DOCUMENT CONTROL

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1. INTRODUCTION

1.1 Purpose/Scope

This Annual Environmental Management Report (AEMR) has been prepared in accordance with Condition 4(2) of Development Consent No DA 470-11-2003 for Dunmore Quarry and covers the period between 1 July 2011 and 30 June 2012.

Condition 4(2) has been reproduced below with reference to the section in the AEMR where each requirement can be found. The AEMR provides a report on:

- the standards and performance measures that apply to the development ***(Section 3)***;
- the works carried out in the last 12 months ***(Section 2)***;
- the works that will be carried out in the next 12 months ***(Section 5)***;
- a summary of the complaints received during the past year, and compare this to the complaints received in previous years ***(Section 3.12.2);***
- a summary of the monitoring results for the development during the past year ***(Section 3)***;
- an analysis of these monitoring results against the relevant ***(Section 3)***:
  - impact assessment criteria;
  - monitoring results from previous years; and
  - predictions in the EIS;
- any trends in the monitoring results over the life of the development;
- any non- compliance during the previous year ***(Section 4)***; and
- what actions were, or are being taken to ensure compliance ***(Sections 4 and 5)***.

In addition to the above requirements the development consent also nominates specific items to be reported in the AEMR. These can be summarised as:

- reporting of production data ***(Section 2.1.2)***;
- progress of waste reduction initiatives ***(Section 2.5)***;
- the site water balance ***(Section 2.6.1)***;
- progress of the Flora and Fauna Management Plan ***(Section 2.7)***; and
- progress of the Rehabilitation Management Plan ***(Section 2.8)***

1.2 Background

Dunmore Quarry is located on the western side of the Princes Highway, approximately half way between Shellharbour and Kiama. It is located within hills formed by the hard, resistant volcanic rock known as latite which is the rock type being extracted at the quarry. The location and layout of the Dunmore Quarry can be seen in **Figures 1** and **2**.

Quarrying first commenced at Dunmore Quarry in 1921, and since that time, Boral and its predecessor companies have progressively expanded the extraction area into the hills to the west. The quarry is divided into three areas, known as the original Dunmore Quarry, the RIC extraction area and the Croome Farm extraction area. Quarrying is currently only being undertaken within the RIC and Croome Farm extraction areas, however, consented resource is still available within the original Dunmore Quarry.

On 30 September 2004 the Minister Assisting the Minister for Infrastructure and Planning (Planning Administration) granted development consent (Consent No. 470-11-2003) for increasing production at Dunmore Quarry from 1.2 million tonnes per annum (Mtpa) to 2.5 Mtpa. This increase was achieved by:

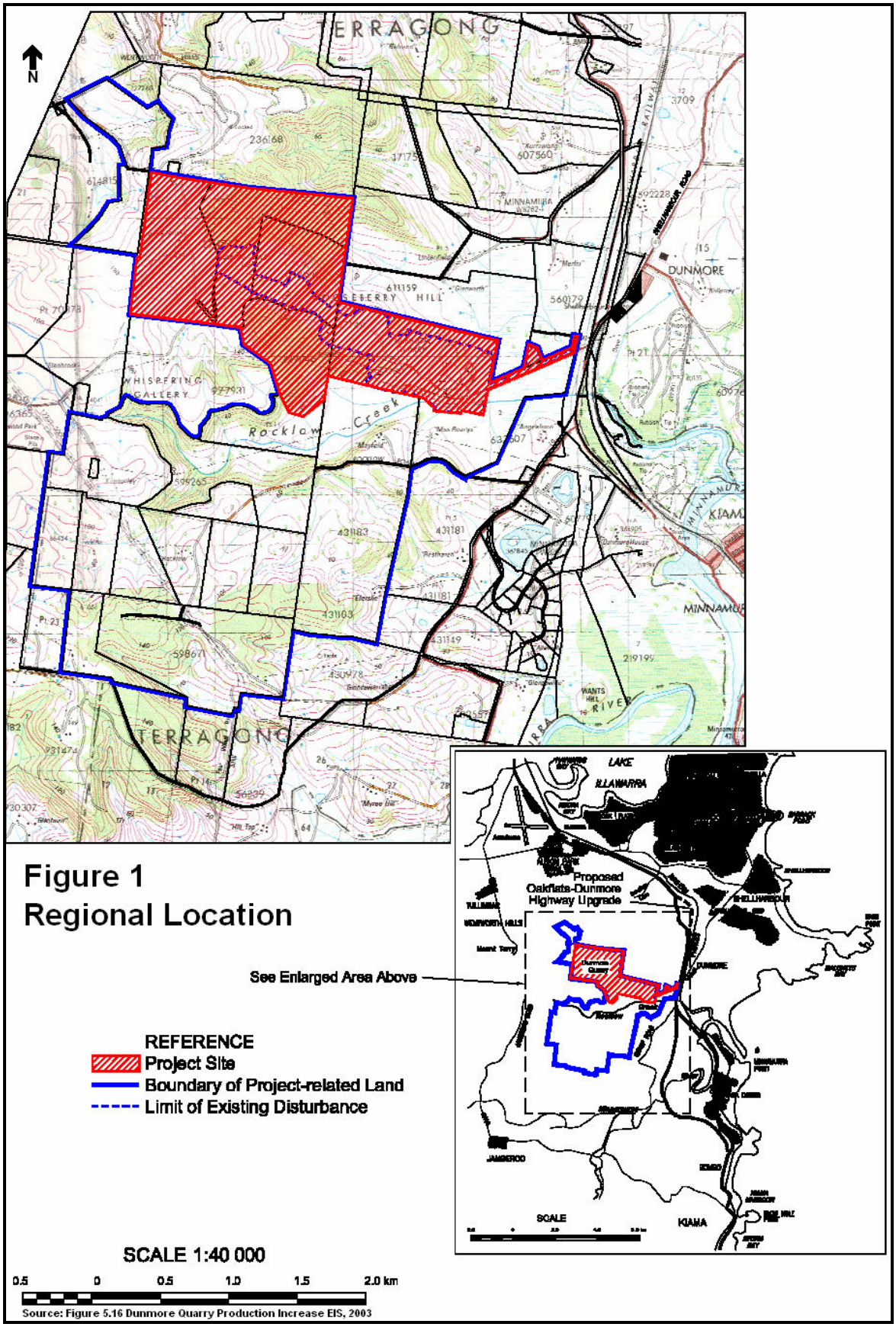
- extending the hours of operation for extraction and processing;
- making minor changes to equipment types and configuration, mainly within the crushing and conveying circuit; and
- increasing rail and road transportation of product.

The development consent came into effect on 18 November 2004. On this date, Dunmore Quarry's environment protection licence (EPL) was varied to reflect the new consent.

A summary of all the approvals relevant to the Dunmore Quarry production increase are presented in **Table 1**.

Table 1
Approvals, Licences and Permits

Approval Type	Approval Authority	Approval No.	Date Granted	Date Expires
Development Consent	Department of Planning (DoP)	470-11-2003	30/09/2004	18/11/2029
Environment Protection Licence	Office of Environment & Heritage (OEH)	77	31/08/05	Review Date 13/07/2015
Water Extraction Licence	NSW Office of Water (NOW)	10SL050221	16/10/1992	15/10/2007
Controlled Activity Approval	NSW Office of Water	ERM2008-0716	7 July 2008	7 July 2011



Source: Figure 5.16 Dunmore Quarry Production Increase EIS, 2003

Figure 1
Regional Location

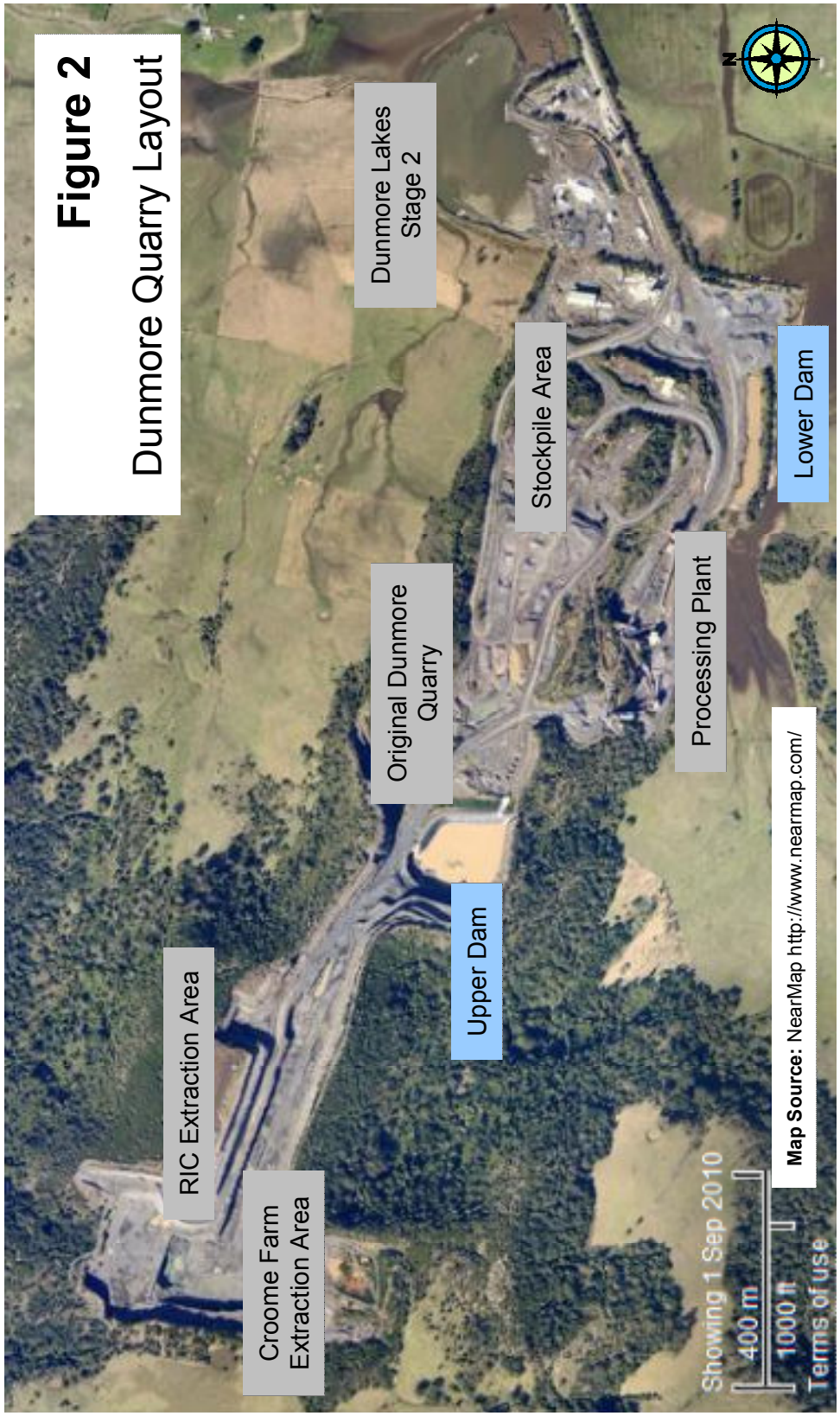


Figure 2
Dunmore Quarry Layout
Dunmore Lakes Stage 2
Stockpile Area
Lower Dam
Original Dunmore Quarry
Processing Plant
Upper Dam
RIC Extraction Area
Croome Farm Extraction Area
Map Source: NearMap http://www.nearmap.com/
Showing 1 Sep 2010
400 m
1000 ft
Terms of use
N

2. THE LAST 12 MONTHS OF OPERATIONS

2.1 Quarry Development

Since the start of the reporting period, quarrying has continued within the Croome Farm and RIC extraction areas (See **Figure 3**). The majority of extraction took place within RIC slot and the Northern wall in Croome Farm.

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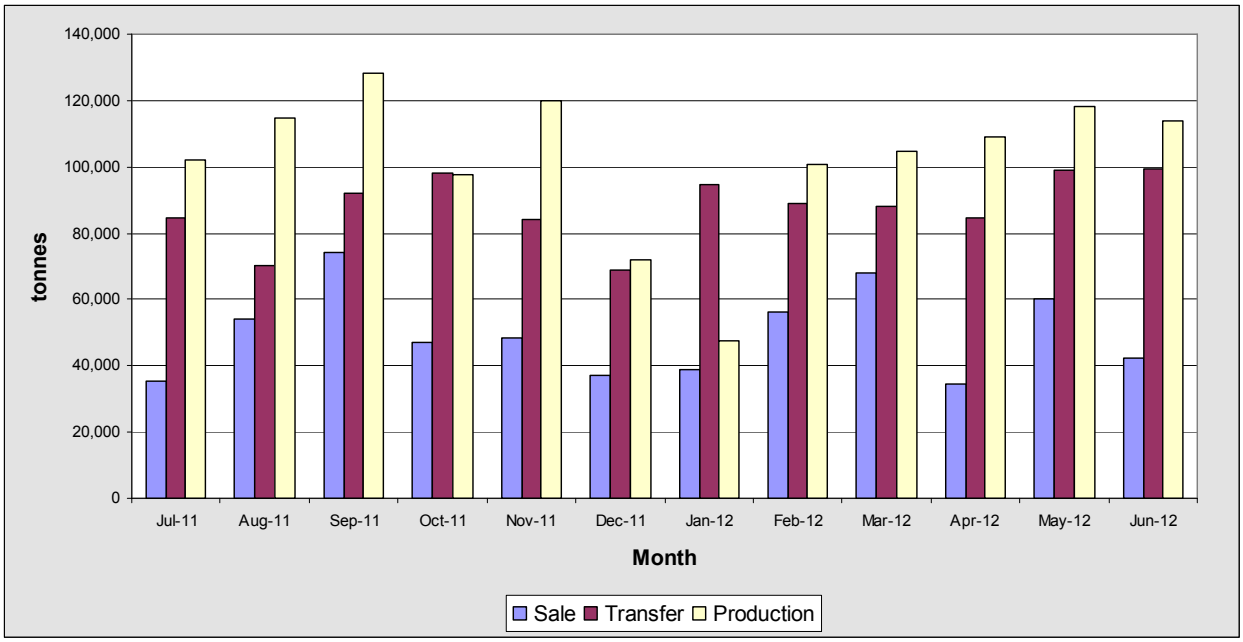
2.2 Production, Sales & Transport

Table 2 presents the production figures during the reporting period. The quarry produced 1,228, 742 tonnes during the reporting period, 163,266 tonnes greater than the previous reporting period. This is well below the potential consented capacity of the quarry and is indicative of a downturn in the aggregate market in Sydney and the impact of the Global Financial Crisis although some signs of improvement are evident with the increased production for the year. Transportation of quarry product over the reporting period saw 1,053,098 tonnes (64%) transferred to Sydney by train or transferred to Dunmore Sand & Soil for blending with sand products, compared to sales by road at 596,911 tonnes (36%). *Graph 1* provides graphical presentation of this data. **Table 3** presents the production data as reported to the Department of Industry & Investment (DII) (Mineral Resources).

Table 2
Production and Sales Tonnes

Month	Production	Sales	
		Road	***Transfers***
Jul 2011	**102,035**	35,477	84,700
Aug 2011	**114,860**	54,110	70,369
Sep 2011	**128,159**	74,315	92,172
Oct 2011	**97,643**	47,275	97,975
Nov 2011	**119,976**	48,282	84,345
Dec 2011	**71,989**	36,856	69,092
Jan 2012	**47,385**	39,030	94,437
Feb 2012	**100,739**	56,353	88,885
Mar 2012	**104,794**	68,133	88,025
Apr 2012	**109,147**	34,483	84,718
May 2012	**118,339**	60,283	98,998
Jun 2012	**113,676**	42,313	99,382
Total	**1,228,742**	**596,911**	**1,053,098**
		1,3650,009	



Graph 1: Production and Sales Volumes

Table 3
Production Data Reported to DII

		Total Sales / Disposals	
Product	**Type of Material**	**Quantity (Tonnes)**	**$Value of Sales***
Crushed and Broken Stone (Excluding Gravel)			
Over 75mm	Latite	13,404	*
Over 30mm to 75mm	Latite	39,282	*
5mm to 30mm	Latite	699,102	*
Under 5mm	Latite	380,963	*
Natural sand	Latite	75,026	*
Manufactured Sand	Latite	197,945	*
Pavement Material 1st Grade	Latite	-	-
2nd Grade	Latite	-	-
Prepared Road Base & Sub Base	Latite	244,286	*
Other Unprocessed Materials	Latite		
Total		1,650,009	*

**This information is commercially sensitive and has been omitted*

2.3 Waste Management

2.3.1 Fines Management – Condition 4(24)

Approximately 30% of the hard rock processed at Dunmore Quarry becomes material of less than 4mm in diameter. The material is known as quarry fines. In the past quarry fines were considered as product waste and stockpiled due to having no steady market. Quarry fines are now an important blending component in making manufactured sands, and have a steady market.

A Fines Management Plan was prepared in recognition of Condition 4(24) and in consultation with the OEH. The plan provides guidelines for the management of fines stockpiles, particularly when stock levels increase to a point where they are a potential source of wind blown dust.

Stock levels to the end of June 2012 remain very low due to high demand in manufactured sand, of which up to 50% is quarry fines. Accordingly, stockpiling of large quantities of quarry fines is no longer an issue as quarry fines are blended with the fine sand at Dunmore Sand and Soil to create manufactured sand blends.

2.3.2 Waste Minimisation – Condition 4(70 - 72)

Boral is committed to managing waste in accordance with the waste hierarchy, and minimising the amount of waste sent to landfill. To achieve this, all liquid and solid wastes are classified and sorted so they can be appropriately re-used or recycled.

Table 4 presents the various waste streams and end use at Dunmore Quarry.

Table 4
Waste Streams and End Use

Waste Stream	Action/End use
Waste Oils	Recycled by EPA licensed contractors
Steel	Either reused on site by boiler makers or recycled
Vehicle Batteries	Stored on pallets and picked up by contractors for re-use/recycling
Paper and Cardboard	All paper and cardboard waste is recycled by Flagstaff
Heavy Vehicle Tyres	Either re-used on site for such uses as traffic management or delineation of parking area or returned to the tyre fitting contractor for recycling
Conveyor Belt	Stored in a designated area and periodically transported for recycling
Timber Waste	Stored in a designated area and periodically transported for recycling
General garbage	All other municipal waste that cannot be reused or recycled is sent to the Shellharbour Waste Depot

2.4 Water Management

Background

In accordance with the approved Site Water Management Plan prepared by Evans and Peck planned upgrades to the water storages onsite were proposed. As part of the upgrade process the existing dam was taken offline from Rocklow Creek and a new middle dam was constructed. Further works will be undertaken to create a sump in the Croome Farm extraction area as the extraction process allows.

The following sections provide further information on the sites water management.

2.4.1 Site Water Balance – Condition 4(30)

Water consultants Evans and Peck prepared a site water balance as part of the amended Site Water Management Plan submitted April 2008. Updated water demands are presented below.

- Plant dust suppression (sourced from dam) 93 kL/day
- Plant dust suppression (mains back-up) 50-55 kL/day
- Water cart (from dam, un-metered) 450 kL/day

The site water balance will be reviewed and updated where necessary upon collection of data from the operation of the new dam configurations and water transfer systems onsite.

2.4.2 Storm water Management System – Condition 4 (31 & 32)

The stormwater design criteria for the site has been modeled and designed to capture and treat a 95th percentile 5 day rain event in accordance with *'Managing Urban Stormwater: Soils and Construction Volume 2E – Mines and Quarries'*.

2.4.3 Offline Dam – Condition 4 (33 & 34)

The upgraded existing quarry dam (Lower Dam) is offline from Rocklow Creek. A dam upgrade plan was prepared by Coffey Geotechnics which accompanied the application for a Controlled Activity Approval (formerly Part 3A Permit) under the *Water Management Act 2000* to undertake works within 40 metres of Rocklow Creek with spillway construction being completed in the 2008-2009 reporting period.

The following aerial photograph (**Figure 4**) shows the upper dam storage and the offline lower dam.

Figure 4: *Current water storages onsite forming part of the sites Water Management Plan.*

2.4.4 Flocculant Management – Condition 4(36 & 37)

The current water management plan does not propose the use of flocculants to treat stormwater prior to discharge, rather, filter the stormwater through the use of a bio-retention swale. Accordingly, no Flocculant Management Plan is necessary. No discharge to the bio-swale occurred over the reporting period with water being transferred onsite to the Top Dam for use onsite. Once volumes in the Top Dam increase the site will discharge to the swale to manage water storage volumes onsite.

2.5 Flora and Fauna Management

2.5.1 Vegetation Offset Strategy – Condition 4(46)

As a result of the vegetation being cleared for the southern extension of the Croome Farm extraction area, and in recognition of Condition 4(46), a Vegetation Offset Strategy was prepared to set out how the impacts of the clearing would be offset. The vegetation offsets comprise:

- 4.6 hectares of Melaleuca armillaris Tall Shrubland; and
- 8.2 hectares of Blue Gum-White Box Woodland/Forest (Illawarra Lowlands Grassy Woodland).

These two endangered ecological communities will be re-established through a combination of natural regeneration, assisted natural regeneration, reconstruction and fabrication on Boral owned land to the south of the quarry. Bush regenerators, Southern Bushland Repair collected seed on Borals land at Dunmore during December 2006 and January 2007 ready for propagation. The planting out of the tube stock in the compensatory habitat management area took place between August and December 2007 and was assisted by good rainfall which aided a high success rate for the planted tube stock.

As a result of the RailCorp quarry extension and in recognition of Condition 4 (46c) of the Consent a Biodiversity Offset is being conserved, maintained and enhanced in accordance with and in the area outlined in the letter sent to DoP on 22 September 2008. This biodiversity offset is also to be subject to a long-term security mechanism to ensure the offset is protected into the future. A Voluntary Conservation Agreement is in place to provide the long-term security mechanism described in the Consent.

2.5.2 Flora and Fauna Management Plan – Condition 4(47-50)

The Vegetation Offset Strategy document prepared by Cumberland Ecology also included a Flora and Fauna Management Plan for the site. The plan provides procedures and protocols to be followed by quarry staff when clearing vegetation to ensure that the potential impacts on native fauna are minimised. The plan also provides guidance for the ongoing maintenance of the vegetation offsets in the compensatory habitat management zone as well as a plan to preserve, enhance and maintain the gully of remnant rainforest immediately south of the quarry.

2.5.3 Independent Audit – Condition 4(52)

On 18 October 2007, the DoP endorsed the appointment of Julie Gander of International Environmental Consultants to carry out the Independent Audit of the Dunmore Quarry Flora and Fauna Management Plan (FFMP). Boral commissioned the audit on 19 October 2007.

The audit took place on 17 January 2008 and audited the FFMP with the following aims:

- To verify compliance with the conditions of consent relevant to the Draft Flora and Fauna Management Plan;
- To verify implementation of the Draft Flora and Fauna Management Plan;
- To assess the adequacy of the Draft Flora and Fauna Management Plan; and
- If necessary, make recommendations to improve the performance and / or adequacy of the Draft Flora and Fauna Management Plan.

The audit concluded that conservation, remedial and revegetation activities associated with Dunmore Quarry have been conducted in general compliance with the conditions of consent and Draft Flora and Fauna Management Plan. It was also considered that the plan was still being implemented at the time of the audit. With the implementation of the recommendations made within the audit report, it was considered that the intent and aims of the Flora and Fauna Management Plan will be adequately met.

2.5.4 Grey-Headed Flying Fox Aviary

The Grey-headed flying fox aviary has continued to be used by members of WIRES and the Wildlife Rescue South Coast (formerly NANA) to rehabilitate injured flying foxes and release them back into the local colony. During the reporting period 40 Grey-headed flying fox's were rescued and used the facility for rehabilitation and ultimately released to the Bomaderry colony. The number of rescued flying foxes was around half that of previous years when there was a food shortage. The Jamberoo colony did not return over the season and bats were subsequently released to the Bomaderry colony due to the Blackbutt colony not being deemed a safe release site.

2.6 Rehabilitation

2.6.1 Rehabilitation Management Plan – Condition 4(54-55)

As outlined in the Rehabilitation Management Plan, the only quarry faces to become terminal (final) and ready for rehabilitation are along the southern wall in RIC and the northern edge of Croome Farm. The southern wall in RIC is now complete, and will be prepared for rehabilitation in the coming reporting periods. Additionally, the benches completed to the west of the middle dam will also be scheduled for vegetating once works have been completed on the dam.

2.6.2 Rehabilitation and Conservation Bond – Condition 4 (56-57)

Following the calculation of the disturbed areas on site and the preparation of the Rehabilitation Management Plan, Boral submitted a bank guarantee to the Department of Planning according to the rates presented in Condition 4(56). The current amount covered by the bank guarantee is $2,559,812. This amount has been revised upon the approval of the proposed RIC extension, which will increase the disturbed area on site, as well as provide for additional compensatory habitat area management.

2.7 Aboriginal Heritage

2.7.1 DQ2 Scarred Tree – Condition 4(64)

Scarred trees are the result of the Aboriginal removal of bark from a living tree for use in the manufacture of structures and implements such as shelters, canoes, coolamons and sculptures. The Scarred tree at Dunmore has two scars located on opposite sides of the trunk at its base and holds local Aboriginal significance.

Since the tree was discovered in 1992, its health gradually deteriorated due to its age of approximately 150 years. Following extensive consultation with 5 local Aboriginal groups and various archaeological investigations, Boral was granted a Section 90 Consent from the Department of Environment Climate Change & Water to relocate the tree subject to a number of conditions from the various Aboriginal groups.

The approved quarry extension within Croome Farm held the abovementioned Aboriginal Scarred tree. On 7 March 2005, Boral was granted a Section 90 Permit (#2137) from the Department of Environment Climate Change & Water (National Parks) to remove the Scarred Tree. The permit was valid for a period of two years from the date of issue.

Members of the local Aboriginal community who had initially inspected the Scarred Tree were invited to supervise the removal of the tree and provide advice on its preservation and relocation. The Aboriginal Elders invited were:

- Mr Allan Carriage - Wadi Wadi Coomaditchi Aboriginal Corporation, part of the Northern Illawarra Aboriginal Collective (NIAC);
- Mr Rueben Brown – Korewal Elouera Jerrungarugh Tribal Elders Aboriginal Corporation; and
- Mrs Cheryl Davis – Wodi Wodi Elders Corporation and Illawarra Local Aboriginal Land Council

On 23 November 2006 the upper limbs of the Scarred Tree were carefully removed to reduce the weight of the tree and make the base easier to maneuver. This process was supervised by Mr Allan Carriage and Mr Rueben Brown. Mrs Cheryl Davis was unable to make it on the day.

On 24 January 2007 the remaining stump and root ball were removed by excavator and the tree laid on its side in readiness for relocation. This process was supervised by Mr Allan Carriage and Mr Sean Sudderry who attended on behalf of Mr Rueben Brown. Mr Paul Cummins from NIAC was also present as a visitor.

On 14 October 2008 the Scarred Tree was relocated to an area within the quarry that is protected from potential disturbance from the day to day operations of the site. This relocation was to allow for quarry progression into the Croome Farm South area in which the Scarred Tree was originally located.

Boral has been consulting with the Aboriginal Liaison Officer, Veronica Graff, from Shellharbour City Council (SCC) who convenes the local Aboriginal Tribal Elders Group and with the NPWS and local Aboriginal representatives who are currently discussing the most appropriate location and preservation for the tree. To date, no location has been confirmed, however, Bass Point Nature Reserve or Kiillalea State Park have been shortlisted as potential long-term locations for the tree. Once a suitable location has been chosen, Boral will relocate the tree. It was hoped a location will be confirmed to relocate the Scarred Tree within the near future. Boral has also held discussions with Illawarra Local Aboriginal Land Council member Sharralyn Robinson and National Parks & Wildlife Services Mark Simon. In the meantime discussion continues between Boral and SCC along with the Illawarra Local Aboriginal Land Council and National Parks & Wildlife Service to ensure the relocation process continues.

2.7.2 Aboriginal Site DQ2004/1 – Condition 4(65)

Site DQ2004/1 was discovered during archaeological investigations carried out in response to issues in the EIS raised by the DECCW. Site DQ2004/1 consists of two stone artifacts discovered during the surface survey. The site is located outside of quarry operations and does not pose a risk of disturbance.

2.8 Visual Impacts

2.8.1 Visual/Noise Bund – Condition 4(67)

The Visual and Noise Bund was constructed and vegetated prior to the issuing of consent and was reported as completed in the 2005/2006 AEMR.

2.9 Emergency Management

2.9.1 Emergency Management Measures – Condition 4 (75)

In recognition of Condition 4(75) and to adequately prepare and respond to emergency situations that might occur on site, an emergency contingency management plan was prepared for the site and submitted to the DECCW in response to Condition U1 of the EPL. The plan uses a risk assessment based approach assessing the likelihood and consequence of each identified potential threat.

Following the risk assessment processes, no significant threats to the environment and/or public health were identified. Notwithstanding this, Boral has adopted protocols and systems for responding to any potential environmental threat such as the spillage of hydrocarbons from fixed or mobile plant. Employees and contractors are trained and educated about these systems through the monthly site team briefings and site safety inductions. No operational emergencies occurred during the reporting period.

2.10 Bushfire Management

2.10.1 Bushfire Management Plan – Condition 4(76)

A Bushfire Management Plan was prepared in consultation with the NSW Rural Fire Service. The plan identifies the potential impacts of bushfire on people, land and assets and describes the control measures to be put in place to minimise the risk a bushfire could have.

The control measures adopted can be summarized as:

- grazing of pastures to reduce fuel loading and provide fire breaks;
- slashing of grass around infrastructure;
- ongoing communication with the NSW Rural Fire Service;
- the Dunmore Quarry emergency response plan;
- use of adequate fire fighting equipment around the site; and
- use of the on site 50,000L water truck fitted with a water canon.

No bushfires threatened the operation during the reporting period.

2.11 Community Liaison and Complaints Management

2.11.1 Community Consultative Committee – Condition 5(8-9)

The Community Consultative Committee (CCC) met twice during 2011/2012 on 17 August 2011 and 29 February 2012. The community members and people that comprise the CCC are as follows:

Company Representatives

- Todd Kalajzich, Quarry Manager – Boral Quarries NSW; and
- Mel Goodall, Environment Advisor – Boral Quarries NSW.

Shellharbour City Council (SCC) Representatives

- No council representatives were on the CCC

Community Members

- Margrit Stocker, representing Swamp Rd residents;
- Dennis Fogarty, representing the McParland family;
- Cindy Neaves, representing the Dunmore Lakes Estate; and
- Kathryn Burton from nearby "Dunmore House".

Independent Chairperson

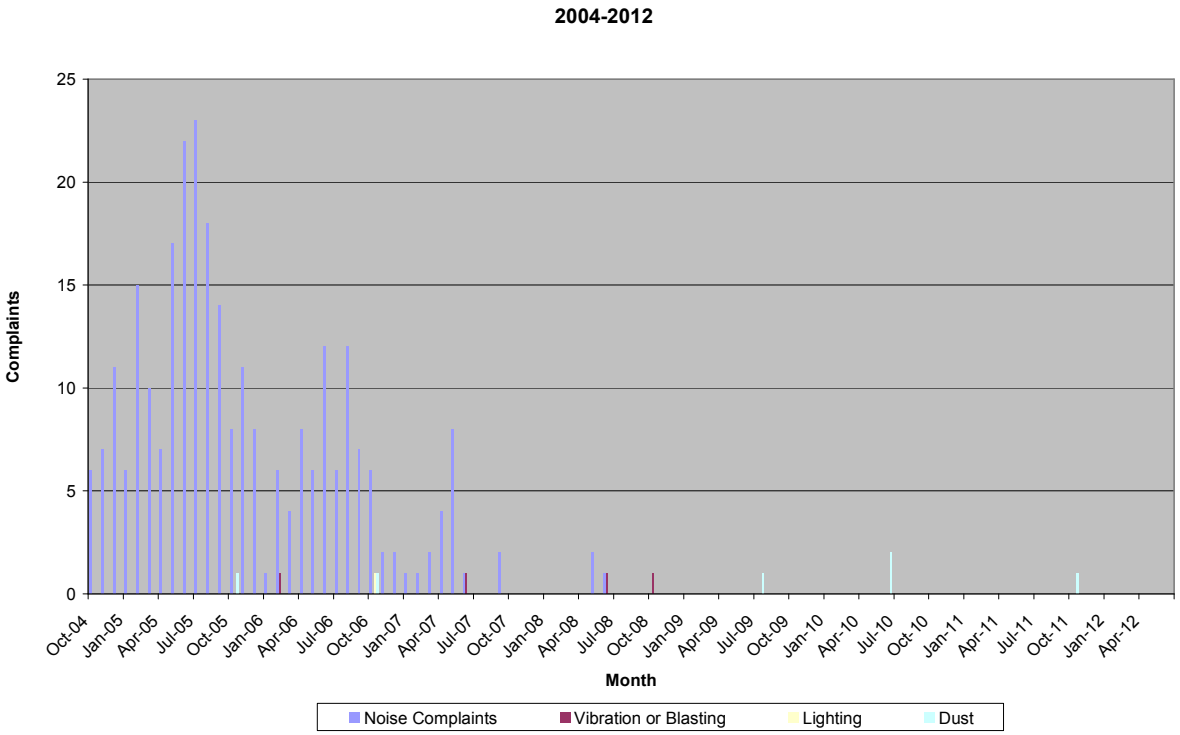
- James Bailey, Partner – Hansen Bailey Consulting.

The CCC has served as a valuable dialogue between Boral and the local community with valuable input and feedback being provided by the community regarding quarry operations and plans. Members are informed of the environmental performance of the site, provided with an update on operations and given a chance to tour the site and ask questions they may have regarding the operation. CCC members have also been diligent in disseminating the information from the meeting minutes to other interested community members in the local area.

2.11.2 Complaints Management

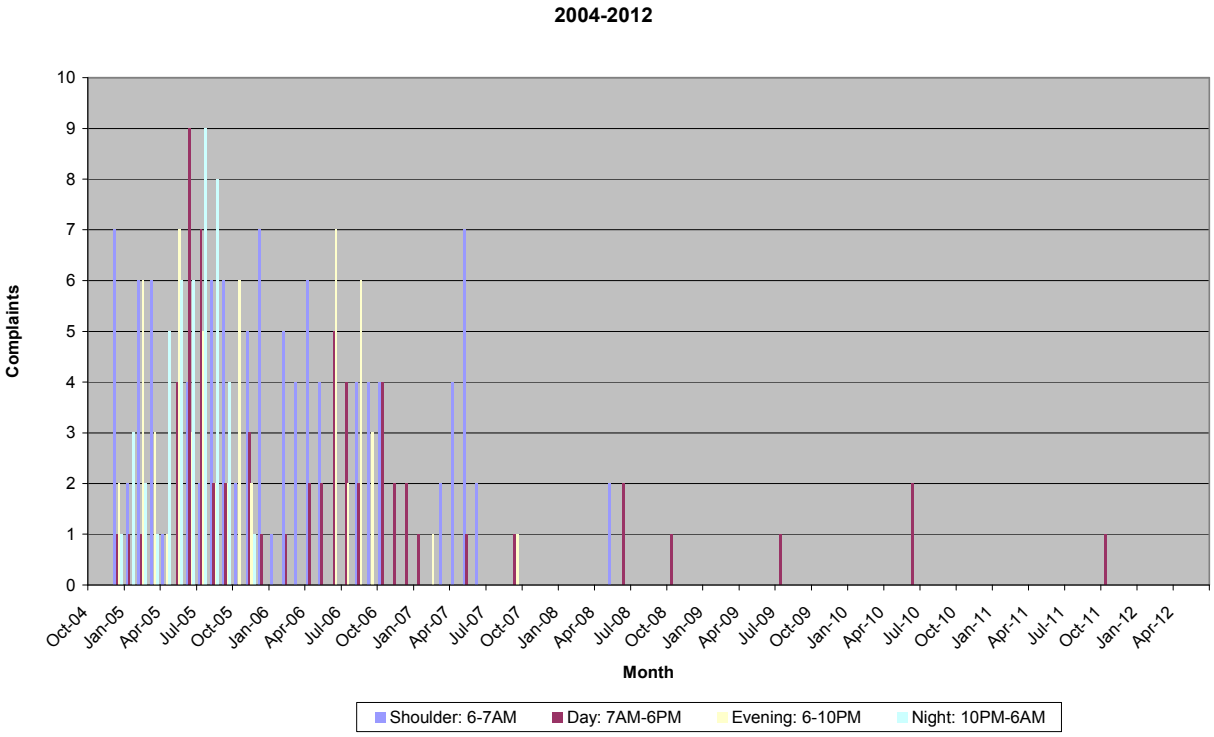
The table below provides a summary of complaints made during the reporting period. *Graph 2* provides a graphical summary of the noise, vibration and dust complaints received since 2004. One complaint was received during the reporting period relating to dust emissions.

No. Complaints	Reason	Complaint Means
1	Dust	DECCW Pollution Line/ Phone



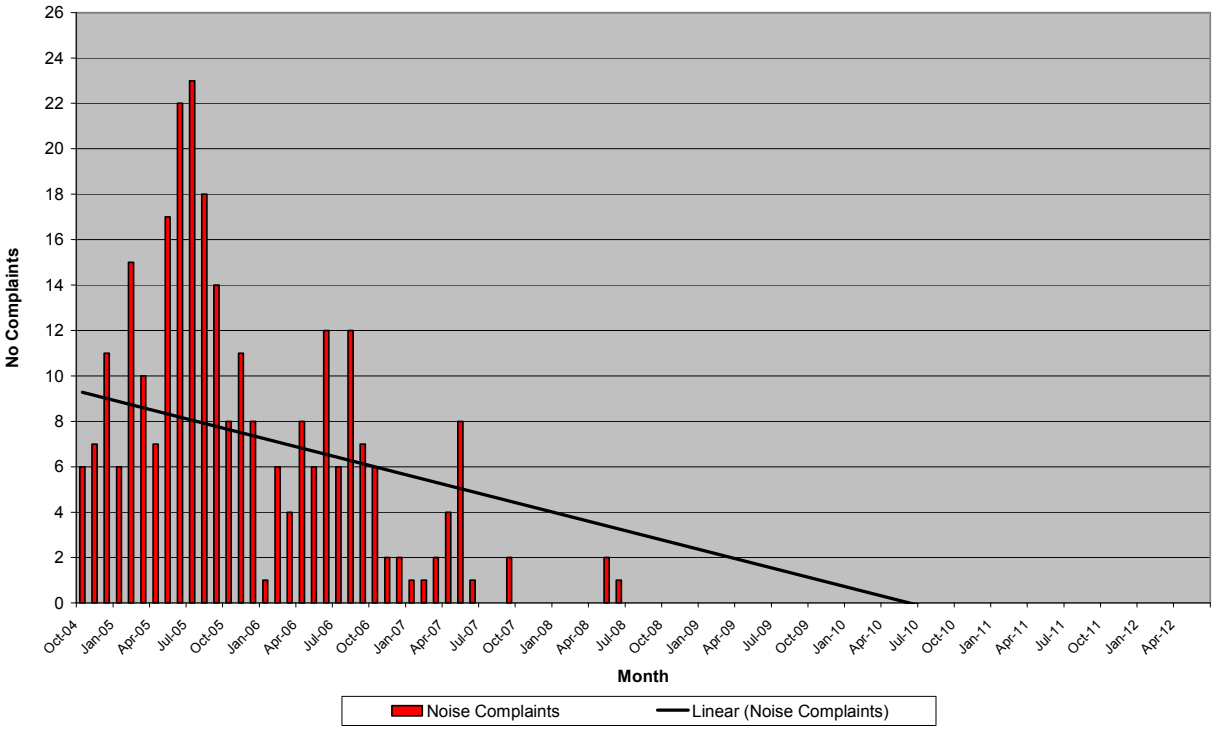
Graph 2: Summary of complaints

Graph 3 presents an analysis of the frequency of complaints during the respective noise assessment periods (i.e. shoulder, day, evening etc.) from 2004 to the current reporting period. The one complaint received over the reporting period was recorded during the Day noise assessment period in response to dust emissions on 6 October 2011.



Graph 3: Complaint frequency and timing

Graph 4 presents the frequency of noise complaints reported to the EPA Pollution Line since issuing of consent i.e. 30 September 2004. The graph shows a decline in noise complaints since this time. This has largely been due to the erection of enclosures around the primary and secondary crushers and the remainder of the primary screen. Of particular note is the significant reduction in noise complaints with no noise complaints received over recent reporting periods.



Graph 4: Noise Complaints over time

Operational responses to complaints

The following operational response was made following the complaint received during the reporting period:

- An investigation was conducted into the cause of the dust complaint. It was found that dust suppression sprays were in use but a water valve had been partially closed resulting in dust suppression not being used to its full capacity.
- Quarry staff were re-educated in the need to manage dust emissions. Staff are actively encouraged to take ownership of the site and act to reduce dust emissions as part of their job roles.
- Results of the investigation were passed on to OEH to provide feedback to complainant. OEH issued a formal warning letter in response to the incident.

3. ENVIRONMENTAL MONITORING & MANAGEMENT

3.1 Noise, Blasting and Vibration

3.1.1 Noise Monitoring and Management

Introduction

The Environmental Impact Statement (EIS) prepared for the Dunmore Quarry Production Increase ('the EIS') predicted that quarry operations would have a minor noise impact on surrounding land holders however, the quarry would be compliant with the project specific noise levels set in accordance with the NSW Industrial Noise Policy (INP).

Following the issuing of consent, a noise monitoring program was prepared in recognition of Condition 4(14) to monitor noise at the three receiver locations specified in the consent and EPL. The noise monitoring program includes:

- continuous directional real-time noise monitoring at Location K (the most affected residence); and
- annual attended noise monitoring surveys at all receiver locations during winter conducted by a specialist noise consultant.

The Noise monitoring locations relevant to Dunmore Quarry can be seen in **Figure 5**.

Continuous Real-time Noise Monitoring – Condition 4(12)

A directional noise monitoring system (BarnOwl) was installed at Location K during May 2005, which has the ability to measure noise in the direction of the quarry. Operators in the controlroom use this real-time data to inform them on the performance of the quarry.

Noise Compliance Assessment Report – Condition 4(13)

Noise consultants Heggies were engaged to undertake attended noise monitoring surveys during worst case weather conditions during winter. This occurred on 14, 15 & 18 July 2011 at the McParland Residence (Location A), Stocker Residence (Location K) and the Dunmore Lakes Estate (Location O).

The attended noise survey deemed the quarry operations to be compliant at all locations consistent with predictions in the EIS (refer to **Appendix A** for report).

3.1.2 Blasting and Vibration

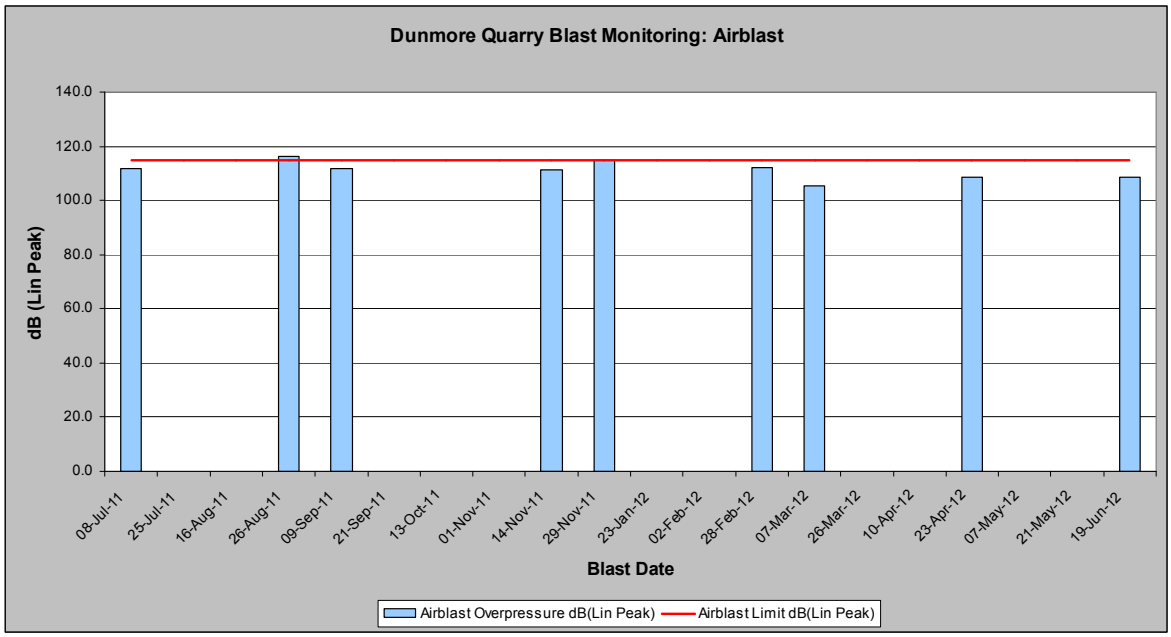
Blast Management Plan – Condition 4(20)

Blasts are specifically designed to minimise the impact of ground vibration and airblast on neighbouring properties. All blasts are monitored for ground vibration and airblast at the McParland residence. The Blast Management Plan will be reviewed if the 100 percentile assessment criteria are exceeded or if a complaint is received from the owners of the McParland property.

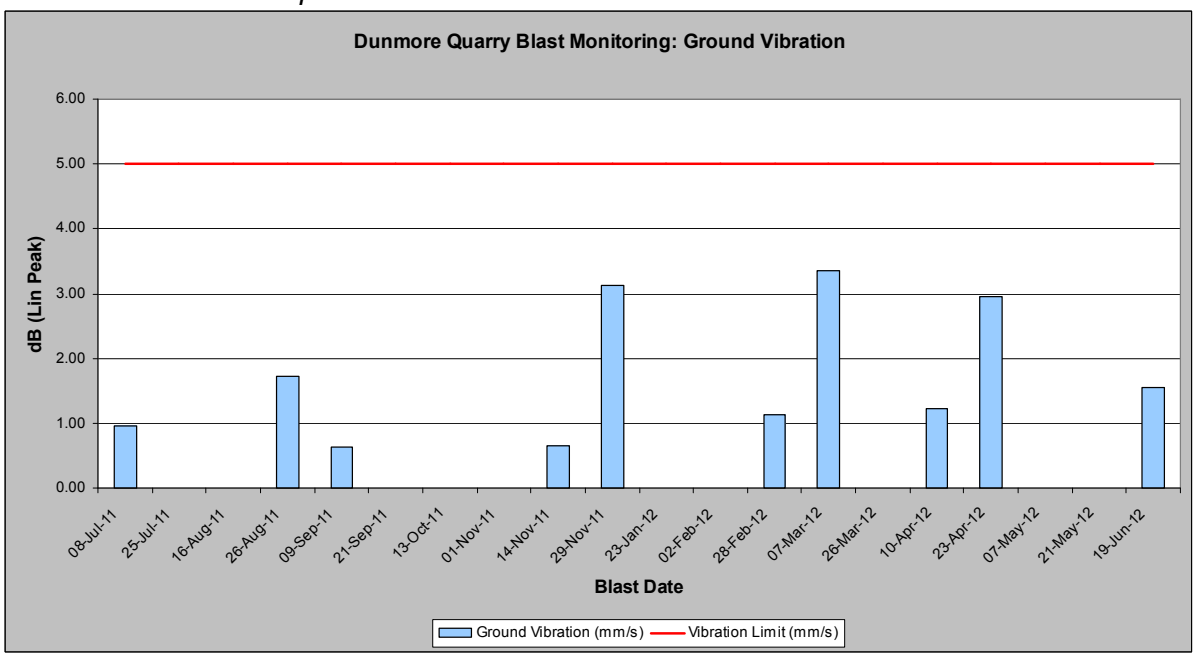
Blasting Monitoring – Condition 4(21)

Graphs 5 and *6* present the ground vibration and airblast overpressure results of each blast during the reporting period as recorded at the McParland monitor. **Figure 4** shows the location of the blast monitor.

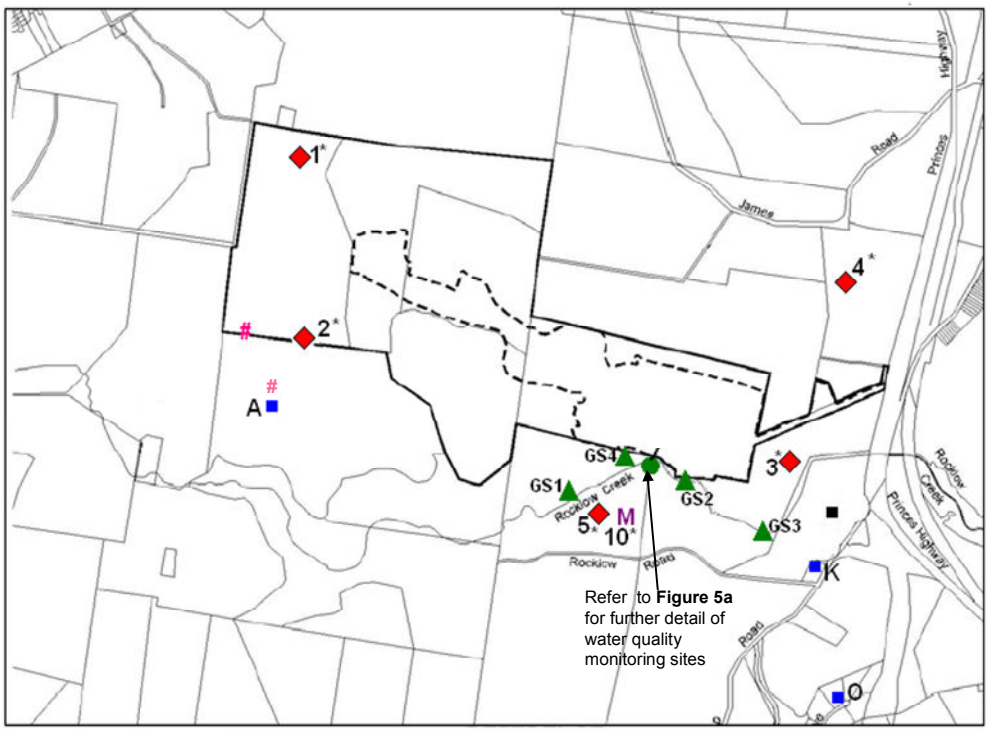
Graph 5: Airblast Overpressure Results-McParland Monitor 2011-2012



Graph 8: Ground Vibration-McParland Monitor 2011-2012



Of the blasts conducted during the reporting period a number did not exceed the trigger levels set on the monitoring instruments indicating they are of low level and in compliance with the assessment criteria. One blast over the reporting period recorded over the 95 percentile criteria at 116.1dB(L) however the site remained compliant with this condition as no other blasts recorded over the criterion during the reporting period.



N

REFERENCE
Project Site Boundary
Limit of Existing Disturbance
Cadastral Boundary
A Residence / Identifier
Noise Monitoring Location
Air Quality Monitoring Location
Discharge Water Quality Monitoring
GS1 Baseline Water Quality Monitoring
Blast Monitoring Location
1* Enironmental Protection Licence Identifier
M Meteorological Monitoring Location

SCALE 1:40 000

0.5 0 0.5 1.0 1.5 2.0 km

Base map: Figure 5.9 Dunmore Quarry Production Increase EIS, 2003

Figure 5

Environmental Monitoring Locations

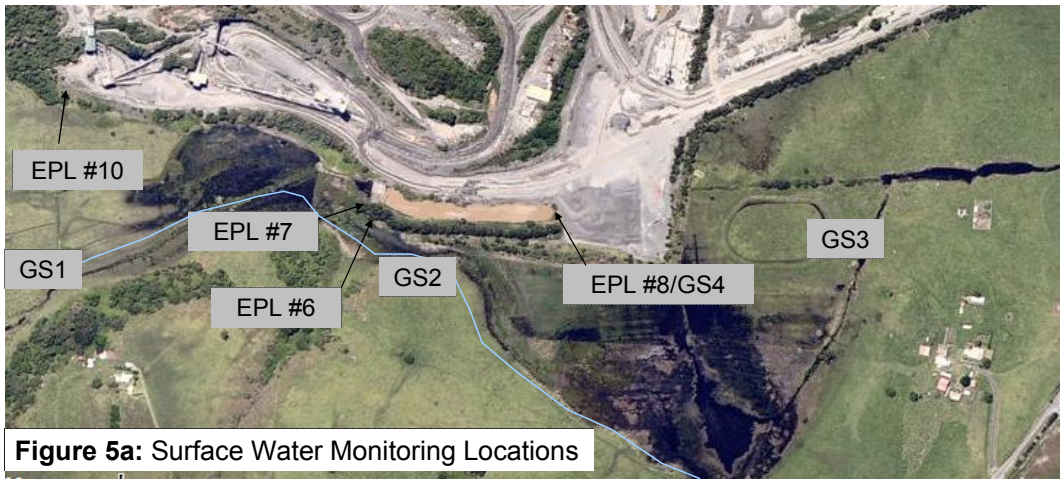


Figure 5a: Surface Water Monitoring Locations

3.2 Air Quality

3.2.1 Deposited Dust Monitoring

The air quality monitoring program for heavy particulates comprises 4 deposited dust gauges that have been in operation for approximately 10 years. The location of these dust gauges can be seen in **Figure 4**.

Table 5 and *Graphs 9 to 12* present the results of deposited dust monitoring during the reporting period reported as insoluble solids and ash content.

Table 5
Deposited Dust Results

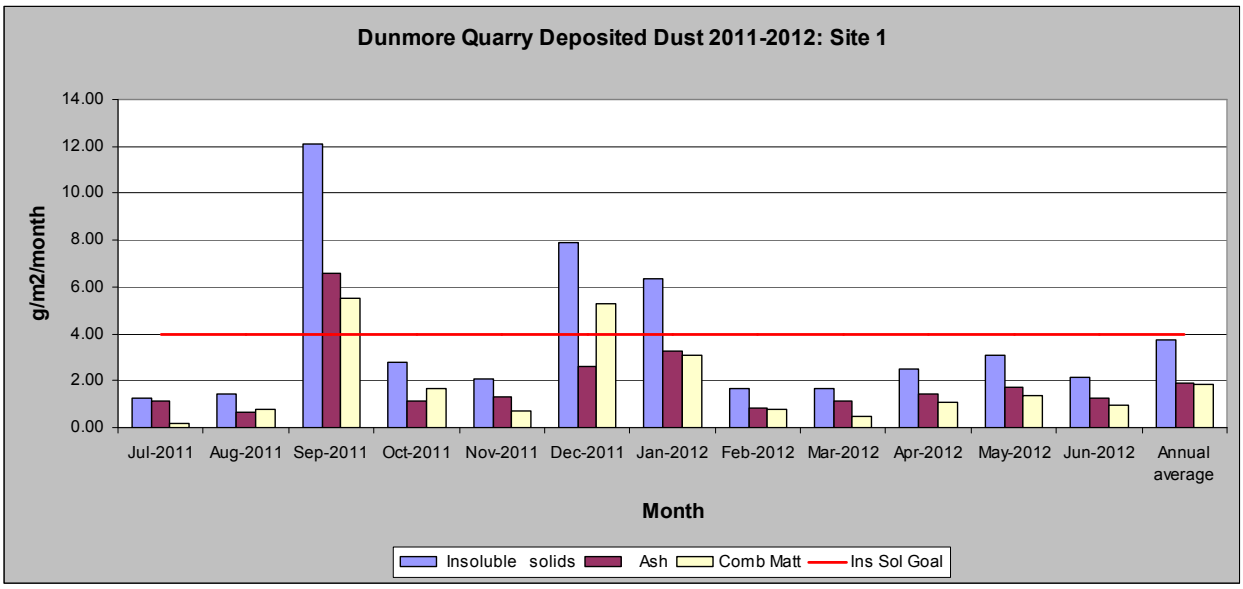
Month	Site 1 grams/m^2/month		Site 2 grams/m^2/month		Site 3 grams/m^2/month		Site 4 grams/m^2/month		IAC
	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash	
2005/2006 Average	*5.85*	*2.66*	*4.48*	*1.67*	*4.85*	*2.22*	*3.90*	*1.92*	*4*
2006/2007 Average	*5.40*	*2.13*	*2.48*	*1.53*	*2.79*	*1.89*	*4.31*	*2.44*	*4*
2007/2008 Average	*3.26*	*1.67*	*2.37*	*1.30*	*3.89*	*2.90*	*5.55*	*3.17*	*4*
2008/2009 Average	*6.60*	*2.63*	*3.01*	*2.10*	*3.12*	*2.17*	*2.71*	*1.66*	*4*
2009/2010 Average	*4.65*	*3.03*	*4.41*	*2.60*	*5.02*	*3.49*	*3.15*	*2.33*	4
2010/2011 Average	*3.35*	*1.43*	*5.86*	*3.92*	*3.43*	*2.09*	*2.53*	*1.60*	*4*
Jul-2011	1.26	1.10	0.38	0.22	0.94	0.85	2.07	1.93	4
Aug-2011	1.42	0.67	1.77	1.08	1.84	1.39	1.23	0.80	4
Sep-2011	12.11	6.57	5.94	4.42	4.79	3.23	4.71	3.48	4
Oct-2011	2.80	1.15	3.18	1.38	4.54	2.20	2.86	1.45	4
Nov-2011	2.05	1.33	2.22	1.50	3.71	2.75	1.52	1.35	4
Dec-2011	7.88	2.60	5.96	2.22	7.22	5.17	3.54	2.10	4
Jan-2012	6.34	3.27	10.21	3.53	3.59	2.37	3.22	1.93	4
Feb-2012	1.64	0.84	0.95	0.86	3.13	2.28	0.91	0.44	4
Mar-2012	1.65	1.15	0.61	0.17	3.28	2.12	1.42	1.28	4
Apr-2012	2.52	1.44	3.79	2.59	17.82	12.26	4.50	2.88	4
May-2012	3.07	1.73	2.40	1.49	5.23	3.88	4.19	2.48	4
Jun-2012	2.15	1.23	1.93	0.98	4.28	2.73	2.79	1.62	4
2011/2012 Average	**3.74**	**1.92**	**3.28**	**1.70**	**5.03**	**3.44**	**2.75**	**1.81**	**4**
2011/2012 Adj Aver					3.87	2.63			4

Note: Shaded values indicate contaminated sample. An adjusted average has been provided for comparison.

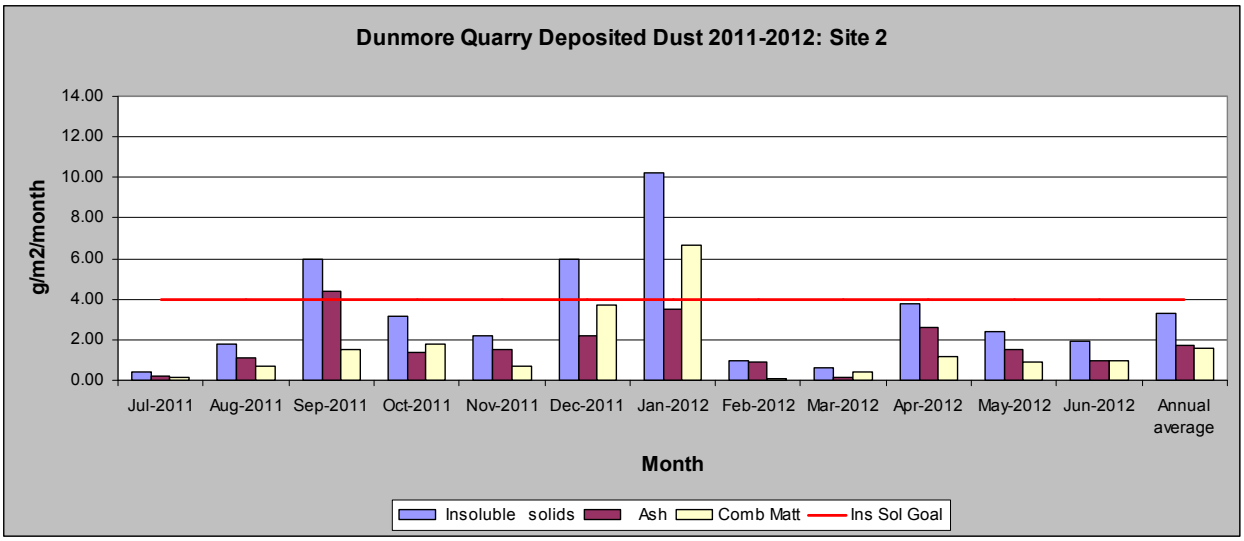
IAC = Impact Assessment Criteria

The results in **Table 5** show that the annual average for insoluble solids was below the impact assessment criteria at three (3) of the four (4) sites. Site 3 recorded an annual average of 5.03g/m^2/month insoluble solids. Although the annual average is above the 4g/m^2/month insoluble solids assessment criteria the average ash content for the Site is below the assessment criteria at 3.44g/m^2/month. As a deposited dust sample is non-discriminate ie collects material from all sources and not just that of the quarry and as the insoluble solids content of a sample includes organic material such as leaf litter and insects it is useful to also assess the ash content of a sample to help determine the possible quarry contribution to such a sample. The ash content of a deposited dust sample is more indicative of the material processed onsite and therefore can be used as a means to help eliminate some of the contaminates in a deposited dust sample and gain a better understanding of the quarry contribution to samples. Average annual ash levels recorded at each site over the reporting period were below 4g/m^2/month.

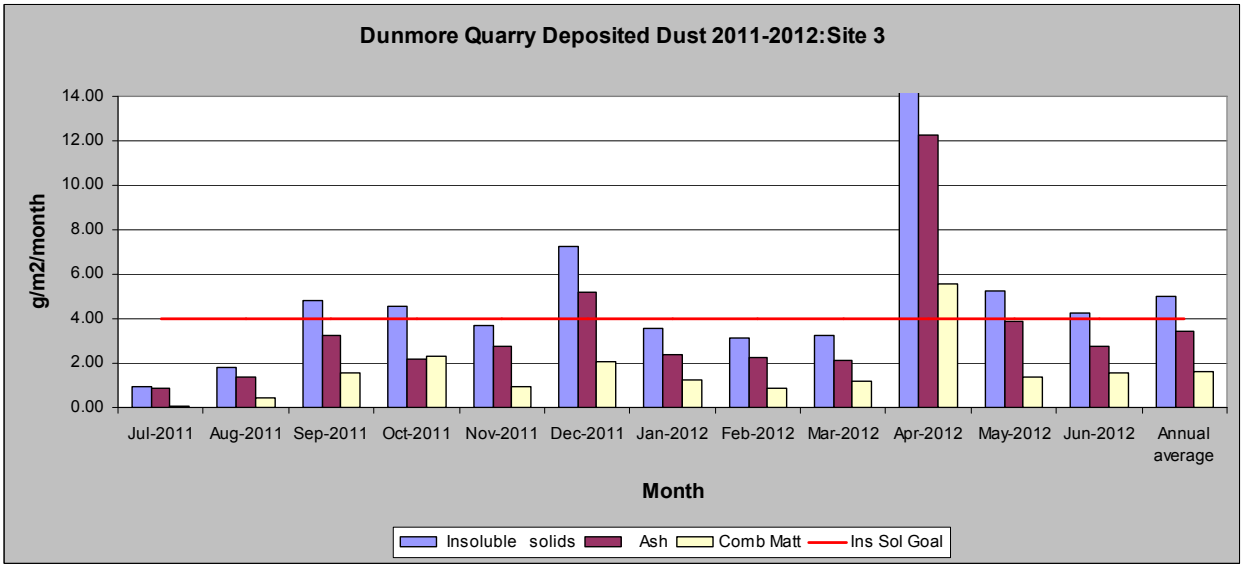
Further details of monthly non-compliance with the impact assessment criteria are discussed further in **Section 4.2.**



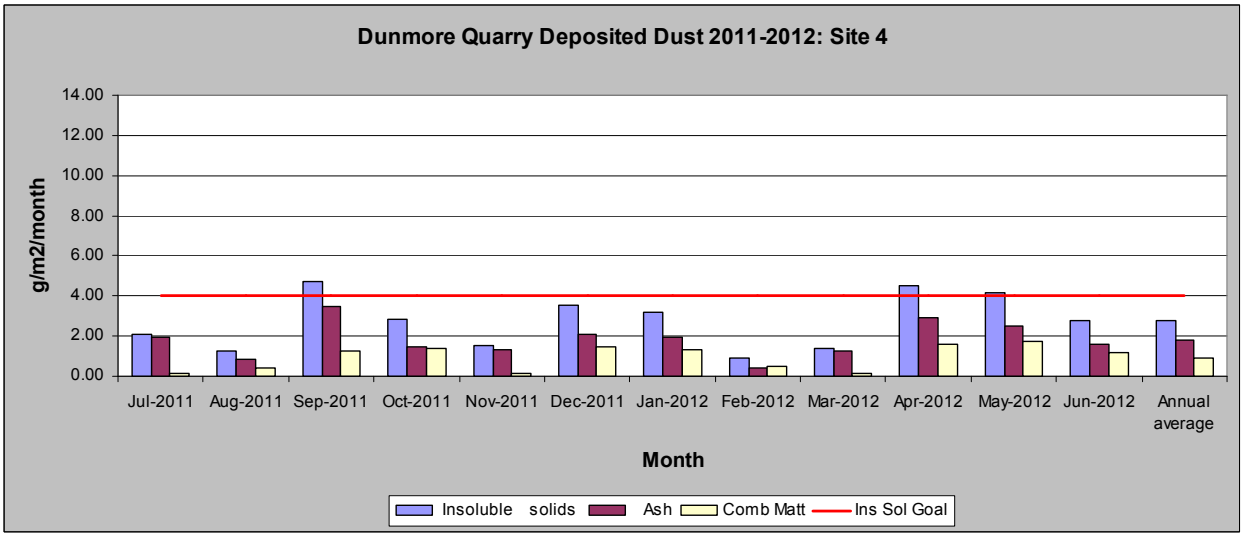
Graph 9: Deposited Dust Results – Site 1



Graph 10: Deposited Dust Results – Site 2



Graph 11: Deposited Dust Results – Site 3

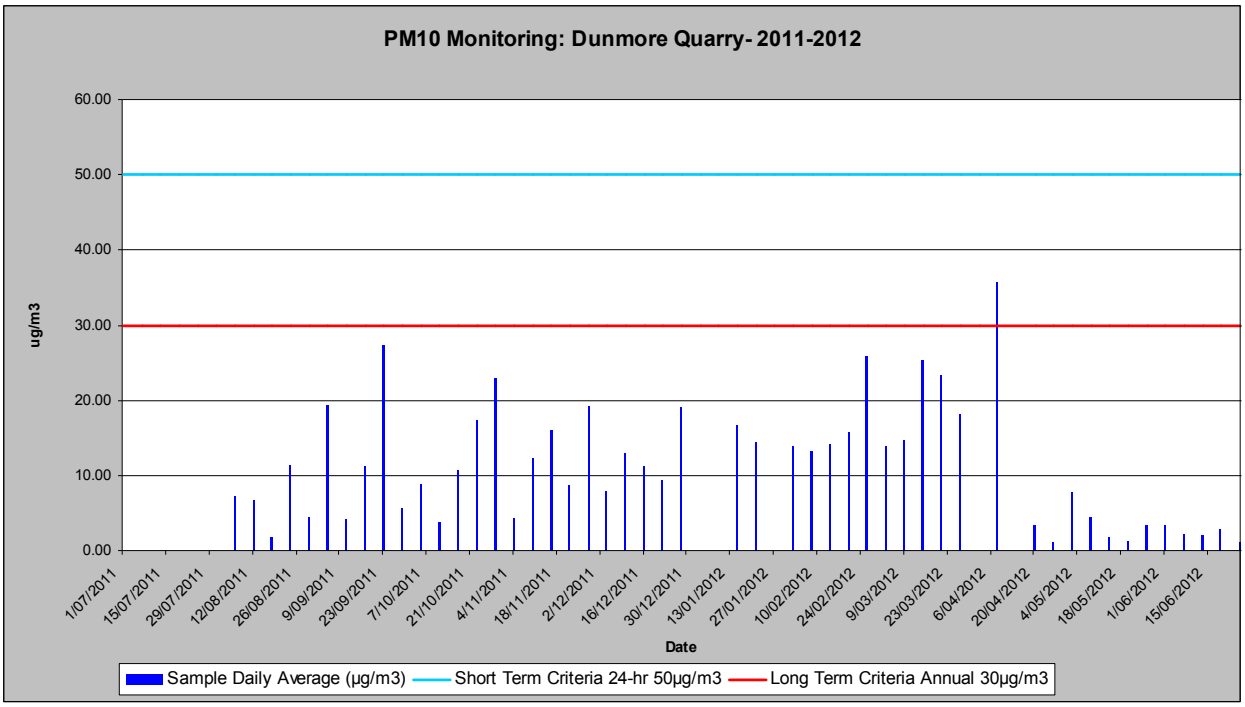


Graph 12: Deposited Dust Results – Site 4

3.2.2 PM_{10} Monitoring

The monitoring program for finer particulates includes monitoring of dust finer than 10 micron through use of a high volume air sampler (HVAS). The HVAS draws air through a filter and allows only dust finer than 10 micron to adhere to a filter paper which is then weighed to determine dust content. The HVAS runs for a 24 hour period every 6 days in accordance with consent and EPL conditions. **Figure 4** shows the location of the HVAS which was determined in consultation with the OEH.

Graph 13 presents the results of PM10 monitoring over the reporting period.

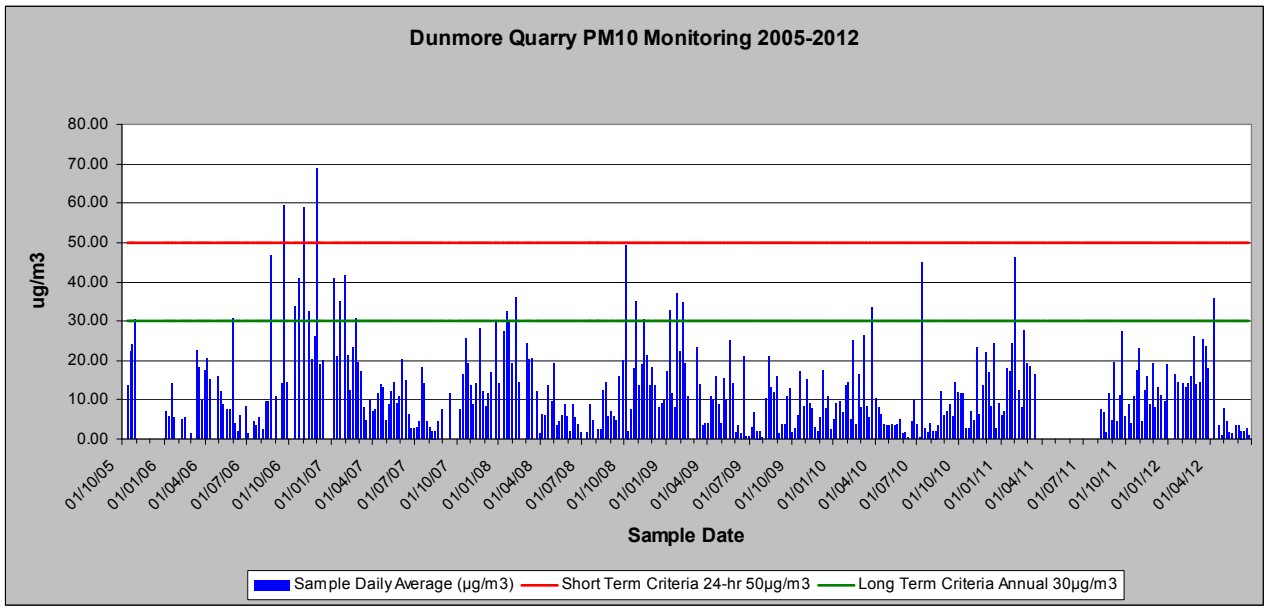


Graph 13: PM10 Dust Monitoring Results

The annual average of recorded results was 11.30µg/m^3, well under the long term impact assessment criteria of 30µg/m^3. The lowest recorded result was 1.02µg/m^3 on 24th April 2011, with the highest result being recorded on 2nd April 2012 at 35.67µg/m^3. The short term impact assessment criteria of 50µg/m^3 was not exceeded during the reporting period. The results to date indicate PM_{10} dust levels are well below short and long term impact assessment criteria despite being situated so close to quarry processing operations (approximately 400m from plant).

A number of PM10 samples were not successfully collected over the reporting period. An explanation as to the cause of these incomplete samples is provided in **Section 4.2**.

The graph below (**Graph 14**) shows PM10 results obtained from 2005 to 2012 and shows fluctuations in PM10 concentrations are apparent throughout each reporting period. The data also shows what appear to be seasonal fluctuations in PM10 levels. Overall the data shows that the quarry is performing well against both the long and short term assessment criteria.



Graph 14: PM10 Monitoring results 2005-2012

3.3 Meteorology

3.3.1 Metrological Monitoring – Condition 4(27)

A meteorological monitoring station has been operating at Dunmore Quarry for many years. The location of the meteorological monitoring site can be seen in **Figure 4**. **Table 6** presents a summary of the results of rainfall received during the reporting period against that received in previous years and regional averages. Seasonal wind roses showing the local wind movements can be seen below.

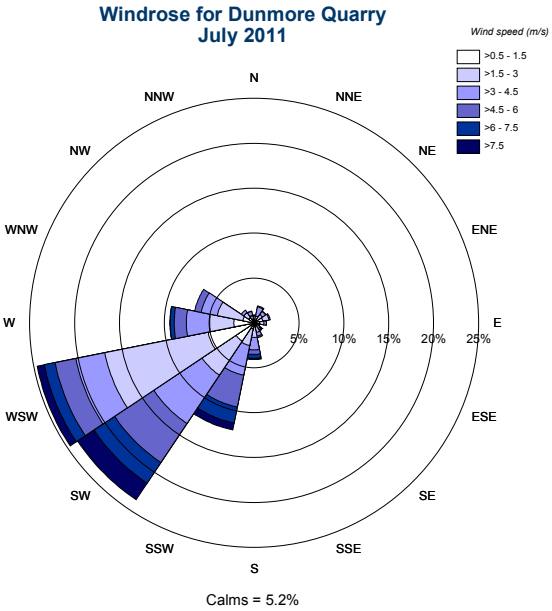
Table 6
Summary of Dunmore Rainfall

Month	Rainfall (mm)										Regional Averages* (mm)
	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	
July	20	24	27.5	41	66.8	30.5	63.5	35.5	78	194	63.4
August	13.5	39	17	3	51	58.5	39	0.5	72	85.5	83.3
September	14	8	20	33	104	39	56	19.5	145.5	58.5	67.4
October	6.5	49	248.5	48	12	17	79	125.5	126	124.5	100.5
November	17	150	79	144.5	39.5	161.5	46.5	65	198	165.5	115.6
December	70	41	71	36.5	68.5	120	112.5	80.5	147.5	60.5	94.6
January	68	31	39.5	90	14	65.5	9.5	79	59.5	52	130.3
February	112	70	126.5	87.1	218	351.5	107.5	197.5	48	307.5	156.4
March	121	84	0	43.5	68.5	36.5	39	74	362.5	146.5	160.4
April	91.5	200	25	8	167	90.5	106	63	37.4*	85	129.3
May	427.5	44	66	65.5	21	8	20	80.5	58.3*	9.5	106.4
June	74.5	42	12.5	124	287.5	85.5	67	52	74	88	112.4
Total	**1035.5**	**782**	**732.5**	**724.1**	**1117.8**	**1064**	**745.5**	**872.5**	**1407**	**1377**	**1320**

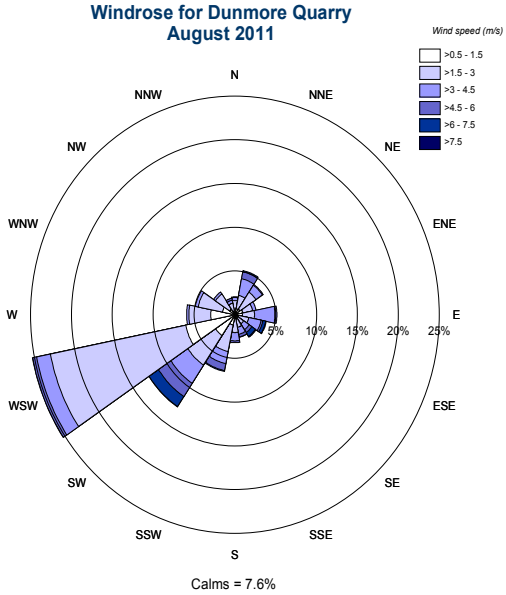
* Source: Bureau of Meteorology, Climate Statistics for Australian Location, Wollongong University http://www.bom.gov.au/climate/averages/tables/cw_068188.shtml

Wind Roses – July 2010 to June 2011

July 2011

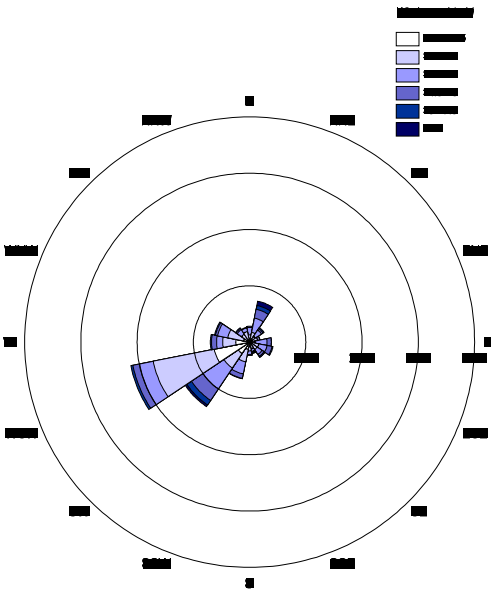


August 2011



September 2011

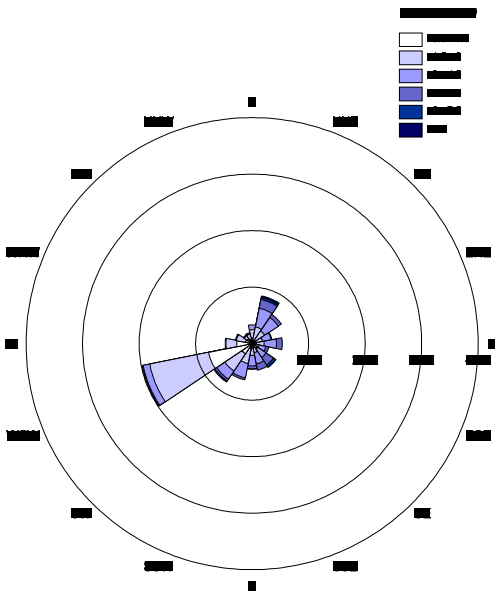
[redacted]



[redacted]

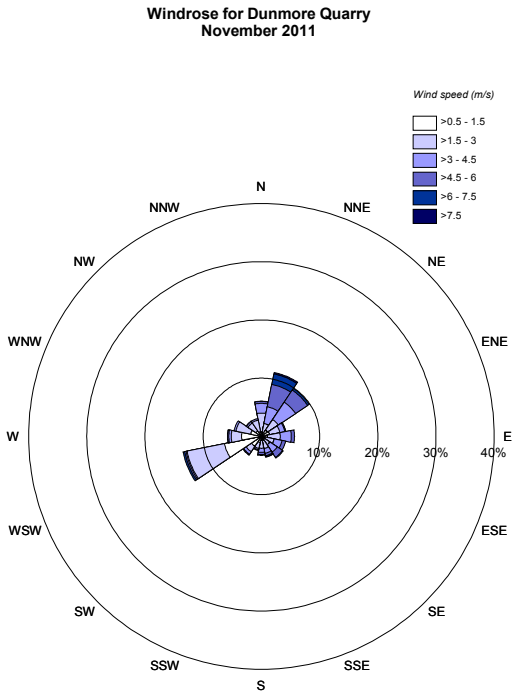
October 2011

[redacted]



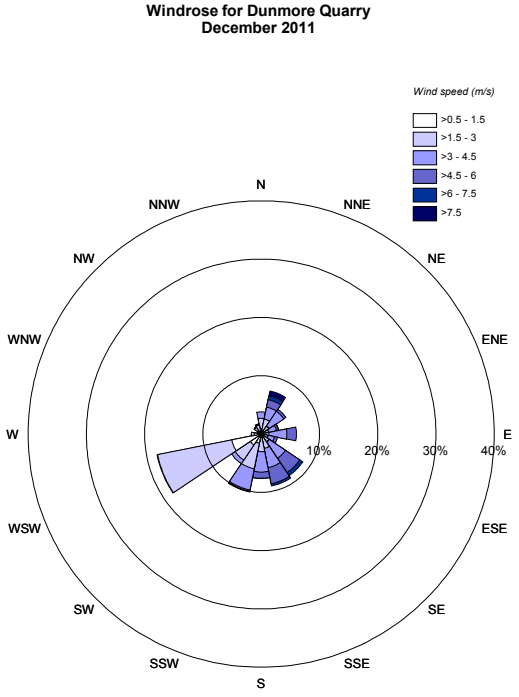
[redacted]

November 2011



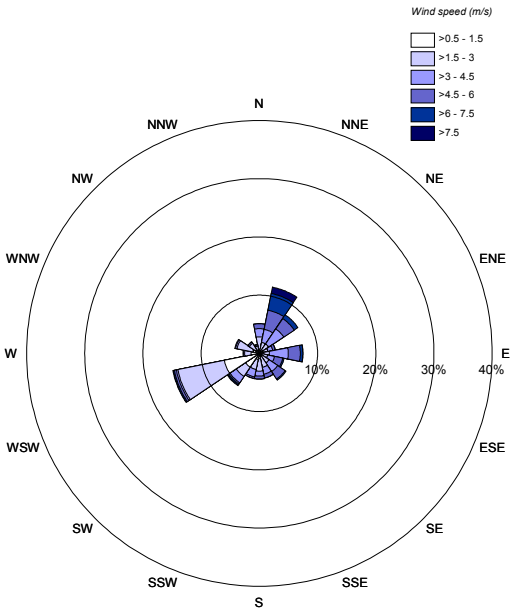
Calms = 10.2%

December 2011



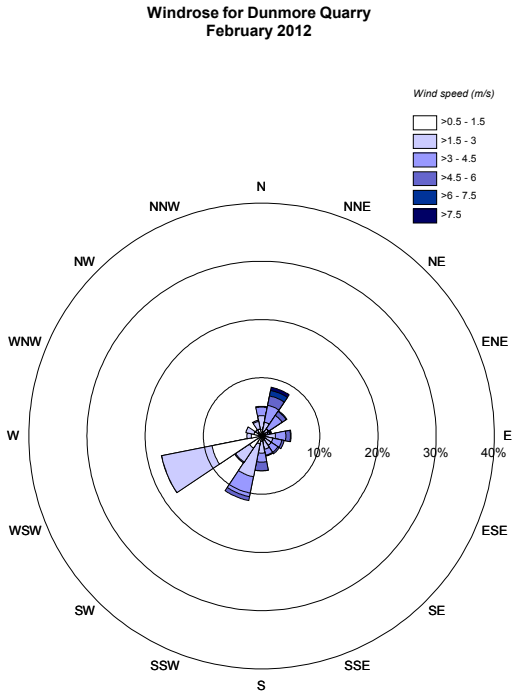
Calms = 6.2%

January 2012



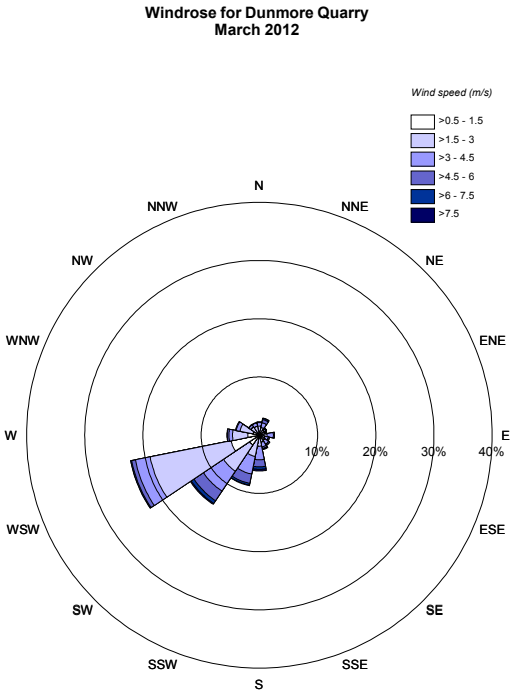
Calms = 8.9%

February 2012



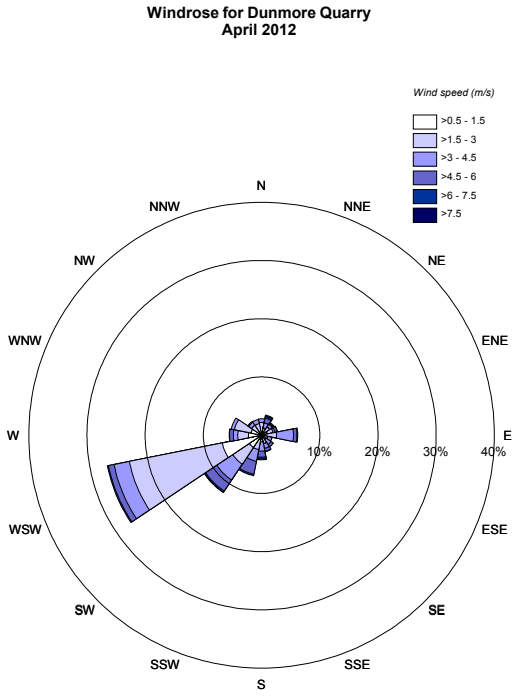
Calms = 13.4%

March 2012



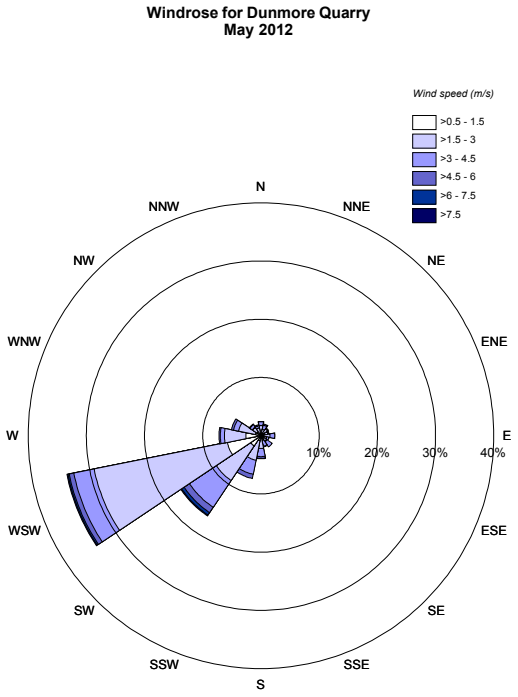
Calms = 16.8%

April 2012



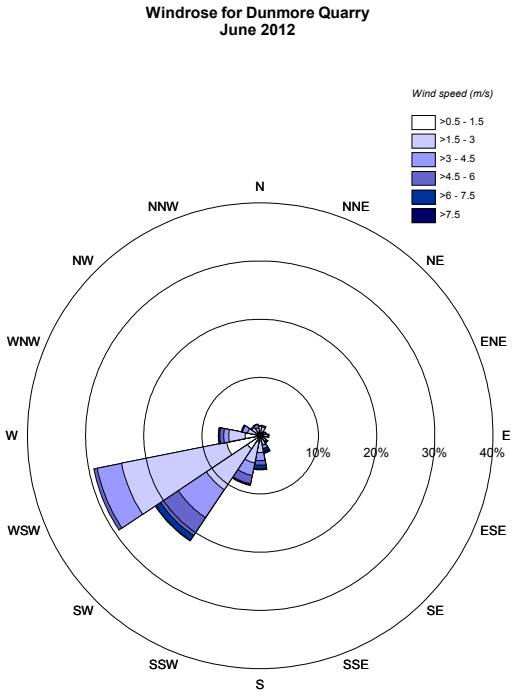
Calms = 8.2%

May 2012



Calms = 5.7%

June 2012



Calms = 7.5%

3.4 Surface Water Monitoring

Quarry Dam and Rocklow Creek

Surface water quality is monitored on a monthly basis within the quarry Lower Dam. At times of discharge water quality is also monitored within Rocklow Creek (upstream and downstream of the site) and at the discharge point to the creek. These locations can be seen in **Figure 5**. Each grab sample is analysed for pH, total suspended solids (mg/L), turbidity (NTU) and conductivity (µS/cm). Field parameters are also obtained at each site to analyse water quality conditions in-situ. The results of routine surface water quality monitoring program are presented in **Table 7**.

Dunmore Quarry's EPL has a licensed discharge into Rocklow Creek (See **Figure 5**) providing water quality is within the relevant discharge limits for total suspended solids. Sites 6, 7, 8 and 10 and their respective monitoring requirements will not take effect until the completion of the offline sediment and water supply dams. No discharge from the quarry dam occurred over the reporting period. When water levels approached the spillway water was transferred to the middle dam to prevent discharges whilst there was still sufficient storage space in the middle dam to accept water from the lower dam. During times of heavy rainfall Rocklow Creek would back up over the spillway and into the lower dam. During these times transfer of water to the top dam would cease until the creek level fell below the spillway.

Table 7
Surface Water Quality Monitoring in Quarry Dam

		Field Parameters								Laboratory Testing			
	Date	*Temperature oC*	*pH*	*Conductivity uS/cm*	*Salinity PSS*	*DO mg/L*	*DO %*	*ORP mV*	*Turbidity NTU*	*pH*	*TSS mg/L*	*Turbidity NTU*	*Conductivity uS/cm*
Background Averages	2004-2005									7.90	18.4	21.0	
	2005-2006									8.13	7.4	3.0	
	2006-2007									7.15	67.2	84.0	1093
	2007-2008									7.52	40.3	62.0	664
	2008-2009	20.39	7.57	737	371.4 (ppm)					7.55	14.1	38.0	693
2009-2010 Average		21.00	7.62	4392	2.60	8.40	89.5	296	35.7	7.89	18.0	23.3	4201
2010-2011 Average		18.66	7.16	640	0.31	6.71	73.5	323	131.3	7.59	38.4	95.1	601
2011-2012	22/07/2011	15.15	7.71	401	0.20	5.91	65.1	271	400.0	7.50	183.6	370.0	364
	31/08/2011	16.71	7.88	565	0.27	5.81	62.7	321	200.0	7.60	80.4	130.0	558
	5/10/2011	18.29	8.15	608	0.29	5.72	67.7	291	61.2	7.90	12.4	55.0	587
	31/10/2011	19.23	7.52	515	0.25	6.21	65.7	320	122.0	7.90	26.8	110.0	594
	5/12/2011	19.81	7.82	525	0.22	6.55	72.9	328	81.2	8.00	26.8	60.0	507
	10/01/2012	18.71	7.42	587	0.31	5.59	62.3	304	47.0	7.70	23.0	23.0	605
	30/01/2012	19.15	8.47	478	0.21	4.98	53.9	271	71.0	8.60	15.0	65.0	454
	2/03/2012	20.58	7.45	459.00	0.24	5.87	55.40	298.00	197.00				
	5/04/2012	22.59	7.99	550	0.27	6.49	72.9	287	133.0	7.80	33.0	75.0	532
	24/04/2012	20.00	7.31	479	0.23	6.24	67.6	342	196.0	7.90	31.0	85.0	481
	28/05/2012	14.14	6.72	558	0.27	8.72	85.6	346	135.0	8.00	30.0	55.0	549
	29/06/2012	12.14	6.17	522.00	0.25	10.74	97.30	429.00	93.50	8.10	20.0	90.0	508
2011-2012 Average		18.04	7.55	521	0.25	6.57	69.1	317	144.7	7.91	43.8	101.6	522

4. RESPONSES TO NON-COMPLIANCE

4.1 Deposited Dust

The deposited dust monitoring results for the reporting period show that annual average insoluble solid levels recorded at one of the four of the monitoring sites were above the impact assessment criteria of 4g/m^2/month. The insoluble solid fraction of a dust sample also contains

organic matter that is not related to quarry operations such as sea spray, pollen, insects, bird droppings and other wind blown organic matter. To determine the likely quarry contribution of insoluble solids it is more accurate to assess the ash content of the dust sample, which is the material left after heating. The latite material extracted at Dunmore Quarry is not able to be burned after heating and makes up part of the material left in the sample as ash.

The table below (**Table 9**) shows a comparison of each of the sites annual average insoluble solid levels and the corresponding ash component of the sample.

Table 9
Comparison of annual average insoluble solid and ash levels at dust monitoring sites

Site	Insoluble solids (annual average)	Ash (annual average)
	gram/m2/month	*grams/m2/month*
1	3.74	1.92
2	3.28	1.70
3	5.03	3.44
4	2.75	1.81

These results show that although the annual average insoluble solids at Site 3 was above 4g/m^2/month the corresponding ash component which gives an indication of the likely quarry contribution was below 4g/m^2/month.

Table 10 presents a comparison of months with elevated insoluble solids at each site in comparison to ash content, dominant wind direction and production tonnes for the month.

Table 10
Comparison of months with elevated insoluble solids in comparison to ash content, wind direction and production tonnes

	Month	Insoluble Solids (g/m^2/month)	Ash (g/m^2/month)	Dominant Wind Direction*	Direction of Strongest Winds*	Production Tonnes
Site 1	Sept-11	12.11	6.57	WSW, SW	NNE, Variable	128,159
	Dec-11	7.88	2.60	Variable	NNE, Variable	71,989
	Jan-12	6.34	3.27	Variable	NNE	47,385
Site 2	Sept-11	5.94	4.42	WSW, SW	NNE, Variable	128,159
	Dec-11	5.96	2.22	Variable	NNE, Variable	71,989
	Jan-12	10.21	3.53	Variable	NNE	47,385
Site 3	Sept-11	4.79	3.23	WSW, SW	NNE, Variable	128,159
	Oct-11	4.54	2.20	WSW	NNE	97,643
	Dec-11	7.22	5.17	Variable	NNE, Variable	71.989
	Apr-12	17.82	12.26	WSW	Variable	109,147
	May-12	5.23	3.88	WSW	SW,WSW	118,339
	Jun-12	4.28	2.73	WSW, SW	SW	113,676
Site 4	Sept-11	4.71	3.48	WSW, SW	NNE, Variable	128,159
	Apr-12	4.50	2.88	WSW	Variable	109,147
	May-12	4.19	2.48	WSW	SW,WSW	118,339

** Note: Wind directions are approximate only. Refer to wind roses for further information.*

Of the three (3) samples that recorded insoluble solid levels above 4g/m^2/month at Site 1 one (1) sample had an ash content greater than 4g/m^2/month (6.57g/m^2/month September 2011). Further analysis shows that the dominant wind direction and the direction of strongest winds for each of the months in exceedance of the criteria were mainly from the WSW or of a variable nature and generally not from the direction of the quarry (generally SSE).

Site 2 recorded three (3) samples with insoluble solids outside the assessment criteria with one (1) sample returning an ash content above 4g/m^2/month (4.42g/m^2/month September 2010). The dominant wind direction for September was from the SW to WSW with strongest winds from the NNE suggesting that some contribution may have been from the quarry. September saw above average production with an average number of blasts occurring in the month. All sites recorded deposited dust results above the assessment criteria for September suggesting that a regional contribution may have impacted on samples.

Of the six (6) samples that returned insoluble solid results above 4g/m^2/month at Site 3 two (2) samples had an ah content above 4g/m^2/month (5.17g/m^2/month December 2011, 12.26g/m^2/month April 2012). The sample collected for April 2012 appears to have collected a

localised contamination as results recorded at Site 3 for this month were significantly higher than those collected at other sites for the same sampling period. A review of the winds for April 2012 show that the majority were from the WSW with variable stronger winds. This indicates that the majority of the winds for the month were not from the direction of the quarry. Further investigation into the cause of the higher results indicates that production and blasting for the month was average for the reporting period. The sample collected for December 2011 experienced winds from the direction of the quarry and Tabbita Rd site entrance and below average production and average number of blasting events. This may indicate that the quarry had some contribution to the sample although seasonal variations are likely to have had a contribution as all sites recorded higher insoluble solids throughout this month.

All samples collected at Site 4 returned an ash content below 4g/m^2/month. Possible external factors that may contribute to the samples outside of the quarry operations include Dunmore Sand & Soil, Shellharbour and Kiama tips, the use of the area for cattle grazing and traffic generated dust from the Princes Highway.

Measures to reduce dust emissions are presented in **Section 5.4**.

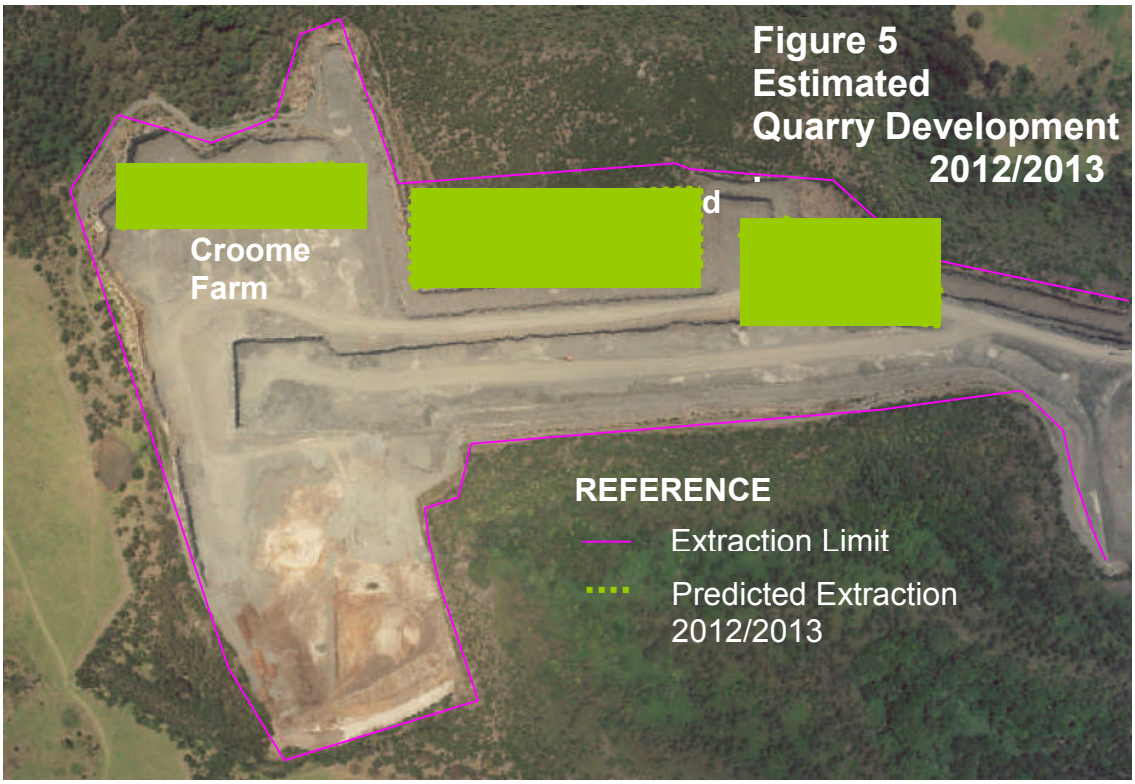
4.2 PM_{10} Samples

A number of PM10 samples were not collected and analysed as required over the reporting period. Over the reporting period the High Volume Air Sampler malfunctioned and it was required to remove the sampler from site for upgrades. This resulted in a total of 6 samples not being analysed over the annual return period. The new software upgrades have remediated the problem and will be closely monitored to ensure continued performance. Due to power outages a further 4 samples were not analysed. Power outages can occur in response to storm events or power surges and as the instrument is programmed to run on a timer the impact of a power outage may go unnoticed until the sample is due for collection. If a persistent problem is noted an investigation into an alternative power source will be undertaken.

5. THE NEXT 12 MONTHS OF OPERATIONS

5.1 Quarry Development

Figure 5 shows the predicted quarry development during 2012-13. Extraction of Latite will continue within RIC and Croome Farm, with the majority of extraction taking place within RIC,



5.2 Production, Sales and Transport

The forecasted rate of production and sales for 2012/2013 is expected to improve producing more than 1.5 million tonnes. This predicted increased in production is resultant from an improvement in market conditions. A similar ratio of road sale to transfers is expected for the next reporting period.

5.3 Noise

Due to the success of noise mitigation performed in previous years, no further noise compliance issues exist at Dunmore Quarry. Accordingly, no further mitigation work is planned for the coming year.

5.4 Air Quality

The fines bay of the Tertiary Screenhouse was previously enclosed in response to the Pollution Reduction Program 20 of the EPL. Operators in the controlroom use video surveillance to monitor dust emissions from the plant and act accordingly if emissions are noted to be excessive such as turning off or slowing the plant until the issue can be identified and resolved.

Mists and sprays were trialled on the product bays and investigations into improving ease of dust suppression on the plant will continue.

5.5 Waste Management

5.5.1 Fines Management

The stock piling of fines is not considered to be an issue as the demand for manufactured sand is increasing and is forecast to keep up with the production of fines in the coming years. The close proximity of Dunmore Lakes Stage 2 operations will continue to mean that quarry fines can be readily transferred and blended with fine sand to make courser manufactured sands. It is expected that this will continue and eliminate the need to stockpile large volumes of quarry fines.

5.6 Water Management

The lower dam provides the quarry with a licenced discharge point that can be used to discharge excess water from the site through a bio-retention swale. To date no water has been discharged from site through the bio-swale with water being transferred internally to the middle dam for future use onsite. Controlled discharge will occur as required to ensure sufficient storage volume is maintained onsite for stormwater management. Further works to investigate and improve the integrity of the middle dam will continue into the next reporting period.

5.7 Flora and Fauna Management

In response to the OEH Conservation Strategy for the Dunmore Hills area an agreement has been negotiated for African Olive management in partnership with OEH and the Southern Rivers Catchment Management Authority. African Olive occurrences were mapped and treated over the reporting period and work will continue into subsequent reporting periods.

5.8 Rehabilitation

Rehabilitation around the middle dam will take place upon completion of works on the dam to avoid unnecessary disturbance to rehabilitation areas. Rehabilitation opportunities may also present on Southern side of the RailCorp area of the quarry. All other quarry areas remain operational and present no opportunity for rehabilitation in the near future.

5.9 Aboriginal Heritage

Following the removal of the scarred tree in March 2007, it is Borals intention to relocate the tree to a location chosen by the local Aboriginal people. Communications continued to work towards resolving a location for the Scarred Tree but no final location was able to be determined. Issues that are currently providing some set backs include finding a location that will offer a level of security to the tree to prevent vandalism and to select a location that will provide value to the artifact and allow visitor access.

6. CONCLUSION

Dunmore Quarry will continue to undertake environmental monitoring and make site improvements to ensure the operation operates in compliance with the consent and ensure the number of complaints to continue to remain low by ensuring a high level of environmental performance at the site. The recommendations presented in **Section 4** to address non-compliance will need to be implemented to ensure ongoing compliance with blasting and air quality impact assessment criteria.

APPENDIX 1

global environmental solutions

Annual Compliance Noise Monitoring
Dunmore Quarry

Tabbita Road, Dunmore NSW

Report Number 630.01142 Compliance 2011-R1

12 August 2011

Boral Property Group
38 Tabbita Road
Dunmore NSW 2529

Version: Revision 0

Annual Compliance Noise Monitoring

Dunmore Quarry

Tabbita Road, Dunmore NSW

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR Consulting) conducted a noise assessment of operations at Dunmore Quarry on 14 July 2011, 15 July 2011 and 18 July 2011. The assessment consisted of operator attended noise monitoring at the Stocker residence, McParland residence and the Dunmore Lakes Estate. A comparison was not conducted with the 'Barn Owl' unattended continuous directional noise monitoring system at the Stocker Residence due to complications with the instrument.

The purpose of this assessment is to determine the quarry noise contribution at Location K (Stocker). Location A (McParland residence) and Location O (Dunmore Lakes Estate) in relation to the Development Consent DA 470-11-2003 (DA) and Environment Protection Licence (EPL) limits for the Dunmore Quarry operation.

2 METHODOLOGY

Noise measurements and assessments in this report have been prepared in accordance with Australian Standard AS 1055-1997 "*Description and Measurement of Environmental Noise*" Part 1, 2 and 3 and with reference to the NSW Industrial Noise Policy (INP) and Environmental Noise Control Manual.

The objectives of the noise monitoring assessment are as follows:

- Measure the quarry noise contribution at the McParland, Stocker and Dunmore Lakes Estate residential locations. Noise surveys comprised of operator-attended monitoring. Particular emphasis was given to measurement and analysis of noise levels within the 6.00 pm to 10.00 pm period, during which unstable atmospheric conditions are believed to enhance noise emissions from the quarry.
- Qualify all sources of noise within each of the attended surveys, including estimated contribution or maximum level of each source.
- Assess the noise emissions of Dunmore Quarry in relation to DA/EPL limits for the site and with regard to wind speed and direction during the noise surveys.

2.1 Monitoring Locations

Operator attended noise measurements were conducted at the locations provided in **Table 1**.

Table 1 Monitoring Locations

Location	Description
A	McParland residence
K	Stocker Residence
O	Dunmore Lakes Estate

2.2 Operator-attended Monitoring

Operator-attended surveys were conducted at each monitoring location to determine the character and contribution of noise sources, including quarry noise, to the total ambient noise level.

3 OPERATOR ATTENDED NOISE MONITORING RESULTS

3.1 Compliance Monitoring

Operator attended noise measurements were conducted during the morning shoulder period (6:00 am to 7:00 am) on 14 July 2011, 15 July 2011 and 18 July 2011, during the daytime period of 14 July 2011 and 18 July 2011 and during the evening period of 18 July 2010.

A summary of the operator-attended measurements presenting the estimated contribution of quarry noise sources is contained within **Table 2, Table 3** and **Table 4**.

The table provides the following information:

Monitoring location

Date and time

Wind velocity (m/s) at 10 m above the ground

Temperature (Temp) in degrees Celsius

Atmospheric stability class

Quarry contribution - $L_{Aeq(15minute)}$

EPL Limit $L_{Aeq(15minute)}$

Table 2 Attended Noise Survey Results Location A - McParland

Period DA/EPL Limit LAeq(15minute)	Date/Start Time/ Weather Stability Class	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Morning Shoulder 35 dBA	18-07-2011 0640 hrs 10° C, Wind 2-4m/s NW	49	45	41	33	37	Birds – 36 to 49 Trees/Wind 35 to 43 Plane Flyover 38 to 48 Quarry not audible **Quarry Contribution < 30**
Day 35 dBA	15-07-2011 0744 hrs 10° C, Wind 1m/s S-SW	57	47	41	33	38	Birds – 36 to 50 Trees/Wind 35 to 43 Plane Flyover 40 to 51 Operator 42, 50 Quarry not audible **Quarry Contribution < 30**
Evening 35 dBA	18-07-2011 1937 hrs 9° C, Wind 1m/s SW	51	45	40	32	37	Trees/Wind 35 to 53 Cow 38 to 47 Dog 39 Quarry not audible **Quarry Contribution < 30**

Table 3 Attended Noise Survey Results Location K - Stocker

Period DA/EPL Limit LAeq(15minute)	Date/Start Time/ Weather Stability Class	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Morning Shoulder 47 dBA	14-07-2011 0644 hrs 7° C 1m/s SW	67	52	47	43	46	Princes Highway 40 to 45 Swamp Road 51 to 54 Birds 44 to 67 Quarry Trucks 40 to 56 Quarry General Operation <40 **Quarry Contribution < 42**
Day 49 dBA	14-07-2011 00702 hrs 9° C 1m/s SW	67	52	48	43	46	Princes Highway 40 to 47 Swamp Road 47 to 57 Birds 46 to 55 Plane Overhead 47 to 50 Quarry Haul Trucks 39 to 51 Dog 42 to 45 Wind up to 46**Quarry Contribution < 40**
Evening 44 dBA	18-07-2011 1836 hrs 17 °C, Wind 2m/s NW	56	50	45	37	42	Princes Highway Traffic – 38 to 40 Swamp Rd Traffic ~ 46 to 56 Plane Flyover – 42 to 51 Quarry <38 Quarry only audible for short duration in lulls of ambient noise **Quarry Contribution <38**

Table 4 Attended Noise Survey Results Location O - Dunmore Lakes Estate

Period DA/EPL Limit LAeq(15minute)	Date/Start Time/ Weather Stability Class	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
		LAmax	LA1	LA10	LA90	LAeq	
Morning Shoulder 47 dBA	15-07-2011 0615 hrs 9°C, 1m/s SW	80	72	48	37	57	Princes Highway Traffic ~ 36 to 39 Resident Traffic – 76 to 80 Traffic Swamp Road – 40 to 51 Insects <35 Wind – 39 to 42 Quarry not audible **Quarry Contribution < 37**
Day 49 dBA	14-07-2011 0753 hrs 8°C, Wind 1 m/s SW	74	55	46	37	49	Princes Highway ~ 37 to 40 Swamp Rd Traffic – 46 to 52 Local Traffic - 74 Birds – 42 to 60 Cow – 52 to 55 Wind ~ 40 to 42 Quarry not audible **Quarry Contribution < 37**
Evening 44 dBA	18-07-2011 2036hrs 10°C, Wind 2-4 m/s SW	62	59	53	44	50	Swamp Rd Traffic – 41 to 46 Wind – 48 to 62 Quarry not audible **Quarry Contribution <34**

4 DISCUSSION OF RESULTS

4.1 Operational Noise Levels

. Stocker Residence

It is understood that the quarry was operating under normal conditions. The evening period has been identified in previous noise surveys and assessments as the most likely to cause noise enhancing conditions. The Stocker residence is the closest noise sensitive receiver. Hence the main focus of the compliance survey is noise levels at the Stocker residence

Noise contributions from the quarry at the Stocker residence were estimated to be:

<43 dB $L_{Aeq(15minute)}$ during the morning shoulder period.

<43 dB $L_{Aeq(15minute)}$ during the daytime period.

<38 dB $L_{Aeq(15minute)}$ during the evening period.

Quarry operations were clearly audible during measurements conducted on the morning shoulder period of 14 July 2011 at the Stocker residence. Precise estimations of quarry noise contribution were made difficult during the morning shoulder period by high noise levels from traffic. Quarry operations which contributed to the estimated noise level included truck movements and general activities.

Quarry operations during the day period were also audible at the Stocker residence. Ambient noise was primarily dominated by traffic noise.

Quarry operations during the evening period were only audible at the Stocker residence for a short duration and in lulls of ambient noise.

Dunmore Lakes

At Dunmore Lakes Estate, quarry noise was not audible during any of the monitoring periods. The quarry noise level was estimated to be below the relevant licensing criteria at the time of monitoring.

McParland Residence

At the Mc Parland receiver location, quarry noise was not audible at any time during the survey period and was estimated to be below $L_{Aeq(15minute)}$ 30 dBA.

5 CONCLUSION

Operational noise levels from the quarry comply with the DA/EPL limits at all monitoring locations during all monitoring periods.

I trust that the preceding is sufficient for your current requirements. Please do not hesitate to contact me on Ph 4284 3933 or email mfernandez@slrconsulting.com if you need further information.

Regards,

M. Fernandez

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