



Calga Sand Quarry

2011 Annual Environmental Management Report

Development Consent:
DA 94-4-2004

Compiled in conjunction with:



R.W. CORKERY & CO. PTY. LIMITED

Calga Sand Quarry

2011 Annual Environmental Management Report

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CONTENTS

	Page
1. INTRODUCTION.....	1
1.1 Scope	1
1.2 Standards and Performance Measures	2
1.3 Site Management and Responsibilities.....	3
1.4 Document Preparation	4
2. OPERATIONS DURING THE REPORTING PERIOD.....	5
2.1 Introduction	5
2.2 Extraction Operations	6
2.3 Overburden and Silt Management.....	9
2.4 Waste Management.....	9
2.5 Site Infrastructure and Services.....	9
2.6 Water Management	9
2.7 Hazardous Material Management.....	9
2.8 Product Transportation	10
2.9 Rehabilitation	10
3. COMMUNITY RELATIONS	13
3.1 Surrounding Community	13
3.2 Community Consultative Committee Meetings.....	13
3.3 Environmental Complaints	13
3.4 Community Involvement	13
4. ENVIRONMENTAL MONITORING	15
4.1 Groundwater	15
4.1.1 Introduction	15
4.1.2 Groundwater Criteria and Results	15
4.1.3 Analysis of Results	17
4.1.4 Conclusion	18
4.2 Surface Water	19
4.2.1 Introduction	19
4.2.2 Water Quality Limits and Results	19
4.2.3 Analysis of Results	21
4.2.4 Conclusion	22
4.3 Noise	22
4.3.1 Introduction	22
4.3.2 Noise Criteria and Results	22
4.3.3 Analysis of Results	26
4.3.4 Conclusion	27



CONTENTS

	Page
4.4 Air Quality.....	27
4.4.1 Introduction	27
4.4.2 Air Quality Goals and Predicted Dust Levels	27
4.4.3 Results	29
4.4.4 Analysis of Results	29
5. COMPLIANCE ASSESSMENT	31
5.1 Development Consent	31
5.1.1 Umwelt Report	31
5.1.2 New Non-Compliances for 2011	31
5.2 Environment Protection Licence	32
6. ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD	33
6.1 Introduction	33
6.2 Extraction Operations	35
6.3 Processing and Product Stockpiling	35
6.4 Waste Management.....	35
6.5 Site Infrastructure.....	35
6.6 Community Involvement	35
6.7 Water Management	37
6.8 Air Quality Management	37
6.9 Product Transportation	37
6.10 Rehabilitation	37
6.11 Monitoring	37
7. REFERENCES.....	38

TABLES

Table 1.1 Calga Sand Quarry – Consents and Licences.....	2
Table 2.1 Overview of Principal Site Activities and Key Environmental Events Throughout 2011.....	5
Table 2.2 Calga Sand Quarry – 2011 Sales – tonnes	6
Table 2.3 Recorded Truck Loads Throughout 2011 * #	10
Table 4.1 Routine Monthly Surface Water Results – 2011	19
Table 4.2 Wet Weather Surface Water Results	21
Table 4.3 Noise Criteria and Predicted/Measured L _{Aeq} Levels – dB(A)	24
Table 4.4 Air Quality Goals	28
Table 4.5 Summary of Dispersion Model Predictions due to Quarry Operations	28
Table 4.6 Deposited Dust Monitoring Results (g/m ² /month).....	29
Table 6.1 2012 Proposed Quarry Activities and Key Events	33



CONTENTS

	Page
FIGURES	
Figure 2.1 2011 Quarry Activities	7
Figure 3.1 Land Ownership and Surrounding Residences	14
Figure 4.1 Groundwater Monitoring Bores	16
Figure 4.2 Surface Water Monitoring Locations.....	20
Figure 4.3 Noise and Dust Monitoring Locations	23
Figure 4.4 2011 Deposited Dust Monitoring Results – Insoluble Matter.....	30
Figure 6.1 Proposed 2012 Quarry Activities	34
Figure 6.2 Proposed Site Layout.....	36
PLATES	
Plate 1 View across Stage 3/4 with new acoustic bund in the background.	11
Plate 2 View across existing stockpile area	11
Plate 3 View across former Dam 10.....	11
Plate 4 Cell 2/5 with overburden stockpile in background	11
Plate 5 View across Stage 3/3 during capping of Dams 10 and 12.....	12
Plate 6 Bund Spray Seeding	12
Plate 7 Dredging of Dams 10 and 12	12
Plate 8 Capping of Cell 2	12
ANNEXURES	
Annexure 1 Development Consent 94-4-2004	A1-1
Annexure 2 Monitoring Data and Reports	A2-1
Annexure 3 Independent Groundwater Audit	A3-1
Annexure 4 Community Consultative Committee Meeting Minutes	A4-1
Annexure 5 Complaints Register.....	A5-1
Annexure 6 Rehabilitation Assessment Report.....	A6-1
Annexure 7 Compliance Schedule for Relevant Development Consent Conditions for Calga Sand Quarry Activities during 2011	A7-1
Annexure 8 Correspondence	A8-1



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1. INTRODUCTION

1.1 SCOPE

This report has been prepared in accordance with *Condition 5(4)* of Development Consent 94-4-2004 to record the activities and environmental monitoring undertaken within and surrounding the Calga Sand Quarry during the period 1 January to 31 December 2011 and to outline the activities and environmental monitoring planned throughout 2012. This condition requires the preparation of a report that:

- *identifies the standards and performance measures that apply to the development* (see Section 1.2);
- *describes the works carried out throughout the last 12 months* (see Section 2);
- *describes the works that will be carried out throughout the next 12 months* (see Section 6);
- *includes a summary of the complaints received during the past year, and compares this to the complaints received in previous years* (see Section 3.3);
- *includes a summary of the monitoring results for the development during the past year* (see Section 4);
- *includes an analysis of these monitoring results against the relevant:*
 - *impact assessment criteria;*
 - *monitoring results from previous years; and*
 - *predictions in the EIS and Amendment Report* (see Sections 4.1.3, 4.2.3, 4.3.3 and 4.4.4);
- *identifies any trends in the monitoring results over the life of the development* (see Section 4.1.3, 4.2.3, 4.3.3 & 4.4.4);
- *identifies any non-compliance during the previous year* (see Section 5); and
- *describes what actions were, or are being taken to ensure compliance* (see Section 5).

In addition, the following conditions specifically request that the subject information is incorporated in this document.

- 3(18) *The results of the yearly Water Management Plan review including:*
 - *details of the review for each sub-plan* (see Sections 2.5 and 4.1.1);
 - *the results of monitoring* (**Annexures 2 and 3**);
 - *the results of the independent groundwater audit (including a copy of the report)* (**Annexure 3**); and
 - *details of the measures undertaken/proposed to address any identified issues* (see Sections 4.1 and 4.2 and **Annexure 3**).
- 3(32c) *A progress report on the re-vegetation and maintenance of the acoustic barrier* (Section 2.8).



- 3(35d) *A report on waste management and minimisation (Section 2.3).*
- 3(39b) *Annual production data (Section 2.3).*

Within 1 month of the completion of each AEMR, *Condition 5(10)* requests that the Applicant:

- *provide a copy of the AEMR to the Council, relevant agencies and the CCC;*
- *ensure that a copy of the AEMR is made publicly available at the quarry; and*
- *a copy of the document is placed on the Rocla website;*

to the satisfaction of the Director-General.

Throughout this document, the land on which the Calga Sand Quarry is located (Lot 1, DP229889) is referred to as the “Quarry Site”.

1.2 STANDARDS AND PERFORMANCE MEASURES

Rocla is required to operate the approved activities at the Calga Sand Quarry in accordance with the consent and licences listed in **Table 1.1**.

Table 1.1
Calga Sand Quarry – Consents and Licences

Consent/Licence	Issue Date	Expiry Date
Development Consent 94-4-2004	28 October 2005	1 July 2030
Environment Protection Licence No 11295	16 December 2002	24 July*
Water Access Licence 20WA211660	6 July 2011	No Expiry
* Licence Anniversary Date		

A modification to Development Consent 94-4-2004 was lodged with the NSW Department of Planning and Infrastructure in late 2011 with all documentation finalised for circulation on 25 January 2012. This modification seeks an amendment to the Development Consent to allow for the relocation of the administration centre to Cell 2/5 to allow for extraction to take place at the site of the existing administration area.

Relevant conditions within Development Consent 94-4-2004 which nominate specific environmental criteria are as follows.

- Noise
 - 3(2) – noise emissions (day, evening and night).

Each of the relevant criteria are presented in Section 4.3.2 in conjunction with the assembled monitoring results.

- Air Quality
 - 3(8) – dust emissions (suspended and deposited).

Each of the relevant air quality goals are presented in Section 4.4.2 in conjunction with the assembled monitoring results.



In addition, *Condition 3(20)* requires Rocla to establish and subsequently maintain a meteorological station in the vicinity of the quarry, to the satisfaction of the DECCW and the Director-General of the Department of Planning. The station is required to as a minimum, unless otherwise authorised by the Director-General, to monitor daily rainfall and evaporation in accordance with the requirements in *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW*.

Relevant conditions within Environment Protection Licence (EPL) 11295 which nominate specific environmental criteria are as follows. As noted above, details of the relevant criteria are presented in Sections 4.3.2 and 4.4.2.

- Noise
 - *Condition L6.1* – noise emission limits (day, evening and night).
 - *Conditions L6.2* and *L6.3* specify the monitoring locations, adjustments due to tonal noise and relevant meteorological conditions for compliance.
- Dust
 - EPL 11295 does not nominate any dust criteria, hence reliance is placed on the criteria nominated in *Condition 3(8)* within Development Consent 94-4-2004.

The performance criteria relevant to assessing groundwater impacts are nominated either in the Site Water Management Plan (Section 6.4) or from the Freshwater Ecosystem Protection Guideline drawn from ANZECC (2000).

All surface water monitoring was undertaken pursuant to the Site Water Management Plan, and for the purposes of assessing compliance, reliance is placed upon the water quality limits nominated within this Plan.

1.3 SITE MANAGEMENT AND RESPONSIBILITIES

The management of the Calga Sand Quarry to ensure all conditional requirements are satisfied is the responsibility of the NSW/Victorian Regional Manager, Mr John Gardiner. Day to day responsibility for the site activities rests with the Quarry Manager, Mr Paul Slough. Other persons involved with site management and compilation of quarry-related documentation and monitoring data include:

- Mr Paul Slough – Quarry Manager (Mr Slough is responsible for Quarry Operations, including environmental monitoring and rehabilitation);
- Mr Pat McCue – Quarry Superintendent (Mr McCue is responsible for Quarry Operations and Planning);
- Mr Alex Echt – NSW Development Manager (Mr Echt is responsible for Government liaison); and
- Mr Col Davies – Carbon Based Environmental Pty Ltd (Mr Davies is contracted to undertake the monthly collection of water samples, recording of groundwater levels and collection/assembly of deposited dust and meteorological data).



1.4 DOCUMENT PREPARATION

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

- Carbon Based Environmental Pty Limited – 2011 Surface Water and Deposited Dust Results Summary (**Annexure 2**).
- RPS Aquaterra – Calga Sand Quarry Annual Groundwater Audit (**Annexure 3**).
- Wilkinson Murray Pty Limited – Compliance Noise Monitoring.
- Toepfers Rehabilitation Environmental & Ecological Services Pty Ltd (TREES) – Calga Sand Quarry, Rehabilitation Assessment Report, July 2011.

This document has been assembled by Mr Rob Corkery (Principal), Mr David Schumacher (Environmental Consultant) and Ms Tabitha Kuypers (Environmental Scientist) with R.W. Corkery & Co. Pty Limited in conjunction with Mr Pat McCue (Quarry Superintendent), Mr Paul Slough (Quarry Manager) and Mr Alex Echt (NSW Development Manager).



2. OPERATIONS DURING THE REPORTING PERIOD

2.1 INTRODUCTION

Table 2.1 lists the principal activities / milestones that occurred at the Calga Sand Quarry throughout 2011. **Figure 2.1** presents the location(s) of the activities described. Reference to operational areas within Calga Sand Quarry are to either “stages” for extraction areas, i.e. consistent with the terminology in the 2004 EIS or “cells” for the completed extraction stages used for silt storage.

Table 2.1
Overview of Principal Site Activities and Key Environmental Events Throughout 2011

January	<ul style="list-style-type: none"> • Prepare Stage 3/4 area for stockpiling purposes • Removing silt from Dam 12 to Cell 3/1
February	<ul style="list-style-type: none"> • Trial cone crusher on oversized material
March	<ul style="list-style-type: none"> • Stripping overburden from Stage 3/6 and stockpiling on Stage 3/5
April	<ul style="list-style-type: none"> • Commence initial sand extraction in Stage 3/6 (interim plan due to unforeseen silt quantities in Stage 3/3) • Continue removing silt from Dam 10, 11 and 12 (see Plate 7)
May	<ul style="list-style-type: none"> • Continue to prepare for extraction and haul road development • Conduct attended compliance noise monitoring
June	<ul style="list-style-type: none"> • Survey new wash plant area within Stage 2 • Conduct unattended compliance noise monitoring
July	<ul style="list-style-type: none"> • Contractor dredging of Dam 10 to Stage 3/1 • Prepare draft plans for wash plant and administration area • Prepare annual Rehabilitation report (TREES Pty Ltd) • Received Water Access Licence 20WA211660 from NSW Office of Water
August	<ul style="list-style-type: none"> • Completed contractor dredging in Dam 10 • Conduct attended compliance noise monitoring
September	<ul style="list-style-type: none"> • Compile plans for modification of development consent, i.e. for new admin, weighbridge and amenities • Submit application to electricity authority for high voltage installation
October	<ul style="list-style-type: none"> • Stripping silt from Dam 11 and placing in Cell 3/1 • Stripping overburden from Dam wall 10 & 12 • Creating entry road to proposed quarry floor
November	<ul style="list-style-type: none"> • Start extracting Stage 3/3. • Capping Cell 2/5 to be ongoing (see Plate 8) • Rehabilitate acoustic bund extension • Erect additional colourbond fence on acoustic bund • Trial new mobile screening plant
December	<ul style="list-style-type: none"> • Conduct attended compliance noise monitoring
<p>Note: Extraction activities occur in areas referred to as “Stages” consistent with the 2004 EIS and silt placement occurs in areas referred to as “cells”.</p>	



2.2 EXTRACTION OPERATIONS

During the reporting period, extraction operations were conducted solely in Stages 3/2B, 3/3 and 3/6. Extraction operations involved:

- ripping and pushing up friable sandstone within Stages 3/2B, 3/3 and 3/6; and
- overburden removal within Stages 3/3 and 3/6.

Figure 2.1 displays the locations where extraction operations were undertaken.

Table 2.2 records the monthly/annual sales of the various products produced at the Quarry during 2011. This data was provided to the Division of Resources & Energy (DTIRIS) in accordance with the requirements of *Condition 3(39b)*.

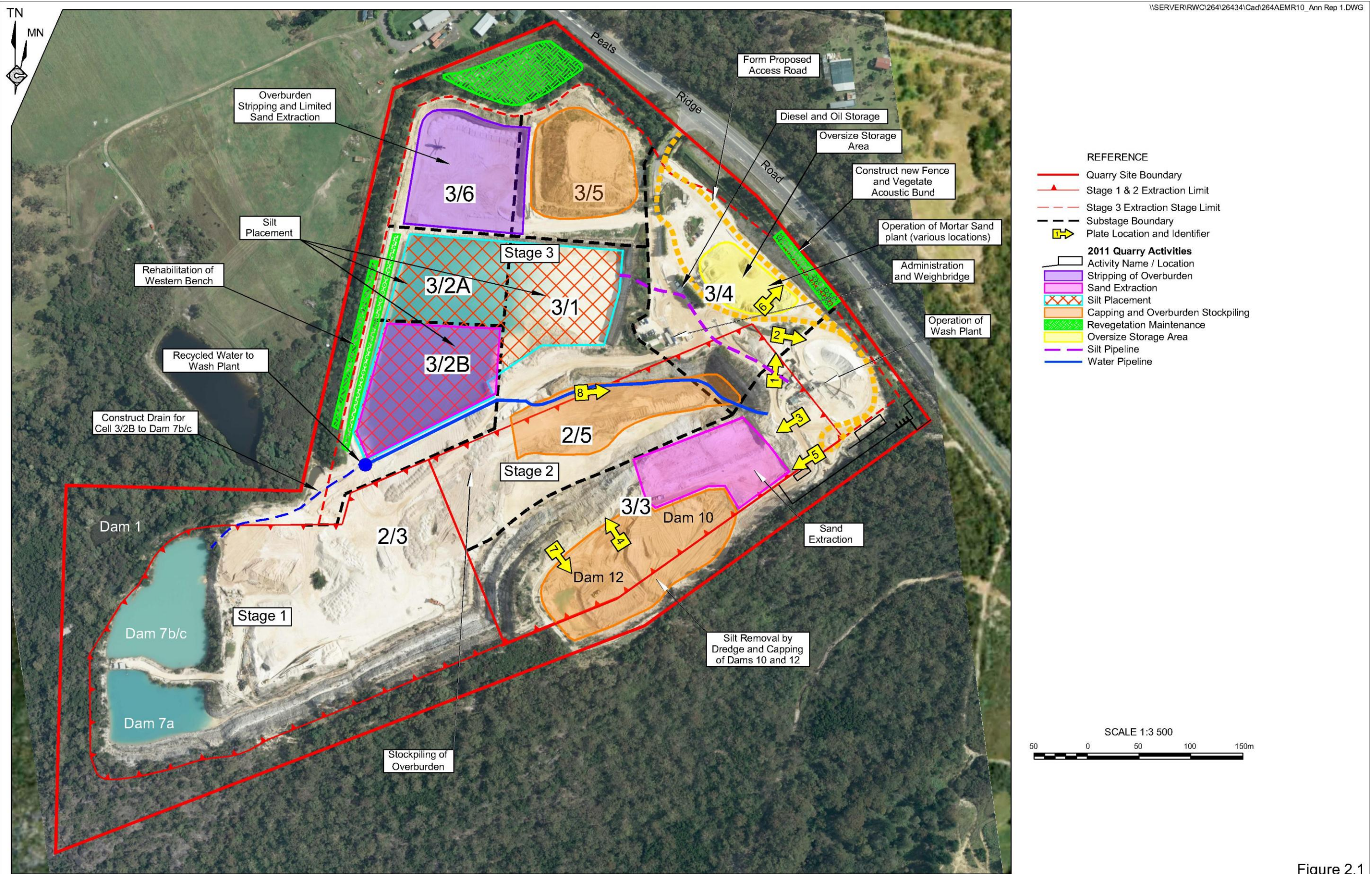
Processing and Product Stockpiling

During the reporting period, sand processing was undertaken using both the wash plant and the mortar sand plant. Approximately 70% of the sand extracted was washed to produce a range of concrete sand products. The remaining sand was dry screened (and blended at times with washed sand) to yield premium mortar sand products.

Table 2.2
Calga Sand Quarry – 2011 Sales – tonnes

	Washed Sand	White Mortar Sand	Yellow Mortar Sand	Other	Monthly Total
Jan	11 990.84	2 363.25	1 316.52	-	15 670.61
Feb	15 794.83	3 391.62	1 637.00	12.78	20 836.23
Mar	17 935.73	3 715.85	1 759.10	-	23 410.68
Apr	13 289.27	2 701.56	1 292.10	-	17 282.93
May	16 581.65	3 369.28	1 953.64	61.96	21 966.53
Jun	13 154.08	2 848.02	1 829.78	51.04	17 882.92
Jul	14 363.48	2 546.10	1 658.94	-	18 568.52
Aug	20 112.78	2 724.86	1 940.62	-	24 778.26
Sep	24 597.69	2 779.22	1 792.86	-	29 169.77
Oct	20 357.48	2 324.18	1 549.18	-	24 230.84
Nov	20 320.40	2 314.20	1 707.04	-	24 341.64
Dec	17 722.52	2 277.78	1 345.80	-	21 346.10
Total	206 220.75	33 355.92	19 782.58	125.78	259 485.03





Base Photo Source: Geo-spectrum (Australia) Pty Ltd - Date of Photograph: 4 January 2012

Figure 2.1
2011 QUARRY ACTIVITIES

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2.3 OVERBURDEN AND SILT MANAGEMENT

The clay overburden from Stage 3/6 was stockpiled on Cell 3/5. Clay overburden from Cell 3/3 was used to cap and batter southern walls of Dam 10, 11 and 12. Small quantities of overburden were sold (see **Table 2.2**).

All silt produced from the sand washing process was placed in Cell 3/1 throughout the reporting period. All oversize material was stockpiled above Cell 2/3. Dredging of accumulated silts in Dams 10 and 12 commenced during the reporting period to expose friable sandstone in Stage 3/3 and remove sufficient silt to achieve the long term landform.

2.4 WASTE MANAGEMENT

All wastes from the site office and amenities were collected in waste skips and removed from site by a waste contractor, as required. During 2011, the following waste was removed from the site:

- 6 600 litres of oily waste was removed for recycling.
- Approximately 8 tonnes of steel was removed for recycling.
- All waste batteries were removed for recycling.
- All oil and fuel filters, and oily rags removed to a licenced waste facility.

2.5 SITE INFRASTRUCTURE AND SERVICES

No changes were undertaken to the site infrastructure and services throughout the reporting period.

2.6 WATER MANAGEMENT

Throughout the reporting period, changes were undertaken to the water management circuits on site. Water management on site was undertaken largely in accordance with the approved Site Water Management Plan, dated February 2006. Rocla transferred return water from the wash plant to Cell 3/1 for silt storage and pumped recycled water from Cell 3/1 directly to the wash plant. Water for dust suppression was supplied from a new stand pipe located adjacent to Cell 2.

Surface water was observed to flow from the Quarry Site (via Dam 1) during the reporting period following periods of prolonged rainfall.

2.7 HAZARDOUS MATERIAL MANAGEMENT

Oil and diesel fuel are the only hazardous substances used on site. Oil is stored on an oil spill tray in the oil storage container located at the diesel fuel bowser, north of the weighbridge (see **Figure 2.1**).



2.8 PRODUCT TRANSPORTATION

Table 2.3 provides a summary of the accumulated number of loads of products that were despatched on a daily basis during 2011 for the periods 5:00am-7:00am, 7:00am-12:00 noon, 12:00 noon- 5:00pm and 5:00pm-10:00pm.

Table 2.3
Recorded Truck Loads Throughout 2011 * #

	Mon	Tue	Wed	Thu	Fri	Sat	Total
Days	42	46	45	46	45	44	
5:00am - 7:00am	412	380	367	423	382	247	2211
7:00am - 12:00 noon	725	768	787	803	775	238	4096
12:00 noon - 5:00pm	490	479	485	426	405	10	2295
5:00pm - 10:00pm	0	3	2	2	0	0	8
Total	1627	1630	1642	1654	1562	495	8610
* Based on an average load of 31.5t. # One load generates two truck movements.							

The data in **Table 2.3** reveals that 73% of the products were despatched between 5:00am and 12:00 noon and less than 0.1% of products were despatched after 5:00pm. Only 6% of the products were despatched on Saturdays.

2.9 REHABILITATION

Rehabilitation activities undertaken during 2011 involved the construction and revegetation of the extension to the acoustic bund along the eastern boundary of Stage 3/4 with Peats Ridge Road (see **Plate 6**) as well as the emplacement of overburden within the former Dams 10 and 12 (see **Plate 5**).

TREES' report on revegetation of status of previous rehabilitation/maintenance is presented in **Annexure 6**.





\\SERVER\RWC\264\26433\Cad\264Base_Plates 2.DWG

Plate 1: View across Stage 3/4 with new acoustic bund in the background.
(Ref: E664M_001)

Plate 2: View across existing stockpile area
(Ref: E664M_003)



Plate 3: View across former Dam 10
(Ref: E664M_011)

Plate 4: Cell 2/5 with overburden stockpile in background.
(E664M_015)



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Plate 5: View across Stage 3/3 during capping of Dams 10 and 12.
(Ref: E664M_Capping Dams 111012)

Plate 6: Bund Spray Seeding
(Ref: E664M_Bund spray seeding)



Plate 7: Dredging of Dams 10 and 12
(Ref: E664M_Calga dredging dams 10 12 072)

Plate 8: Capping of Cell 2.
(E664M_Capping Cell 2)



3. COMMUNITY RELATIONS

3.1 SURROUNDING COMMUNITY

Figure 3.1 displays the land ownership and residences around the Calga Sand Quarry. During the reporting period, there was only one change in the land ownership around Calga Sand Quarry. Property D2 was purchased by Glenworth Valley Pastoral Company. Rocla maintained contact with its neighbours throughout 2011 through direct one-to-one contact and involvement in the Community Consultative Committee.

During the reporting period, a total of six local residents inspected the quarry and representatives from the local Aboriginal groups were provided access to the engravings on the adjoining property through the quarry.

3.2 COMMUNITY CONSULTATIVE COMMITTEE MEETINGS

Two scheduled Community Consultative Committee meetings were held on 14 March 2011 and 19 September 2011 to discuss the activities within the quarry and to report on any updates regarding the "Southern Extension." The number of meetings held is consistent with the requirements of *Condition 5(8)(c)* for at least two meetings each year.

An extraordinary meeting was held on 18 October 2011 at Coastplan Consulting to discuss the status of non-compliances identified in the Umwelt 2009 Independent Audit Report and issues for Rocla to follow up.

The minutes of all meetings are reproduced as **Annexure 4**.

3.3 ENVIRONMENTAL COMPLAINTS

No complaints were received during the reporting period. This represents a significant decrease from the previous reporting period when 41 noise-related complaints were received.

3.4 COMMUNITY INVOLVEMENT

During the reporting period, Rocla personnel hosted various visits from local community representatives and neighbours as part of the Community Consultative Committee Meetings as discussed in Section 3.2.



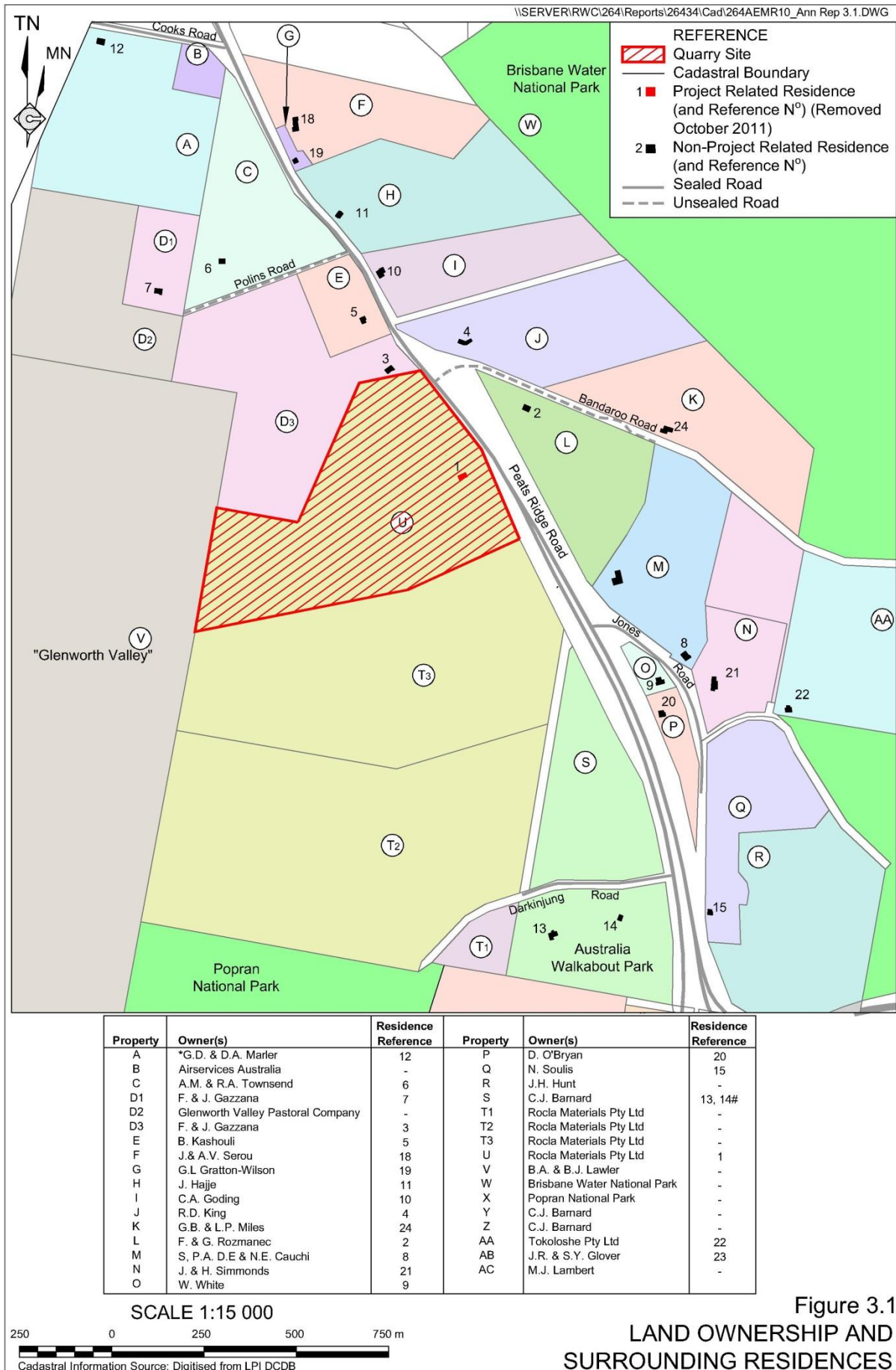


Figure 3.1
LAND OWNERSHIP AND
SURROUNDING RESIDENCES



4. ENVIRONMENTAL MONITORING

4.1 GROUNDWATER

4.1.1 Introduction

Groundwater monitoring throughout the reporting period was undertaken on behalf of Rocla by Carbon Based Environmental Pty Ltd and an audit of the results was undertaken by RPS Aquaterra (RPS Aquaterra, 2012) in accordance with the requirements of *Condition 3(18)*. The audit report is provided in full as **Annexure 3**, with a summary of the results provided as follows.

During the monitoring period, 25 groundwater bores were monitored, both within the Quarry Site and on neighbouring properties, to collect data on groundwater levels and quality, and to monitor for any potential impacts from sand extraction on water supply bores on the neighbouring properties. The locations of the monitoring bores are shown on **Figure 4.1**. Rocla sought permission to monitor the groundwater levels and quality in the bore on the Australia Wildlife Walkabout Park in September 2009 but this has not yet been granted.

Rocla was approached by Mr L. Wilson (Property G, Figure 3.1) regarding his claimed impact on his water bore. Rocla's offer, on 14 May 2011, to test and monitor the water levels and yields in the bore was denied.

Each month, the standing water level (SWL) was either measured manually in all accessible bores or automatically using automatic water level recorders installed in fourteen of the bores and set to record the water level every 6 hours (the method of measurement at each bore is depicted on **Figure 4.1**).

Each monitoring bore was sampled monthly to determine the electrical conductivity (EC) and pH, and six-monthly for comprehensive laboratory analysis. The monitoring results are compiled into monthly Environmental Monitoring Reports (Carbon Based Environmental, 2011) which are posted on Rocla's website.

4.1.2 Groundwater Criteria and Results

Groundwater Levels

The criteria relevant to groundwater levels are drawn from the approved Site Water Management Plan, dated February 2006 (Section 6.4.1).

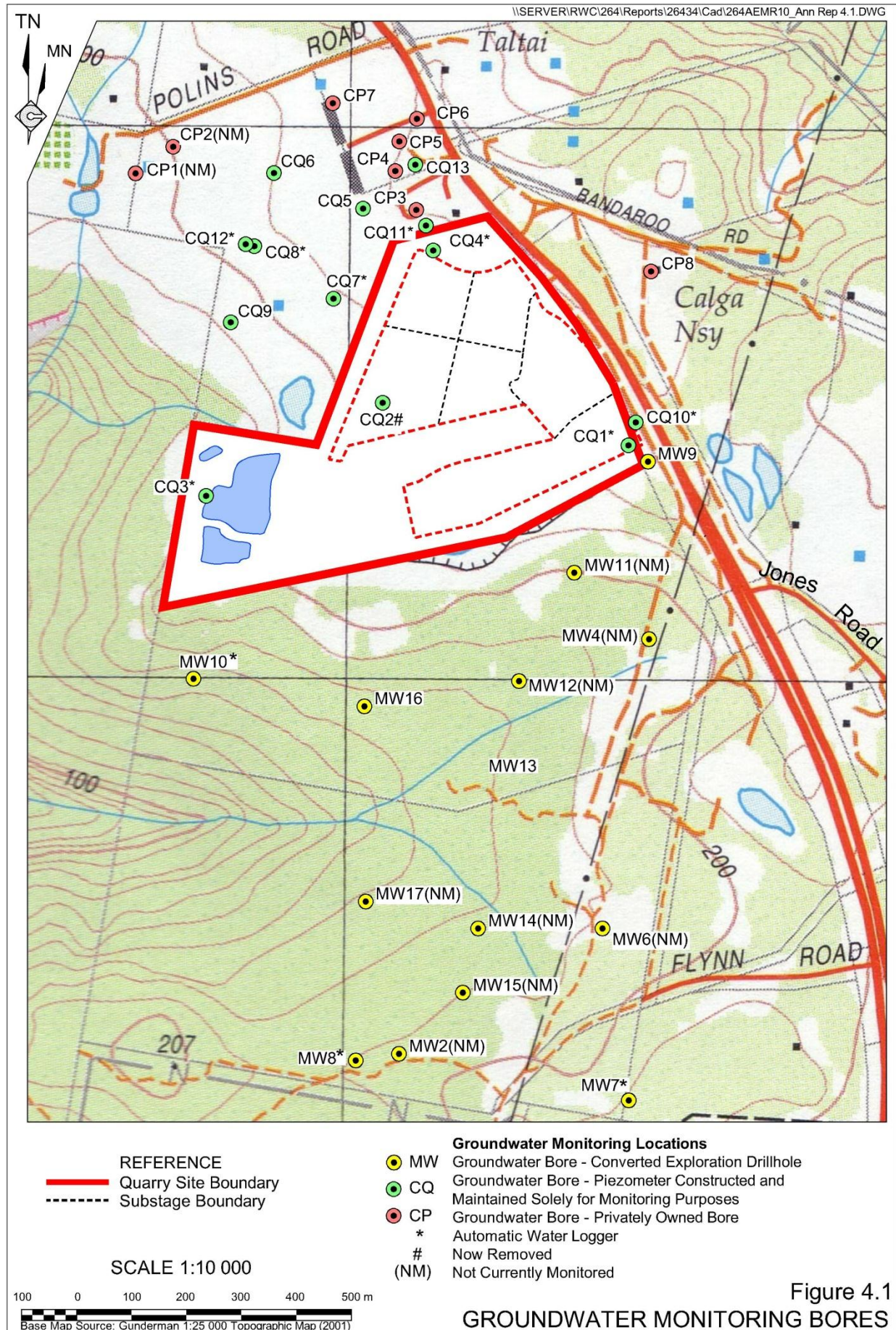
Firstly, it is a requirement to establish that any recorded declining trend in groundwater levels is attributable to climatic conditions or other factors not related to sand extraction activities on the Quarry Site.

Secondly, in the event groundwater levels at monitoring bores CQ10 or CQ11 experience drawdowns of >1.0m attributable to sand extraction activities on the Quarry Site, then a range of response actions need to be undertaken.

Thirdly, if any private bore on adjoining properties within 500m of the extraction area experiences a loss of yield >10% attributable to the extraction operation on the Quarry Site, a range of response actions are also applicable.

Monitored groundwater levels are presented in **Annexure 2** and shown graphically as hydrographs, together with rainfall and evaporation data, in Figures 3-11 in **Annexure 3**.





Groundwater Quality

The criteria relevant to groundwater quality are drawn from the Site Water Management Plan, dated February 2006 (Section 6.4.2). It is nominated that if any private production bore within 500m of the extraction area experiences a sustained salinity increase of >20% measured in either electrical conductivity or total dissolved solids, a range of response actions will be implemented.

Field measurements of electrical conductivity (EC) and pH were recorded monthly from all accessible bores. The results of all monitoring are displayed in **Annexure 2**. Samples for comprehensive laboratory analysis were collected in April and October 2011. The results of laboratory analysis are presented in RPS Aquaterra (2012).

4.1.3 Analysis of Results

Groundwater Levels

Groundwater levels are presented graphically as hydrographs, together with rainfall and evaporation data, in **Annexure 3**.

During the 2011 reporting period, rainfall totals for the nearest Bureau of Meteorology Station at Peats Ridge varied in comparison to the long-term average (LTA) with rainfall in June/July of 2011 more than double that of the LTA. In general, the 2011 records were observed to be higher than the LTA (Table 2.1) in **Annexure 3**. Total rainfall at Calga for the period January – December 2011 was 1486 mm, compared with 1668.2 mm at the BoM Peats Ridge gauge. The Peats Ridge total for the calendar year 2011 was considerably higher (131%) than the long-term average total rainfall of 1269.4mm.

All monitoring areas showed the same seasonal rainfall driven responses, with recharge events visible in most hydrographs in March to September and November to December 2011, and normal recession trends observed in the intervening periods. There were no noticeable deviations from past patterns of recharge, and past recession trends, that would suggest dewatering of specific groundwater areas. The same types of responses were seen in bores located close to, and bores more distant from, the Quarry Site.

The very close correlation between rainfall and hydrographs, and the lack of differential trends between the various parts of the monitoring system, clearly shows that there is no evidence of any adverse impacts on groundwater levels on adjoining properties from the quarry operations during 2011, nor since records were first obtained.

Groundwater Quality

The EC data collected for the 2011 reporting period showed generally low concentrations of dissolved ions, with values ranging from 70 to 250µS/cm. Groundwater is naturally weakly acidic with the pH values typically ranging from pH 4 to pH 6, which is outside of the NHMRC & NRMMC (2004) aesthetic guidelines for Drinking Water Quality (6.5 to 8.5). This remains consistent with previous years. The exception to this is the measurement taken on the 1 June 2011, which indicated an increase in pH levels across all the monitoring sites (values ranged from pH 6.3 to pH 8.6). As all monitoring points exhibited this spike, it may indicate a calibration error at this time of sampling. The subsequent measurements taken across the site were observed to return to the naturally weakly acidic range.



Concentrations of some dissolved metals were elevated relative to ANZECC (2000) guidelines for freshwater ecosystem protection (95%). These are reflective of the natural groundwater quality, with the type and number of exceedances being observed to be broadly constant over the period of monitoring. Whilst a number of exceedances of metals analysed across the monitoring network it appears that natural concentrations of aluminium, copper, lead and zinc regularly exceed the ANZECC (2000) guidelines, however, there has been no significant trend over time in the number of exceedances of other metals that have been recorded.

Several of the groundwater samples reported elevated nitrate concentrations, ranging up to 20.2mg/L in CP5 in April 2011, compared with the ANZECC (2000) freshwater ecosystem protection guideline value of 0.7mg/L. Those concentrations greater than 10mg/L Nitrate as N [this is the equivalent of 50mg/L Nitrate as NO_3 as quoted in Australian Drinking Water Guidelines] exceeded the Australian Drinking Water Guideline Value (NHMRC & NRMCC, 2004). The results were generally comparable with those reported during the previous reporting periods and reflect former land uses on the surrounding properties.

4.1.4 Conclusion

RPS Aquaterra (2012) concludes that the groundwater regime at Calga Quarry and the surrounding monitoring network is trending in a more stable or improving manner to that observed in previous reporting periods. During the 2011 year, groundwater levels across the Quarry Site, and in the private bores and associated monitoring bores, followed similar natural recharge/discharge patterns as those observed in the previous years. This correlation between rainfall recharge and groundwater levels has been identified in all previous reporting periods.

RPS Aquaterra (2012) concludes that there was no evidence in the 2011 data of impact from the quarry activities. Monitoring records continued to show that there has been no drawdown of water levels outside the Quarry Site due to sand extraction in 2011, or at any of the neighbouring private production bores.

Water quality records for 2009 showed that recharge from higher than average rainfall for the first half of 2009 generally led to a freshening of the groundwater aquifer. These trends have been maintained through 2010 and 2011. Apart from nitrate in Bore CP5, water quality monitoring did not reveal any trends that were not consistent with background fluctuations and climate related trends, and showed that there were no impacts on the groundwater aquifer from quarry activities.

In terms of compliance, RPS Aquaterra (2012) concludes that the analysis of groundwater levels and groundwater quality clearly show that the quarry activities during 2011 were in compliance with the groundwater impact assessment criteria, as detailed in the approved 2006 Site Water Management Plan.

Due to the lack of any trend in the number of exceedances of metals and nitrates, RPS Aquaterra recommends that sampling and laboratory analysis of water quality be reduced to an annual monitoring round. Given the lack of any exceedances of the ANZECC (2000) guideline values for arsenic, manganese, selenium and boron throughout the monitoring period, it is recommended that these parameters be removed from the analytical suite of tests.



4.2 SURFACE WATER

4.2.1 Introduction

Monitoring of surface water quality was undertaken monthly by Carbon Based Environmental. Samples collected were analysed by Australian Laboratory Services for pH, electrical conductivity, total suspended solids and total oil and grease at Site A (Dam 1), Site F (Dam 7b/c – at the overflow) and at Sites B to D when they were flowing (see **Figure 4.2**). Rocla has previously been requested by the landowner of “Glenworth Valley” for Site E to discontinue sampling at that location.

4.2.2 Water Quality Limits and Results

Table 4.1 presents a compilation of the routine monthly surface water monitoring results collected throughout 2011, together with the water quality limits drawn from the approved Site Water Management Plan. Three wet weather samples were collected during 2011, these results are outlined in **Table 4.2**.

Table 4.1
Routine Monthly Surface Water Results – 2011

	pH	EC	TDS	TSS	O&G
Units	-	µS/cm	mg/L	mg/L	mg/L
Water Quality Limits	±1 unit	<1500	NA	<50	<10
A (Dam 1)					
No. of Samples	11	11	11	11	11
Minimum	5.15	65	31	6	0.0
Maximum	6.46	80	57	14	0.0
Average#	5.69	73	47	8	-
Standard Deviation#	0.37	5	8	3	-
B (Upstream from Dam 1 Overflow)					
No. of Samples	2	2	2	2	2
Minimum	6.58	98	65	12	0.0
Maximum	6.81	125	90	12	0.0
Average#	6.70	112	78	12	-
Standard Deviation#	0.16	19	18	-	-
C (Upstream – Background Site)					
No. of Samples	0	0	0	0	0
Minimum	-	-	-	-	-
Maximum	-	-	-	-	-
Average#	-	-	-	-	-
Standard Deviation#	-	-	-	-	-
D (Upstream – Background Site)					
No. of Samples	10	10	10	10	10
Minimum	4.98	78	46	6	0.0
Maximum	6.29	156	112	6	0.0
Average#	5.46	96	70	6	-
Standard Deviation#	0.42	22	18	-	-
F (Dam 7b/c)					
No. of Samples	12	12	12	12	12
Minimum	4.60	65	37	7	0.0
Maximum	5.84	90	55	26	0.0
Average#	5.35	73	48	13	-
Standard Deviation#	0.44	9	7	7	-
EC = Electrical Conductivity			TSS = Total Suspended Solids		
TDS = Total Dissolved Solids			O&G = Oil and Grease		
# Rounded Value					



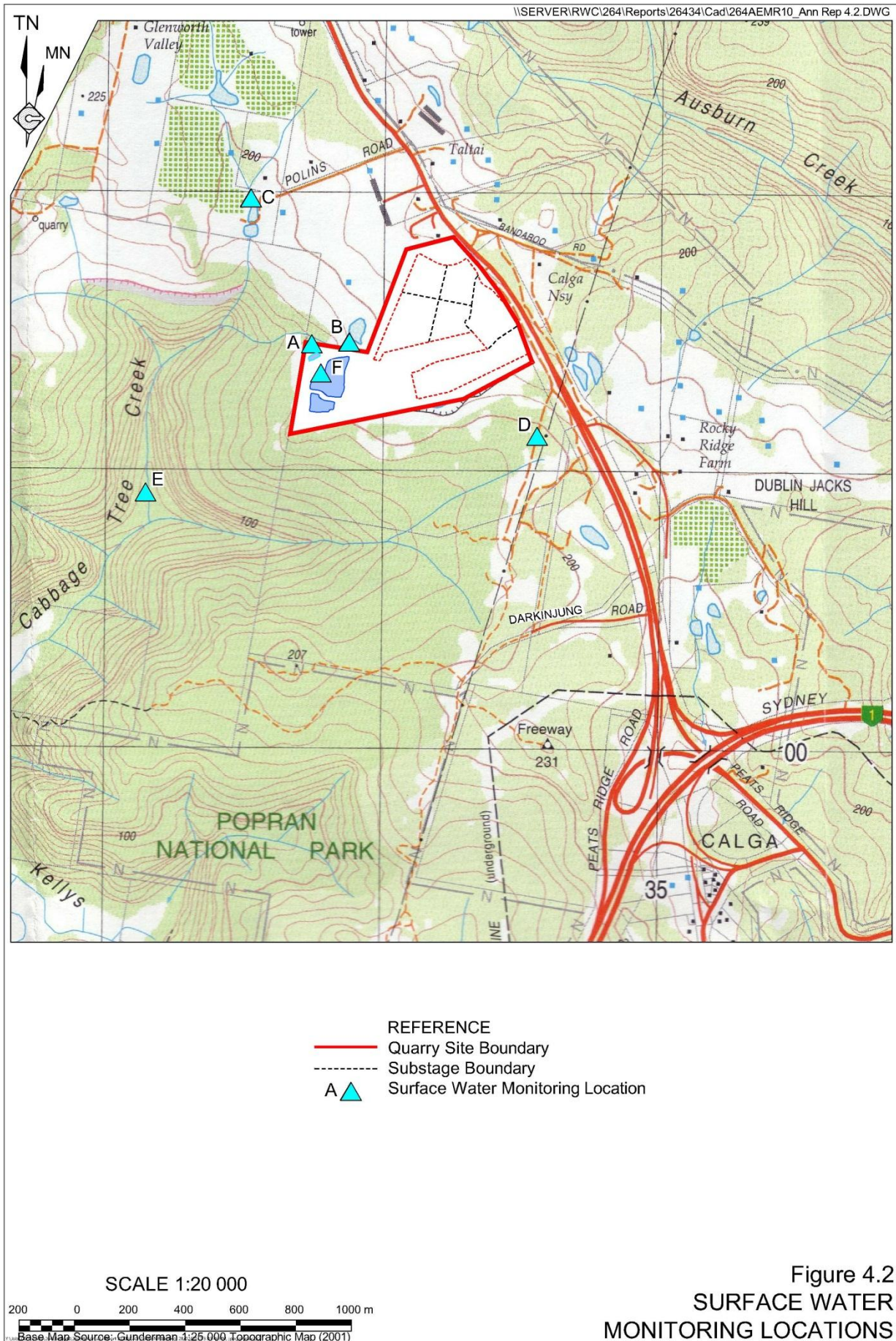


Table 4.2
Wet Weather Surface Water Results

	pH	EC	TDS	TSS	O&G
A (Dam 1)					
30/05/2011	5.85	71	68	24	<5
22/07/2011	6.03	54	25	<5	<5
26/09/2011	5.99	73	50	10	<5
B (Upstream from Dam 1 Overflow)					
30/05/2011	6.14	55	72	62	<5
22/07/2011	6.91	74	62	8	<5
26/09/2011	6.66	81	68	5	<5
C (Upstream – Background Site)					
30/05/2011	-	-	-	-	-
22/07/2011	-	-	-	-	-
26/09/2011	-	-	-	-	-
D (Upstream – Background Site)					
21/03/2011	4.82	141	88	23	
30/05/2011	6.26	34	66	17	<5
22/07/2011	6.90	62	50	171	<5
26/09/2011	6.96	98	80	5	<5
F (Dam 7b/c)					
30/05/2011	5.59	65	66	15	<5
22/07/2011	6.18	61	36	28	<5
26/09/2011	5.62	90	52	8	<5
EC = Electrical Conductivity TDS = Total Dissolved Solids # Rounded Value					
TSS = Total Suspended Solids O&G = Oil and Grease					

4.2.3 Analysis of Results

In Comparison with Water Quality Limits

When compared to the water quality limits nominated at the top of **Table 4.1**, the following comments are relevant.

1. pH values in Dam 1 range from 5.15 to 6.46. Whilst these values have a range >1pH unit, they are consistent with pH levels recorded elsewhere in the catchment, including at upstream locations not influenced by the quarrying operations.
2. Electrical conductivity (EC) values were always well below the 1 500µS/cm limit. EC values at Sites A, B and F on the Quarry Site were always less than the maximum EC values at the upstream background Site D (up to 156µS/cm).
3. Total suspended solids (TSS) values were <50mg/L at all monitoring sites. No exceedances of the water quality limit occurred with recorded off-site discharges from Dam 1 (Site A).
4. Oil and grease concentrations were below the <10mg/L limit for all samples.
5. TSS were shown to decrease between the inflows and outflows during significant rain events.



In Comparison with Previous Years Results

Table A2-3 (in **Annexure 2**) lists the recorded surface water quality since 2006.

1. pH and EC values were comparable throughout the period 2006 to 2011.
2. TSS values recorded in 2011 were comparable to those recorded between 2008 and 2010.
3. Oil and grease concentrations were also low, and regularly below the detection limit throughout the period 2006 to 2011.

In Comparison with EIS Predictions

The 2004 EIS predicted that, with the adoption of the proposed design and operational safeguards, any discharge from the Quarry Site should satisfy the EIS predictions, an outcome achieved during 2011.

4.2.4 Conclusion

The analysis of results has established that during 2011 there were no substantive surface water-related issues requiring follow up during 2012.

4.3 NOISE

4.3.1 Introduction

Noise monitoring was undertaken by Wilkinson Murray (Sydney) Pty Ltd during the reporting period generally in accordance with the approved Noise Monitoring Program prepared in accordance with Condition 3(7) of the Development Consent 94-4-2004. Four periods of attended monitoring were conducted on 19 May, 24 August, 19 October, and 16 December 2011 which yielded valid measurements for inclusion in this report. Monitoring was conducted at four surrounding residences, the locations of which are displayed on **Figure 4.3**.

4.3.2 Noise Criteria and Results

Table 4.2 displays the noise criteria for the Calga Sand Quarry together with the noise levels predicted at Residence 4 (CN-2), Residence 5 (CN-3) and Residence 6 (CN-4) in 2004 and the measured noise levels throughout 2011. It is noted in the Industrial Noise Policy that:

“A development will be deemed to be in non-compliance with a noise consent or licence condition if the monitored noise level is more than 2dB above the statutory noise limit specified in the consent or licence condition.”

A summary of the noise results is included in **Annexure 2** and full copies of all reports are included on Rocla's website. The range of measured noise levels between 2006 and 2011 and also provided for comparative purposes. It is noted that criterion and predicted noise levels for Residence 3 (CN-1) were not included in project documentation as the residence was intended at the time of document preparation to be “project-related”. Notwithstanding this approach, the criteria adopted for Residence 3 (CN-1) are consistent with those determined for the nearby Residence 5 (CN-3).



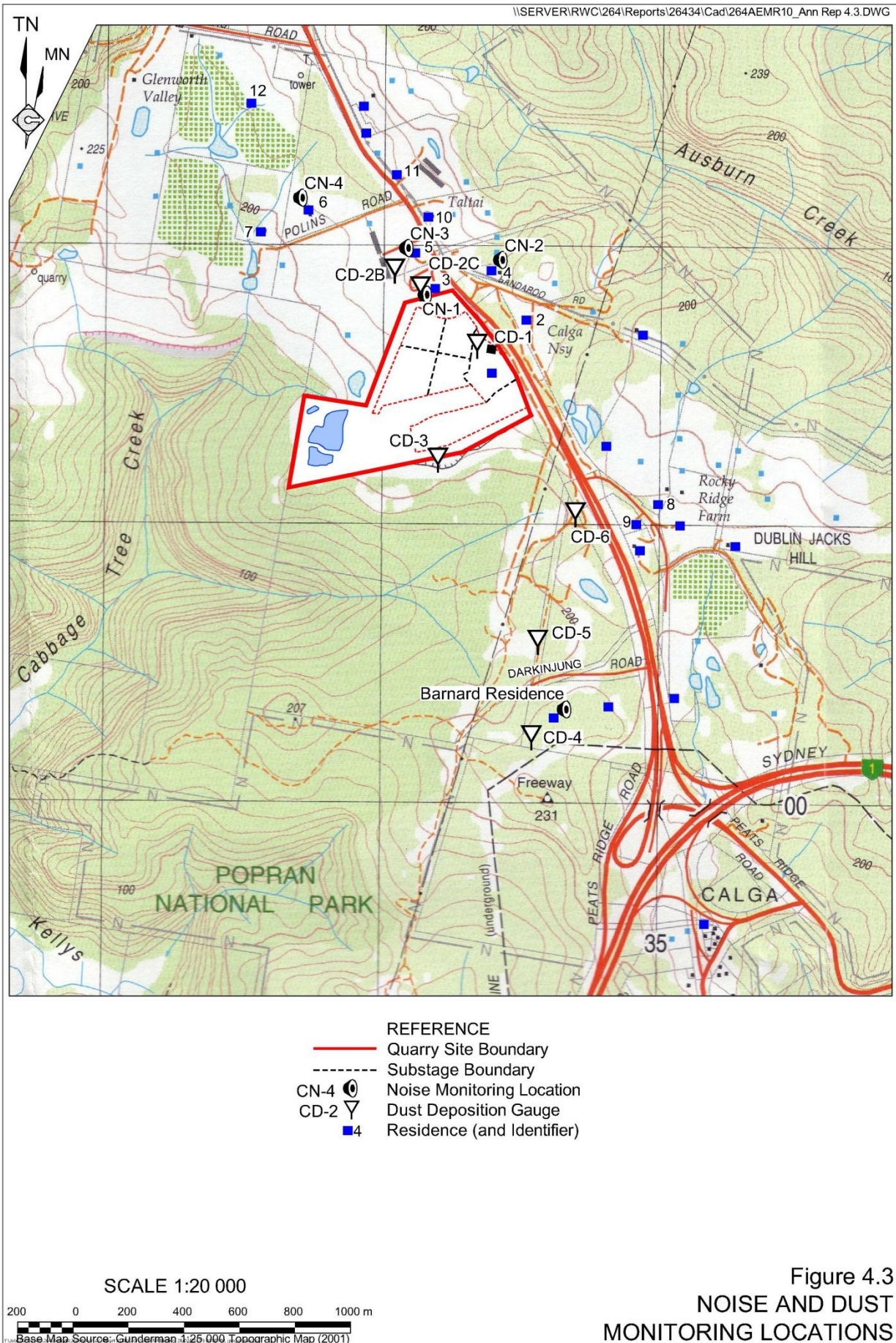


Figure 4.3
NOISE AND DUST
MONITORING LOCATIONS



The noise criterion used to assess compliance at the Barnard residence was 35dB(A), i.e. in the absence of background measurements recorded as part of the previous background noise assessment. In 2010, Wilkinson Murray identified the ambient noise at the Barnard residence is dictated by traffic on the F3 Freeway and not by noise from the direction of the quarry. Wilkinson Murray reviewed the results of the recorded noise levels and established that considering the most conservative calculation of the Rating Background Level (RBL) at the Barnard residence, this would provide for noise criteria as follows.

- Day (7:00am-6:00pm) 45dB(A)
- Evening (6:00pm-10:00pm) 45dB(A)
- Night (10:00pm-5:00am) 38dB(A)
- Day Shoulder (5:00am-7:00am) 42dB(A)

Table 4.3
Noise Criteria and Predicted/Measured L_{Aeq} Levels – dB(A)

Page 1 of 3

	Time Period		
	5:00am-7:00am	7:00am-6:00pm	6:00pm-8:00pm
Residence 3 (CN-1): Gazzana			
Criterion			
Extraction, Processing and Transportation [@]	44	41	38
Product Transportation only [@]	41	40	37
Predicted Noise Levels⁺			
Extraction, Processing and Transportation	Nil	Nil	Nil
Product Transportation only	Nil	Nil	Nil
Monitoring Results			
2006	-	26	-
2007	-	36-39	-
2008	-	38-42	-
2009	-	30-37	-
2010	-	37-41	-
19/05/2011 Attended	-	37	-
17/06/2011 – 27/06/2011 Unattended**	-	50-57	45-55
24/08/2011 Attended	-	43	-
19/10/2011 Attended	-	41	-
16/12/2011 Attended	-	44	-
16/02/2012 Attended	-	35	-
Residence 4 (CN-2): King			
Criterion			
Extraction, Processing and Transportation	45	40	40
Product Transportation only	43	40	39
Predicted Noise Levels⁺			
Extraction, Processing and Transportation	39	39	39
Product Transportation only	28	28	28



Table 4.3 (Cont'd)
Noise Criteria and Predicted/Measured L_{Aeq} Levels – dB(A)

Page 2 of 3

	Time Period		
	5:00am-7:00am	7:00am-6:00pm	6:00pm-8:00pm
Residence 4 (CN-2): King (Cont'd)			
Monitoring Results			
2006	-	<40	-
2007	-	24-34	-
2008	-	35-40	-
2009	-	33-40	-
2010	-	36-42	-
19/05/2011 Attended	-	39	-
19/05/2011 – 25/05/2011 Unattended**	-	48-57	42-50
24/08/2011 Attended	-	37	-
19/10/2011 Attended	-	36	-
16/12/2011 Attended	-	46	-
16/02/2012 Attended	-	31	-
Residence 5 (CN-3): Kashouli			
Criterion			
Extraction, Processing and Transportation	44	39	38
Product Transportation only	41	40	37
Predicted Noise Levels ⁺			
Extraction, Processing and Transportation	37	37	38
Product Transportation only	27	27	28
Monitoring Results			
2006	-	<39	-
2007	-	28-29	-
2008	-	31-37	-
2009	-	26-39	-
2010	-	32-39	-
19/05/2011 Attended	-	NA	-
19/05/2011 – 31/05/2011 Unattended**	-	50-57	44-52
24/08/2011 Attended	-	28	-
19/10/2011 Attended	-	35	-
16/12/2011 Attended	-	40	-
16/02/2012 Attended	-	NA	-



Table 4.3 (Cont'd)
Noise Criteria and Predicted/Measured L_{Aeq} Levels – dB(A)

Page 3 of 3

	Time Period		
	5:00am-7:00am	7:00am-6:00pm	6:00pm-8:00pm
Residence 6 (CN-4): Townsend			
Criterion			
Extraction, Processing and Transportation	35*	35*	35*
Product Transportation only	35*	35*	35*
Predicted Noise Levels *			
Extraction, Processing and Transportation	33	32	35
Product Transportation only	27	27	28
Monitoring Results			
2006	-	<35	-
2007	-	33-34	-
2008	-	35-36	-
2009	-	NA	-
2010	34	35	-
19/05/2011 Attended	-	NA	-
19/05/2011 – 03/06/2011 Unattended**	-	37-50	33-45
24/08/2011 Attended	-	24	-
19/10/2011 Attended	-	33	-
16/12/2011 Attended	-	36	-
16/02/2012 Attended	-	33	-
<p>Note: Bold results identify an exceedance of the nominated criterion – see Section 4.3.3 for discussion of results. @ Criterion proposed are consistent with those determined for Residence 5 (CN-3). It is noted these are not specified in either Development Consent 94-4-2004 or EPL 11295. NA: Not Audible. * Condition 3(2) specifies that the noise criterion at non specified residences should be 35dB(A). ** Unattended results include all noise sources including traffic on Peats Ridge Road. +Source: Tables 4-3 and 4-4 Noise Assessment by Wilkinson Murray (May 2004).</p>			

4.3.3 Analysis of Results

In Comparison with Noise Impact Assessment Criteria

The criteria relevant for attended monitoring were complied with at all monitoring locations except at two locations on 16 December 2011. On that occasion, the criteria were exceeded by between 3dB(A) and 6dB(A) for the period of time whilst the muffler on a pump operating in Cell 3/2b was not fully effective. A new muffler was purchased and subsequent testing has shown that noise compliance levels are now being met. It is noted that during the period of time when the defective muffler was in use, no complaints were received.

The unattended monitoring established that $L_{Aeq\ 15min}$ noise level experienced at all assessment locations were substantially higher than that recorded during the attended noise monitoring. The elevated noise levels were attributed largely to traffic on Peats Ridge Road and natural noises such as birds, trees, insects and frogs. Wilkinson Murray noted that the graphical presentation of the unattended measured noise data show that the measured noise levels do not fluctuate at the starting and finishing hours of the quarry operations as expected if they were dominated by noise associated with quarry activities.



In Comparison with Previous Years Results

Table 4.2 also records the range of recorded noise levels during 2006, 2007, 2008, 2009 and 2010 at the four residences (Residences 3 to 6). In general, the noise levels during 2011 were comparable with those recorded in 2007, 2008, 2009 and 2010. The quantity of data recorded in 2006 was insufficient for a useful comparison. However, the exceedances recorded on 16 December represent a notable increase upon the results in previous years.

In Comparison with EIS Predictions

With the exception of the two exceedances recorded on 16 December 2011, the measured noise levels at all monitoring locations were at, or immediately below, the predicted noise levels in the 2004 EIS for the May, August and October monitoring. It does, however, need to be acknowledged that it is difficult to accurately assess the contribution of quarry-related noise for a 15 minute period when quarry-related noise is dominated by traffic noise generated from Peats Ridge Road.

4.3.4 Conclusion

Compliance with noise criteria continued throughout 2011 with the exception of the incident on 16 December 2011. The cause of this short term non-compliance has since been remedied with the installation of a new muffler on the water pump which caused the exceedances.

4.4 AIR QUALITY

4.4.1 Introduction

Monitoring of air quality around the Calga Sand Quarry is currently appropriately confined to monitoring deposited dust. Notwithstanding this, the Air Quality Monitoring Program nominates that in the event of a sustained annual average dust deposition level of $>3.7\text{g/m}^2/\text{month}$ at a non-project related residence, Rocla would introduce a program of PM_{10} monitoring at the relevant location(s).

Since 2001, three dust deposition gauges (CD-1, CD-2a/2b, and CD-3), located at representative locations within and around Calga Quarry, have been monitoring deposited dust levels attributable to the activities within the quarry and other local sources. A further three gauges (CD-4 CD-5 and CD-6) were installed in 2006. Dust deposition gauge CD-2 was relocated in late January 2010 to avoid interference with results from a nearby access road on the adjoining property. The new site is referred to as "CD-2c". **Figure 4.3** displays the locations of all gauges.

All samples are collected monthly by Carbon Based Environmental Pty Ltd and analysed by the ALS Laboratory Group.

4.4.2 Air Quality Goals and Predicted Dust Levels

The full set of air quality goals for the Calga Sand Quarry are summarised in **Table 4.4**.



Table 4.4
Air Quality Goals

Pollutant	Criterion	Averaging Period	Agency
Total suspended particulate matter (TSP)	90 $\mu\text{g}/\text{m}^3$	Annual mean	NHMRC
Particulate matter <10 μm (PM ₁₀)	50 $\mu\text{g}/\text{m}^3$ 30 $\mu\text{g}/\text{m}^3$ 50 $\mu\text{g}/\text{m}^3$	24-hour maximum Annual mean (24-hour average, 5 exceedances permitted per year)	NSW DECCW NSW DECCW long-term reporting goal NEPM
Particulate matter <2.5 μm (PM _{2.5})	8 $\mu\text{g}/\text{m}^3$ 25 $\mu\text{g}/\text{m}^3$	Annual mean 24-hour maximum	NEPM NEPM
Deposited dust	4 g/m ² /month*	Annual mean	DECCW
* or 2g/m ² /month above the annual background level.			

The only current applicable criterion is for deposited dust which is 2g/m²/month above the background level of 1.7g/m²/month or a total of 3.7g/m²/month.

Extraction within Stages 3/1 and 3/5 was considered to produce “worst-case” scenarios and modelled to predict the likely deposition levels of particulate material. **Table 4.5** presents a summary of the model predictions at each of the Residences 1 to 14 for Stage 3/1. The level of activity within Stage 3/1 is considered to remain appropriate for the comparative assessment for the activities during the reporting period.

Table 4.5
Summary of Dispersion Model Predictions due to Quarry Operations

	PM ₁₀ ($\mu\text{g}/\text{m}^3$)		TSP ($\mu\text{g}/\text{m}^3$)	Dust deposition (g/m ² /month)
Averaging period	24-hour	Annual	Annual	Month
Air quality goal	50	30	90	3.7
Residence ID	Stage 3/1			
1	15.8	5.1	10.9	0.63
2	21.6	4.1	8.4	0.44
3	11.8	2.2	4.5	0.23
4	14.2	2.1	4.2	0.21
5	5.0	0.9	1.7	0.08
6	6.3	0.8	1.7	0.08
7	8.4	1.3	2.6	0.14
8	4.4	0.6	1.1	0.06
9	9.4	1.4	2.6	0.13
10	4.8	0.6	1.0	0.05
11	2.9	0.4	0.8	0.04
12	1.9	0.3	0.5	0.02
13	2.2	0.3	0.6	0.03
14	1.4	0.2	0.4	0.02



4.4.3 Results

Table 4.6 displays the average deposited dust results at each monitoring site throughout 2010 and the monthly monitoring results for 2011. These are displayed graphically on **Figure 4.4**. Deposited dust monitoring at CD-2b ceased in January 2010 after samples were consistently contaminated by motorcycle activity on a trail close by. A new monitoring location, CD-2c replaced CD-2b in February 2010 (see **Figure 4.4**).

Table 4.6
Deposited Dust Monitoring Results (g/m²/month)

	CD-1	CD-2c	CD-3	CD-4	CD-5	CD-6
2010 Average	1.3	1.1	0.5	0.5	0.5	0.7
Jan-11	0.6	1.2	0.3	0.2	0.6	0.3
Feb-11	6.4	1.6	0.7	1.2	0.9	1.0
Mar-11	1.4	1.6	1.0	0.2	0.1	0.2
Apr-11	4.8	0.9	0.6	0.1	0.1	0.2
May-11	1.6	0.6	0.2	0.1	0.1	0.6
Jun-11	0.8	0.4	0.3	0.1	0.2	1.1
Jul-11	0.6	0.4	1.9	0.7	0.3	0.4
Aug-11	0.4	0.5	0.2	0.2	0.2	0.5
Sep-11	2.7	0.7	2	0.3	0.2	0.5
Oct-11	3.8	0.4	0.3	0.3	0.3	0.3
Nov-11	0.9	0.4	0.3	0.7	0.4	0.5
Dec-11	0.6	0.4	0.4	0.5	0.4	0.5
2011 Average	2.1	0.8	0.7	0.4	0.3	0.5

4.4.4 Analysis of Results

In Comparison with Air Quality Goals

All monthly deposited dust results were within the nominated goals for deposited dust excepting for the February and April at monitoring site CD-1. Given the location of CD-1 within the quarry boundary and adjacent to a newly formed haul road (constructed in January 2011), and the prevailing westerly winds during February (no wind data was available for April) these exceedances are considered to be minor. The yearly averages for all monitoring locations were within the nominated goals for deposited dust.

In Comparison with Previous Years Results

Average deposited dust levels for all six locations were similar to those in 2010.

In Comparison with EIS Predictions

The predicted dust deposition levels (**Table 4.4**) were comparatively low and as such, it is not possible given the accuracy and variability of deposited dust measurements to accurately compare levels with just six years of data. The ongoing accumulation of future data will assist to better understand the comparison with EIS predictions. Suffice it to say, the measured deposited dust levels are comparatively low with the contribution from the quarry activities and hence air quality issues are not of concern.



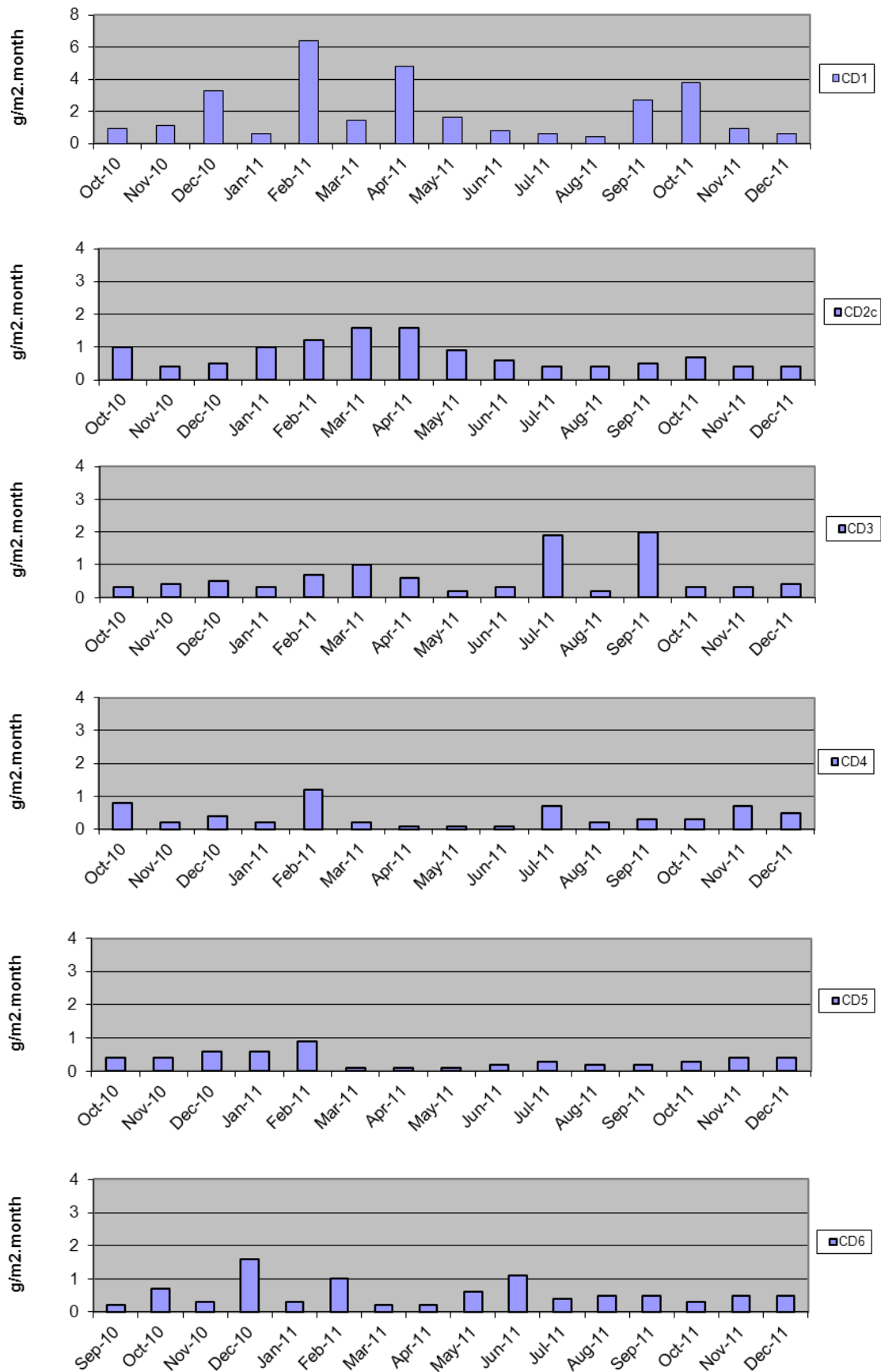


Figure 4.4
2011 Deposited Dust Monitoring Results – Insoluble Matter



5. COMPLIANCE ASSESSMENT

5.1 DEVELOPMENT CONSENT

Annexure 7 summarises each of the conditions of Development Consent DA 94-4-2004 and provides an assessment of compliance against these conditions established through an internal audit by Rocla personnel.

5.1.1 Umwelt Report

Umwelt (Australia) Pty Ltd (Umwelt) conducted an independent environmental audit of the development consent for the Calga Sand Quarry in 2009.

The Umwelt (2009) report found that operations at the Calga Sand Quarry were generally being undertaken in a manner that is consistent with the requirements of Development Consent DA 94-4-2004. However, a number of non-compliances were identified where action was required to achieve full compliance.

The bulk of the non-compliances related to the lack of documentation confirming the acceptance or otherwise of documentation submitted to various Government agencies or inspection results all of which had not contributed to any environmental harm. Letters were sent to both the NSW Department of Planning and Infrastructure and the NSW Roads and Maritime Services to address the issues of outstanding documentation. Responses are yet to be received.

Annexure 8 contains a letter from the NSW Department of Planning and Infrastructure which identifies that the 'painted seagull' arrangement has been implemented as required by Condition 27 of DA 94-4-2004.

Two substantial non-compliances identified in the Umwelt audit related to the need to obtain a Part 5 licence under the *Water Act 1912* and the need to upgrade the hydrocarbon bunding.

The following actions have been undertaken by Rocla in response to various non-compliances identified in the independent environmental audit.

1. The copies of documentation not held on site at the time of the audit have been re-located to site.
2. A Water Access Licence has been obtained for the Calga Sand Quarry.
3. The hydrocarbon storage area has been fully upgraded with the installation of a self-bunded fuel tank and the introduction of a custom-made fuel delivery truck to transfer fuel to the less mobile earthmoving equipment.

5.1.2 New Non-Compliances for 2011

A total of three non-compliances were recorded during the internal audit. The two non-compliances will remain non-compliant throughout the life of the operation. A brief explanation of each of the non-compliances is provided as follows.

Condition 3/2 As discussed in Section 4.3 of this report, one exceedance of the noise criteria was measured on 16 December 2011. This has since been remedied.



Condition 3/19 Overburden was removed from the Stage 3/6 area and stockpiled elsewhere on site. While no long term groundwater report has been undertaken, work has since ceased within this area.

Condition 5/3 As discussed in Section 5.3.1, a number of the outstanding non-compliances related to the lack of documentation confirming the acceptance, or otherwise, of documentation submitted to various Government agencies. Given this is still to be received, it remains an outstanding technical non-compliance.

The three non-compliances discussed above have not contributed to any long-term adverse environmental impacts or harm.

5.2 ENVIRONMENT PROTECTION LICENCE

Rocla holds Environment Protection Licence 11295 for a 'land-based' extractive industry. The licence has an anniversary date of 23 July. The annual return covering the reporting period (i.e. 24 July 2010 to 23 July 2011) reported no non-compliances.



6. ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

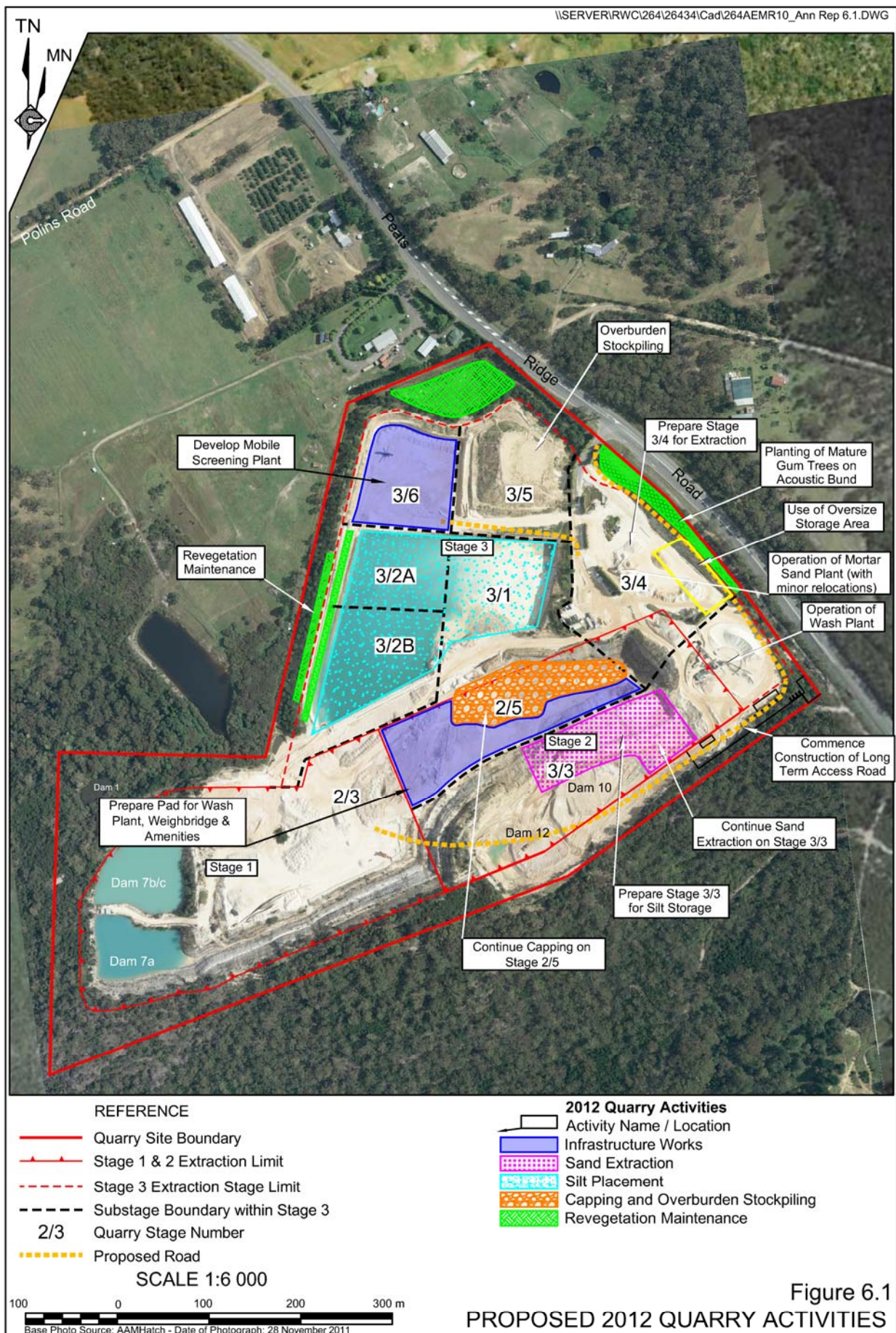
6.1 INTRODUCTION

The following section provides a brief summary of the operational activities planned throughout 2012. **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
2012 Proposed Quarry Activities and Key Events

January	<ul style="list-style-type: none"> Continue extracting Stage 3/3 Continue capping Stage 2/5 Develop mobile screening area on Stage 3/6
February	<ul style="list-style-type: none"> Purchase new mobile screening plant to replace old screen Conduct threatened species monitoring report Conduct Noxious weed survey Fit acoustic exhaust to Transfer pump 5 (TP5) Conduct attended noise monitoring
March	<ul style="list-style-type: none"> Plant more mature gum trees on Acoustic bund opposite Stage 3/4 Hold Community Consultative Committee meeting
April	<ul style="list-style-type: none"> Designing sales haul road to new washplant area
May	<ul style="list-style-type: none"> Continue capping of Stage 2/5 & prepare pad for new washplant Conduct attended noise monitoring
June	<ul style="list-style-type: none"> Commence haul road construction through Stage 3/3 Prepare Stage 3/4 for extraction
July	<ul style="list-style-type: none"> Continue capping campaign on Stage 2/5 Organize weed spray control
August	<ul style="list-style-type: none"> Complete Annual Rehabilitation Assessment Report Conduct attended and unattended noise monitoring
September	<ul style="list-style-type: none"> Conduct Feral animal survey Hold Community Consultative Committee meeting
October	<ul style="list-style-type: none"> Review preparations for new washplant, amenities and administration area Submit plans and application for new admin area
November	<ul style="list-style-type: none"> Review High voltage power pole & line application for new washplant and administration area Conduct attended noise monitoring
December	<ul style="list-style-type: none"> Prepare Stage 3/3 for silt storage
<p>Note: Extraction activities occur in areas referred to as "Stages" consistent with the 2004 EIS and silt placement occurs in areas referred to as "cells".</p>	





6.2 EXTRACTION OPERATIONS

Extraction will continue to be undertaken by a bulldozer ripping and pushing the friable sandstone with an excavator loading articulated dump trucks.

Extraction operations will involve extraction in Stages 3/3 and 3/4.

The extraction in Stage 3/3 will be followed in subsequent years by extraction within Stage 3/4, then Stage 3/5 and finally Stage 3/6.

6.3 PROCESSING AND PRODUCT STOCKPILING

Processing activities will continue to occur at the existing wash plant during 2012. The mortar sand plant will be relocated to Stage 3/4 to allow for construction of approved access road, i.e. until extraction commences in Stage 3/4. Rocla will continue to undertake minor modifications to the wash plant to assist in optimising plant throughput during 2012. Site preparation for a new wash plant on the quarry floor will commence in late 2012, i.e. on former silt Cells 2/3 and 2/5.

6.4 WASTE MANAGEMENT

The silt from the wash plant will continue to be placed in Cells 3/2a and 3/2b throughout the reporting period.

Rocla proposes to amend the current Rehabilitation and Landscape Management Plan following completion of fines transfer from Dams 10 and 12. At that stage, the exact elevations of the silt would be known and plans would be modified to reflect the final landform in that area and its integration with the surrounding landform.

6.5 SITE INFRASTRUCTURE

An application has been lodged with the NSW Department of Planning and Infrastructure which seeks to relocate the existing administration buildings and wash plant to the rehabilitated quarry floor within the Quarry. This relocation is necessary to improve operational safety on site.

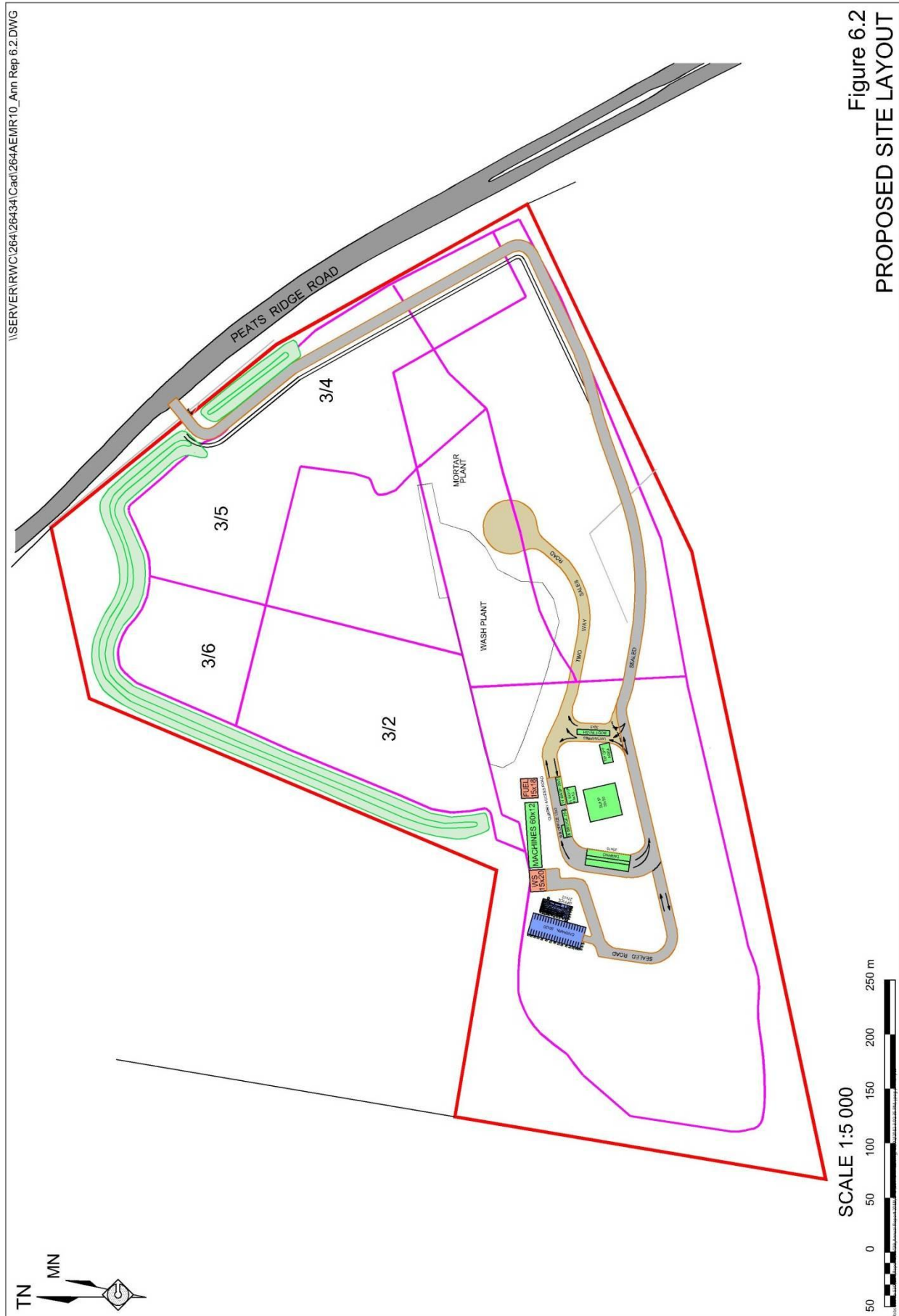
The alignment of the internal road network will need to be modified slightly to accommodate the proposed modified extraction sequence (see **Figure 6.2**).

Rocla has sought a modification of Development Consent DA 94-4-2004 to enable the administration area to be relocated to the floor of the quarry rather than be constructed within Stage 3/3.

6.6 COMMUNITY INVOLVEMENT

During the reporting period, Rocla personnel intend to again host various visits from local community representatives and neighbours.





6.7 WATER MANAGEMENT

The existing water transfer/recovery system involving Dams 7a and 7b/c will be maintained. Silts will continue to be pumped to Stages 3/2a and 3/2b and the return water pumped directly to the wash plant.

Surface water sampling will continue on a monthly basis. Should there be any flows off site, or rainfalls >50mm in a day, water sampling will also be undertaken.

The components of the Site Water Management Plan will continue to be adopted throughout the reporting period including an improved level of recording water use.

6.8 AIR QUALITY MANAGEMENT

Rocla will continue to incorporate a range of design and operational safeguards, and operational procedures for the quarry to ensure that the effectiveness of the air quality controls are optimised throughout all stages of the project.

6.9 PRODUCT TRANSPORTATION

No changes are proposed to the despatch and transportation of road products from the site during the 2012 reporting period.

6.10 REHABILITATION

During 2012, Rocla will undertake a revegetation program on the eastern side of Stage 3/4 parallel to Peats Ridge Road and near the quarry entrance.

Reporting of rehabilitation progress will be undertaken throughout 2012. This will include a description of what has been done on site to date and what is proposed. An evaluation of the success of the species used in rehabilitation works will also be undertaken.

6.11 MONITORING

Throughout 2012, the environmental monitoring programs undertaken will be continued in the same manner as those conducted throughout 2011, with further monitoring of threatened species and noxious weeds also taking place.



7. REFERENCES

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

RPS Aquaterra (2012) – Calga Sand Quarry 2011 Annual Groundwater Audit.

Aquaterra Consulting Pty Ltd (2011) – Calga Sand Quarry 2010 Annual Groundwater Audit.

Carbon Based Environmental (2011) – *Environmental Monitoring Reports*.

Rocla Materials Pty Ltd (2006) – *Site Water Management Plan* – Prepared by R. W. Corkery & Co. Pty Limited in conjunction with GSS Environmental and Peter Dundon and Associates.

Rocla Materials Pty Ltd (2011) – Annual Environmental Management Report for 2010.

R. W. Corkery & Co. Pty Limited (2004) – *Environmental Impact Statement* – Prepared for Rocla Materials Pty Ltd.

R. W. Corkery & Co. Pty Limited (2011) – *Environmental Assessment for the Relocation of the Administration Centre at the Calga Sand Quarry* – Prepared for Rocla Materials Pty Ltd.

Wilkinson Murray (2004) – Calga Sand Quarry Extension Noise Assessment.

Wilkinson Murray (2012) – Calga Sand Quarry Noise Monitoring Reports

