



# **ENVIRONMENTAL MANAGEMENT REPORT**

July 2008 to  
December 2011



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# 1 Introduction and Executive Summary

## 1.1 Introduction

This report has been prepared to satisfy condition 17 of the approved development application for the expanded sand and gravel quarry at Broken Head commonly referred to as Broken Head Quarry (the “quarry”). The determination relates to DA 97/0465 lodged with Byron Shire Council on 31 October 1997 and approved by the then Minister for Urban Affairs and Planning on 7 May 1999.

The current operator of the quarry and the party responsible for compliance with the conditions of consent and other environmental matters is Leadshine Pty Limited [ACN 102 229 943]. The land is owned by a related entity, Crisjoy Pty Limited and others.

The relevant consent condition requires the quarry operator to report on the effectiveness of its environmental management including review of water harvesting and recycling, waste pollution control, monitoring of air, noise & water, flora & fauna management, sedimentation & erosion controls and compliance with other specific requirements of relevant authorities.

The consent condition also provides an opportunity for the operator to highlight its environmental management targets and demonstrate its adoption of best practice and technology.

The quarry also operates under an Environmental Protection Authority licence (“EPL”) No. 4860. This EPL was transferred from the previous quarry General Manager’s name (Mr Lucas Bracken) to the current operator during the reporting period with an effective date of 1 July 2010.

The EPL restricts the amount of sand to be extracted, processed or stored to 500,000 tonnes and covers numerous environmental management matters including water discharge sampling & testing, identification of acceptable pollution limits, general quarry operating conditions and standard reporting and general conditions.

The last Environmental Management Report was prepared by the operator in early 2007 so this report expects to analyse environmental management of the quarry over a longer period than normal.

Where relevant, this report seeks to maintain the reporting format of previous reports and references the site map contained in the report. It should be noted that this map is included to highlight particularly areas and functions on the site only and should not be viewed as representing a current aerial photograph.

The contents of this report are expected to address all the above objectives and satisfy the relevant conditions of consent. The report is provided for the benefit of all stakeholders so they are aware of the operator’s progress in meeting its statutory obligations and general environmental management. A full copy of the report is also available on the company’s web site [www.brokenheadquarry.com.au](http://www.brokenheadquarry.com.au)

Leadshine Pty Limited is pleased to submit the following information for the period **1 July 2008 to 31 December 2011** and believes the information contained herein to be true and correct.



Stuart Dixon-Smith  
Director

## 1.2 Paper Outline

The remainder of this report deals with the following main areas in detail:

- General Resource Consumption & Data
- Water Management;
- Noise and Air Management;
- Flora & Fauna Management;
- Rehabilitation;
- Other Environmental matters
- Technology / Future;

## 2 General Resource Consumption and Data

### 2.1 Raw Material

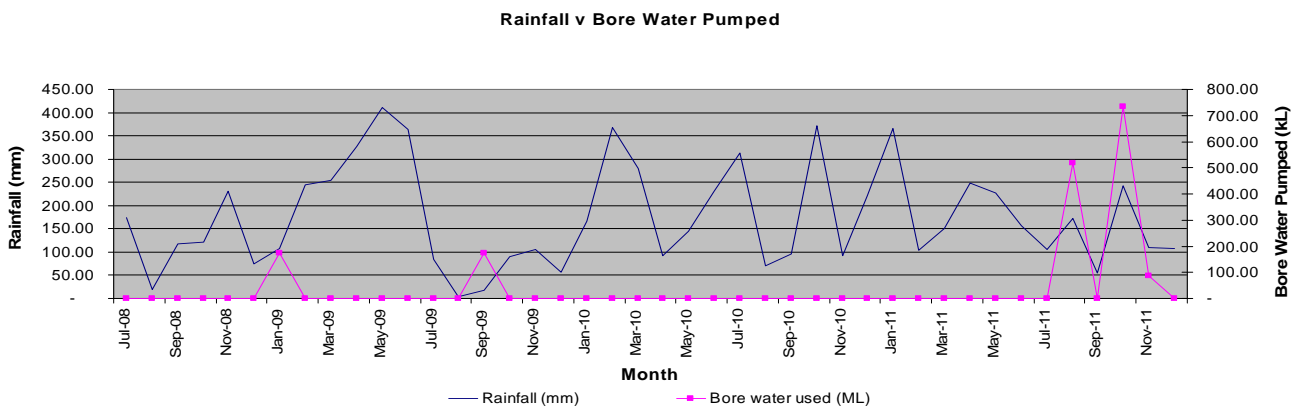
The total volume (expressed in tonnes) of all sales from the quarry is shown below. The variation from year to year demonstrates the volatility of the construction industry and variable demand for raw materials of the quarry.

2008*:	55,630
2009:	94,018
2010:	131,264
2011:	84,340

\* relates to 6 months only

Due to significant reduction in local development and construction work over the last 4 years, a large percentage of raw material sold was used in the construction of various highway upgrades. The spike in 2010 sales relates directly to sand supply for a section of the Ballina Bypass.

Graph 1



## 2.2 Rainfall

Rainfall is measured on-site each day using conventional measuring equipment and recorded by quarry employees on a climate data sheet. The rainfall for the reporting period is presented in Graph 1 below. As can be seen, the graph also shows the correlation between rainfall and the consumption of natural water (other than harvested and recycled water) obtained from the licensed bore pump on the west side.

## 2.3 Diesel Fuel

Diesel fuel is used within the quarry operations for running three trucks, excavation and dozer equipment and generators required for pumping water from catchment dams, bores or the process water pond to the wet processing plant and dispersing waste products.

The following table shows the consumption of diesel during the reporting period expressed in litres per tonne of washed product sold.

	Litres	Litres/T
2008*:	62,030	1.12
2009:	92,778	0.98
2010:	122,814	0.94
2011:	99,070	1.17

\* relates to 6 months only

Actual consumption achieved continues to be more efficient than that originally anticipated of 1.63 litre per tonne. Various spikes in consumption can be attributed to increases in demand for earthmoving activity and/or correlated to production and sale of washed sand.

## 2.4 Electricity

The average annual electricity consumed by the quarry during the reporting period expressed as kWh per tonne of washed product sold is shown below.

	Total kWh	kWh/T
2008*:	136,711	2.46
2009:	222,790	2.37
2010:	319,948	2.43
2011:	205,270	2.43

\* relates to 6 months only

The above figures demonstrate that electricity efficiency has improved slightly over the last 3 years but is 10-15% more efficient than a decade ago.

As part of their function, the Department of Primary Industries oversees occupation, health and safety aspects of quarry operations. This includes compliance with electrical safety audit requirements.

In addition to the obvious safety benefits of the electrical audit process, it also provides a platform for promoting the efficient use of electricity. This can occur through the regular maintenance and/or upgrading of equipment and control of electricity leakage etc.

The last audit conducted was in January 2011 resulting in Concept Engineering Services Pty Limited providing several recommendations including a formal maintenance regime and equipment replacement plan. The regime and plan are progressively being implemented by quarry management.

The above initiatives, the anticipated cost of electricity in the future and the quarry's desire to achieve its environmental objectives will ensure electricity consumption throughout quarry operations is minimised and remains efficient.

## 2.5 Heavy Vehicle Movements

The majority of truck movements from the quarry are undertaken by the business' major customers in relation to product they have purchased.

The quarry business purchased a new truck and dog [T16] in March 2010 which is used for customer deliveries. It is also used in conjunction with the other quarry operated trucks in general quarry operations.

The direction of truck movements leaving the quarry are recorded at the time of trucks leaving the weighbridge. The directional break down of truck movements for the reporting period were as follows:

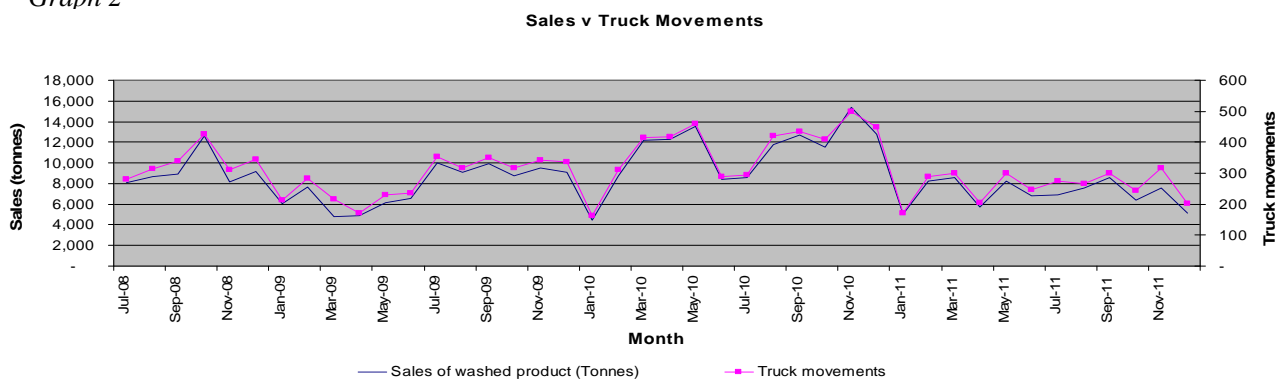
	North	South
Predicted:	60%	40%
Actual:	32%	68%

The larger than predicted percentage of loads to the south reflects major sand deliveries to highway upgrades. The direction of truck movements have varied over time however during the reporting period they have been focused more towards Ballina.

Actual truck movements during the reporting period totalled 13,064 which equates to an average of 17 loads per work day. This is significantly less than the average predicted in the EIS of 24 loads per day (in 1999) increasing at an annual rate of 2% (ie anticipated 31 loads per day in 2012). Graph 2 below shows the correlation between sand sales and truck movement during the reporting period.

This reduction is directly related to the less than forecast raw material sales contemplated by the approval which by 2012 was expected to be in the vicinity of 150,000 tonnes per annum.

Graph 2





### 3 Water Management

#### 3.1 Water Management overview

A comprehensive hydrology study was prepared in September 2002 by Gilbert & Associates which sought to understand how water within the site could be managed and effectively controlled. This study anticipated similar activity on site to what exists today although at more aggressive production levels.

The study analysed monitoring of ground water, surface water, intra-site transfers of water, modelling of infiltration, run-off and groundwater flow, water balance and levels within Taylors Lake and concluding with the formulation of a catchment management plan. It also followed a Water Management Plan prepared by Ray Sargent & Associates in 1993 which was prepared in support of an initial development application lodged with Byron Shire Council in 1993 but not proceeded with.

The specific results, recommendations and actions resulting from the above plans are detailed further below in updating the key water management status and considerations for the site.

#### 3.2 Treatment of surface water

It was highlighted in the above reports that the issue of surface water run-off primarily related to water discharged from the site. It was also suggested that the core issue is one of quality rather than quantity of the water.

The measurement of quality can be described as one's ability to control the migration of fine suspended sediments in water leaving the site and entering surrounding water courses and drainage systems including Taylors Lake. A topography and drainage plan showing general water flows for the site has been provided below in Diagram 2.

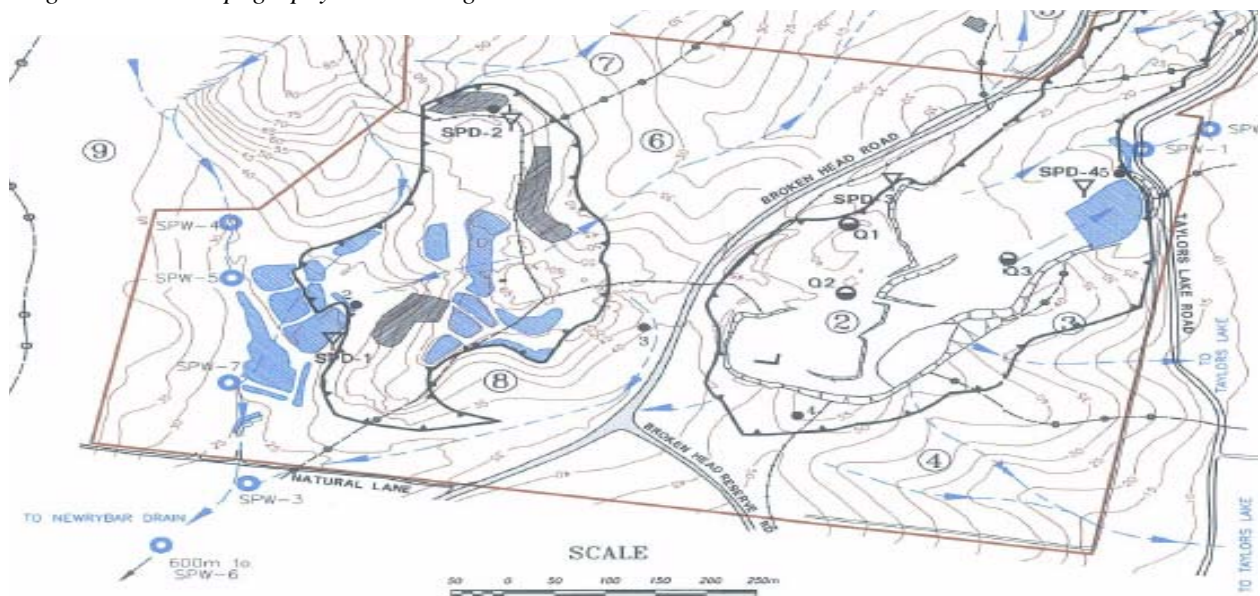
The quarry clarifies 'dirty' surface water through a series of silt traps and sedimentation / settling ponds contained on both sides of the quarry. These traps and settling ponds form a key role in the quarry-wide catchment management plan.

The water pollution control system proposed by the above reports sought to address several issues. These included reducing the overall quantity of 'dirty' water, retention and recycling 'dirty' water within site for use in quarry operations, minimising erosion and finally restricting any released water to contain less than 50mg/L of non-filtrable residue and contain less than 5mg/L of oil and grease.

The water pollution control system as originally adopted remains in existence today and continues to be effective. The ultimate test of the systems effectiveness is however determined by the frequency of discharge and quality of water released from the site.

Monitoring and testing is completed on every occasion water is discharged from the site as required under the EPL. These water samples are obtained at two dedicated monitoring / discharge points known as EPA 1 and EPA 2 and submitted for independent testing. These points are shown on the site map included further in this report.

Diagram 2 – Site topography and drainage



During the reporting period water was discharged from the property on 5 occasions at which time water samples were collected and sent for testing.

Testing has historically been conducted by Byron Shire Council laboratory but more recently by Tweed Shire Council laboratory upon the closure of the Byron facility.

Test results are notified to Byron Shire Council and relevant findings summarised and recorded in EPA Annual returns for each year.

Results of water monitoring and testing for the reporting period are provided in the table below:

*Table 1: Water monitoring results – pH & suspended solids*

Discharge Date	Test	EPA 1	EPA 2	Reason
22-05-09	pH	5.4	5.5	
	Suspended Solids (mg/L)	66	7	220mm of rain in 48 hours
	Oil & Grease (mg/L)	<5	N/A	
26-06-09	pH	5.6	5.7	
	Suspended Solids (mg/L)	111	17	316mm of rain in 5 days
	Oil & Grease (mg/L)	<5	N/A	
28-02-10	pH	4.8	4.6	
	Suspended Solids (mg/L)	72	20	156mm of rain in 12 hours
	Oil & Grease (mg/L)	<5	N/A	
04-06-10	pH	5.6	5.7	
	Suspended Solids (mg/L)	85	<5	97mm of rain in 3 hours
	Oil & Grease (mg/L)	<5	N/A	
11-01-11	pH	5.6	6.0	
	Suspended Solids (mg/L)	120	6	278mm of rain in 24 hours
	Oil & Grease (mg/L)	<5	N/A	

The above results show non-conformity in suspended solids which should be no more than 50mg per litre and which occurred from abnormal rain events. All other testing criteria including pH and oil and grease concentrations were found to be within acceptable ranges.

Over the last 12 months, the quarry operator has installed additional water storage tanks adjacent to the wet processing plant and has also sought to control the water level in the discharge pond on the west side to ensure it has sufficient capacity to hold water from both normal and extreme rainfall events.

The above together with increased pumping from the east catchment / sedimentation dam during times of production will help minimise off-site discharge occurrences in the future.

### 3.3 Processing of waste water

The primary source of waste water comes from the wet processing plant situated on the west side of the quarry.

At the end of the sand wash process return water flows through a clarifier. All overflow water is disbursed to the process water dam through a series of settling ponds whilst the balance of the water containing solids (silt) has historically been directed to silt traps.

More recently however the quarry has acquired a silt press specifically designed for processing sand. The two main features of the silt press are firstly to facilitate efficient water recycling at the point of production ie extract more ‘clean’ water before waste leaves the wet processing plant and secondly to speed up the drying time of silt prior to transporting and use in rehabilitation.

Whilst the silt press is being commissioned and tested, the quarry utilises eco-friendly silt bags as an interim silt management solution. Silt bags are considered to be the most efficient and environmentally sound method of silt management however the unit cost and single use of each bag makes them a prohibitive long term silt management solution.

Although the quarry’s process for managing waste water is solid and reliable, the operator is continually looking for more effective and environmentally friendly silt management options and this endeavour will continue whilst quarry activity is taking place on the site.

### 3.4 Source of 'make up' water for processing plant

'Make up' water for the wet processing plant is sourced directly from the process water pond on the west side of the quarry.

Water is supplied to individual functions of the wet processing plant including the shaker deck, trommel and sand washer. Water used in the sand washing function is first used for extraction of coarse sand and then the recovery of fine sands. Cyclones are used at each stage of sand extraction for dewatering and removal of fines.

A schematic showing the wet processing plant functions has been provided in Diagram 3 below:

The wet processing plant has a constant demand for water when in operation of 3,400 litres per tonne of washed product or 50 litres per second. Given approximately 25% of the water used in the process is lost either by evaporation, retained in waste products (ie silt) or retained in the washed sand, it is important to harvest and recycle water on site.

The majority of water used in the wet processing plant comes into the process water pond by harvesting surface run-off water or recycling waste water. The water is either pumped directly from catchment / sedimentation dams on either side of the quarry or from a licensed bore.

Pumping from the east catchment / sedimentation dam is controlled by a licence which imposes a restriction of 103 Megalitres per annum. During the reporting period only 136 Megalitres in total was pumped from the east dam. Of this however, approximately 92 Megalitres was pumped during the period 1 July 2009 to 30 June 2010.

The natural bore is only used in times of prolonged dryness for topping up the process water pond and is operated under licence from the NSW Office of Water [No.30BL178149]. The bore was used on 39 days through the reporting period resulting in the consumption of 1.68 Megalitres of natural water. This is only a fraction of the licence restriction of 40 Megalitres in any 12 month period.

The relatively small volume of water required from the bore during the reporting period is testament to the quarry's ability to harvest and recycle water and suggests sufficient capacity exists in current infrastructure (ie dam sizes etc) to manage water efficiently.

### 3.5 Natural water flows into Taylors Lake

An essential part of the hydrology work undertaken and reported by Gilbert & Associates in 2002 was to address the requirement to "restore water requirements of Taylors Lake originating from the area of the eastern quarry to as close to natural flows as possible".

As part of the hydrology study undertaken at the time, six ground water monitoring bores were constructed across both sides of the quarry in 1999. A seventh bore was later constructed near Taylors Lake in early 2002 to directly gauge the impact of water flows on Taylors Lake.

The data from the monitoring activity and the resultant hydrology report confirmed ground water levels showed a cyclical response to relative periods of wetter and drier weather and that investigations indicated that the eastern quarry activity was likely to increase the potential volume of water flowing to Taylors Lake as both surface water and ground water flow.

Despite this potential, during the initial monitoring period it was concluded that any impact was more than offset by pumping water from the east catchment dam to the west process water pond. The operator expects that the pumping of water from the east catchment dam for quarry operations during the current reporting period provides consistent results to the initial findings.

At the time of the original monitoring and reporting, it was recommended that the capacity of the eastern catchment dam be expanded from 5 to 20 Megalitres. This increase in capacity was constructed as part of expansion approval and commissioned in late 2002.

When combined with controlled pumping and storage of water on the west side this increased capacity has minimised the discharge occurrences of water from the downstream end of the quarry towards Taylors Lake. The quarry also adheres to the recommended practice of limiting pumping in dry periods and ceasing pumping activity altogether in drought situations.

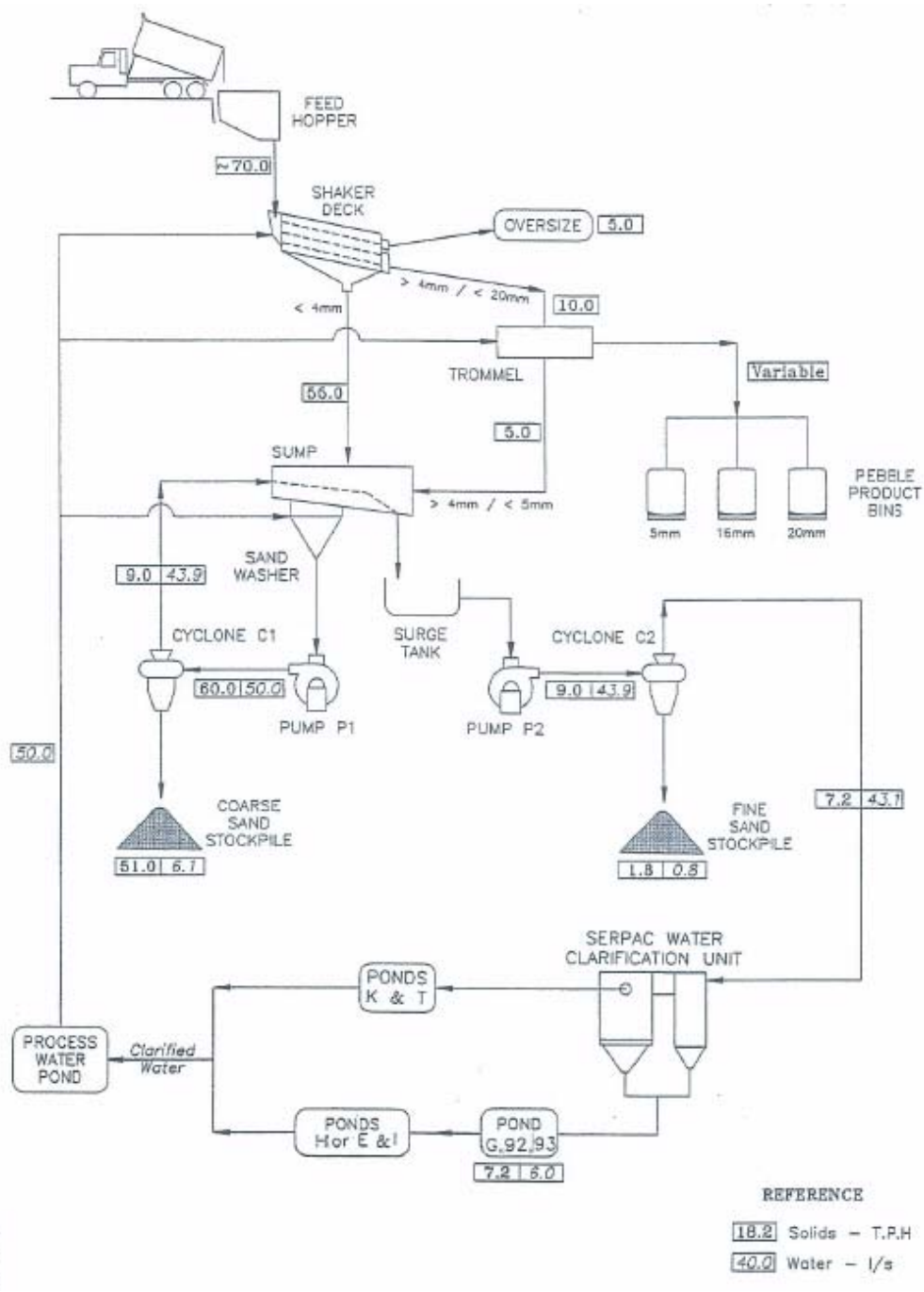
Although physical monitoring of water levels has not been undertaken in recent years, the adherence to original recommendations and other water management controls appear to support the original objective of maintaining the water balance of Taylors Lake.



In order to aid the release of 'clean' water towards Taylors Lake, the quarry operator has proposed the construction of a gravity fed water line and distribution manifold creating one metre of free board in the east catchment dam. This has been confirmed by the EPA and resulted in a formal variation to the quarry's EPL. This is addressed further in section 6.1.

The quarry operator will be looking to undertake some preliminary monitoring of water flows and levels towards and around Taylors Lake during the next reporting period. This work will substantiate that the overall objective of restoring natural water requirements of Taylors Lake is being achieved.

Diagram 3 – Wet Processing Plant







SPD - 2

Silt traps

Final Rehabilitation

EPA 2

SPD- 1

Sedimentation ponds

EPA 1

Process water pond

Workshops

Wet processing plant

Weigh Bridge / Offices

Main quarry entrance

Natural Lane

Broken Head Road

Broken Head Reserve Road





Byron Bay

East catchment /  
sedimentation dam

SPD - 4

SPD - 3

Final Rehabilitation

## 4 Noise and Air Management

### 4.1 Noise management

As part of the expansion approval, the quarry operator at the time undertook noise monitoring at various locations on the site. They also commissioned an acoustic report from Richard Heggie Associates Pty Limited from which several assessment guidelines and control measures were proposed. Noise monitoring was proposed to distinguish between ambient, quarry operating and normal traffic conditions.

It was concluded that noise generated from the quarry activity primarily related to plant and equipment noise including operating plant (ie dozers and excavators), trucks accessing and egressing the quarry, wet processing plant and other ancillary activities.

Noise control measures to address the impact of noise from plant and equipment on site were proposed at the time of consent which together with some additional initiatives continue to be adopted and managed by the current quarry operator.

The noise reduction measures currently employed include:

- i) equipment fitted with residential mufflers;
- ii) regular maintenance and good running order of equipment;
- iii) diligent management of time of day operations;
- iv) grading of haul roads within maximum 1:10 slope;
- v) rubber lining of equipment including trommel and shutes etc;
- vi) management of in-house trucks and machinery performance ie haulage cost incorporated in sand price to avoid rushing / pushing machinery;
- vii) Management of production schedule and utilisation of stock piles;

The adoption of manual reversing alarms on machinery was originally recommended for reducing unnecessary plant and equipment noise. It should be noted however that due to Department of Primary Industry safety requirements, automatic reversing alarms have now been re-instated.

The quarry diligently and proactively manages the impact of this noise by strict adherence to the above control measures. In addition to this, the quarry staff apply commonsense and basic respect for the community and the surrounding residents in performing general quarry operations. This includes some basic processes like not generating unnecessary noise from opening the workshop roll-a-doors and operating excavation equipment within the vicinity of residences on the west side until later in the morning.

It was envisaged that noise monitoring would continue to be performed at various times throughout the life of the quarry particularly in the early stages of operations on both the east and west. The frequency of ongoing monitoring is to be determined in conjunction with EPA and Byron Shire Council and used to determine any additional control measures required.

It was anticipated that as the depth of extraction increased, the natural acoustic shielding afforded by the quarry surrounds and local topography would also increase and therefore the need for ongoing monitoring would ordinarily reduce.

The operator acknowledges that no formal noise monitoring has occurred over the last decade. There does not appear to be any inherent issue with noise generated from the quarry operations and no advice has been received from EPA or Byron Shire Council requesting commencement of noise monitoring.

During the reporting period one informal enquiry was received relating to noise. In November 2008, a neighbour rang the quarry manager seeking an explanation as to abnormal earthmoving activity in the south section of west side of the quarry. The activity was business critical involving stock piling of raw material and only continued for a short period of time. It should also be noted that the activity was performed in compliance with the quarry's approvals including hours of operation.

Apart from the one issue mentioned above, no other noise issues have been reported or brought to the attention of the operator. In light of this, the absence of noise monitoring does not appear to have resulted in any environmental issues or concerns.



## 4.2 Air

Dust sampling continues to be undertaken at four separate locations on site. These locations are shown on the site map included in this report and marked as SPD 1, SPD 2, SPD 3 and SPD 4 and also represented by the red squares in Diagram 3 below.

Diagram 3 – Dust monitoring locations



Sampling originally commenced on a monthly basis and was then performed two monthly until more recently when in November 2011 monthly testing was re-introduced. The core objective of air sampling and testing is to detect total suspended particles in the atmosphere.

Causes of air contamination at the quarry include soil removal and handling, ripping and pushing raw material, stockpiling and exhaust fumes from usage of earth moving equipment and haulage trucks.

The quarry utilises various measures to control the volume of dust generate from the site. These include progressive rehabilitation, stabilising topsoil stockpiles, using a water cart to suppress dust on unsealed roads, limited vehicle speed on internal, unsealed roads, ensuring all loads leaving site are covered and regularly maintaining mobile and fixed equipment to minimise exhaust emissions.

Results of dust sampling performed are shown in Table 2 below. The results from all tests are forwarded to relevant authorities as required by the condition of consent and are made available for inspection by other interested persons or parties.

Table 2: Dust monitoring results – Total insoluble solids (g/m<sup>2</sup>)

Month	SPD 1	SPD 2	SPD 3	SPD 4
Jul-08	0.4	1.5	0.9	1.3
Sep-08	1.1	1.6	1.6	2.6
Nov-08	2.3	1.5	<b>6.8</b>	5.8
Jan-09	0.5	2.3	0.9	4.3
Mar-09	0.4	0.8	1.1	2.2
May-09	0.9	2.2	0.9	2.3
Jul-09	1.5	2.4	1.7	1.5
Sep-09	0.8	0.6	0.5	0.1
Nov-09	2.7	1.9	2.0	3.1
Jan-10	1.9	1.9	2.5	3.7
Mar-10	1.0	1.2	1.2	3.8
May-10	1.4	1.1	1.7	0.4
Jul-10	1.7	1.8	2.2	5.6
Sep-10	0.9	<b>8.3</b>	0.8	0.5
Nov-10	2.3	<b>10.3</b>	3.8	1.3
Jan-11	1.1	2.3	<b>11.0</b>	0.9
Mar-11	0.7	4.0	<b>6.5</b>	1.5
May-11	1.8	1.4	3.1	1.3
Jul-11	2.1	1.5	<b>10.8</b>	1.5
Sep-11	4.7	<b>15.2</b>	3.3	3.0
Nov-11	1.4	1.1	<b>26.7</b>	2.1
Dec-11	1.1	0.9	2.6	1.7
Jan-12	0.2	0.7	0.2	0.7
Feb-12	1.4	2.2	0.0	2.0

There are a number of highlighted results above that exceed EPA air quality guidelines on a stand alone basis. These short term dust episodes relate to temporary increases in the amount of dust raised by disturbed surfaces in strong winds and generally in dry weather conditions.

A more relevant measurement of air pollution being under control is annual average dust. The quarry expansion approval suggested an appropriate level of average dust would be in the order of 2 to 3 g/m<sup>2</sup>/month. During the reporting period the annual average dust level was 1.52 g/m<sup>2</sup>/month therefore indicating that overall dust levels were being managed within the acceptance range.

During the next reporting period the quarry will be looking to decrease the frequency of air quality exceedances. This is expected to materialise by undertaking more temporary rehabilitation and thus reducing the area of exposed extraction. The quarry's ability to achieve this however will be influenced by the constraints mentioned earlier including the sequence of extraction based on quality of extracted material.

## 5 Flora & Fauna Management

### 5.1 1999 Flora and Fauna Management Plan

A Flora and Fauna Management Plan was prepared in October 1999 by Greenloaning Biostudies Pty Limited which was preceded by a Species Impact Assessment performed by the same company in 1997.

The Flora and Fauna Management Plan detailed many crucial environmental considerations including many already raised in this report. These include clearing protocols, soil and erosion management, rehabilitation and water pollution controls.

The Plan also dealt extensively with species assessment in relation to flora and fauna, habitat protection, fire protection measures, monitoring of flora and fauna and other proactive educational initiatives. These matters are addressed further below.

### 5.2 Amendments to plan and surveys

The quarry continues to engage the services of an ecological company to assist in management of flora and fauna matters and facilitate a formal reporting framework.

Greenloaning Biostudies Pty Limited, the author of the original Flora and Fauna Management Plan, were engaged by the quarry until May 2006 and replaced by Blackwood Ecological Services Pty Limited from October 2006. Blackwood continue to provide ecological services today.

Around this time, the quarry operator in consultation with Byron Shire Council and the quarry Community Consultative Committee, agreed to have the original management plan reviewed, summarise the results of prior flora and fauna management and monitoring and provide suitable recommendations. Blackwood was commissioned to undertake this work.

The above work was completed and detailed in a comprehensive Environmental Management Report dated April 1997. The formulation of the report was done in conjunction with the resident Council ecologist, David Milledge, who prepared a list of recommendations that he believed would maintain, restore and enhance flora and fauna values at the quarry. These recommendations were adopted as part of the report and new plan.

The revised Fauna and Fauna Management Plan also included additional measures not required under the original plan and discontinued some other existing practices and measures either considered ineffective or unnecessary.

### 5.3 Current Flora and Fauna Management

Following implementation of the revised Flora and Fauna Management Plan, a comprehensive flora and fauna survey was completed on site. This was finalised in late 2007 and included a fauna trapping program, micro chiropteran bat survey, bird surveys, call playback and spotlighting surveys. In addition to this a further flora survey and assessment was completed in January 2009 by 3D Environmental Vegetation Assessment and Blackwood Ecological Services.

The quarry currently engages Blackwood to review and report on flora and fauna management each six months. Several monitoring reports have been received during the reporting period including June 2008, January 2009, October 2009, April 2010, November 2010, May 2011 and the last report received on December 2011. Copies of all these reports are available on the company's web site.

Blackwood also prepared a detailed Flora and Fauna Assessment for the eastern quarry sector in June 2009. This assessment was conducted in relation to a possible expansion of the some 4.71 hectares of land to the south east which to date has not progressed.

The additional field work undertaken for this proposed expansion has aided the accumulation of knowledge and understanding of the biodiversity value of the surrounding habitat. This information is important in benchmarking the current management plan to the impact on flora and fauna on the site.

### 5.4 Weed management

A team of qualified bush regenerators lead by Mr Ross Faithfull of Forest Regeneration Services have been engaged since mid 2007 to undertake regular (1-2 days per month) weed control;

This work has been effective in the identification and control of serious environmental weeds impacting the quarry during the reporting period including Madiera vine and Bitou bush have been controlled.



It has also provided quarry staff with first hand experienced in distinguishing weeds from other important species that improve biodiversity values;

## 5.5 Pest Management

A high abundance and extensive distribution of cane toads were discovered as part of the fauna surveys conducted during the reporting period. The presence of cane toad was concentrated on the east side around the catchment / sedimentation dam.

The operator has implemented a cane toad control strategy to avoid them spreading into neighbouring bushland areas, competing and foraging on native frogs and threatening other fauna that might feed on the cane toads;

The cane toad control strategy involved the erection of a cane toad control fence around the east catchment / sedimentation dam and the continued planting out of the dam perimeter to reduce the habitat value for cane toads and improve the habitat value for native frogs;

This solution was promoted by the quarry's ecologist who had other recent experience in dealing with this issue. The quarry operator understands a similar issue was present at both Mullumbimby Golf Course and Byron Bay Golf Course. These cases were resolved by the adoption of similar control techniques.

## 5.6 Summary of Flora and Fauna status / achievements

As mentioned above, detailed information in relation to the progress and status of flora and fauna management can be found in the Blackwood reports.

Summarised below are some key results of environmental monitoring and management together with new initiatives implemented during the reporting period:

- Previously identified threatened plant species on site are confirmed to be in good health;
- Red-fruited kurrajong in north section of west quarry that had suffered insect attack and lost a large portion of leaves is now in excellent condition;

- Additional habitat for native hollow-dwelling fauna provided including eleven fauna nest boxes;
- Significant growth of native species throughout rehabilitated areas and dense growth of shrub species particularly around east catchment / sedimentation dam;
- Additional seedlings have been planted and have become well established while prior planting show signs of continued growth;
- Alterations to planting strategy including adding water crystals, time of planting, fertilising and mulching has increased the survival rate of plantings;
- Seed collection continues to be undertaken and the nursery has continued to produce a variety of trees, groundcovers, shrubs and sedges for planting in rehabilitated areas;
- Local off-site seed collection has been adopted to complement on-site collections in order to maintain adequate stock levels of seedlings;

*Example of Fauna nest box*



## 6 Rehabilitation

### 6.1 Rehabilitation overview

Rehabilitation remains a progressive responsibility for the quarry and remains a focus of the quarry operator however the quantum of temporary rehabilitation in recent years has reduced.

It was originally contemplated that a maximum of 5 hectares would be exposed on each side of the quarry as part of a systematic sequence to quarrying. This strategy was to provide a natural filter for surface run-off water and to minimise the visual amenity from surrounding properties.

Despite the anticipated sequence of quarrying being followed, there are currently eight hectares of exposed quarry on the west and twelve hectares of exposed quarry on the east.

There are many factors that influence the amount of exposed quarry area at any one time, some of which are out of control of the operator or are influenced by other commercial pressures (ie cost of production of sub standard raw material).

In relation to the specific considerations of this site, the quality of raw material discovered at higher levels on the west of the quarry have been found to be sporadic. This has resulted in trialling alternate excavation areas, moving unsuitable extracted material around and revisiting quarried areas within a short period of time thus not allowing time for temporary rehabilitation to take place.

The other key reason is the availability of space for managing silt including traps and ponds. This has been particularly relevant with utilisation of space on the east side given the inefficient stockpiling of unsuitable extraction material on the west side where some silt traps and ponds have previously been based.

Significant final rehabilitation has been undertaken and continues to be progressed. These efforts are regularly monitored and reported on by the quarry's environmental consultants. Fully extracted areas are shaped and vegetated to provide a stable final landform and hence form part of the site's long term landscape.

### 6.2 Sediment and erosion control

It was originally determined by external consultants that the slopes and topography of the site would create moderate to very high erosion potential particularly with reduced vegetation cover.

A number of controls currently in place for the management of surface run-off also assist in controlling sediment and soil erosion. In addition to the surface run-off controls however, effective sediment and erosion control relies on adequate temporary and final rehabilitation.

The methods of rehabilitation adopted by the quarry include removal of top soil and sub soils from newly cleared areas and placing on near horizontal ex-quarried surfaces. It should be noted however that no clearing occurred in this reporting period.

The rehabilitated areas are prepared as recommended with low slope drainage networks that incorporate logs, brush and other vegetation litter in the topsoil. This ensures the impact of raindrops on the surface is reduced, assists rainfall infiltration, reduces run-off velocity, minimises dust and aids seed retention

The use and effectiveness of the above methods being adopted at the quarry can be seen in two major areas.

These are approximately 3 hectares in the north / east section of the west side which has undergone extensive temporary rehabilitation and a large section of land to the south east of the east side (see picture on back cover of this report) and around the east catchment / sedimentation dam where significant final rehabilitation has been undertaken.

Rehabilitation efforts and progress are monitored, assessed and reported on a six monthly basis in conjunction with other environmental management work performed by Blackwoods as mentioned earlier in this section.5.

## 7 Other Environmental Matters

### 7.1 EPA licence ("EPL")

The last EPA annual return for the quarry was lodged on 2 May 2011 relating to the period 1 July 2010 to 9 March 2011. The current report due for the period since 10 March 2011 is not due for lodgement until 9 June 2012.

All past reporting under the license has been satisfied including submitting water and air monitoring samples for testing. Results of water discharged from the property referred to in section 3.2 have also been included in EPA reports previously lodged. Copies of prior year EPA annual returns are available upon request from the company.

As there have only been five cases of non conformance in relation to the discharged quality of water during the reporting period, the water management measures implemented appear to be working effectively. Notwithstanding this, as mentioned earlier, the quarry operator will continue to review and refine storage capacity, water levels and use of pumping to further reduce the frequency of discharges and improve the quality of water discharged.

There have been several audits specifically conducted by the EPA over the time the licence has been held including during the reporting period.

The last assessment conducted by EPA was on 30 November 2011 which formed part of a wider condition of consent compliance audit conducted by Department of Planning. Testing of water (pH) at the two discharge points was conducted at the time by the EPA officer and was suggested to be satisfactory.

#### *Silt press*



The EPA wrote to the quarry on 9 December 2011 requesting an amendment to the EPL to include the construction of the gravity fed water line and distribution manifold as mentioned in section 3.5. The intent of this amendment was to turn the eastern dam into a 'capture, treat and release sedimentation basin'. This variation has been added to the quarry's EPL. A copy of the full licence is available on the company's web site.

The construction was agreed to be completed by 30 April 2012. Survey work has been completed, a Statement of Environmental Effects has been finalised and completion of works is currently on schedule subject only to consent being received from Byron Shire Council.

Recommendations for improvement resulting from prior inspections by relevant authorities including EPA have also been actioned. These have included, amongst other things, environmental measures like refinement to bunding of fuel, chemical and oil storage areas.

### 7.2 Log of complaints

The quarry has received very few complaints during the reporting period relating to any part of the quarry's operations. In addition to some general non-conformances in relation to the quarry's conditions of consent and the impact of water and air monitoring detailed in this report, there has only been one environmental complaint during the reporting period which relates to bulldozer noise. The details of this occurrence have been examined in section 4.1 below.

A dedicated complaint hotline number [1800 880 000] has remained active during the reporting period. This number is displayed on prominent signs on both sides of the quarry however no calls have ever been received on this number.

## 8 Technology / Future

### 8.1 Technology and best practice

The quarry and its environmental systems and policies have been around for several decades coinciding with changes in activity on the site.

Over this time the systems and policies have been continually updated and refined to take into account relevant trends, changes in biodiversity importance, changes in law, amendments imposed by authorities and the adoption of technology and best practices.

The quarry seeks the advice and feedback from experts in their respective fields to ensure they are aware of relevant technologies and best practice from time to time. During the reporting period several consultants have been engaged which has allowed practices of the quarry to remain current and relevant.

Examples of the quarry embracing best practice and technology have been provided throughout this report however we have summarised some key items again below:

- Constant review of environmental management planning including review and revision of flora and fauna management plan;
- Ongoing monitoring and survey of key environmental aspects to ensure any conflicts and negative impacts can be identified and managed effectively;
- Engagement of specialist bush regeneration experts to ensure the adequate control of weeds through the site and aid rehabilitation efforts;
- Adoption of off-site propagation and seed collection to aid the process and timing of rehabilitation;
- Reinforcement of environmental management goals of the business to staff and contractors;
- Continual education of staff in regards distinguishing between weeds and species that improve biodiversity values;

- Review of customer plant layouts and engagement in general industry discussions to remain aware of issues and challenges faced by others and what the quarry can learn from their experience;
- Implementation of electrical audit recommendations to improve energy efficiency of quarry operations;
- Changes to silt management process by introducing new silt press infrastructure;

### 8.2 Environmental Management Targets [2012 / 2013]

There have been many achievements in effectively managing environmental considerations of the quarry.

The quarry operator takes its environmental responsibilities seriously and is cognisant to allocate sufficient time and resources to managing these responsibilities.

The environmental targets identified for the next reporting period include:

- Make environmental information in relation to the quarry more transparent by utilising on-line sharing capability;
- Improve engagement with Community, Council and other authorities by reintroducing specific quarry Community Consultative Committee meetings;
- Reduce electricity consumption and/or improve efficient of use;
- Construction of a gravity fed water line and distribution manifold from eastern dam;
- Reduce exposed quarry ground by increasing temporary rehabilitation efforts;
- Maintain flora and fauna management efforts including monitoring, planting and weed control;
- Review of ground water monitoring and confirm intent in relation to natural water flows into Taylors Lake;
- Reduce environmental non conformances including air and water by adopting alternate control measures including increased rehabilitation and additional water controls mentioned in this report;

*Final rehabilitation on east side (RE3)*

