METROMIX

Teralba Quarry

2018 Annual Review

Project Approval PA10_0183

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

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Teralba Quarry

2018 Annual Review

Project Approval PA10_0183

Period: 1 January 2018 to 31 December 2018

Prepared by:

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Ref No. 559/58

March 2019

R.W. CORKERY & CO. PTY. LIMITED

Table 1
Title Block

Name of operation	Teralba Quarry
Name of operator	Metromix Pty Ltd
Development consent / project approval #	PA10_0183
Name of holder of development consent / project approval	Metromix Pty Ltd
Mining Lease #	Not applicable
Name of holder of mining lease	Not applicable
Water licence #	Water Access Licence 40303
Name of holder of water licence	Metromix Pty Ltd
MOP/RMP start date	Not applicable
MOP/RMP end date	Not applicable
Annual Review start date	1 January 2018
Annual Review end date	31 December 2018

I, Brad Allman, certify that this audit report is a true and accurate record of the compliance status of the Teralba Quarry for the period 1 January 2018 to 31 December 2018 and that I am authorised to make this statement of behalf of Metromix Pty Ltd.

Note.

a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: Section 192G (Intention to defraud by false or misleading statement – maximum penalty 5 years imprisonment); Section 307A, 307B and 307C (false or misleading application/information/documents – maximum penalty 2 years imprisonment or $22,000, or both).

Name of authorised reporting officer	Mr Brad Allman
Title of authorised reporting officer	General Manager
Signature of authorised reporting officer	
Date: 29/03/2019	

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CONTENTS

Page

CONTENTS

Page

CONTENTS

Page

APPENDICES

FIGURES

CONTENTS

Page

TABLES

PLATES

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)
DRG	Division of Resources and Geoscience (within DPE)
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. STATEMENT OF COMPLIANCE

Table 2
Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes / No
Project Approval PA 10_0183	No
EPL 536	No

Table 3
Non-compliances

Relevant Approval	Condition #	Condition Description (summary)	Compliance Status	Comment	Where Addressed in Annual Review
PA 10_0183	2(21)	Meteorological monitoring	Administrative non-compliance	In the period between the 29 July 2018 to 10 August 2018 (13 days) the meteorological station was offline for repair following vandalising of the equipment. This break in continuous monitoring was notified to DPE and acknowledged in correspondence dated 15 August 2018. On 11 October 2019 the sensor on the equipment failed but the issue was resolved within the same day.	6.1
PA 10_0183	5(5)	Management Plans	Administrative non-compliance	Following the approval of Modification 1 to PA 10_0183 Metromix was required to update and submit all management plans for approval. Metromix is yet to finalise consultation for each of the management plans and is awaiting comments from stakeholders.	3
EPL 536	M4.1	Meteorological monitoring	Administrative non-compliance	As per non-compliance for PA 10_0183 Condition 2(21).	6.1

Compliance Status Key

Risk level	*Colour code*	*Description*
High	*Non-compliant*	*Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence.*
Medium	*Non-compliant*	*Non-compliance with:* • *potential for serious environmental consequences, but is unlikely to occur; or* • *potential for moderate environmental consequences but is likely to occur.*
Low	*Non-compliant*	*Non-compliance with:* • *potential for moderate environmental consequences, but is unlikely to occur; or* • *potential for low environmental consequences but is likely to occur.*
Administrative non-compliance	*Non-compliant*	*Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions).*

2. INTRODUCTION

2.1 SCOPE AND FORMAT

This Annual Review has been prepared by R.W. Corkery & Co. Pty Limited (RWC) on behalf of Metromix Pty Ltd (Metromix) and in accordance with *Condition 5(4)* of Project Approval PA10_0183 (PA10_0183). The Annual Review records the activities and environmental monitoring undertaken within and surrounding the Teralba Quarry ("the Quarry") during the period 1 January 2018 to 31 December 2018 (the "reporting period"). This document also outlines the activities and environmental monitoring planned to be undertaken by Metromix within and surrounding the Quarry in 2019. This *Annual Review* has been prepared based upon the approval and licencing requirements applicable for the reporting period, however, the report generally follows the format and content requirements identified in the *Annual Review Guideline* dated October 2015.

The Quarry is situated upon Lots 1 and 2 DP 224037 and was initially established in 1964, with the operation purchased by Metromix in 1986. The Teralba Quarry Extension Project was approved in February 2013 under PA10_0183. A modification (MOD 1) to PA 10_0183 was approved on 16 April 2018. **Figure 1** displays the location of the Quarry in the local context and **Figure 2** displays the layout of the Quarry.

The approved Quarry activities comprise the following.

- Conglomerate extraction (blasting and excavation).
- Processing operations (size reduction, screening and blending).
- On-site load and haul operations involving off-road trucks on the internal road network conveying primary-crushed rock to the processing plant.
- Off-site transportation of products.
- Vehicle/equipment maintenance and ancillary activities and stores.
- Administration and product despatch.
- Progressive rehabilitation and maintenance.

2.2 KEY PERSONNEL CONTACT DETAILS

During the reporting period, the management of the Teralba Quarry, to ensure all conditional requirements were satisfied, was the responsibility of the Manager Quarries, Mr William Sanderson. The management of the Teralba Quarry is now the responsibility of the General Manager, Mr Brad Allman. Day to day responsibility for Quarry Operations, including environmental monitoring and rehabilitation rests with the Quarry Supervisor, Mr Mo Yunusa.

The Quarry Supervisor, or his delegate, is responsible for data collection, deposited dust and water sample collection, daily checks and compilation of quarry-related documentation and monitoring data.

Figure 1
LOCALITY PLAN

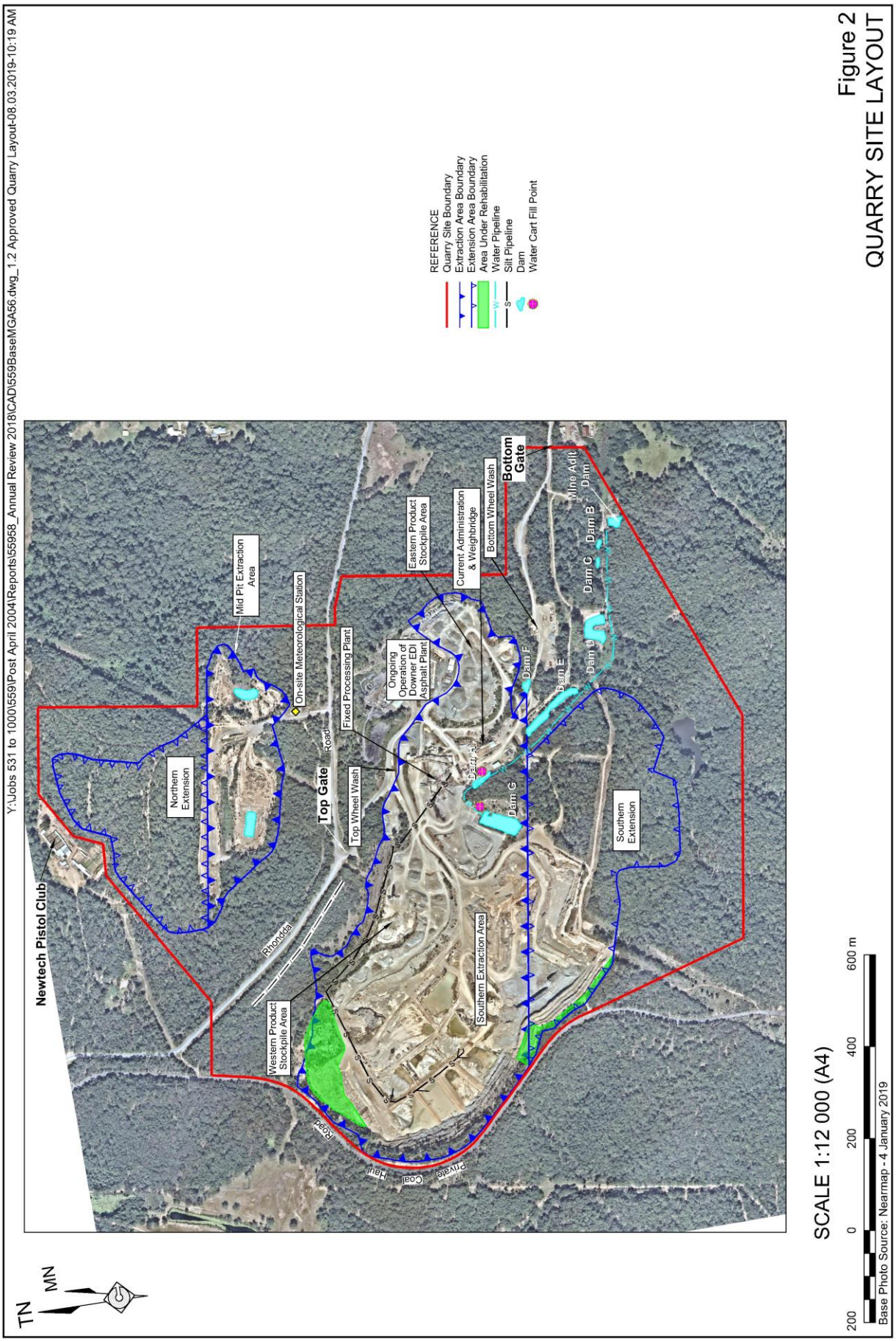

Figure 2
QUARRY SITE LAYOUT

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

The key personnel contact names, position and phone numbers are as follows.

Name	**Position**	**24 Hour Contact**
Brad Allman	General Manager	0447 440 373
Mo Yunusa	Quarry Supervisor	0423 832 077

3. APPROVALS

The 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 4**. An internal compliance review of the conditions of PA10_0183 is presented as **Appendix 1** with the outcomes discussed in Section 1 and Section 11.

Table 4
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	16 April 2018 (Modification 1)	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. 40303	12 October 2012 (as Bore Licence 20BL173206)	1 July 2016	No Expiry	Recovery and use of water from Dam A
* Licence Anniversary Date				

An application to modify PA 10_0183 was submitted to DPE on 7 December 2017. The application sought to modify the wording of conditions related to the biodiversity offsetting obligations of the Teralba Extension Project. This application was approved on 16 April 2018.

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

- A description of the activities (including preparatory activities, extraction, processing and rehabilitation) that were carried out during the reporting period (see Section 4), and the activities that are proposed to be carried out during the next reporting period (see Section 12).
- A comprehensive review of the environmental monitoring results and complaints recorded during the reporting period (see Section 6, Section 7 and Section 9), 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 documents for the extension application and Modification 1.
- An assessment of compliance during 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 11).

- Identification of any trends in the monitoring data over the life of the Quarry (see Section 6).
- 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 6 and Section 7).
- A description of the measures that will be implemented throughout 2018 to improve the environmental performance of the Quarry (see Section 12).

Relevant conditions within PA 10_0183 which nominate specific environmental criteria are as follows, with **Appendix 2** providing the complete records of all monitoring results.

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

  Each of the relevant noise criteria and frequencies are presented in Section 6.2.
- *Condition 3(9):* blasting overpressure and ground vibration emissions.

  Each of the relevant blasting criteria are presented in Section 6.3 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 6.4 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 7.2 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 4.2 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 7).
- *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)* of PA10_0183 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 measurements 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. A summary of meteorological monitoring is provided in in Section 6.1.

The Quarry operates in accordance with the following management plans and strategies.

- Environmental Management Strategy.
- Landscape Management Plan
- Aboriginal Heritage Management Plan
- Air Quality Management Plan
- Blast Management Plan
- Lower Level Management Plan
- Noise Management Plan
- Waste Management Plan
- Water Management Plan
- Transport Management Plan

Following the approval of Modification 1 for PA 10_0183, DPE requested that all management plans required under PA 10_0183 for the Quarry be reviewed and updated.

The following plans have subsequently been reviewed and approved by DPE.

- Noise Management Plan (dated 2 October 2018)
- Water Management Plan (dated 2 October 2018)
- Environmental Management Strategy (dated 25 January 2019)

No changes are currently required to the Lower Level Management Plan, however this plan is under review by an external consultant.

Metromix is currently reviewing comments provided by Lake Macquarie City Council on a draft of the Biodiversity and Rehabilitation Management Plan.

The remaining plans have been submitted to various government agencies for review and comment. At the time that this document was finalised, comments had not been received on these plans and they were therefore not finalised for review and approval by DPE.

4. OPERATIONS SUMMARY

4.1 INTRODUCTION

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 3 presents the location(s) of the activities described, including activities shown within **Plates 1** to **9**.

4.2 EXTRACTION OPERATIONS

Extraction operations continued within Stages 1A, Stage 1B and Stage 1C of the Southern Extension in 2018, as displayed on **Figure 3**. A total of 19 blasts were initiated in 2018. **Plate 1** displays a view of the active extraction faces within the Southern Extension.

It is estimated that approximately 615 000t of material was extracted during the reporting period. Total product sales (products despatched from the Quarry) during the reporting period was 471 894t. This is lower than total sales in 2017 (608 390t) and within the approved limit of 1 million tonnes per annum. **Table 5** records the monthly/annual sales of the various products produced at the Quarry during 2017. This data is drawn from Quarry records and is provided to the Division of Resources & Geoscience (DRG) of the Department of Planning and Environment in accordance with the requirements of Condition 2(20) of PA10_0183. A copy of the annual return for extractive materials to DRG for 2017/2018 is included within **Appendix 2**. It is anticipated that total sales in the next reporting period would be consistent with the current reporting period.

Table 5
Teralba Quarry Sales – 2018

2018 (Month)	Washed Products (t)	Road Pavement (t)	Other (t)	Total (t)
January	17,976	4,037	None	22,013
February	27,025	7,446	None	34,471
March	29,840	8,162	None	38,002
April	29,187	10,308	None	39,495
May	37,981	21,127	None	59,108
June	24,943	5,544	None	30,487
July	41,224	15,616	209	57,049
August	35,557	12,990	151	48,698
September	26,262	10,592	424	37,278
October	23,753	8,238	202	32,193
November	30,891	8,077	610	39,578
December	22,664	9,560	1,298	33,522
Total	**347,303**	**121,697**	**2,894**	**471,894**
Source: Metromix				

Plate 1
A view to the south towards the active extraction faces in the Southern Extension
(E559AH_100)

Plate 2
A view to the northwest towards the Pugmill and pugmill stockpile area
(E559AH_061)

Plate 3
A view to the northwest across all silt cells
(E559AH_045)

Plate 4
A view to the northeast towards the Processing Plant
(E559AH_057)

Plate 5
Excellent growth on placed overburden near Silt Cell 1
(E559AH_075)

Plate 6
Initial growth of planted tube stock on Silt Cell 2
(E559AH_078)

Plate 7
A view along the upper extraction bench in Stage 1B. Intermediate bulk container used to store water for intermittent watering.
(**E559AH_112**)

Plate 8
A view of the vehicle refuelling area
(E559AH_139)

Plate 9 View of the Mine Adit Dam and pump infrastructure
(E559AH_021)

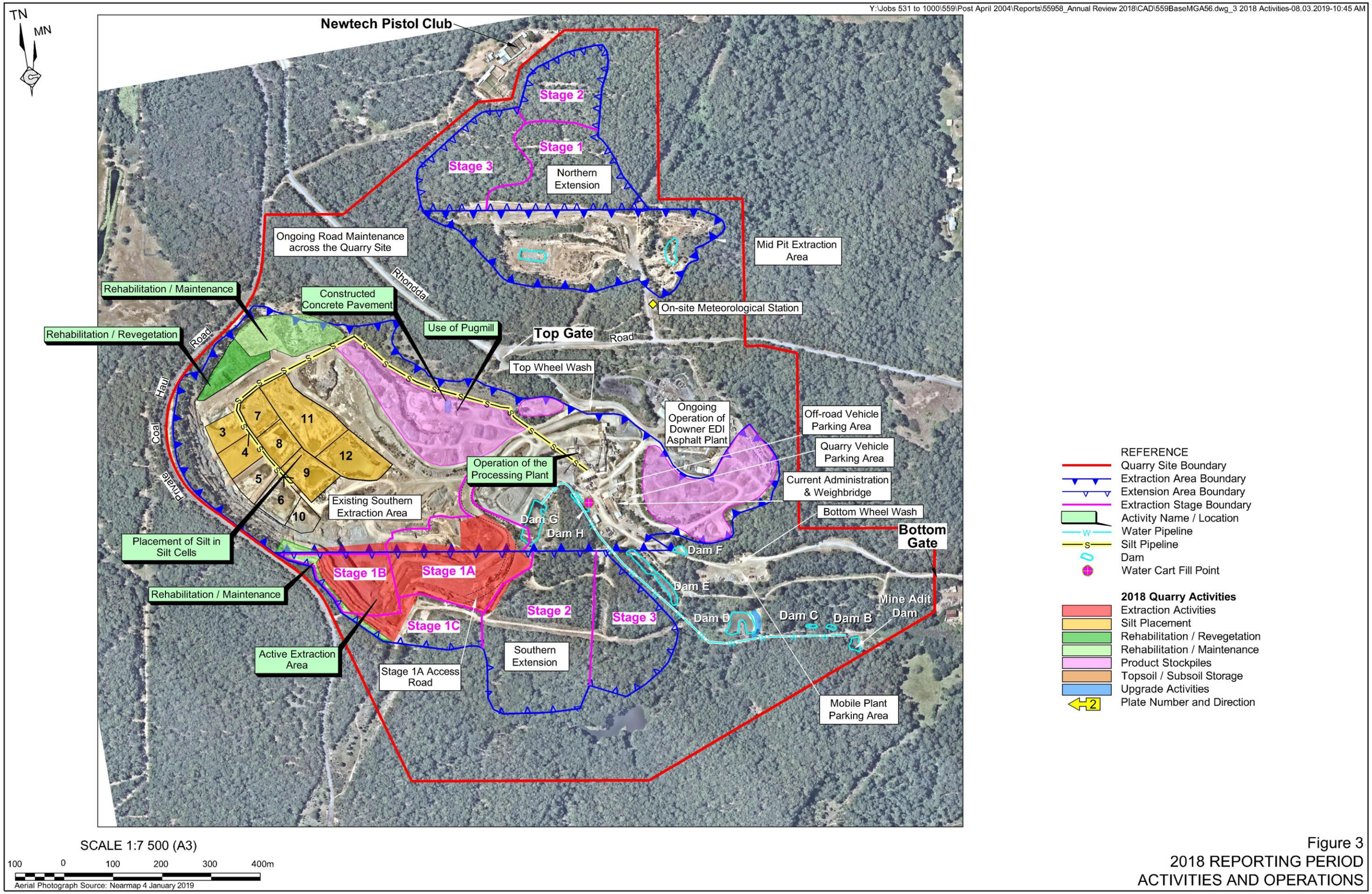

Figure 3
2018 REPORTING PERIOD
ACTIVITIES AND OPERATIONS

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4.3 PROCESSING OPERATIONS

Processing operations occurred throughout the reporting period, producing washed products and road pavement products. **Plate 4** displays a view of the processing plant. Fill materials were not processed through the processing plant.

The only change during the reporting period when compared to 2017 was that the processing plant operated in the "wet" mode for approximately 74% of sales, compared to approximately 75% in 2016. The remaining 26% of the total products comprised of road pavement products (80%) and fill materials (20%) respectively.

4.4 RECYCLING OPERATIONS

Of the recycled concrete that had been previously crushed and stockpiled, approximately 513t of crushed concrete were despatched/sold during 2018.

A total of 7 643.3t of concrete washout were imported to the pugmill area (the application area for EPL 13015) during the reporting period and 1 893.67t of concrete washout was processed into recycled concrete roadbase product. These levels remain consistent with approved operations.

4.5 OVERBURDEN AND SILT MANAGEMENT

In 2018, approximately 79 430t of overburden 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 Cells 3, 4, 7 or 11 with overflow into Silt Cells 8, 9 and 12.

4.6 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 (22 x 4m^3 bin, 1 x 10m^3 bin, 6 x 6m^3 bin and 2 x 20m^3 bin)
- waste oil (3325L)
- co-mingled recyclables (2 x 240L bins per fortnight)
- paper and cardboard (11 x 3m^3 bins)
- scrap steel (6.58 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.

4.7 SITE INFRASTRUCTURE AND SERVICES

During the reporting period, a self-bunded portable oil storage container was used on site to temporarily store oil that was delivered to the Quarry (see **Plate 10**). Oil is stored in this container until needed.

Plate 10 Portable Oil Storage Container
(Ref: E559AH_143)

4.8 BUSH FIRE MANAGEMENT

In 2018, the *Bush Fire Management Plan* was discussed and reviewed by the Deputy Captain of the local Teralba Fire Service and a 20m Asset Protection Zone (APZ) was established around the fuel and oil storage areas.

4.9 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) (see **Plate 8** and **Plate 10**).

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 appropriately licenced facility.

4.10 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 limits.

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 4** 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).

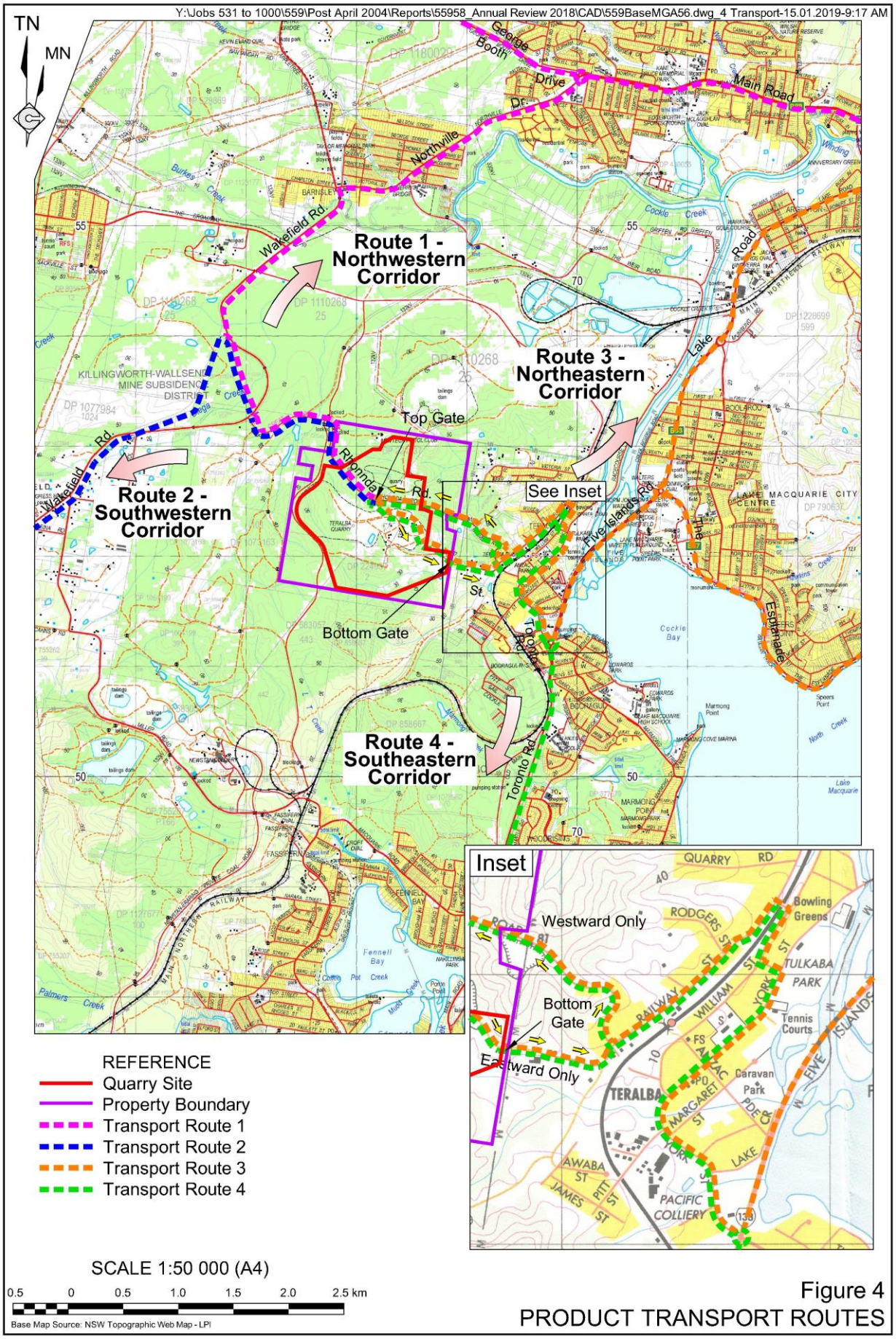


Figure 4
PRODUCT TRANSPORT ROUTES

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 2018 and December 2018 are collated in **Appendix 2**. **Table 6** provides a summary of transportation and limit compliance during the reporting period. The maximum daily average for each conditional requirement is well below the approved limits in *Conditions 2(8*) and *2(9*). There were no identified non-compliance issues with the Teralba Quarry Driver's Code of Conduct during the reporting period.

Table 6
Summary of Transportation Limit Compliance – 2018

Condition Description			Maximum Record for 2018											
Time Period	**Condition**	**Approved Limits**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Annual	Annual Product Despatch	1 million tonnes												
Daily	Total trucks per day	326 trucks/ day												
Daily	Westwards trucks per day	241 trucks/ day												
Daily	Eastwards trucks per day	85 trucks/ day												
6:00am to 7:00am	Cumulative Max Hourly	28 trucks/ hour												
7.00am to 6.00pm	Cumulative Max Hourly	20 trucks/ hour												
6:00am to 7:00am	Westwards Max Hourly	28 trucks/ hour												
7.00am to 6.00pm	Westwards Max Hourly	20 trucks/ hour												
6:00am to 6:00pm*	Eastwards Max Hourly	8 trucks/ hour												
6:00pm to 5:00am	Westwards Max Hourly	6 trucks/ hour												
5:00am to 6:00am	Westwards Max Hourly	12 trucks/ hour												
	Compliance with approved limits													
	Exceedance of approved limits													
* Transport eastwards is not permitted between the hours of 6:00pm and 6:00am														
Source: Metromix														

4.11 VENM/ENM IMPORTATION MANAGEMENT

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

4.12 NON-METROMIX OPERATIONS

The two non-Quarry-related commercial operations located within the Quarry Site boundary, namely the Newtech Pistol Club and the Downer EDI asphalt plant, continued to operate independently of all quarry-related operations. A pugmill previously operated by Civilake is now the responsibility of Metromix. A view of the pugmill and pugmill stockpile area is displayed on **Plate 2**.

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. The Downer EDI asphalt plant is in the process of being upgraded to improve the facilities available in this location. This upgrade is expected to be completed in the first half of 2019.

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

No coal was hauled on the Coal Haul Road to Eraring during 2018.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Correspondence from the Department of Planning and Environment regarding the 2017 Annual Review was provided on 18 October 2018. **Table 7** describes the information that the Department requested to be included in the 2018 Annual Review and where in this document that information is provided.

Table 7
Actions from the Previous Annual Review

Action Required from Previous Annual Review	Comments	Where Discussed in Annual Review
Comparison with Environmental Assessment predictions Please provide a detailed analysis of site environmental performance against the predictions in the Environmental Assessment documents.	Comparison of site performance against the predictions in the Environmental Assessment (RWC, 2014) has been provided in the review of environmental performance (Section 6) and water management (Section 7)	Section 6 and Section 7
Water Use Please include details of external water consumption.	Water use at the Quarry is described in Section 7.2.3 in relation to water pumped from Dam A (the Mine Adit Dam) to Dam G where it is used for processing. The use of 923.6ML during the reporting period is consistent with historic use and within the licenced limit of 1,407ML	Section 7.2.3
Rehabilitation Please described any issues that may affect successful rehabilitation and address progress on achieving the rehabilitation objectives listed in the Schedule 3 Condition 58 of the March 2018 modification of the Approval	A discussion of progress against the rehabilitation objectives in Condition 3(55) of PA 10_0183 is provided in Section 8.3. In summary, rehabilitation activities have continued to make progress against the objectives specified in PA 10_0183 relevant to progressive rehabilitation. Specifically, rehabilitation methods involving the use of coarse woody debris on rehabilitated silt cells and tubestock planting has been successful (see **Plate 5** and **Plate 6**)	Section 8.3

6. ENVIRONMENTAL PERFORMANCE

6.1 METEOROLOGICAL MONITORING

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 3**), ensuring that the meteorological station complies with the requirements in the *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales* guideline.

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.

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 5 and **6** provide monthly wind speed and direction data recorded at the Quarry during the reporting period. The wind rose data indicates that during the warm summer months (January to March and December 2018) prevailing winds were generally from the southeast quadrant; cooler autumn/winter months (April to August 2018) prevailing winds were generally from the southwest quadrant; and spring months (September to November 2018) had less defined prevailing wind patterns, with wind coming from all directions except the northwest quadrant.

Table 8 presents a summary of the continuous monitoring recorded during the reporting period for meteorological parameters that are required to be monitored under EPL 536.

In July 2018 the weather station compound was broken into and vandalised with several key components either stolen or damaged. As a result, the station was offline and not able to record data for 13 days (29 July 2018 to 10 August 2018) until such time as repairs could be completed. Metromix informed Department of Planning & Environment of the incident and the incident was formally recognised in correspondence dated 15 August 2018 recording the breach of Condition 21 of Schedule 3 of PA 10_0183.

On 11 October 2019 there was a sensor error for the weather station, with only limited data being recorded for that particular day. As this error was resolved the following day, DPE were not notified of the issue.

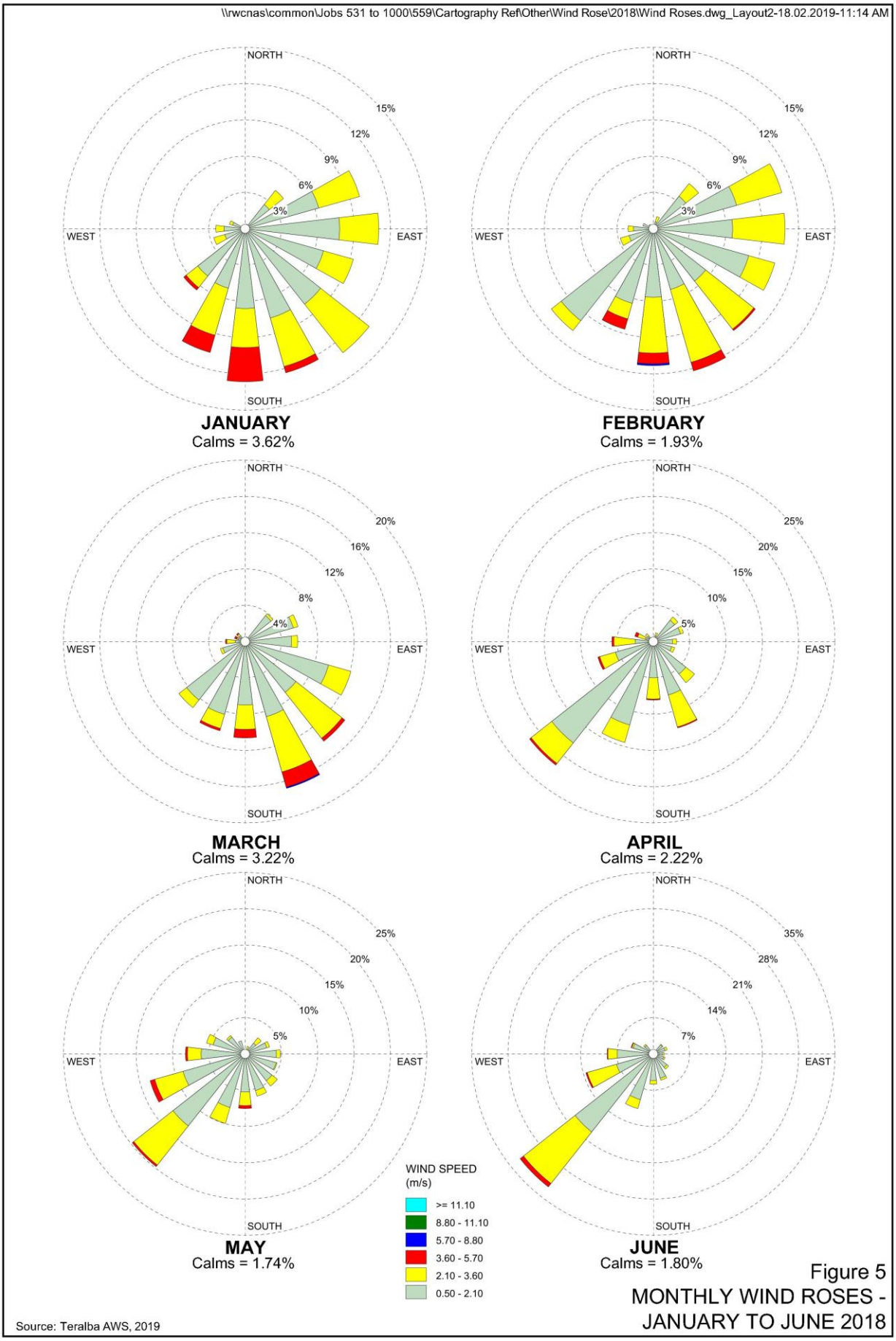


Figure 5
MONTHLY WIND ROSES - JANUARY TO JUNE 2018

Figure 6
MONTHLY WIND ROSES - JULY TO DECEMBER 2018

Table 8
Meteorological Data Summary – 2018

Monitored Parameter	Jan	Feb	March	April	May	June	July[1]	August[1]	Sept	Oct[2]	Nov	Dec	Annual
Total Rainfall (mm)	26.4	137.6	261.0	59.6	9.4	165	1.4	20.6	82.0	228.2	100.4	125.6	1 217.2
Average Minimum Temperature (°C) at 2m	14.1	14.7	12.9	11.1	7.7	5.8	3.2	5.6	6.2	9.4	10.8	14.2	
Average Maximum Temperature (°C) at 2m	44.5	39.7	38.7	34.2	27.6	20.0	23.8	24.3	32.4	31.8	37.4	40.2	
Average Minimum Temperature (°C) at 10m	14.9	15.2	14.0	11.9	8.0	6.1	3.9	5.9	6.7	10.7	10.9	14.6	
Average Maximum Temperature (°C) at 10m	43.0	38.7	37.7	34.0	27.1	19.9	24.0	23.7	31.6	30.8	36.3	38.8	
Average Sigma Theta	32.5	31.3	30.2	30.1	26.5	29.1	28.1	12.9	149.1	28.4	33.0	32.6	
Average Solar Radiation (W/m^2)	215.7	191.9	156.1	133.4	103.6	69.2	93.3	125.5	23.6	51.2	33.5	42.6	
Average Relative Humidity (%)	69	71	73	72	65	75	54	52	67	78	66	71	
Average Maximum Barometric (hPa)	1011	1013	1018	1018	1022	1025	1022	1015	1020	1021	1014	1015	
Average Minimum Barometric (hPa)	989	993	995	991	996	1000	996	998	993	999	985	986	

[1] No data available from 29 July to 11 August 2018 due to vandalism of weather station.

[2] Sensor error on 11 October –results on this day have been omitted.

6.2 NOISE

6.2.1 Introduction

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 within and surrounding the Quarry. In addition, PA 10_0183 – Appendix 3 (Statement of Commitments) details Metromix's commitment to undertake noise monitoring within three months of operations beginning in the Southern and Northern Extensions. Noise monitoring surveys were undertaken in August 2018 and November 2018 by Spectrum Acoustics (Spectrum, 2018a and 2018b) and have been included in **Appendix 2**.

Table 9 lists the address and coordinates of each noise monitoring location and **Figure 7** displays the noise monitoring locations relative to local land holdings.

Table 9
Noise Monitoring Locations

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

* See **Figure 7**.

[1] During previous monitoring, the landowner requested that monitoring be undertaken away from this property. Monitoring was undertaken at easting 369247 and northing 6351878 (approximately 30m south of the property)

[2] Metromix has obtained permission for this monitoring location to be omitted as other monitoring locations are nearby and closer to quarry related noise

Independent monitoring at the nominated locations was required to be undertaken twice annually during the first 2 years of operations and then revert to annual monitoring after this time. The recently approved Noise Management Plan includes annual monitoring only. However, it is noted that EPL 536 still requires bi-annual monitoring. Monitoring will be undertaken in (August and September 2019) of until the outcome of an EPL variation have been resolved.

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

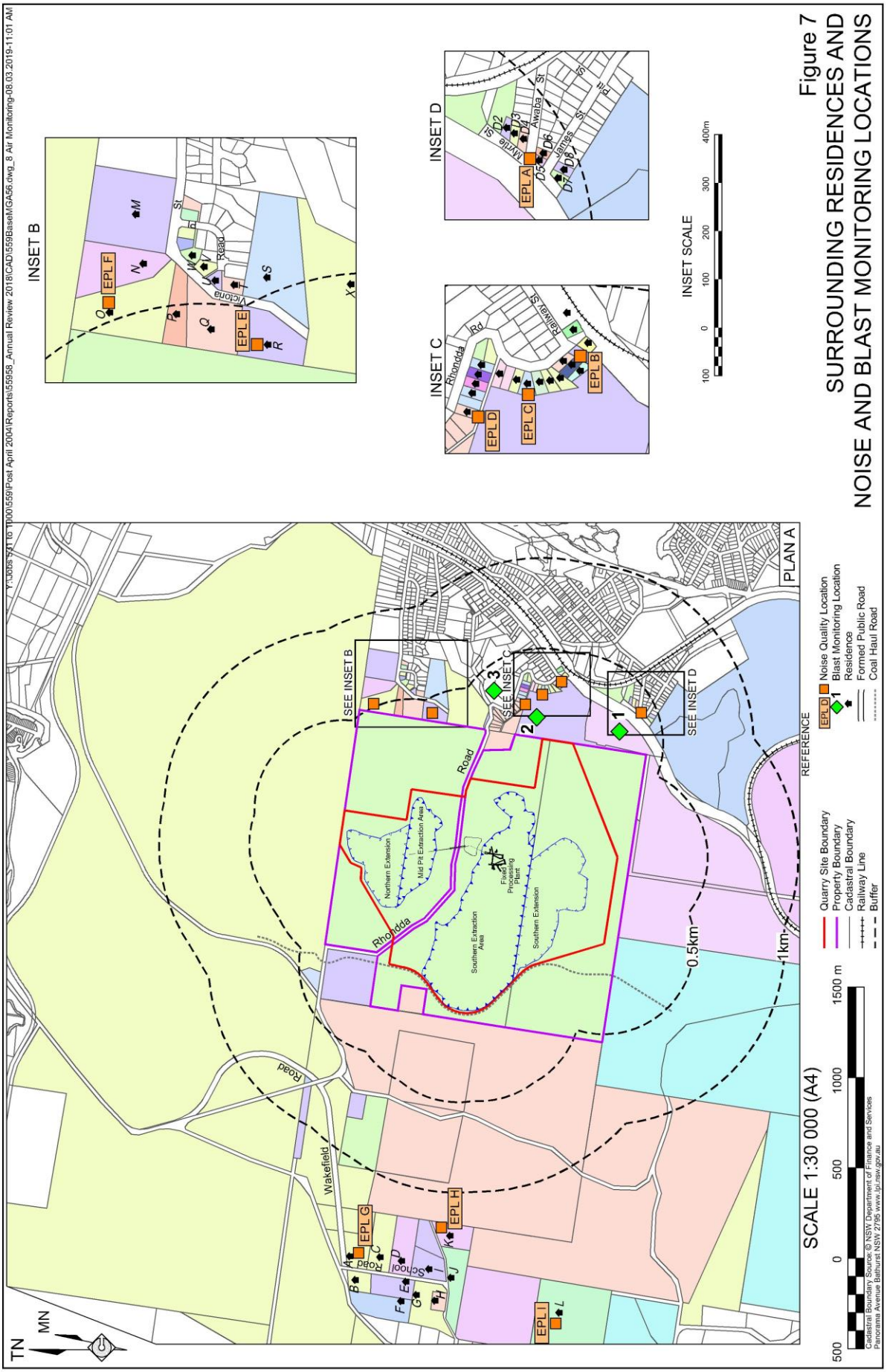


Figure 7
SURROUNDING RESIDENCES AND
NOISE AND BLAST MONITORING LOCATIONS

6.2.2 Noise Criteria

Table 10 presents the noise criteria for the Quarry during the specific time periods as nominated in *Condition 3(5)* of PA10_0183.

Table 10
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 7**					

6.2.3 Noise Monitoring Results and Discussion

Attended noise monitoring was conducted during daytime, evening, shoulder and night periods between 28 August 2018 and 30 August 2018 and the program repeated between 20 November 2018 and 23 November 2018 at monitoring locations EPL-A, B, D, E and H.

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 were omitted from the monitoring program as compliance at these locations may be inferred from other nearby monitoring locations.

During the monitoring period in 2017, the landowner at Residence B (EPL-B) requested that the monitoring not take place in front of their house. Since that time the monitoring location has been moved 30m to the south of this location so that operators could still distinguish Quarry vehicles from other noise sources and record noise levels.

Monitoring location EPL-B is situated close to the corner of Rhondda Road and Railway Street. This monitoring location is included predominantly to measure Quarry noise from trucks exiting the Quarry along the private section of the access road (through the Teralba Business

Park). 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. Noise emissions did not exceed the relevant criterion at any monitoring location during any part of the surveyed time period.

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 operational noise monitoring during 2018 are consistent with results recorded in 2015, 2016 and 2017, indicating that the Quarry remains generally inaudible in the local setting. The monitored noise levels are lower than those predicted in the EA for the Teralba Extension Project, however, it should be noted that the predictions in the EA related to worst-case scenario operations that included operations in the later stages of the Southern Extension and operations in the Northern Extension. Operations in these areas are yet to commence.

6.3 BLASTING

6.3.1 Blasting Activities

All blasting during the reporting period occurred in either Stage 1A, Stage 1B or Stage 1C of the Southern Extraction Area and Southern Extension. Blast monitoring was undertaken for each blast initiated at the Quarry throughout 2018,

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 7** for each blast, i.e. at Locations 1 and 2 for blasts initiated south of Rhondda Road and Locations 2 and 3 for blasts initiated north of Rhondda Road. No blasts were initiated north of Rhonda Road during the reporting period.

6.3.2 Blasting Criteria

Table 11 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, public holidays excluded.

Table 11
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

6.3.3 Blast Monitoring Results

Table 12 presents the results of blast monitoring undertaken throughout 2018 against the criteria for the Quarry. Airblast overpressure and ground vibration were not monitored at Location 3 throughout 2018 as no blasting was undertaken north of Rhondda Road during the reporting period.

Table 12
Blast Monitoring Results – 2018

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 January	1.41pm	NT	NT	NT	NT	NM	NM
17 January	11.03am	109.5	0.19	108.6	0.24	NM	NM
9 February	11.32am	NT	NT	NT	NT	NM	NM
16 February	11.08am	NT	NT	NT	NT	NM	NM
27 March	3.50pm	111.2	0.63	110.9	0.22	NM	NM
13 April	11.22am	NT	NT	105.1	0.24	NM	NM
3 May	10.23am	NT	NT	NT	NT	NM	NM
25 May	1.07pm	NT	NT	NT	NT	NM	NM
15 May	12.33pm	NT	NT	NT	NT	NM	NM
27 June	2.12pm	NT	NT	NT	NT	NM	NM
16 July	3.32pm	NT	NT	NT	NT	NM	NM
30 July	12.12pm	104.4	0.2	106.5	1.0	NM	NM
17 August	11.53am	NT	NT	NT	NT	NM	NM
31 August	1.34pm	NT	NT	NT	NT	NM	NM
14 September	11.36am	NT	NT	NT	NT	NM	NM
16 October	12.32pm	NT	NT	NT	NT	NM	NM
6 November	2:29pm	NT	NT	NT	NT	NM	NM
4 December	1:43pm	NT	NT	NT	NT	NM	NM

Note: NT – Not Triggered, NM – Not Measured

[1] See **Figure 7**.

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

As shown in **Table 12**, the majority of blasts during 2018 did not trigger the blast monitor. The blast monitor trigger level is generally set to 100dB for airblast overpressure and between 0.1mm/s and 1.0mm/s for ground vibration therefore it is inferred that no blasts exceeded these levels at the monitoring locations. The maximum airblast overpressure recorded throughout 2018 was 111.2dB and the maximum ground vibration was 1mm/s, which is below the adopted criteria presented in **Table 11**.

All blasting was undertaken between 10:23am and 3.32pm, i.e. within of the prescribed hours for blasting.

Metromix complied with all blasting criteria for all blasts monitored during the reporting period.

In terms of historic trend analysis, during 2015 and 2016, it was rare for the blasting activities to trigger the blast monitor, whereas the majority of blast events triggered the monitors in 2017. Only four blasts during 2018 triggered the blast monitor. This is considered most likely due to the blasting size and locations during 2017 compared to other years. Between 2015 and 2018 there have been no instances where the criteria presented in **Table 11** were exceeded and all blasting results are consistent with those predicted in the EA.

Both airblast overpressure and ground vibration results are below the predictions made in the EA for the Teralba Extensions Project. However, it is noted that the assessment was based on modelling of worst-case scenarios and blast MIC of up to 60kg.

6.4 AIR QUALITY

6.4.1 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, however, *Condition (3)17* requires 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 2018 but compliance and an estimated annual average levels has been inferred from PM_{10} monitoring results.

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.

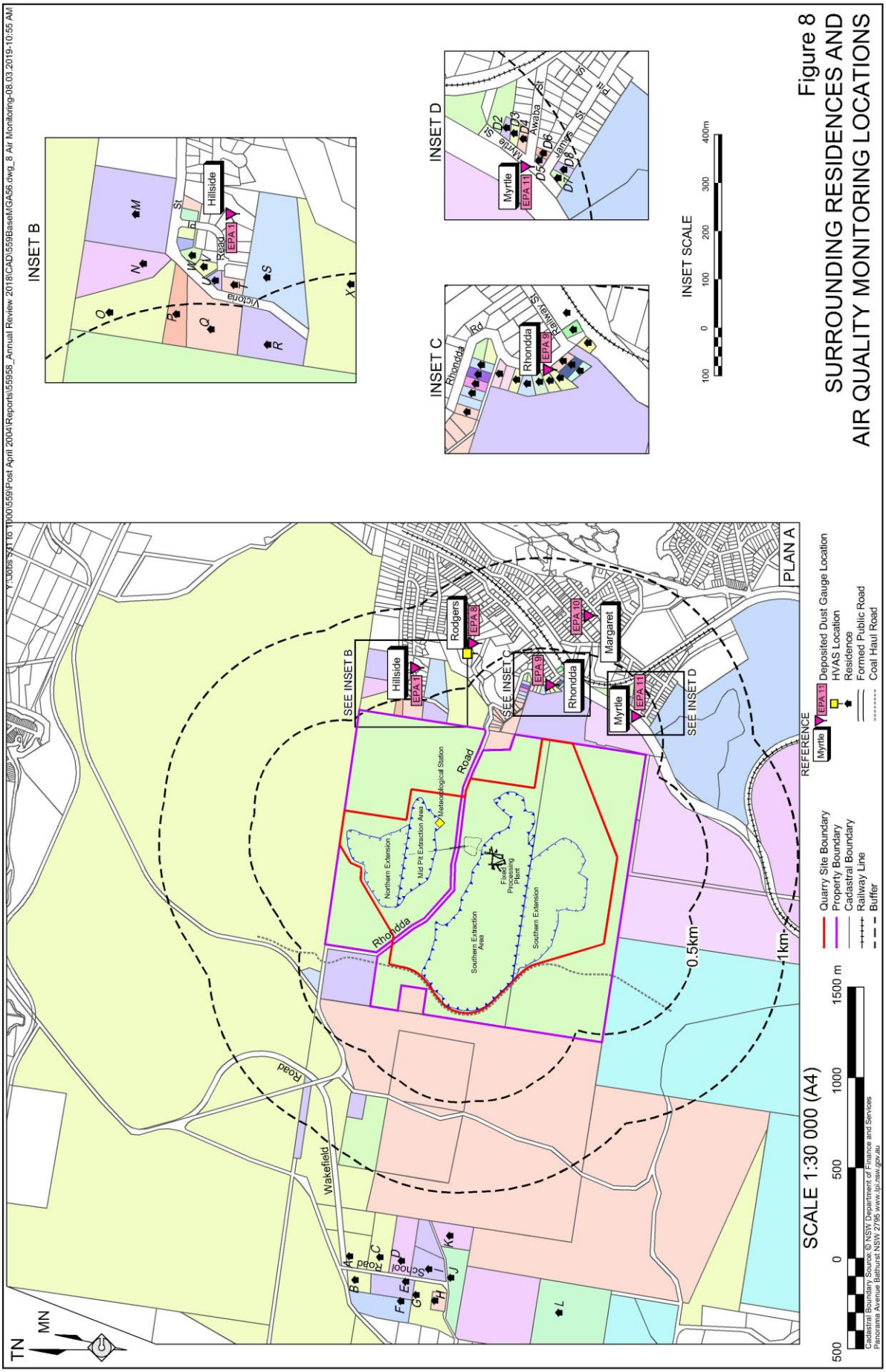


Figure 8
SURROUNDING RESIDENCES AND
AIR QUALITY MONITORING LOCATIONS

6.4.2 Air Quality Monitoring Locations and Frequency

The current air quality monitoring network consists of five deposited dust gauges and the HVAS (see **Figure 8**). **Table 13** provides the coordinates of each location and the date established / sampling frequency respectively. The HVAS was installed in April 2014. In January 2019, the landowners at the Margaret Street location notified Metromix that they no longer granted access to the property for the dust monitoring. The dust gauge was subsequently moved to a location on York Street and monitoring in this location commenced from 1 February 2019.

Table 13
Locations of Air Quality Monitoring Equipment

Monitoring Location*	Easting	Northing	Date Established	Sampling Frequency
DDG – Hillside	369422	6352680	June 2004	Monthly
DDG – Margaret	369622	6351763	April 2011 – Dec 2018	Ceased
DDG - York	369777	6352013	1 Feb 2019	Monthly
DDG – Myrtle	369071	6351492	June 2004	Monthly
DDG – Rhondda	369240	6351972	June 2004	Monthly
DDG – Rodgers	369467	6352369	April 2011	Monthly
Weather Station	368413	6352751	March 2013	Continuous
HVAS	369467	6352369	April 2014	6 days
* See **Figure 8**				DDG = Deposited Dust Gauge

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.

6.4.3 Air Quality Criteria

The air quality criteria for the Quarry, as outlined within *Condition 3(17)* of PA10_0183, are provided in **Table 14**.

Table 14
Air Quality Criteria

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

6.4.4 Air Quality Monitoring Results

Table 15 presents the results of the deposited dust monitoring program and **Table 16** presents the results of the PM_{10} monitoring during the reporting period.

Table 15
Deposited Dust Monitoring Results – 2018

	Deposited Dust Levels (g/m²/month)				
Residence ID	**Rhondda[1]**	**Myrtle[1]**	**Hillside[1]**	**Rodgers[2]**	**Margaret[2]**
Criterion	4	4	4	4	4
Pre - 2018 Average*	1.0	1.2	1.5	1.3	1.1
Results 2018					
January	1.1	1.0	1.5	2.5	1.0
February	0.7	0.7	1.4	0.7	1.0
March	0.7	0.8	1.5	0.6	1.0
April	0.6	0.5	1.2	0.5	0.7
May	0.9	0.6	2.4	0.6	0.7
June	0.5	2.1	5.5	0.5	0.4
July	0.2	0.4	0.5	0.3	0.6
August	1.9	1.5	2.1	1.0	2.4
September	0.7	1.2	1.1	0.7	1.8
October	0.4	1.2	0.8	1.1	1.0
November	1.4	1.6	4.3	1.4	2.4
December	2.7	2.5	3.5	3.4	2.1
Average	1.0	1.2	2.2	1.1	1.3

* 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

Table 16
PM_{10} Air Quality Monitoring Results – 2018

Month	**Samples (Run Dates) (Number)**	**Monthly Average Result (µg/m³)**	**Daily 24hr PM_{10} Exceedance**	**Annual Average (µg/m³)**
Criteria		**50**	**50**	**30**
January	6	21.5	No	
February	4	14.5	No	
March	5	17.0	No	
April	5	13.2	No	
May	6	12.5	No	
June	5	4.8	No	
July	5	22.2	No	
August	5	16.2	No	
September	5	13.2	No	
October	5	14.8	No	
November	5	32.8	Yes (63)	
December	5	24.4	No	
Annual Average				17.3

It is generally recognised that PM_{10} constitutes approximately 40% of Total Suspended Particulates (TSP) and that compliance with TSP criteria may be demonstrated by dividing the recorded PM_{10} by 0.4. This is a common and accepted practice in low risk situations.

Based on this approach, the annual average TSP for the Quarry is estimated to be 43.3µg/m^3. This is well within the assessment criteria of 90.0µg/m^3

6.4.5 Analysis of Results

The annual average deposited dust levels were compliant throughout 2018, although two monthly exceedances of the 4g/m^2/month were recorded at the Hillside Street gauge in June and November 2018 (5.5 and 4.3g/m^2/month respectively). Monitoring throughout the remainder of the reporting period at this location was between 0.5g/m^2/month and 3.5g/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 the 2018 reporting period are generally consistent with average results from preceding historic averages and those predicted in the EA for the Quarry.

During the 2018 reporting period, there was one exceedance of the maximum average 24-hour PM_{10} criteria (50ug/m^3) on 21 November 2018 (63ug/m^3). This exceedance is attributable to a regional dust storm that occurred at this time. There was no recorded exceedance of the annual average PM_{10} criteria during the reporting period.

Overall, the monitored particulate matter levels are lower than those predicted in the EA for the Teralba Extension Project, however, it should be noted that the predictions in the EA related to worst-case scenario operations including operations in the Northern Extension and Mid Pit area. Operations in these areas are yet to (re)commence and existing operations remain consistent with these predictions (i.e. no exceedances of the relevant criteria)

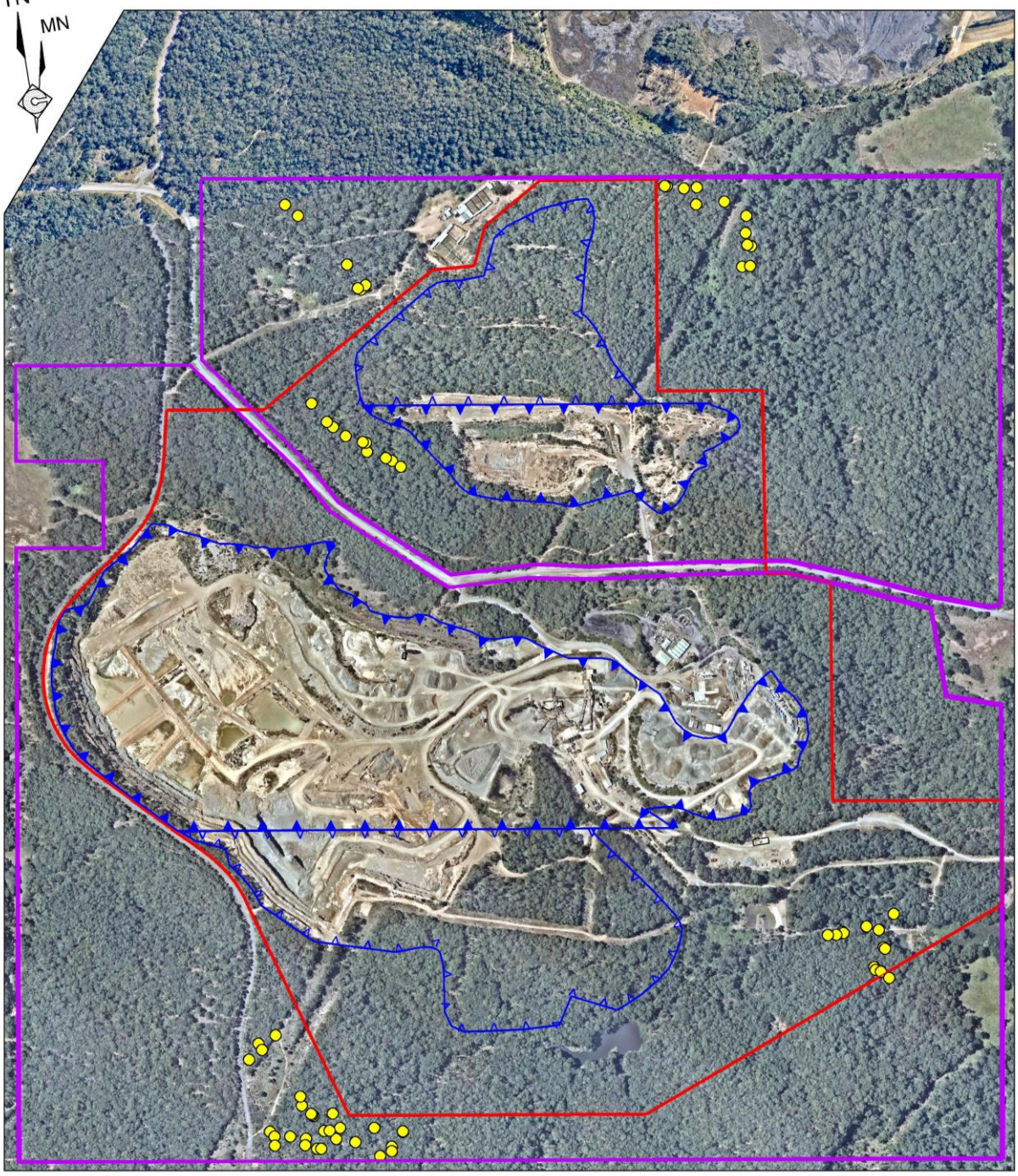
6.5 FAUNA HABITAT

6.5.1 Introduction

In order to mitigate against the impact of removal of hollow-bearing trees, nesting boxes have been installed to provide for replacement nesting sites for the targeted species. The installation of nesting boxes for the following species as outlined within *Condition 3(50)* was completed in April and September 2014 with their locations shown in **Figure 9**.

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

In 2014, 70 nest boxes were installed within the property with these boxes monitored and where necessary relocated in following years. During October and November 2017, a total of 18 nesting boxes were installed to replace those that had previously been damaged or destroyed due to theft or bushfire. The location of the boxes was chosen to avoid the areas previously damaged by bushfire.



REFERENCE
- Property Boundary
- Quarry Site Boundary
- Existing Extraction Area
- Extension Area Boundary
- Nesting Box Location

Note: Nesting box locations are often co-located and are superimposed in this figure.

SCALE 1:10 000 (A4)

100 0 100 200 300 400 500 m

Aerial Photograph Source: Nearmap 4 January 2019

Figure 9
NESTING BOX LOCATIONS

6.5.2 Nesting Box Usage

The nesting boxes were inspected over two days (27 and 28 September 2018) by Echo Ecology and Surveying. The 2018 Nest Box Monitoring Report is provided as **Appendix 3** and provides coordinates for all nesting box locations and an update on box usage during the reporting period. In summary:

- none of the target species (Squirrel Gliders, Little Lorikeets or microbats) were observed using the nest boxes during the inspection;
- seven of the next boxes were recorded as being occupied by Sugar Gliders;
- a further 17 nesting boxes contained leaves with depressions like those created by Sugar Gliders, indicating that these boxes are used by Sugar Gliders for sheltering;
- 23 boxes had leaves present (but no defined nest) indicating that animals had visited the nesting boxes;
- 18 of the nest boxes showed no sign of occupation (the majority of these being microbat boxes);
- Ants were found in two of the boxes;
- no feral honey bees were observed.

The Nest Box Monitoring Report comments that while none of the nest boxes have been used by the target species, the boxes are being used by native fauna species (e.g. Sugar Gliders). The usage by Sugar Gliders has increased progressively over the past four years of monitoring.

Although none of the nesting boxes show evidence of use by the target species over the past 12 months, removing and relocating the nesting boxes would impact use of these boxes by Sugar Gliders. The Report recommends that the boxes continue to be maintained and monitored and only relocated if not used within 10 years of installation. At this time a review of the effectiveness of the nest boxes for the target species would be suitable. Metromix has commenced consultation with Lake Macquarie City Council to determine if this approach is acceptable and aligns with regional management strategies. No nesting boxes will be moved until the outcomes of this consultation are resolved.

6.6 VISIBILITY

It has been acknowledged in previous reporting that the upper benches of the Southern Extension Extraction Area (Stage 1B) are visible from some parts of the residential areas in the vicinity of Speers Point. The upper benches that are visible represent only minor impacts, as Speers Point is more than 4.3km from the Quarry.

Plate 11 displays the area visible from Speers Point.

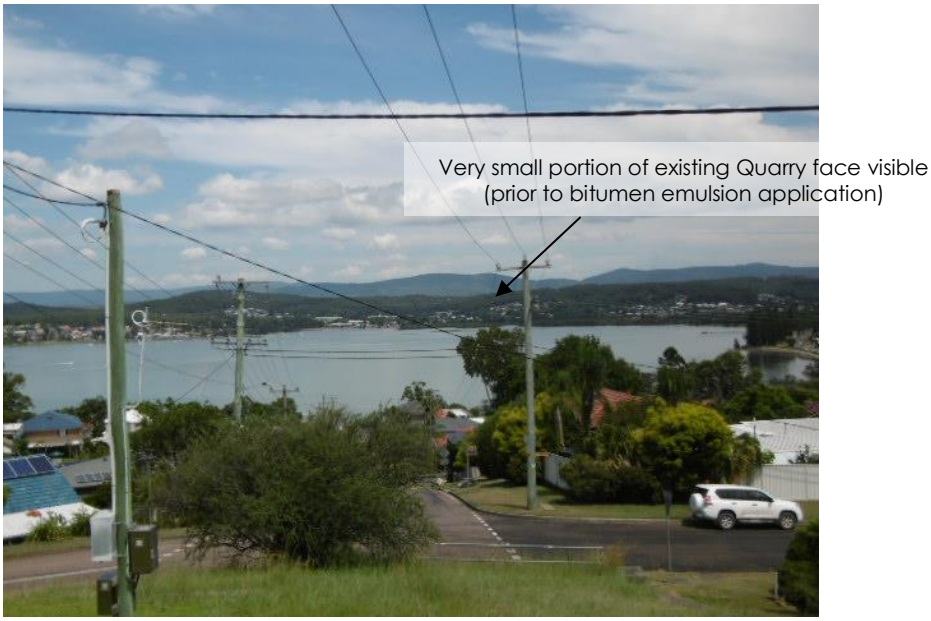


Plate 11 View of the Quarry from Speers Point

In order to mitigate visual impacts from these locations, Metromix prioritised revegetation activities on the two upper benches within Stage 1B with tubestock and placed logs, etc. (**Plate 7)** and trialled bitumen emulsion applications on the visible faces. While the bitumen emulsion trials were considered successful, it is recognised that tree screening will be important to provide a vegetated view consistent with the surrounding landscape.

During the reporting period, rehabilitation activities on these benches was enhanced through watering and maintenance. Vegetation condition would continue to be monitored in this area.

7. WATER MANAGEMENT

7.1 INTRODUCTION

The most recent version of the Surface Water Management Plan for the Teralba Quarry was approved by DPE on 2 October 2018.

The surface water management system of the Quarry comprising Dams A to G continued to operate efficiently. Given the relatively dry weather conditions experienced during 2018, water was only released from site on one occasion (Dam B) in October 2018. The practice of pumping from Dam H to Dam G continued to reduce the quantity of water reporting to Dam D.

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 2018.

Metromix was not required to supply water to any users whose water supply was affected by the Quarry operation. The nearest bore that is located down-gradient of the Quarry is stock/domestic well GW080494 in Fassifern Road, Fassifern, approximately 2.6km to the south. It is considered unlikely that Quarry activities will impact this bore.

7.2 WATER QUALITY

7.2.1 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 (see **Plate 9**). 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.

7.2.2 Water Quality Location, Sampling and Frequency

Water quality monitoring is required to be undertaken at EPA Point 4 (Mine Adit Dam overflow – **Plate 9**), 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 10**.

Table 17 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.

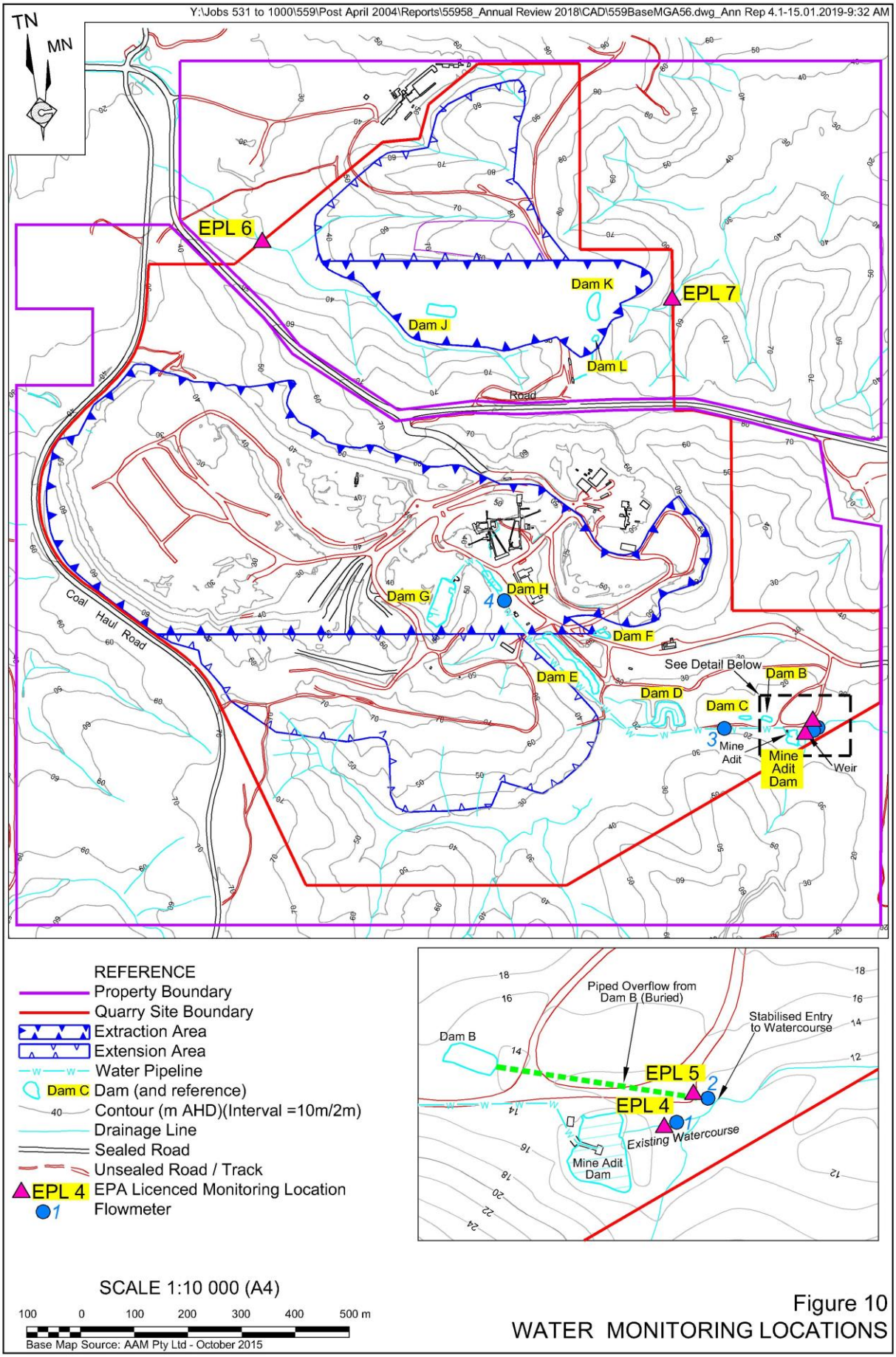


Figure 10
WATER MONITORING LOCATIONS

Table 17
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	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

7.2.3 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 18** 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 18
Surface Water Monitoring Results – 2018

Page 1 of 2

	pH	EC	TSS	Comments	Method
Units	pH Units	µS/cm	mg/L		-
EPL Criterion*	6.5-8.5	NA	<50	None	-
ANZECC Water Quality Limits	6.5-8.5	125-2200	<50	None	-
EPA Discharge Point 4 – Mine Adit Dam (Monthly)					
January	7.1	2160	<5	None	Grab Sample
February	7.17	2280	7	None	
March	7.19	2430	<5	None	
April	7.17	2270	16	None	
May	7.31	2090	<5	None	
June	7.22	2150	<5	None	
July	8.07	2010	9	None	
August	7.5	2030	8	None	
September	7.37	2230	<5	None	
October	7.15	2090	6	None	
November	7.34	2020	<5	None	
December	7.12	2080	<5	None	

Table 18 (Cont'd)
Surface Water Monitoring Results – 2018

Page 2 of 2

	pH	EC	TSS	Comments	Method
EPA Discharge Point 5 – Dam B (Daily during Discharge)					
January	No Discharge				Grab Sample
February					
March					
April					
May					
June					
July					
August					
September					
October	6.88	1220	<5	None	
November	No Discharge				
December					
EPA Discharge Point 6 – Northwestern Boundary to Creek (During 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 (During 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.

7.2.4 Water Use

Water Access Licence 40303 permits the extraction and use of water from the Mine Adit Dam with an allocation of 1 407 shares (currently 1ML per share).

Reporting is currently only required for water pumped from the Mine Adit Dam to Dam G under licence as this represents groundwater intercepted from the Mine Adit (see **Plate 9**). **Table 19** displays the water flow measurements monitored between the Mine Adit Dam to Dam G during the reporting period.

The use of 923.6ML during the reporting period is consistent with historic use (1 077ML in 2017 and 1 233ML in 2016). Water use is closely tied to the requirements of the washing processes used for product preparation and dust supression.

Table 19
Surface Water Flow Measurements – Mine Adit Dam to Dam G – 2018

Month	Flow Meter Readings	Usage (ML)
January	2469040	63.7
February	2526704	57.7
March	2561866	35.2
April	2637715	75.8
May	2712274	74.6
June	2804982	92.7
July	2894971	90.0
August	2960271	65.3
September	3061105	100.8
October	3168706	107.6
November	3245009	76.3
December	3328963	84.0
Total		**923.6**

7.2.5 Discussion of Results

In considering water quality limits nominated in **Table 18**, the following comments are relevant.

1. pH values within the Mine Adit Dam varied from 7.1 to 8.07 with a median pH of 7.31.
2. Discharge from Dam B occurred on one occasion during the reporting period, with the pH values near neutral at 6.88 which is within the EPL and ANZECC criterion of 6.5 to 8.5.
3. EC values were monitored within the Mine Adit Dam and recorded a range between 2 010µS/cm and 2 430µS/cm and a median value of 2 120µS/cm, which is slightly above the ANZECC guideline level. EC values recorded during discharge from Dam B was almost half that recorded at Adit Dam.
4. TSS values were within the EPL criterion and ANZECC guideline level, with all samples returning levels below 20mg/L.

Flow measurements indicate that a total of 923.6 ML of water was pumped from the Mine Adit Dam to Dam G during the 2018 reporting period. This is within the licence allocation of 1 407ML held by Metromix under Water Access Licence 40303.

7.2.6 Conclusion

Water monitoring 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 previous reporting periods (2015 to 2017) and indicates that the Quarry continues to operate with negligible impact to the quality of water in Lake Macquarie.

8. REHABILITATION

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

The status of land under rehabilitation adjacent to and above the former Silt Cell 1 and Silt Cell 2 is provided in **Plates 5** and **6**. T.E.N.T.A.C.L.E. Inc. prepared a progress report of the regeneration works undertaken during 2018 on behalf of Metromix, summarising the aims, methods and results of the rehabilitation works. A copy of the progress report by T.E.N.T.A.C.L.E Inc. is reproduced in **Appendix 4**.

Rehabilitation works during the reporting period included three key activities.

- Revegetation of completed benches and silt cells.
- Weeding within active areas of the Quarry and in the undisturbed non-operational areas of the property.
- Weeding and maintenance of previously rehabilitated areas included the location of translocated *Tetratheca juncea*.

Figure 11 identifies the location of rehabilitation activities undertaken throughout the reporting period.

A variety of weed control 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. Weed management activity focussed upon the following weeds during the reporting period.

- Lantana (*Lantana camara*)
- Camphor Laurel (*Cinnamomum camphora*)
- Crofton weed (*Ageratina adenophora*)
- Asparagus Fern (*Asparagus aethiopicus*)
- Pampas grass (*Cortaderia selloana*)
- Ochna (*Ochna serrulata*)
- Wild tobacco (*Solanum mauritianum*)
- Cassia (*Senna pendula var. glabrata*)
- Narrow-leaf Privet (*Ligustrum sinense*)
- Bitou bush (*Chrysanthemoides monilifera*)
- Castor oil plant (*Ricinus communis*)
- Paspalum (*Paspalum dilatatum*)
- Blackberry (*Rubus fruticosus*)
- Green cestrum (*Cestrum parqui*)

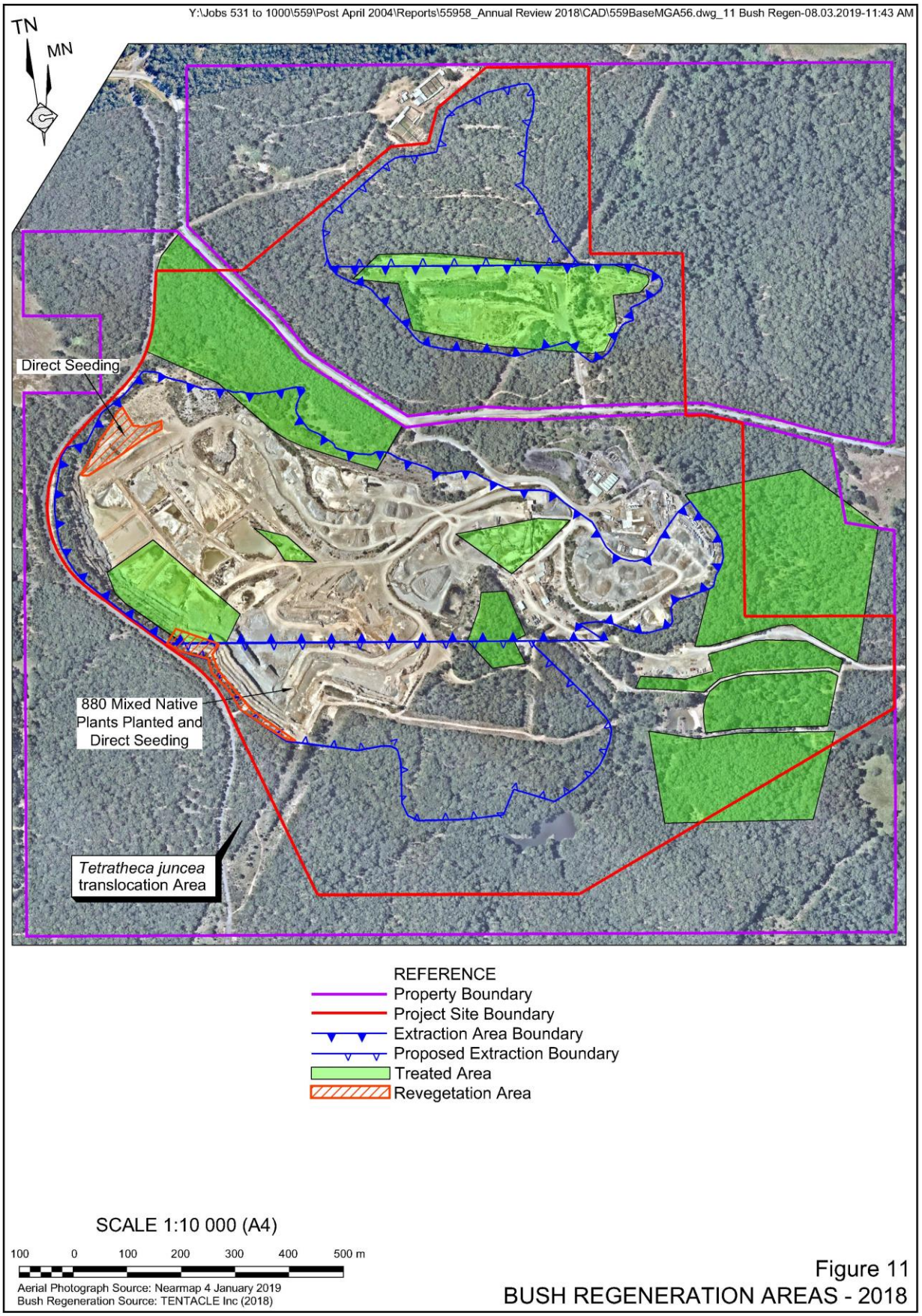


Figure 11
BUSH REGENERATION AREAS - 2018

A total of 825.5 hours were worked by T.E.N.T.A.C.L.E. staff preforming environmental restoration and bush regeneration activities during 2018. This included four days spent removing pampas grass (*Cortaderia selloana*) along with their seed head. All seed heads were bagged then removed from site and treated with Glyphosate.

In 2015, 40 endangered *Tetratheca juncea* were translocated from the active areas of the Quarry to a location to the south, 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 2018 and reported that 75% of the original population continued to survive and that there was no presence of weed species in the translocation area.

During 2018 a total of 480 tree saplings and 400 shrubs were planted in the southern portion of the Quarry along completed benches and completed silt cells. The planting consisted of the following.

- 120 Spotted Gum – *Corymbia maculate*;
- 120 Grey Ironbark – *Eucalyptus paniculate*;
- 120 Grey Gum – *Eucalyptus punctate*;
- 120 Smooth-Barked Apple – *Angophora costata*;
- 200 Prickly Moses – *Acacia ulicifolia*; and
- 200 Prickly Shaggy Pea – *Podolobium ilicifolium*.

At the time this document was finalised, the survival rate for all plants associated with the rehabilitation program is 85%. It has been identified that planting in autumn provides the greatest opportunity of planting success.

8.2 BIODIVERSITY OFFSET

A modification to PA 10_0183 was approved on 16 April 2018 that removed the approved biodiversity offset area from the consent and replaced this with biodiversity credits. A revised biodiversity offset strategy was subsequently approved in July 2018 that describes Metromix's intention to retire credits following purchase on the open market.

The staged biodiversity offsetting obligations are described in Conditions 3(54) to 3(56) of PA 10_0183. The staged obligations are aligned with the staged development of the Quarry such that Metromix cannot proceed to the next stage of development of the Quarry until the biodiversity offset obligations for that stage have been satisfied. **Table 20** summarises the biodiversity offset strategy for the Quarry.

The biodiversity credits for Stage 1 and Stage 2 in the Southern Extension were retired on 21 December 2018.

Table 20
Offsetting Stages, Timing and Credits

Development Stage	Credit Required	Number of Credits	Timing
Stage 1 and Stage 2 in Southern Extension	PCT1589 or equivalent	670	31 December 2018
Stage 1 and Stage 2 in Southern Extension	Black-eyed Susan (*Tetratheca juncea*)	1 103	31 December 2018
Stage 3 in Southern Extension	PCT1589 or equivalent	171	2027 (indicative)
Stage 1, Stage 2 and Stage 3 in Northern Extension	PCT1589 or equivalent	502	2034 (indicative)

8.3 DISCUSSION

Progressive rehabilitation activities have been reviewed in relation to the rehabilitation objectives described in Condition 58 of Schedule 3 of PA 10_0183 and presented in **Table 21**.

Table 21
PA10_0183 *Condition 3(58)* Rehabilitation Objectives

Page 1 of 2

Feature	Objectives	Comments
Site (as a whole)	• Safe • Hydraulically and geotechnically stable • Non-polluting • Fit for the intended post-mining land use(s) • Final landform integrated with surrounding natural landforms as far as is reasonable and feasible • Minimising visual impacts when viewed from surrounding land.	Areas subject to progressive rehabilitation satisfy this objective. Backfilling of silt cells is occurring progressively to ensure these areas are stable and suitable for revegetation activities.
Surface Infrastructure	• To be decommissioned and removed, unless otherwise agreed by the Secretary.	No areas have required decommissioning of infrastructure to date.
Benched Quarry Walls	• Landscaped and revegetated utilising native tree and understorey species, ensuring that the tree canopy is restored and integrated with the surrounding canopy to minimise visual impacts.	Revegetation activities on the two upper benches within Stage 1B applied a selection of native tree flora species in accordance with the species described in the Landscape Management Plan. A success rate of 85% has been reported by T.E.N.T.A.C.L.E. Inc.
Quarry Pit Floors and Silt Ponds	• Landscaped and revegetated utilising native flora species and felled trees from clearing. • Revegetation not required for existing and proposed industrial areas.	Revegetation activities on the Quarry floor areas to the west of the Southern Extraction Area (see Figure 11) applied available mulch and leaf litter material and a selection of native tree flora species in accordance with the species described in the Landscape Management Plan. A success rate of 85% was reported by T.E.N.T.A.C.L.E. Inc.

Table 21 (Cont'd)
PA10_0183 *Condition 3(55)* Rehabilitation Objectives

Page 2 of 2

Feature	Objectives	Comments
Other land affected by the Project	Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of: • native endemic species: and • a landform consistent with Figure 8 (Appendix 6 of PA 10_0183) and the surrounding environment.	Progressive rehabilitation has applied native endemic species described in the approved Landscape Management Plan. Progressive final landform development is considered to be consistent with Appendix 6 of PA 10_0183.

Progressive rehabilitation activities have continued generally in accordance with the planned progress for rehabilitation described in the approved Landscape Management Plan and similar to that undertaken in previous years.

8.4 REHABILITATION DURING THE NEXT REPORTING PERIOD

The subsoil, topsoil and biomass from Stage 2 will be relocated throughout 2019, together with the ongoing establishment of the proposed rehabilitation area over the remainder of Silt Cell 2 and Silt Cell 3. 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".

A further planting program will be undertaken during the reporting period, principally in the vicinity of former Silt Cell 2 and Silt Cell 3. Planting will preferentially occur in Autumn due to past success at this time. The scale of planting will be determined by climatic conditions including predicted rainfall.

9. COMMUNITY

9.1 SURROUNDING COMMUNITY

During the reporting period, it is understood that there were no changes to the land ownership adjacent to the Quarry. Metromix maintained contact with its closest neighbours throughout 2018 through informal discussions and involvement with the Community Consultative Committee.

9.2 COMMUNITY CONSULTATIVE COMMITTEE MEETINGS

Two meetings of the Teralba Quarry Community Consultative Committee (TQCCC) were held during the reporting period on 9 May 2018 and 17 October 2018.

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

9 May 2018 CCC Meeting

Mr William Sanderson presented an overview of the activities undertaken for the year to date. The committee was updated on operations and the approved changes to the biodiversity offsetting strategy and ongoing rehabilitation.

17 October 2018 CCC Meeting

The meeting included a brief site visit. Mr William Sanderson presented an update on operations during the year, compliance issues and community complaints. Monitoring records were discussed. Mr Mo Yunusa was introduced to the committee as the new liaison for Metromix at future committee meetings.

9.3 ENVIRONMENTAL COMPLAINTS

Metromix received one complaint as a result of its activities in 2018. A summary is provided below. A copy of the complaints record is provided in **Appendix 6**. This complaint is consistent with the history of very few complaints at the Quarry. It should also be noted that the majority of historical complaints have related to traffic or transport matters. This demonstrates Metromix's successful management of operations during the reporting period.

April 2018

A community member complained that they had identified one particular truck that had noisy brakes and was generating excessive noise when stopping at intersections within Teralba (specifically, the corner of Railway St at the rail bridge and in Short Street). The truck owner was approached, and the truck was removed from operations for the Teralba Quarry. This information was provided to the complainant.

9.4 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.

10. INDEPENDENT AUDIT

No independent audits of the operation were undertaken during the reporting period. The last Independent Environmental Audit was undertaken at the Quarry by Trevor Brown & Associates on 20 and 21 February 2017 and the Audit Report was submitted to DPE in March 2017 with a Response to Audit Recommendations document. The nominated audit period was February 2014 to February 2017. Acceptance of the Independent Environmental Audit was provided by DPE on 17 January 2018 with the following comments.

1. DPE requested that the next audit period include January and February 2017 (i.e. the next audit will be for the period from January 2017 to December 2019).
2. Further discussion of compliance with criterion for Total Suspended Particulates (TSP) in the next annual review including indicative calculations where appropriate.

Metromix agrees with the Department's request regarding the audit period. A more detailed discussion of compliance with assessment criteria for TSP has been included in Section 6.4.4.

11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 COMPLIANCE ASSESSMENT

11.1.1 Project Approval PA10_0163

An internal environmental compliance review was undertaken in February 2019 by Mr Mo Yunusa (Quarry Supervisor) in conjunction with RWC and has been included within **Appendix 1**, drawing upon the compliance tables incorporated within the independent audit undertaken by Trevor Brown & Associates (Brown, 2017).

Three non-compliance issues were identified during the reporting period with two of the non-compliance issues relating to the same condition.

- In the period between 29 July 2018 and 10 August 2018 (13 days) the meteorological station was offline for repair following vandalising of the equipment. This break in continuous monitoring was notified to DPE and acknowledged in correspondence dated 15 August 2018.
- On 11 October 2019 the sensor on the equipment failed but the issue was resolved within the same day.
- Following the approval of Modification 1 to PA 10_0183 Metromix was required to update and submit all management plans for approval. Metromix is still finalising the amendments to the various management plans and is awaiting comments from stakeholders. During this time Metromix has operated in accordance with the existing approved management plans. Therefore, during the reporting period Metromix has operated in accordance with approved management plans.

It should be noted that both issues related to monitoring or administrative matters and did not threaten environmental harm as a result of the Quarry activities.

11.1.2 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 2018 identified no non-compliances with the conditions of the licence during the period from July 2017 to June 2018.

As noted in Section 11.1.1, one non-compliance issue was identified during the second half of the reporting period. This event was not compliant with the following conditions of EPL 536.

- Condition M4.1 – meteorological conditions monitoring.

EPL 13015 was transferred to Metromix in July 2015 and relates to resource recovery and storage activities associated with the operation of the pugmill. These activities are relevant to PA 10_0183 and therefore not considered in this document.

11.1.3 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 compliance review (see **Appendix 1**), 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 2018 that would contribute to any discrepancies in impacts.

Due to the presence of powerlines in the area designated as extraction stage 1C in the Southern Extension, Metromix propose to commence operations in Stage 2 prior to completing extraction in Stage 1C (see **Figure 12**). This minor deviation in schedule will not sterilise any resource nor create or exacerbate environmental or amenity impacts. Therefore it is considered that this approach is consistent with PA 10_0183.

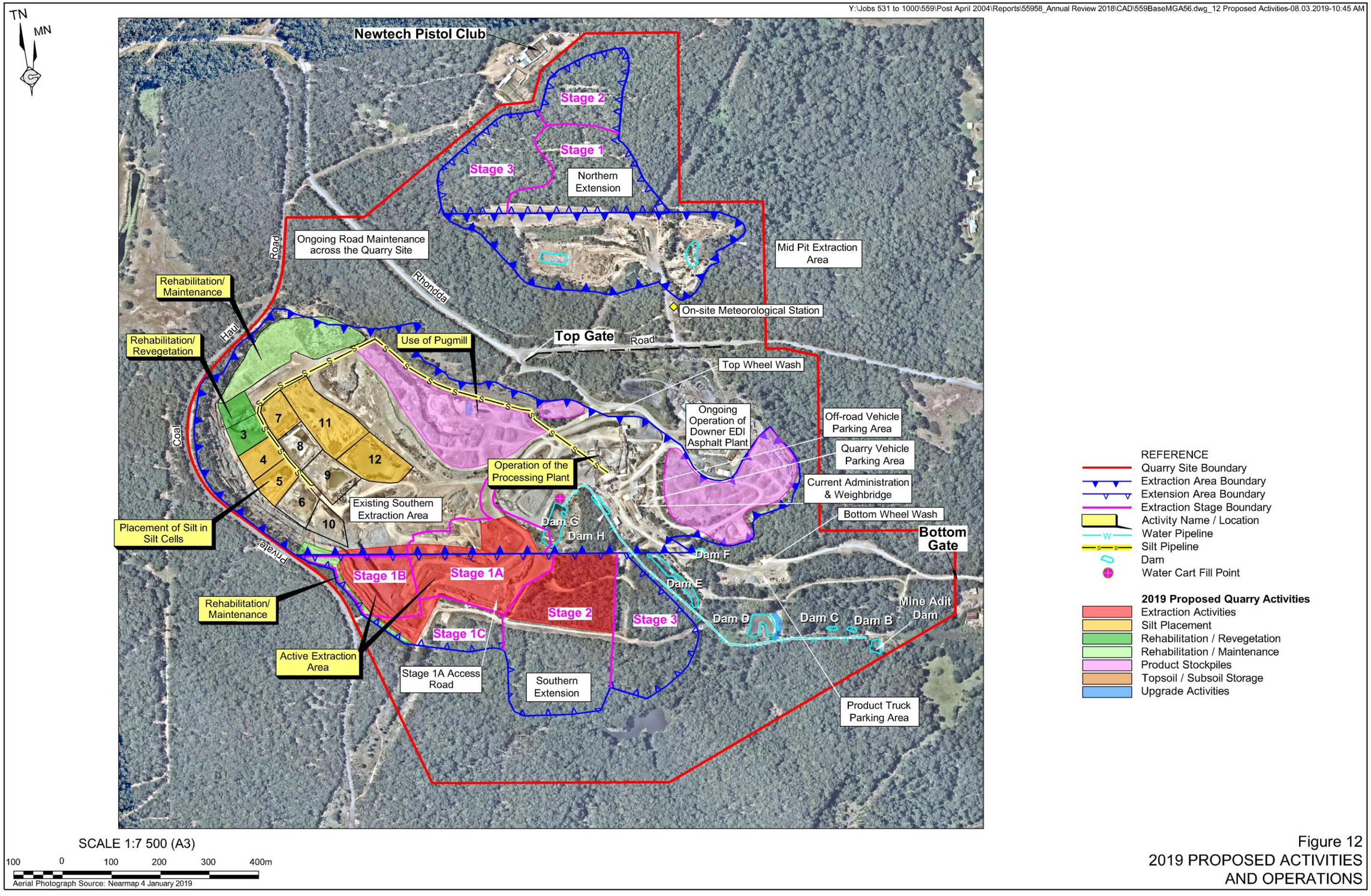


Figure 12
2019 PROPOSED ACTIVITIES AND OPERATIONS

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12. ACTIVITIES TO BE COMPLETED DURING THE NEXT REPORTING PERIOD

12.1 INTRODUCTION

The following section provides a brief summary of the operational activities planned throughout the 2019 reporting period. **Figure 12** presents the location(s) of the activities described.

12.2 EXTRACTION OPERATIONS

Extraction would continue in the Southern Extraction Area within Stage 1B and Stage 2 (see **Figure 12**). Operations in Stage 1C are limited by the presence of high voltage powerlines. Extraction in Stage 2 before the completion of Stage 1C will not change the visibility of the operations as these will remain obscured by topographic features to the south and east.

12.2.1 Aboriginal Heritage Monitoring

In accordance with the approved Heritage Management Plan, a monitoring campaign involving Aboriginal stakeholders was undertaken on 25 February 2019 to assess the potential presence of Aboriginal items, sites or places along the existing easement for the powerlines. The outcomes of this monitoring will be reporting in the Annual Review for the next reporting period.

12.3 PROCESSING

Processing activities will continue as per the current reporting period in 2019 with approximately 70% being washed. It is forecast that approximately 505,000t of product will be despatched from the Site.

12.4 RECYCLING OPERATIONS

Sale of the remaining material previously stockpiled as part of Civilake's operations will occur in 2019. Metromix will continue to blend conglomerate and concrete washout waste to produce a saleable recyclable roadbase for the civil market.

12.5 OVERBURDEN AND SILT MANAGEMENT

Overburden will be moved in stages during the year as the Stage 1B (North) and Stage 2 pit continues to be developed. Approximately 80 000t of overburden will be moved to cover Silt Cell 3 and prepare this area for rehabilitation.

Silt will continue to be placed in Silt Cell 3 (until completed) as well as Silt Cells 4, 5, 7, 11 and 12.

12.6 WASTE MANAGEMENT

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

12.7 SITE INFRASTRUCTURE AND SERVICES

Boundary fencing and gates at easement areas along Rhondda Rd will continue to be replaced/upgraded (see **Figure 12**).

It is also intended that Metromix will finalise design and relevant agreements to complete realignment of the power line corridor during 2019.

12.8 WATER MANAGEMENT

Water management during the 2019 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.

12.9 BUSH FIRE MANAGEMENT

Bush fire management will continue in accordance with the *Bush Fire Management Plan* during 2019. The 20m Asset Protection Zone (APZ) around the fuel and oil storage areas will be maintained.

12.10 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.

12.11 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*).

12.12 VENM/ENM IMPORTATION MANAGEMENT

It is not envisaged any VENM/ENM will be imported into the Teralba Quarry during 2019. However, should it be required for rehabilitation activities, the importation, placement and/or reprocessing of VENM/ENM would not exceed the approved limit of 100 000 tonnes of VENM/ENM per year

12.13 MONITORING

Metromix will continue to undertake and/or commission the following monitoring activities throughout 2019.

- 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: Residences A, B, D, E and H.
- Equipment Noise 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.
- Nesting Box Usage: 3rd quarter.

12.14 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 that Downer EDI will complete installation of a replacement Asphalt Plant in 2019.

It is not expected that coal will be hauled on the Coal Haul Road to the Eraring Power Station during 2019.

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

13. REFERENCES

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

Brown (2017) *Teralba Quarry Independent Audit*, Prepared by Trevor Brown and Associates, February 2017.

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*

Spectrum (2018a) *Teralba Quarry – Results of Attended Noise Monitoring: August 2017*. Spectrum Acoustics Pty Limited

Spectrum (2018b) *Teralba Quarry – Results of Attended Noise Monitoring: November 2017*. Spectrum Acoustics Pty Limited

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