GLENCORE

BAAL BONE COLLIERY

OPERATED BY THE WALLERAWANG COLLIERIES LTD

October to December 2013
Environmental Monitoring Summary

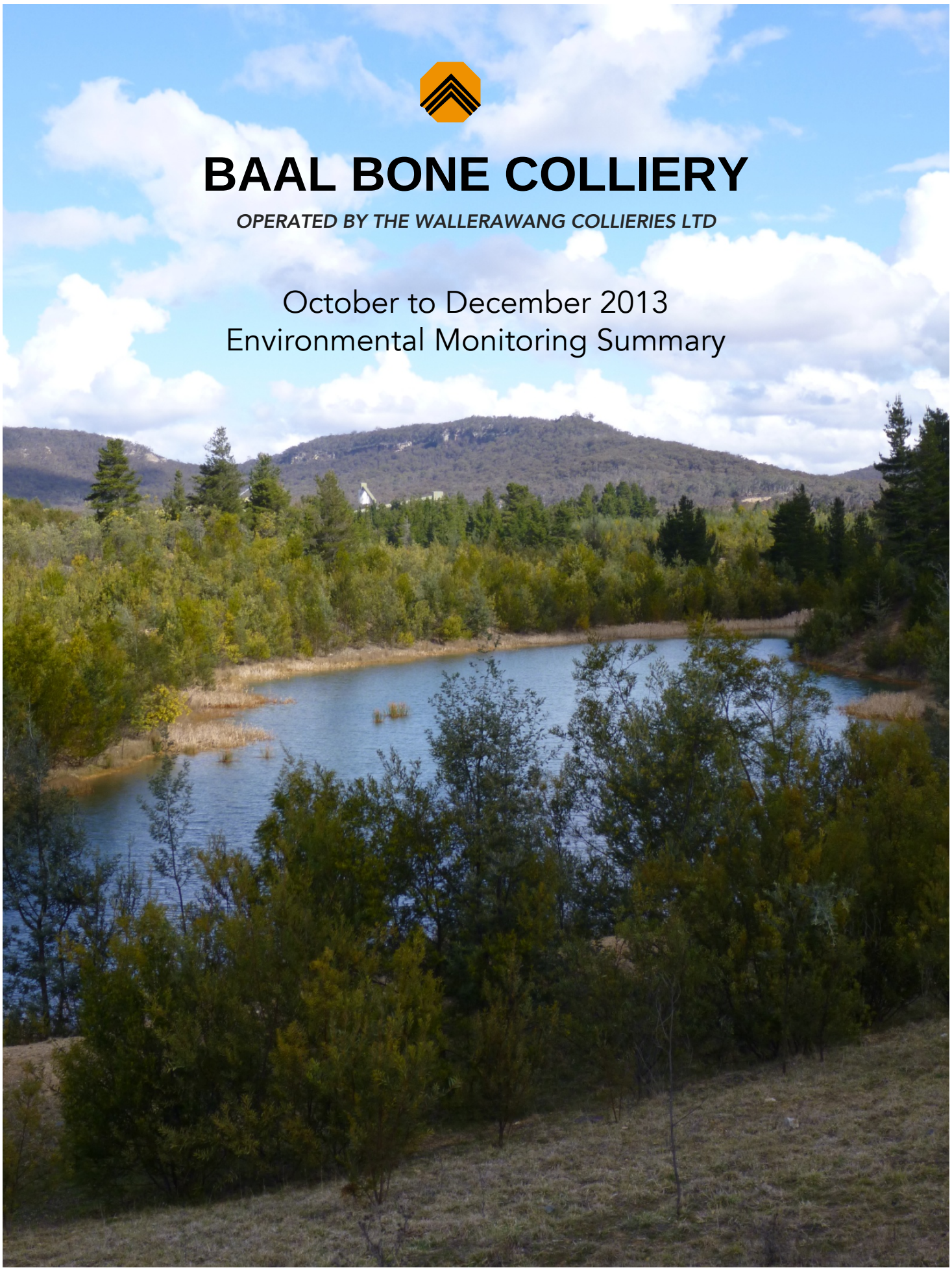


Table of Contents

GLENCORE

Introduction

In accordance with Schedule 5, Condition 9 of Project Approval 09_0178 this report provides a summary of environmental monitoring results for Baal Bone Colliery, for the period 1 October 2013 to 31 December 2013. Baal Bone's licensed discharge and monitoring locations are identified in Drawing 1. Noise monitoring locations are identified in Drawing 2. Results included in this summary include – air quality, surface water quality and dewatering bore flow rates.

Air quality

In accordance with Schedule 3, Condition 12 of Project Approval 09_0178 Baal Bone Colliery has developed an Air Quality Monitoring Program (AQMP). The Department of Planning (DOP) approved the AQMP in correspondence dated 6 July 2011.

Monthly dust fall-out monitoring is carried out in accordance with Australian Standard AS3580.10.1, EPL requirements and Baal Bone's AQMP. Baal Bone has engaged ALS Group Environmental Division Mudgee, a NATA Accredited laboratory, to undertake monthly sampling, monitoring and analysis.

Baal Bone maintains a network of five dust deposition gauges to monitor dust levels around site and in the vicinity of the nearest neighbour, these are:

- Sample location DM1 (EPL monitoring point No. 7);
- Sample location DM2 (EPL monitoring point No. 13);
- Sample location DM3 (EPL monitoring point No. 14); and
- Sample location DM4 (EPL monitoring point No. 15).
- Sample location DM5 – installed 8 September 2011 (EPL monitoring point No. 16).

Particulate matter less than 10 µm in size (PM10) and high volume air sampler total suspended particulate (TSP) monitors were installed 23 October 2011 and 29 October 2011 respectively in accordance with a revised AQMP which was approved by the Department of Planning and Infrastructure in accordance with Project Approval 09_0178. The location of the TSP and PM10 monitors are situated at the same location as DM2.

In accordance with the AQMP, monitoring for PM10 and TSP was discontinued in June 2012. The monitoring was discontinued following Baal Bone mining operations entering care and maintenance in September 2011, and the completion of washing and transporting of coal off-site in December 2011 and April 2012 respectively.

Locations of all air quality monitoring gauges are shown in Drawing 1.

Air Quality Impact Assessment Criteria

Schedule 3, Condition 10 of Project Approval 09_0178 includes air quality impact assessment criteria for the project which are summarised in **Table 2.1** below. The pollutants to be monitored include deposited dust, TSP and PM10.

Table 2.1: Baal Bone Air Quality Impact Assessment Criteria

Pollutant	Averaging period	Criterion	
Deposited dust	Annual	Maximum increase	Maximum total
		2 g/m^2/month	4 g/m^2/month
TSP	Annual	90 $\mu g/m^3$	
PM^{10}	24 hour	50 $\mu g/m^3$	
	Annual	30 $\mu g/m^3$	

Depositional Dust Monitoring Results

Levels of deposited dust at Baal Bone's five gauges were below 4g/m^2/month during the reporting period (refer to **Table 2.2**). Dust levels at all five gauges satisfied the criterion outlined in Project Approval 09_0178.

Figures 2.1 to 2.5 provide monthly results for each depositional dust gauge for 2013.

Table 2.2: Deposited dust monitoring results for 2013 (g/m^2/month)

Month	DM1	DM2	DM3	DM4	DM5
January	0.7	0.4	0.9	0.8	2.1
February	0.6	0.7	0.5	0.5	0.5
March	0.3	0.1	<0.1	0.1	0.4
April	0.2	0.2	0.1	0.2	0.3
May	0.2	0.1	0.1	0.1	0.6
June	0.2	0.1	0.1	0.1	0.2
July	0.1	<0.1	0.1	0.1	0.2
August	0.1	0.1	0.1	0.1	0.2
September	0.1	0.2	0.2	0.4	0.2
October	0.2	0.3	0.4	0.2	0.4
November	0.6	0.7	1.6	0.5	1
December	0.5	0.6	1.5	1.2	1.8

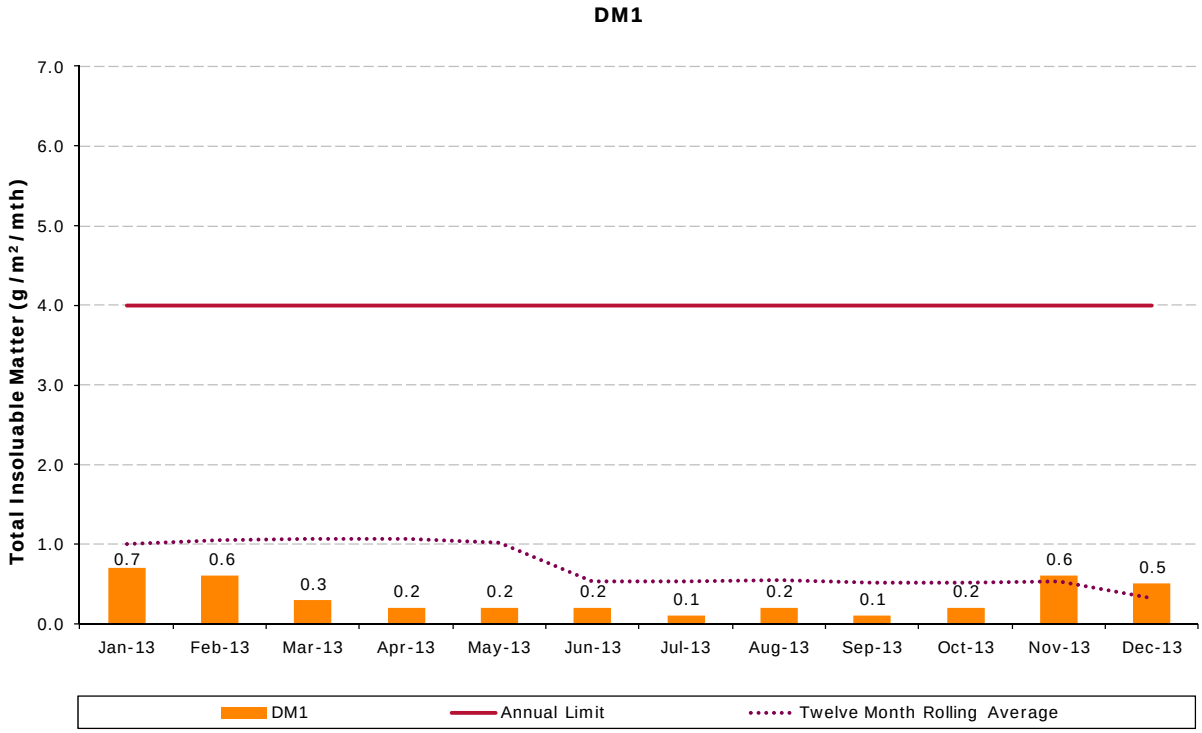


Figure 2.1: Dust monitoring gauge DM1 (EPL monitoring point No. 7)

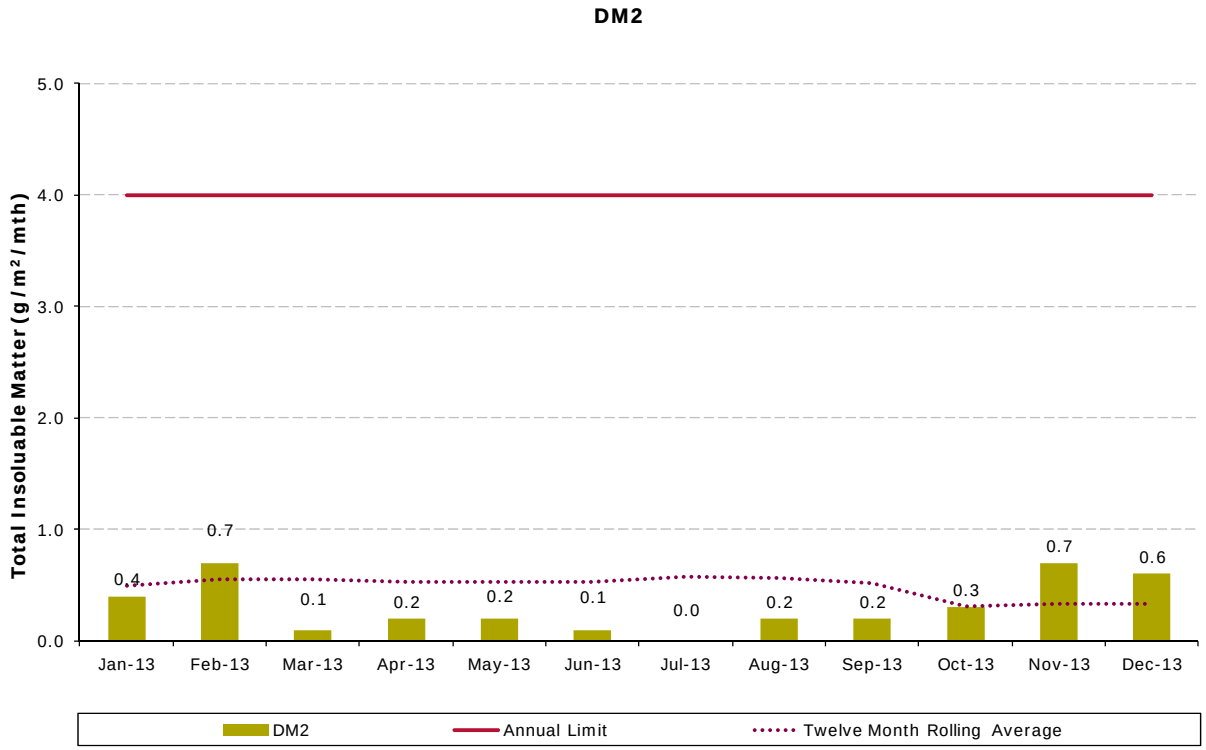


Figure 2.2: Dust monitoring gauge DM2 (EPL monitoring point No. 13)

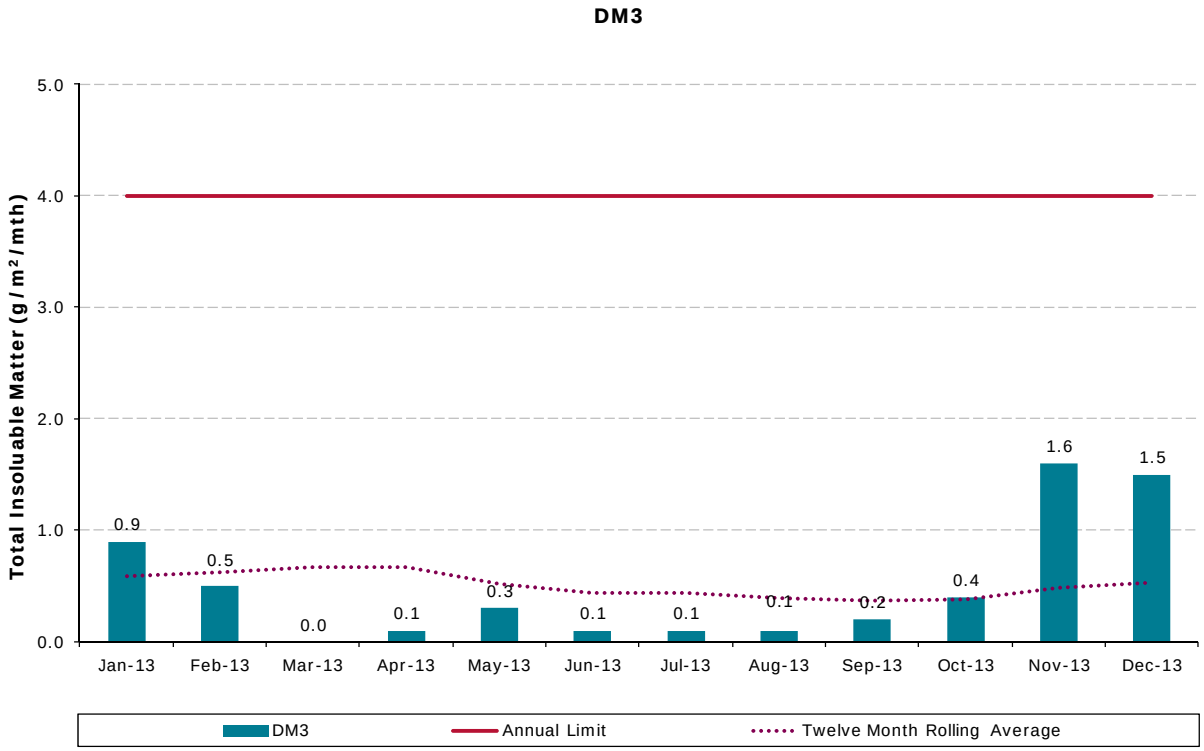


Figure 2.3: Dust monitoring gauge DM3 (EPL monitoring point No. 14)

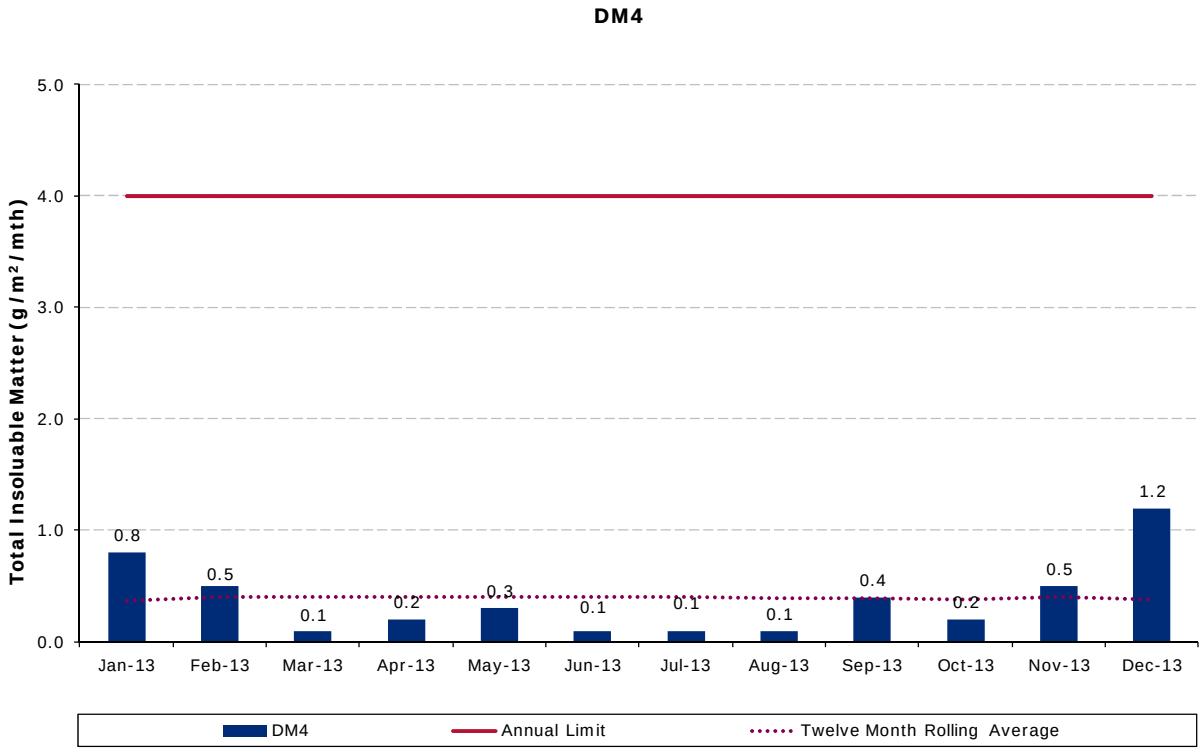


Figure 2.4: Dust monitoring gauge DM4 (EPL monitoring point No. 15)

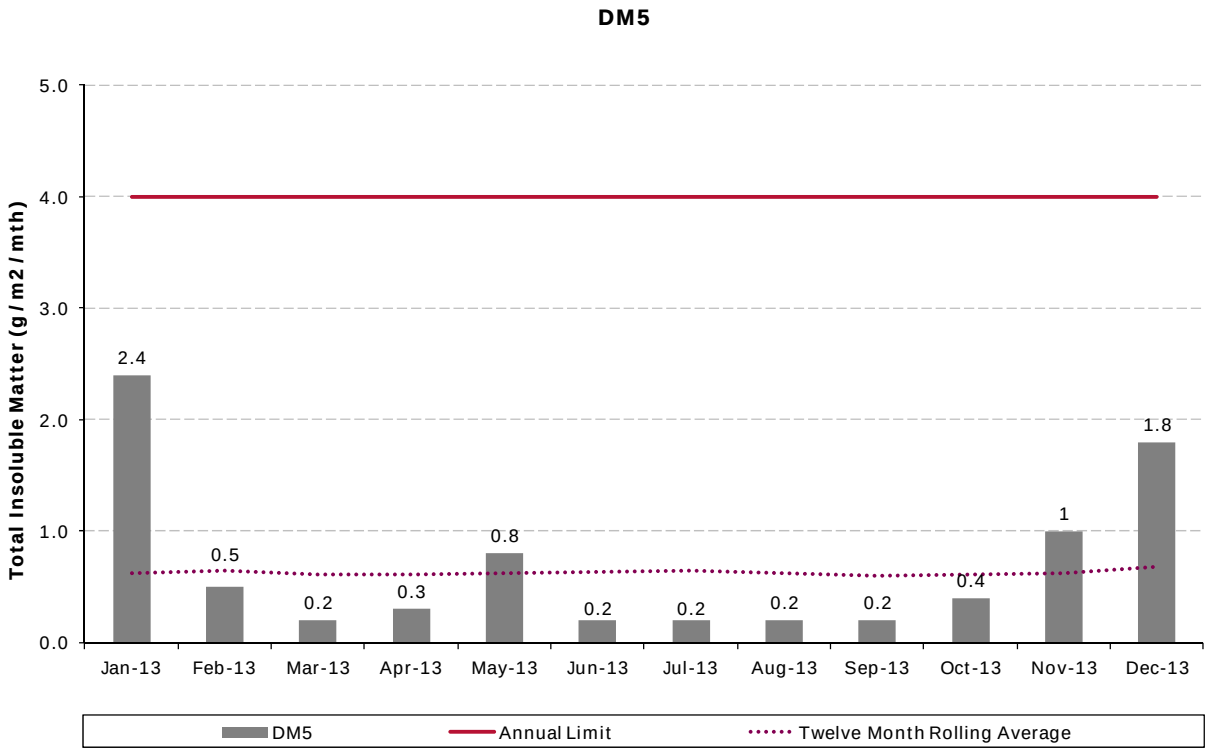


Figure 2.5: Dust monitoring gauge DM5 (EPL monitoring point No. 16)

Total Suspended Particulate Results

A high volume air sampler (HVAS) was installed in October 2011 to monitor total suspended particulates (TSP) at one location: DM2. The HVAS ran on a six-day cycle in accordance with EPA/OEH requirements.

In accordance with the DoPI approved Air Quality Monitoring Program, monitoring for TSP was discontinued in June 2012. The monitoring was discontinued following Baal Bone mining operations entering care and maintenance in September 2011, and the completion of coal washing and transporting of coal off-site in December 2011 and April 2012 respectively.

PM_{10} Results

A Tapered Element Oscillating Microbalance Analyser (TEOM) was installed in October 2011 to measure particulate matter up to 10 microns in diameter (PM_{10}) at one location: DM2.

In accordance with the DoPI approved Air Quality Monitoring Program, monitoring for PM_{10} was discontinued in June 2012. The monitoring was discontinued following Baal Bone mining operations entering care and maintenance in September 2011, and the completion of washing and transporting of coal off-site in December 2011 and April 2012 respectively.

GLENCORE

Surface Water

Baal Bone has engaged ALS Group Environmental Division Mudgee, a NATA Accredited laboratory, to undertake monthly sampling, monitoring and analysis of a range of surface and subsurface waters.

Until 31st July 2013, Baal Bone maintained a network of five licensed discharge and monitoring points in accordance with EPL 765 (viz. LD2, LD3, LD6, LDP1 and WMP1)(**Drawing 1**). On 31st July 2013 both LDP03 and LDP06 (north and south boreholes) were relinquished. Mine water is now pumped back to the Baal Bone pit top and is managed through the site's water management system and discharged through LDP01

A copy of EPL 765 can be accessed here: http://www.environment.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=32193&SYSUID=1&LICID=765.

Water Quality Concentration Limits

Condition L2 of EPL 765 outlines water concentration limits for oil and grease, pH, total suspended solids and total iron. These limits are presented below in **Table 3.1.**

Table 3.1: EPL concentration limits

	LD2	LD3	LD6	LDP1	WMP1
Oil and grease (mg/L)	-	10	10	10	-
pH	-	6.5-8.5	6.5-8.5	6.5-8.5	-
Total Suspended Solids (mg/L)	-	50	50	50	-
Total Iron (mg/L)	-	-	1.0	1.0	-

Water Quality Results

Monitoring results for Baal Bone's five licensed discharge and monitoring points as required by EPL 765 are presented below in **Table 3.2**.

GLENCORE

Table 3.2: EPL Water quality results for the reporting period

EPL Point	Month	EC uS/cm	O&G mg/L	SO_4^{2-} mg/L	Fe mg/L	TSS mg/L	pH	BOD mg/L	Faecal Coliforms cos/100 mls	N mg/L	P mg/L
LD2[a]	Jan	-	-	-	-	-	-	-	-	-	-
	Feb	-	-	-	-	-	-	-	-	-	-
	Mar	-	-	-	-	-	-	-	-	-	-
	Apr	-	-	-	-	-	-	-	-	-	-
	May	-	-	-	-	-	-	-	-	-	-
	June	-	-	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	-	-	-
	Aug	-	-	-	-	-	-	-	-	-	-
	Sep	-	-	-	-	-	-	-	-	-	-
	Oct	-	-	-	-	-	-	-	-	-	-
	Nov	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-
LD3	Jan	1360	<2	334	3.54	6	7.1	-	-	-	-
	Feb	1530	<5	320	<0.05	60	7.0	-	-	-	-
	Mar	1500	2	280	3.48	4	6.9	-	-	-	-
	Apr	1470	<2	323	3.99	8	6.8	-	-	-	-
	May	1380	<2	345	4.03	8	6.8	-	-	-	-
	June	1510	<2	345	2.59	2	6.9	-	-	-	-
	July	No Flow	-	-	-	-	-	-	-	-	-
	LD3 Relinquished 31st July 2013										
LD6	Jan	1420	<2	419	0.61	5	7.6	-	-	-	-
	Feb	1510	<5	418	<0.05	85	7.5	-	-	-	-
	Mar	1410	2	317	0.4	<2	7.5	-	-	-	-
	Apr	1520	<2	364	0.25	2	7.3	-	-	-	-
	May	1500	<2	387	0.31	2	7.3	-	-	-	-
	June	1500	<2	350	0.32	<2	7.3	-	-	-	-
	Jul	1570	<2	323	0.64	2	7.7	-	-	-	-
	LD6 Relinquished 31st July 2013										
LDP1	Jan	1010	<2	387	0.36	2	8.0	-	-	-	-
	Feb	900	<5	280	<0.05	4	7.3	-	-	-	-
	Mar	980	2	289	0.31	2	7.9	-	-	-	-

GLENCORE

	Apr	1020	<2	301	0.25	7	8	-	-	-	-
	May	1020	<2	341	0.47	3	7.8	-	-	-	-
	June	1090	<2	321	0.24	3	8.2				
	July	1150	<2	328	0.39	<2	8.1				
	Aug	1190	<2	346	0.26	<2	8.2				
	Sep	1120	<2	356	0.18	2	8.1	-	-	-	-
	Oct	1160	<2	355	0.14	2	8.1	-	-	-	-
	Nov	1280	<2	357	0.18	10	8.1	-	-	-	-
	Dec	1260	<2	329	0.25	17	8.1	-	-	-	-
WMP 1[b]	Jan	-	-	-	-	-	-	-	-	-	-
	Feb	-	-	-	-	-	-	-	-	-	-
	Mar	-	-	-	-	-	-	-	-	-	-
	Apr	-	-	-	-	-	-	-	-	-	-
	May	-	-	-	-	-	-	-	-	-	-
	June	-	-	-	-	-	-	-	-	-	-
	July	-	-	-	-	-	-	-	-	-	-
	Aug	-	-	-	-	-	-	-	-	-	-
	Sep	-	-	-	-	-	-	-	-	-	-

Notes

(a) No samples taken at LD2 during 2013 to date as sample location was dry
(b) No samples taken at WMP1 during 2013 to date as no flow at sample location

Legend

BOD = Biological oxygen demand
EC = Electrical conductivity
Fe = Iron
N = Nitrogen
O & G = Oil and Grease
P = Phosphorus
SO_4^{2-} = Sulfate
TSS = Total suspended solids
Highlighted cells = Results exceed EPL concentration limits

Figures 3.1 to 3.4 provide monthly water quality results compared to EPL concentration limits.

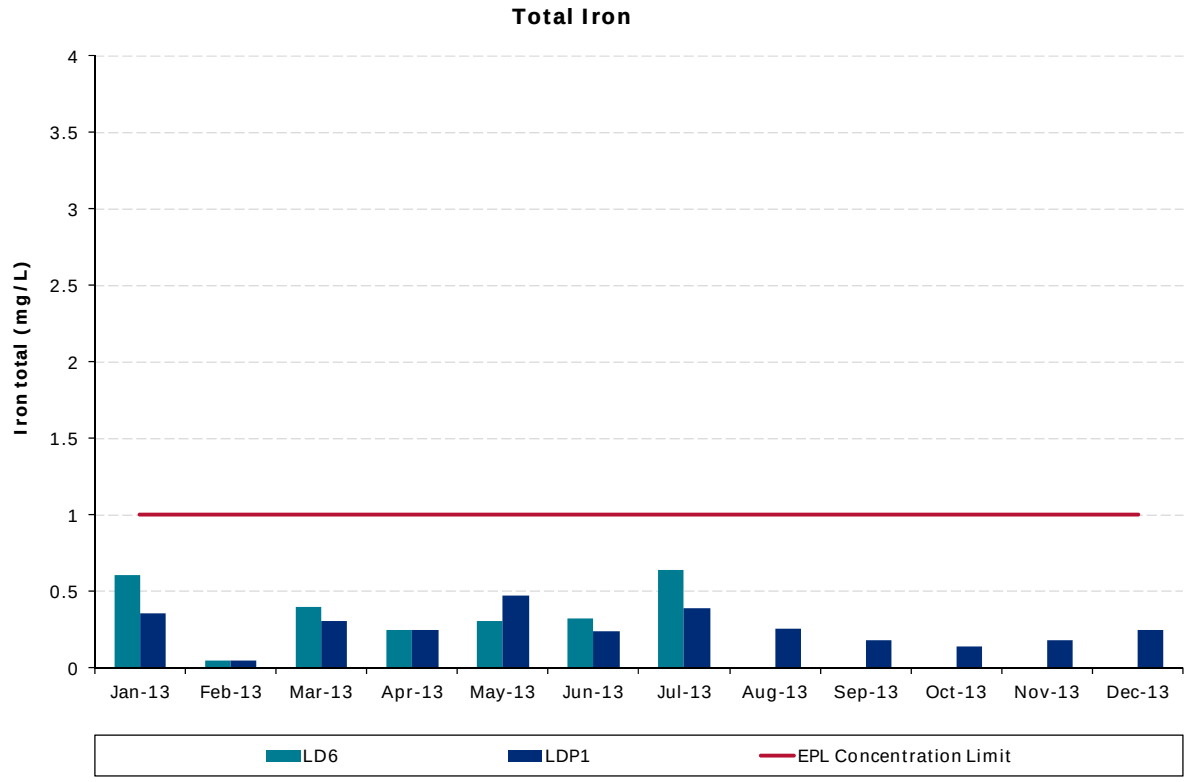
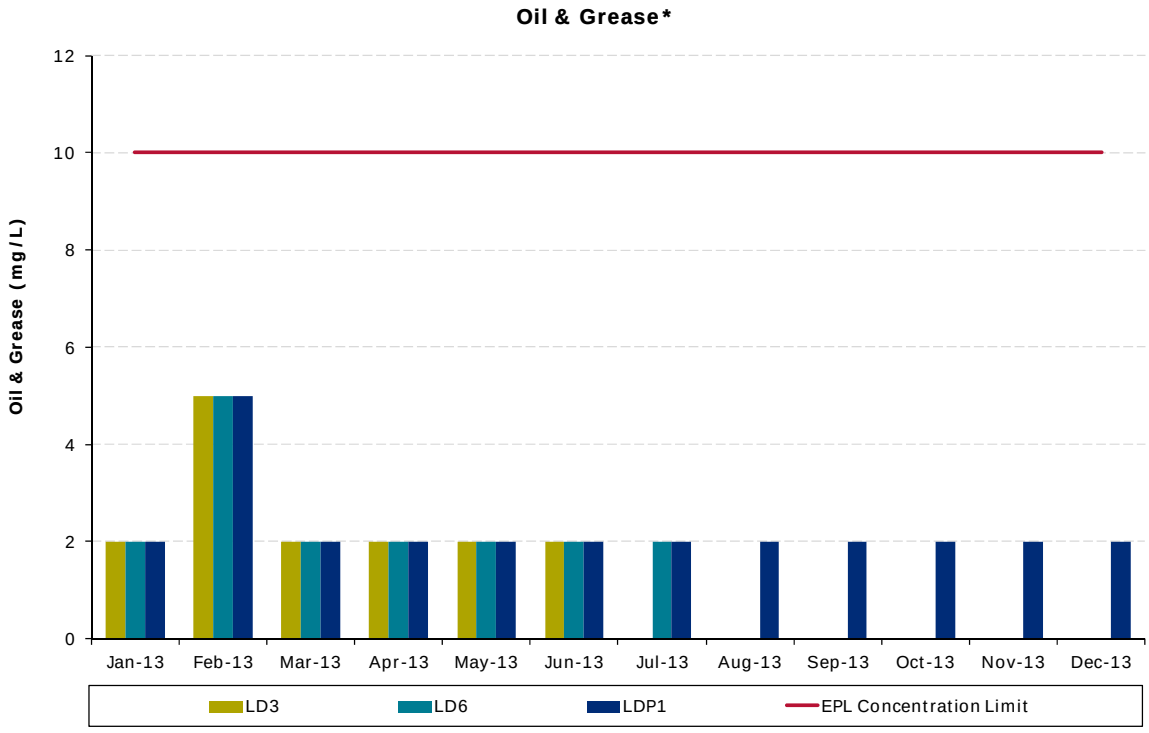


Figure 3.1: Total iron levels



Notes:
* Some values shown as 2 were reported as being <2 (Refer to Table 3.2).

Figure 3.2: Oil and grease levels

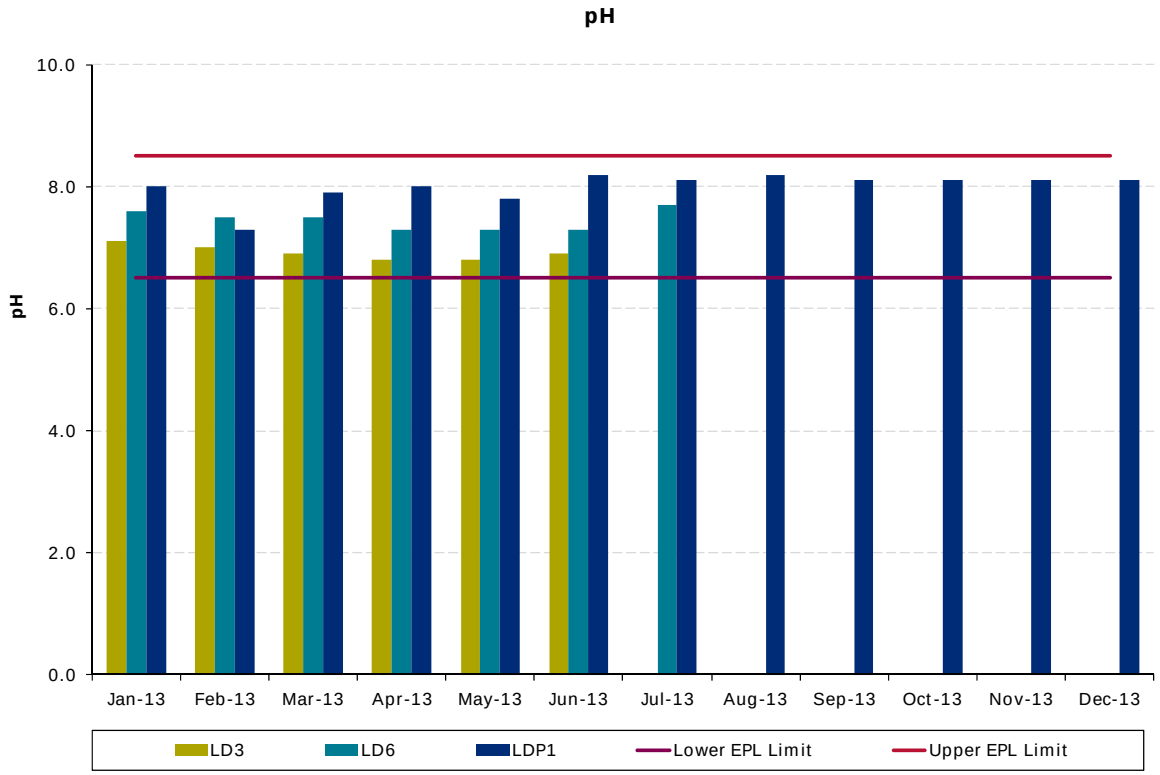


Figure 3.3: pH levels

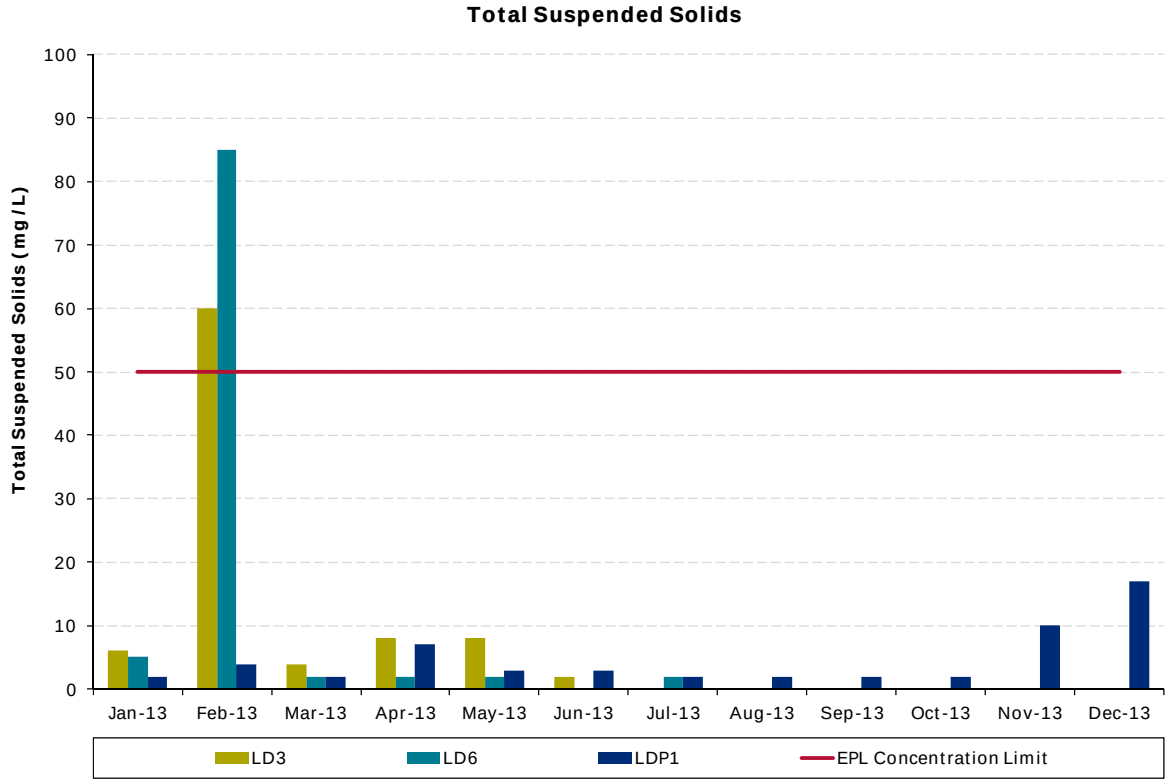


Figure 3.4: Total suspended solids levels

All samples recorded were within EPL concentration limits during the reporting period.

- The highest iron sample for 2013 was 0.64 mg/L (recorded at LD6 in July 2013), well below the concentration limit of 1 mg/L.
- Most samples for oil and grease returned levels of 2 mg/L or less, well below the EPL concentration limit of 10 mg/L.
- All samples returned pH results that were within the upper and lower EPL limits (8.5 and 6.5 respectively).
- Two TSS exceedances at LD3 & LD6 in February. The cause of the high TSS could not be identified and all other monthly results were well below the 50mg/L limit.

Monthly EPL reporting can be accessed here:
http://www.xstratacoal.com/EN/Operations/Baalbone/Pages/EPLreportingBaalBone.aspx

Groundwater

Condition L3.1 of EPL 765 specifies a discharge volume limit of 12 ML per day at LD6.

During the July 2013 period, discharges from LD6 did not exceed the daily limit, with an average daily discharge at LD6 of 0.77 ML per day, and a maximum daily discharge of 5.77 ML.

As of 31st July 2013, LDP6 has been relinquished and no requirement for daily discharges exists from this date.

Noise

Baal Bone Colliery has developed a Noise Management Plan (NMP) in accordance with Schedule 3, Condition 6 of Project Approval 09_0178. The NMP was approved by the Department of Planning in correspondence dated 11 November 2011.

After entering Care & Maintenance approval was sought from DOP to carry out annual noise monitoring surveys in place of quarterly surveys.

As per the NMP Baal Bone Colliery operates a real time noise monitor at location R2. In addition to real time noise monitoring (which is supplementary to regulatory measurements), from 2013 onwards attended monitoring is undertaken on an annual basis at receptors R1 and R2/R3 (**refer to Drawing 2**).

Noise Impact Assessment Criteria

Schedule 3, Condition 4 of Project Approval 09_0178 includes long term noise impact assessment criteria. Table 5.1 outlines the assessment criteria.

Table 5.1: Long term noise impact assessment criteria

Location	All periods dB(a) $L_{Aeq(15\ min)}$	Night dB(a) $L_{A1(1\ min)}$
R1	46	47
R2	41	48
R3	41	48
All other privately-owned land	35	45

GLENCORE

Noise Audit Results

During the reporting period an environmental compliance noise audit was conducted by Atkins Acoustics & Associates on Thursday 21 November 2013 between 4.15pm and 11.30pm. Table 5.2 summarises the results from the audit.

Table 5.2: Attended noise measurement results

Location (Start time)	Measured Predicted Colliery Noise L_{Aeq}	Limit	Unit	Comments
Daytime Audit (2:00pm to 3:35pm) - Thursday 21 November 2013				
Location R1 (1800 hours)	<30	46	dBA	Insects, BBC vent fan (<30), breeze, birds.
Location R1 (1815 hours)	<30	46	dBA	Insects, BBC vent fan (<30), rooster, breeze, insects , birds.
Location R2/3 (1838 hours)	<30	41	dBA	Distant road traffic, insects, breeze in trees, insects, birds.
Location R2/3 (1852 hours)	<30	41	dBA	Highway road traffic, insects, bird, plane, Breeze in trees

Location (Start time)	Measured Predicted Colliery Noise L_{Aeq}	Limit	Unit	Comments
Evening Audit (6.00pm to 9:40pm) - Thursday 21 November 2013				
Location R1 (1800 hours)	<30	46	dBA	Insects, BBC vent fan (<30)
Location R1 (1815 hours)	<30	46	dBA	Insects, BBC vent fan (<30)
Location R2/3 (1838 hours)	<30	41	dBA	BBC vent fan (<30), breeze in trees
Location R2/3 (1852 hours)	<30	41	dBA	BBC vent fan (<30), breeze in trees

Location (Start time)	Measured Predicted Colliery Noise L_{Aeq}	Limit	Unit	Comments
Night Audit (10:00pm to 11:10pm) - Thursday 21 November 2013				
Location R1 (2238 hours)	<30	47	dBA	BBC ventilation fan <30dBA; Intermittent highway traffic; insects.

Location R1 (2245 hours)	<35	47	dBA	BBC ventilation fan <30dBA; Intermittent highway traffic; insects.
Location R2/3 (2200 hours)	<30	48	dBA	BBC ventilation fan <30dBA; Intermittent highway traffic; insects.
Location R2/3 (2215 hours)	<30	48	dBA	BBC ventilation fan <30dBA; Intermittent highway traffic; insects.

The audit report concluded that:

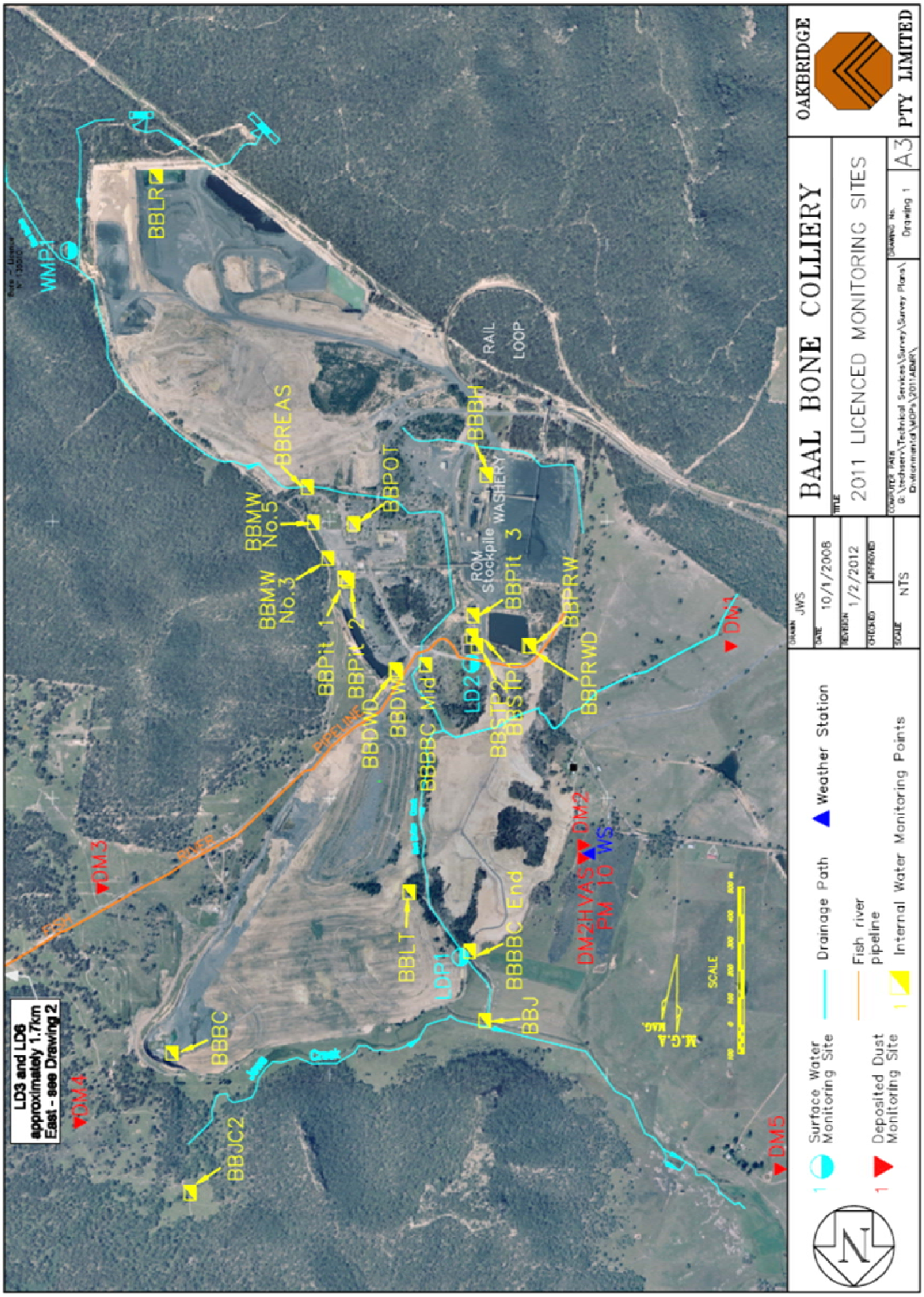
> "From the audit measurements and assessment the LAeq, 15 min noise contributions from Baal Bone Colliery during the day, evening and night assessment periods satisfied the long-term licence noise limits.
>
> Baal Bone Colliery related LA_{max} noise levels were not observed to cause exceedances of the licence noise limits at measurement locations for the duration of the audit."

The full noise audit report can be accessed from the Baal Bone publications page at: http://www.xstratacoal.com/EN/Operations/Baalbone/Pages/BaalBonePublicationsArchive.aspx.

Previous noise audit reports can be accessed from the Baal Bone publications page at: http://www.xstratacoal.com/EN/Operations/Baalbone/Pages/BaalBonePublicationsArchive.aspx.

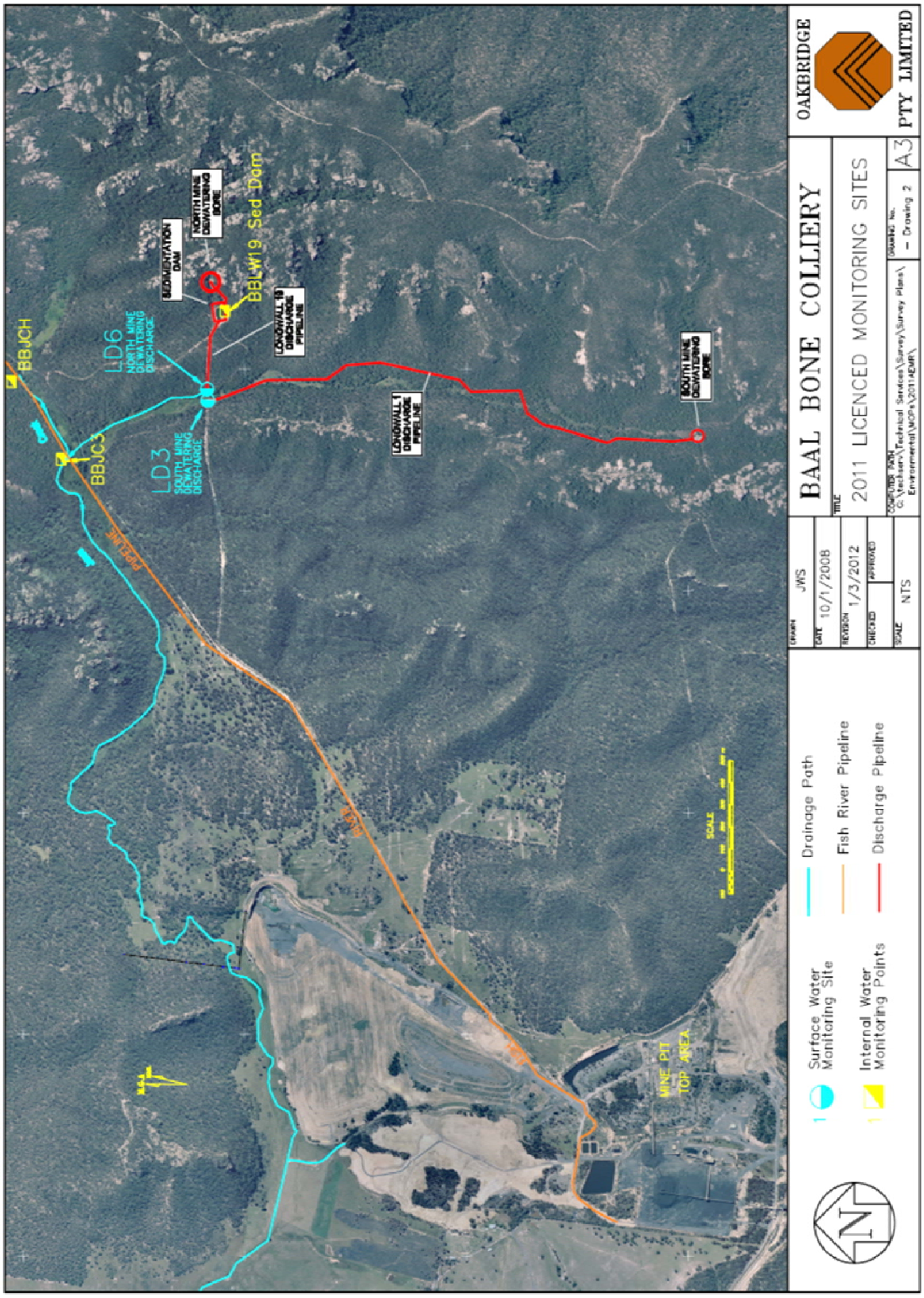
GLENCORE

Drawing 1

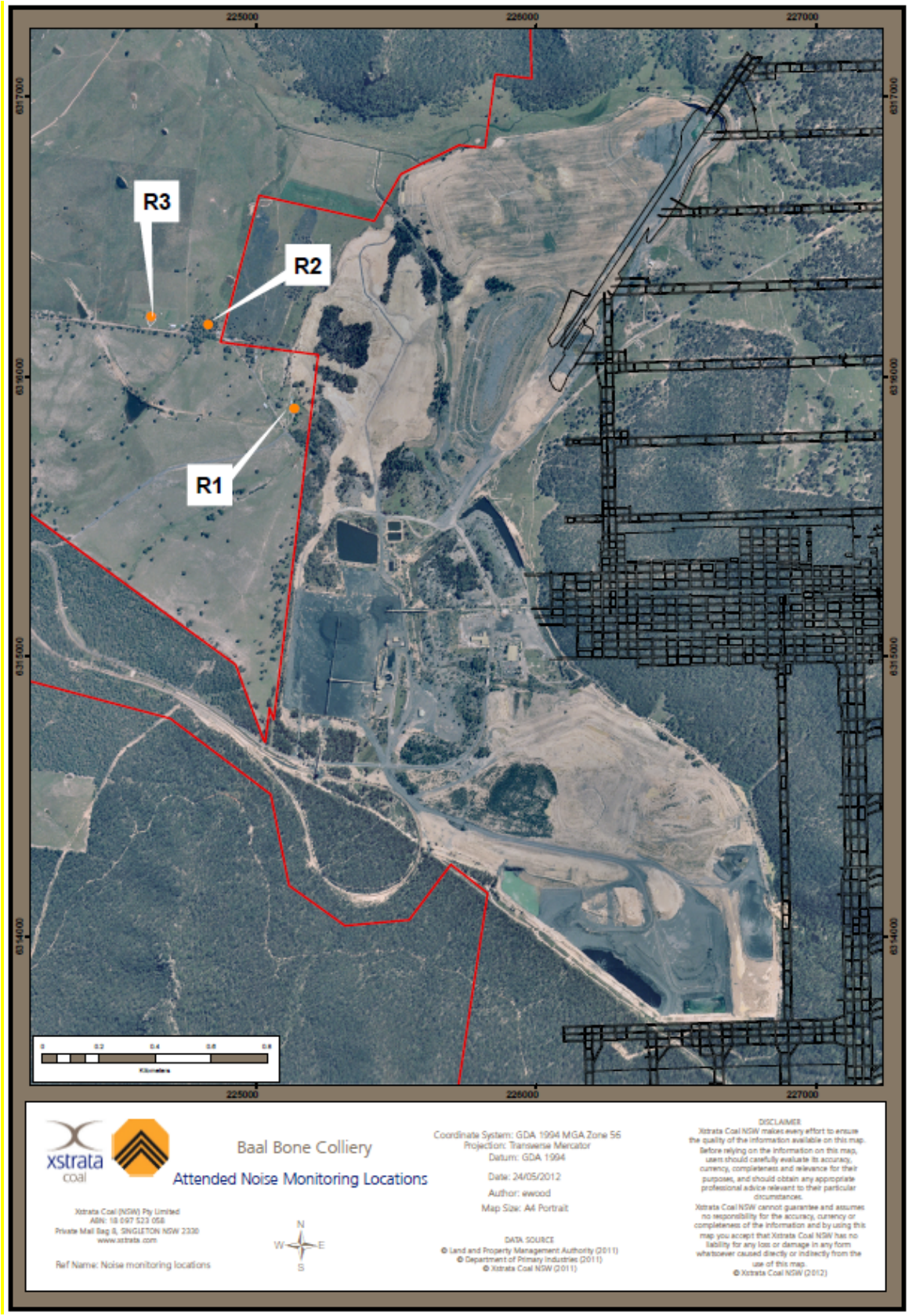


GLENCORE

Drawing 2



Drawing 3


225000
226000
227000
6317000
6316000
6315000
6314000
R3
R2
R1
0
0.2
0.4
0.6
0.8
Kilometers
xstrata coal
Baal Bone Colliery
Attended Noise Monitoring Locations
Xstrata Coal (NSW) Pty Limited
ABN: 18 097 523 058
Private Mail Bag 8, SINGLETON NSW 2330
www.xstrata.com
Ref Name: Noise monitoring locations
N
W
E
S
Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Date: 24/05/2012
Author: ewood
Map Size: A4 Portrait
DATA SOURCE
© Land and Property Management Authority (2011)
© Department of Primary Industries (2011)
© Xstrata Coal NSW (2011)
DISCLAIMER
Xstrata Coal NSW makes every effort to ensure the quality of the information available on this map. Before relying on the information on this map, users should carefully evaluate its accuracy, currency, completeness and relevance for their purposes, and should obtain any appropriate professional advice relevant to their particular circumstances.
Xstrata Coal NSW cannot guarantee and assumes no responsibility for the accuracy, currency or completeness of the information and by using this map you accept that Xstrata Coal NSW has no liability for any loss or damage in any form whatsoever caused directly or indirectly from the use of this map.
© Xstrata Coal NSW (2012)