel Glider	Spotted Gum	Leaves
368554	6353106	Squirrel Glider	Stringybark	Sugar Glider (1)
368062	6353132	Little Lorikeet	not recorded	missing
368061	6353107	Little Lorikeet	not recorded	missing
368031	6353117	Little Lorikeet	not recorded	missing
368015	6353128	Little Lorikeet	not recorded	missing
368003	6353137	Little Lorikeet	not recorded	missing
367987	6353159	Little Lorikeet	not recorded	missing
367959	6353151	Little Lorikeet	Spotted Gum	Leaves
367959	6353151	Little Lorikeet	Stringybark	Leaves
368003	6353177	Little Lorikeet	not recorded	missing
367939	6353175	Little Lorikeet	Stringybark	Leaves
368027	6353183	Squirrel Glider	not recorded	missing
368028	6353181	Squirrel Glider	not recorded	missing
368037	6353193	Squirrel Glider	not recorded	missing
368054	6353188	Squirrel Glider	not recorded	missing
367829	6353174	Little Lorikeet	not recorded	missing
367904	6353123	Little Lorikeet	not recorded	missing
367925	6353114	Little Lorikeet	not recorded	missing
367939	6353091	Little Lorikeet	not recorded	missing
368048	6353003	Little Lorikeet	Spotted Gum	Leaves
368038	6353010	Little Lorikeet	Spotted Gum	Leaves
368039	6353009	Little Lorikeet	Spotted Gum	Nil
368044	6353025	Little Lorikeet	Bloodwood	Sugar Glider (1)
368020	6353052	Little Lorikeet	Spotted Gum	Leaves
367820	6353175	Little Lorikeet	not recorded	missing

* GDA 94, MGA Zone 56

5. COMPLIANCE ASSESSMENT

5.1 PROJECT APPROVAL PA10_0163

An internal environmental compliance review was undertaken in February 2017 by Mr Bill Sanderson (Manager Quarries) and has been included within **Appendix 4**, drawing upon the compliance tables incorporated within the independent audit undertaken by Trevor Brown & Associates (Brown, 2014).

As a result of the internal review, a total of three departures were identified with respect to the Teralba Quarry Code of Conduct for Truck Drivers prepared in accordance with Condition (44).

In July 2016, two trucks travelling together entered the Quarry prior to 6:00am from the west and again in November, a truck driver who has not been to Quarry previously entered the Quarry from the west prior to 6:00am. All three truck drivers were collecting products on behalf of customers.

It is recognised that overall, the departures were relatively minor. Notwithstanding this however, Metromix will endeavour to avoid such departures in future.

5.2 ENVIRONMENT PROTECTION LICENCE

Metromix holds Environment Protection Licence (EPL) 536 for a 'land-based' extractive industry. The licence has an anniversary date of 01 June. The Annual Return covering the reporting period to 1 June 2016 identified two non-compliances with the conditions of the licence.

The first non-compliance was in January 2016 when water from the former Mine Adit overflowed into Dam B after the highest recorded rainfall of any January (290mm in 5 days). The water discharged from Dam B and therefore through EPL Point 5 at a rate exceeding the daily limit of 2 000 kilolitres per day. The second non-compliance, which received a caution notice from the EPA, was for tracking clay fines out the top exit gate onto Rhondda Rd in May 2016.

In is concluded, as noted within the 2016 Internal Environmental Audit, "*The operation of the Teralba Quarry development is generally in accordance with the predictions in the Environmental Assessment and demonstrates compliance with the Project Approval conditions, Statements of Commitment and the Environment Protection Licence conditions*".

5.3 DISCREPANCIES WITH PREDICTED AND ACTUAL QUARRY OPERATIONS

As prescribed by *Condition 5(4)(e),* the identification of discrepancies between the predicted and actual impacts of the Quarry are to be provided within this document with any significant discrepancies analysed to determine the potential cause and follow-up actions taken.

An analysis was undertaken as part of the Internal Environmental Audit (see **Appendix 4**), noting that "the operation of the Teralba Quarry development is generally in accordance with the predictions in the Environmental Assessment", with no significant discrepancies identified. No change occurred to the operations of the Quarry throughout 2016 that would contribute to any discrepancies in impacts.

6. ACTIVITIES PROPOSED DURING THE NEXT REPORTING PERIOD

6.1 INTRODUCTION

The following section provides a brief summary of the operational activities planned throughout the 2017 reporting period. **Table 6.1** provides a summary of the proposed quarry activities and **Figure 6.1** presents the location(s) of the activities described.

Table 6.1
2017 Proposed Quarry Activities and Key Events

Quarter 1 (January – March)	• First lower level extraction blast • Continue to cover Silt Cell 1 with overburden for future rehabilitation • Preparation of the upper benches in Stage 1B for rehabilitation
Quarter 2 (April – June)	• Planting of native seedlings in both the Stage 1B and Area beside Silt Cell 1
Quarter 3 (July – September)	• Continue to cover Silt Cell 1 with overburden for future rehabilitation • Determine with Oceanic Coal whether the coal haul road lease will be relinquished
Quarter 4 (October – December)	• Preparation of the middle benches in Stage 1B for rehabilitation

6.2 EXTRACTION OPERATIONS

Extraction would continue in the Southern Extraction Area within Stage 1A and Stage 1B (North) (see **Figure 6.1**).

6.3 PROCESSING

The forecast for 2017 is to process approximately 640 000t of conglomerate with approximately 60% being washed.

6.4 RECYCLING OPERATIONS

Sale of the remaining material previously stockpiled as part of Civilake's operations. Metromix will assess the viability of recommencing recycling activities.

6.5 OVERBURDEN AND SILT MANAGEMENT

Overburden will be moved in stages during the year as the Stage 1B (North) pit continues to develop. Approximately 40,000 t will be moved to cover Silt Cell 1 and construct other silt cells.

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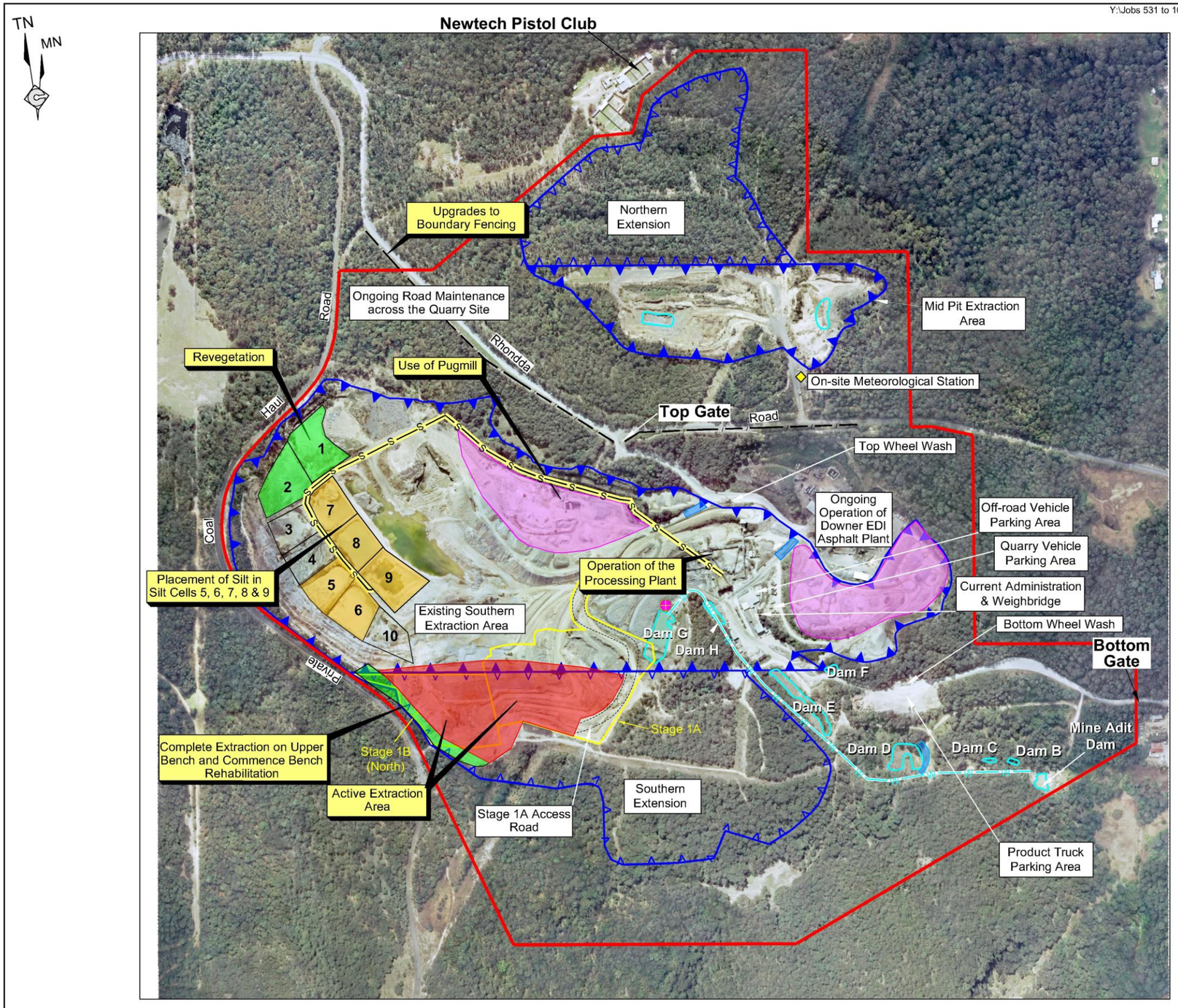

REFERENCE
- Quarry Site Boundary
- Extraction Area Boundary
- Extension Area Boundary
- Activity Name / Location
- Water Pipeline
- Silt Pipeline
- Dam
- Water Cart Fill Point

2017 Proposed Quarry Activities
- Extraction Activities
- Silt Placement
- Rehabilitation / Revegetation
- Product Stockpiles
- Topsoil / Subsoil Storage
- Upgrade Activities

SCALE 1:7 500 (A3)

100 0 100 200 300 400m

Aerial Photograph Source: AAM Pty Ltd - September 2016

Figure 6.1
2017 PROPOSED ACTIVITIES AND OPERATIONS

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6.6 WASTE MANAGEMENT

General waste, co-mingled Council recycling, paper and cardboard, scrap steel, waste oil, oil filters, and etc. will continue to be collected by licenced contractors and volumes and dates recorded.

6.7 SITE INFRASTRUCTURE AND SERVICES

Boundary fencing and gates at easement areas along Rhondda Rd will continue to be replaced/upgraded. (see **Figure 6.1**).

6.8 WATER MANAGEMENT

Water management during the 2017 reporting period, will continue to utilise the existing surface water management system of the Quarry comprising Dams A to G. Flow meters will also continue to be used to record water that is pumped from the Mine Adit Dam to Dam G.

During the 2017 reporting period, it is anticipated that Metromix will finalise the review of the water quality monitoring program at the Quarry in conjunction with the EPA and based on the results of the PRP program currently required by EPL 536.

6.9 BUSH FIRE MANAGEMENT

The *Bush Fire Management Plan* will be discussed and reviewed with both the local Teralba Fire Service and the West Wallsend Rural Fire Service in the second half of 2017.

6.10 HAZARDOUS MATERIAL MANAGEMENT

The existing diesel tank bunding and management of aerosols and paints within the workshop area would continue as is current practice. Each of these activities would be monitored as part of Metromix's internal auditing.

6.11 PRODUCT TRANSPORTATION

Product despatch will continue in the same manner as it has during the past reporting period. Truck movements will be recorded in and out of the Quarry i.e. with respect to routes, weights and times in accordance with the *Transport Management Plan*. All efforts would be placed on avoiding any exceedance of the limitations nominated in *Conditions 2(8)* and *2(9*).

6.12 VENM/ENM IMPORTATION MANAGEMENT

It is not envisaged any VENM/ENM would be imported into the Teralba Quarry during 2017.

6.13 REHABILITATION

The subsoil, topsoil and biomass from Stage 1B will be relocated throughout 2017, together with the ongoing establishment of the proposed rehabilitation area over the remainder of Silt Cell 2 and the remaining section of Silt Cell 1. Placement of overburden and soil/biomass is proposed on the initial upper terminal bench in Stage 1B.

T.E.N.T.A.C.L.E Inc. will continue to be used on site for approximately 800 man hours per year to control weeds throughout the Quarry Site as well as plant seedlings and monitoring plant health. Lantana will again be targeted in areas defined as "poor condition" on **Figure 2.3**.

A further planting program will be undertaken during the reporting period, principally in the area above and surrounding Silt Cell 1 and on the initial upper bench completed in Stage 1B.

Over 1500 plants have been ordered for planting in April or May of 2017.

6.14 BIODIVERSITY OFFSET AREA

Metromix and its consultants will continue to liaise with DPE and OEH regarding the resolution of the Biodiversity Offset Area for the Teralba Quarry. Given advice from the DPE, it is likely that the biodiversity offset area will be secured during the next reporting period following the expected change to legislation that governs biodiversity conservation in NSW.

6.15 MONITORING

Metromix will continue to undertake and/or commission the following monitoring activities throughout 2017.

- Water Quality Monitoring – Monthly and/or event-related: EPA-4, EPA-5, EPA-6 and EPA-7.
- Flow Measurements: Mine Adit Dam to Dam G.
- Operational Noise (two occasions): Residences A, B, D and H.
- Equipment Noise (one occasion): only if there are changes in the equipment fleet.
- Airblast Overpressure and Ground Vibration: all blasts monitored at Locations 1 and 2.
- Meteorology: all parameters – continuously.
- Deposited Dust Monitoring: five locations.
- PM_{10}: every 6 days at Rodgers Street HVAS.
- Nest Box Usage: 3rd quarter.

Metromix will adopt the recommendations provided by Kendall and Kendall to replace the 18 missing or destroyed nest boxes. The overall nest box program will also be reviewed during 2017 given:

i) the nest boxes have not been used by the targeted fauna species; and

ii) the nest boxes are located in the optimum area for the targeted fauna species.

In addition, Metromix will adopt the recommendation of Kendall and Kendall to store nest boxes at the Quarry Site so that missing or destroyed boxes may easily be replaced.

6.16 NON-METROMIX OPERATIONS

Road surfacing company Downer EDI is expected to continue business as normal producing and supplying asphalt to the local markets. It is understood however, that Downer EDI is expected to apply to Council to install a replacement Asphalt Plant in 2018.

No coal is expected to be hauled on the Coal Haul Road to the Eraring Power Station during 2017 or foreseeable future.

The Newtech Pistol Club is expected to continue activities in a similar manner to previous years.

7. REFERENCES

ANZECC (2000) *Australian and New Zealand Guidelines Fresh and Marine Water Quality*.

Brown (2014) *Teralba Quarry Independent Audit*, Prepared by Trevor Brown and Associates, February 2014.

DEC (2007) *Approved Methods for Sampling of Air Pollutants in New South Wales*

DECCW (2007) *Methods for the Sampling and Analysis of Air Pollutants in NSW*

EPA (2000) *NSW Industrial Noise Policy*

NSW Minerals Council (2000) *Technical Paper – Particulate Matter and Mining Interim Report*

Spectrum (2016a) *Teralba Quarry – Results of Attended Noise Monitoring: August 2016*. Spectrum Acoustics Pty Limited

Spectrum (2016b) *Teralba Quarry – Results of Attended Noise Monitoring: November 2016*. Spectrum Acoustics Pty Limited

RWC (2011) *Environmental Assessment for the Teralba Quarry Extensions – November 2011*. R.W. Corkery and Co. Pty Limited