THE WALLERAWANG COLLIERIES LIMITED

# ENVIRONMENTAL MONITORING SUMMARY October - December 2012

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# 1. 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 2012 to 31 December 2012. Baal Bone's licensed discharge and monitoring locations are identified in **Drawing 1** and **Drawing 2**. Noise monitoring locations are identified in **Drawing 3.** Results included in this summary include – air quality, surface water quality and dewatering bore flow rates.

# 2. 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 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 ($PM_{10}$) 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 Air Quality Monitoring Program which was approved by the Department of Planning and Infrastructure in accordance with Project Approval 09_0178. The location of the TSP and $PM_{10}$ monitors are situated at the same location as DM2.

In accordance with the Air Quality Monitoring Program, monitoring for $PM_{10}$ 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.**

## 2.1 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 $\mu g/m^3$ | |

## 2.2 Depositional Rust Monitoring Results

Levels of deposited dust at Baal Bone's five gauges were below 4$g/m^2$/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 2012.

**Table 2.2: Deposited dust monitoring results for 2012 ($g/m^2$/month)**

| Month | DM1 | DM2 | DM3 | DM4 | DM5 |
|---|---|---|---|---|---|
| January | 1.5 | 0.2 | 2.3[c] | 0.6[c] | 0.3 |
| February | 0.1[b] | 0.1[b] | 0.1[b,c] | <0.1[b,c] | 0.3[b] |
| March | 0.1[b,c] | 0.1[b,c] | 0.1[c] | 0.1[c] | See note 'a' |
| April | 0.3 | 0.4 | 0.2 | 0.2 | 0.3 |
| May | 0.6 | 0.2 | 1.9 | 0.2 | 0.6 |
| June | 6.1[d] | 0.1 | 1.0 | 0.1 | 0.1 |
| July | <0.1 | <0.1 | <0.1 | 0.1 | 0.1 |
| August | 0.1 | 0.3 | 0.6 | 0.3 | 0.4 |
| September | 0.4 | 0.7 | 0.4 | 0.4 | 0.5 |
| October | 0.2[c] | 2.6[c] | 0.3[c] | 0.3[c] | 0.3 |
| November | 0.5 | 0.4 | 0.5 | 0.3 | 0.8 |
| December | 2.9 | 0.6 | 1.0 | 1.5 | 1.1 |

a) No results available, sample bottle broken in transit.
b) Gauge overflowing – depositional dust result may be underestimated.
c) Sample exposure period outside of AS/NZS 3580.10.1specifications of 30 ± 2 days.
d) June 2012 sample at DM1 contaminated with bird droppings and insects.

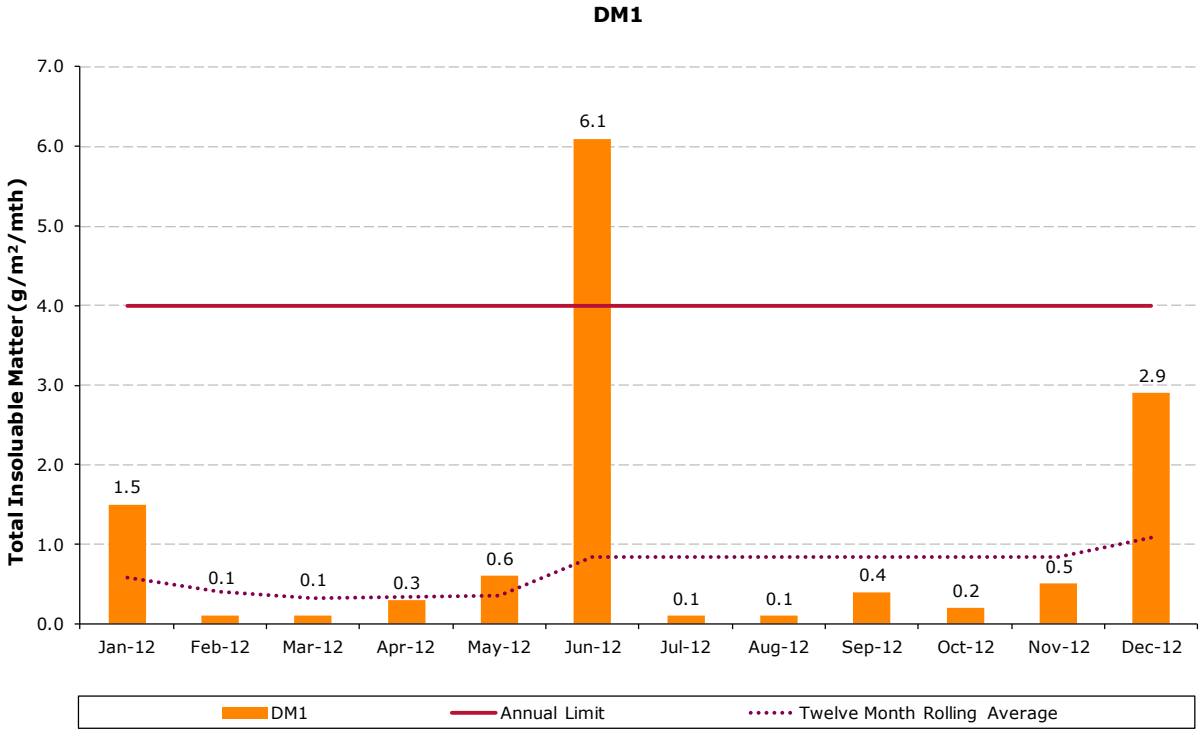



Figure 2.1: Dust monitoring gauge DM1 (EPL monitoring point No. 7)

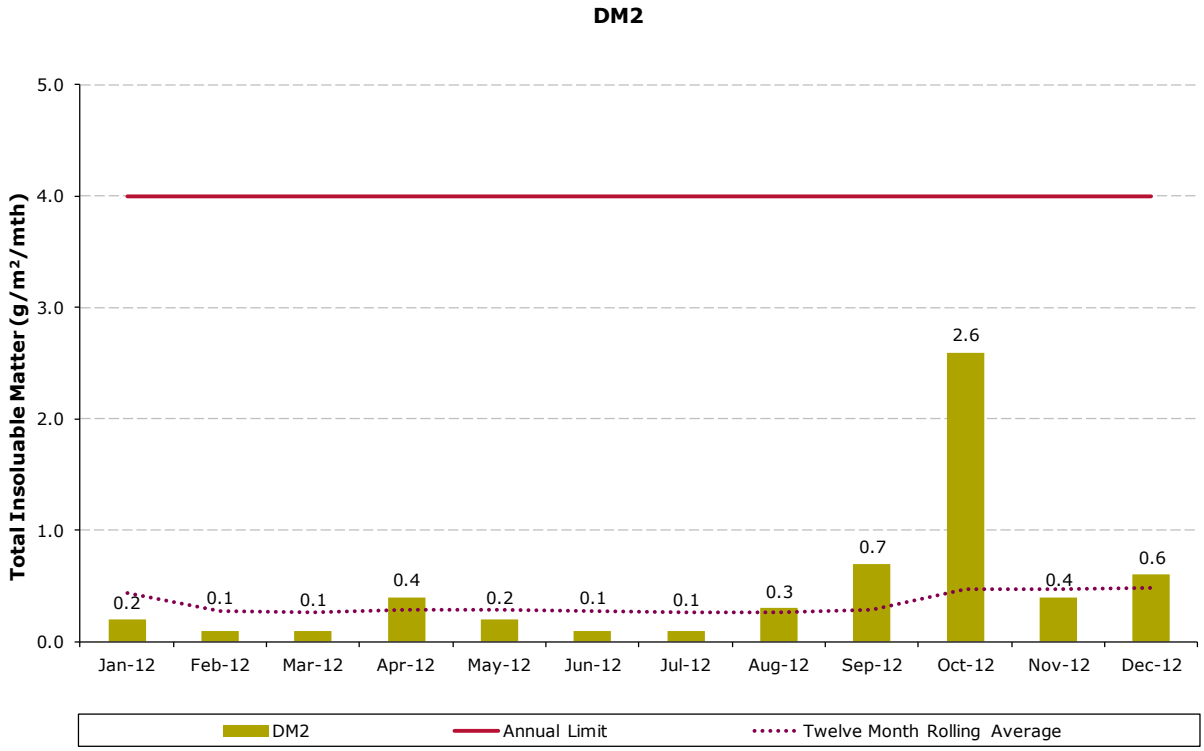



Figure 2.2: Dust monitoring gauge DM2 (EPL monitoring point No. 13)

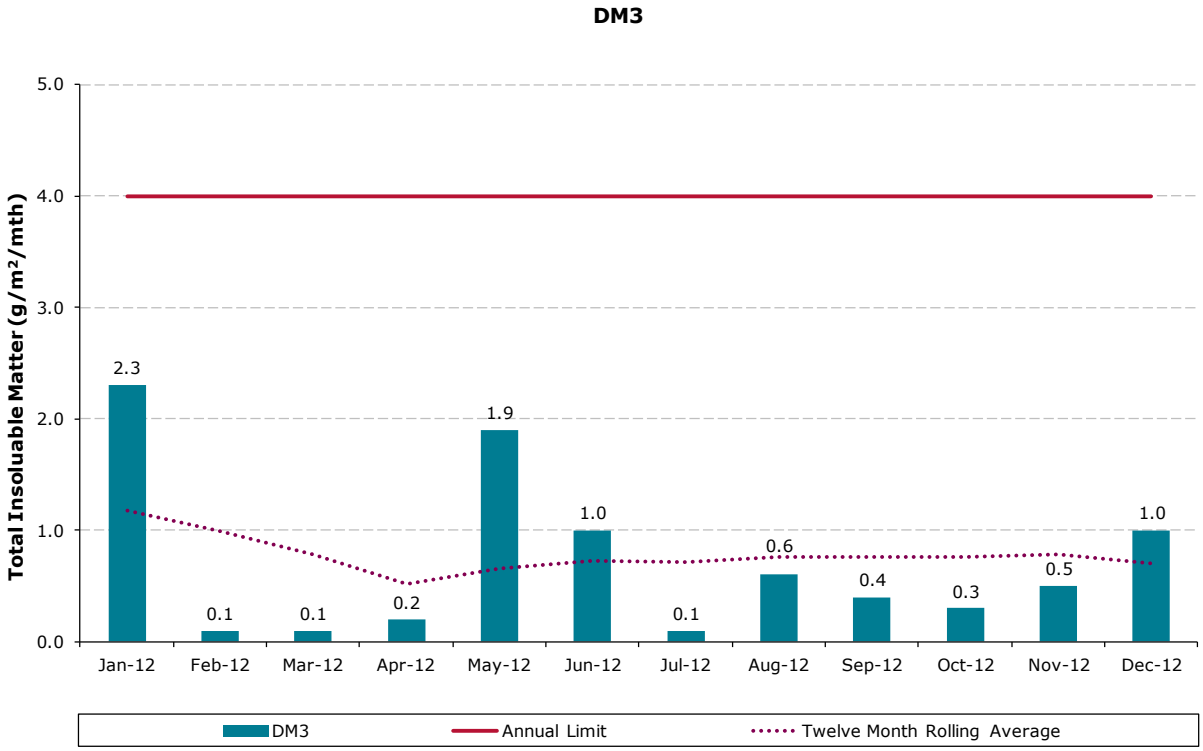



Figure 2.3: Dust monitoring gauge DM3 (EPL monitoring point No. 14)

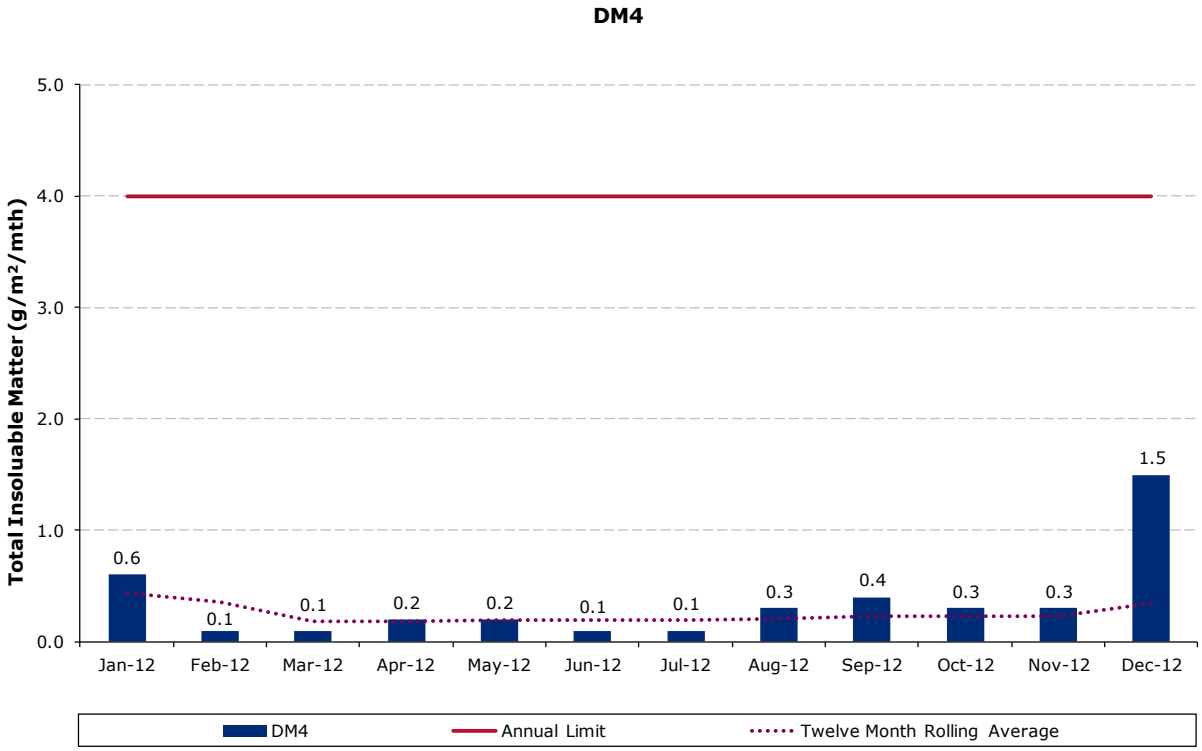



Figure 2.4: Dust monitoring gauge DM4 (EPL monitoring point No. 15)

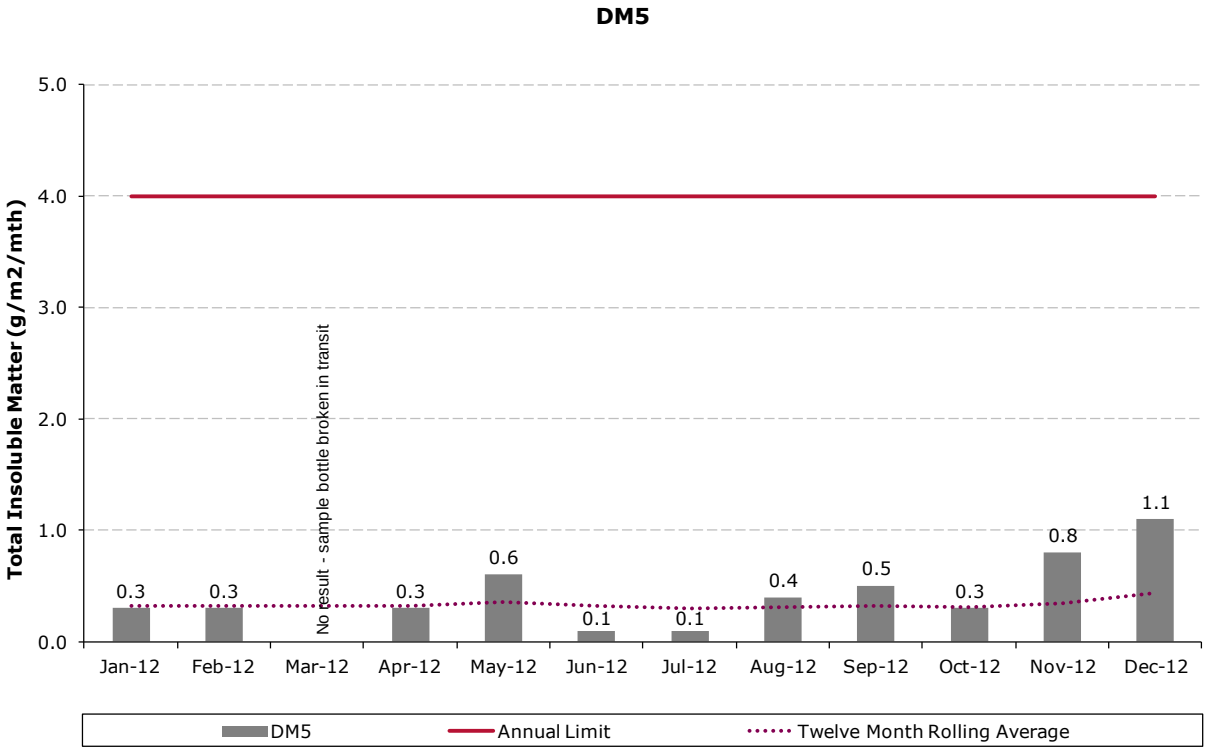



Figure 2.5: Dust monitoring gauge DM5 (EPL monitoring point No. 16)

## 2.3 Total Suspended Particulate Results

A high volume air sampler (HVAS) monitors total suspended particulates (TSP) at one location: DM2. HVAS run on a six-day cycle in accordance with EPA/OEH requirements.

**Figure 2.6** shows the TSP results for the reporting period.

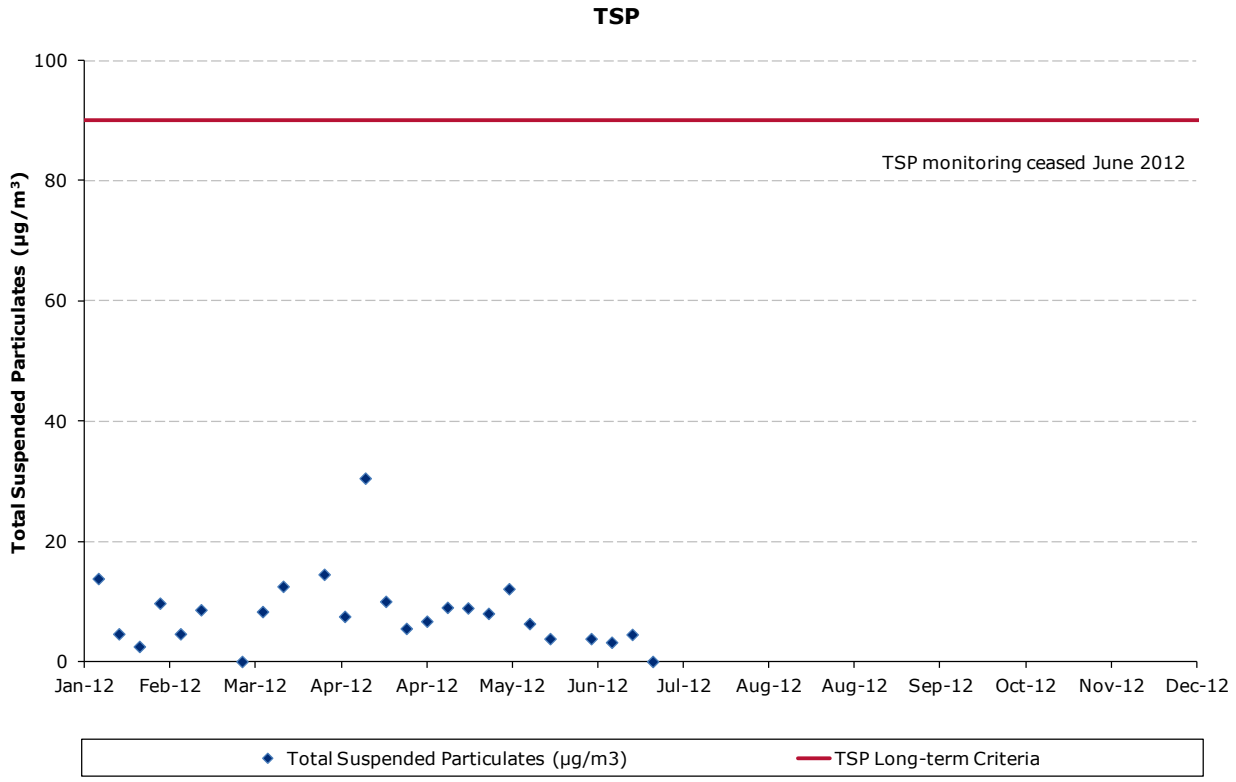



Figure 2.6: TSP Results

As the HVAS for monitoring TSP was installed in October 2011, the annual rolling average is not available for the current reporting period.

As illustrated at **Figure 2.6** the TSP levels during the reporting period were well below the long-term criteria, with the average TSP level for the six months until end June 2012 being 9.5 µg/m$^3$.

In accordance with the 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.

## 2.4 $PM_{10}$ Results

A Tapered Element Oscillating Microbalance Analyser (TEOM) measures particulate matter up to 10 microns in diameter ($PM_{10}$) at one location: DM2.

**Figure 2.7** shows $PM_{10}$ 24 hour average results for the reporting period.

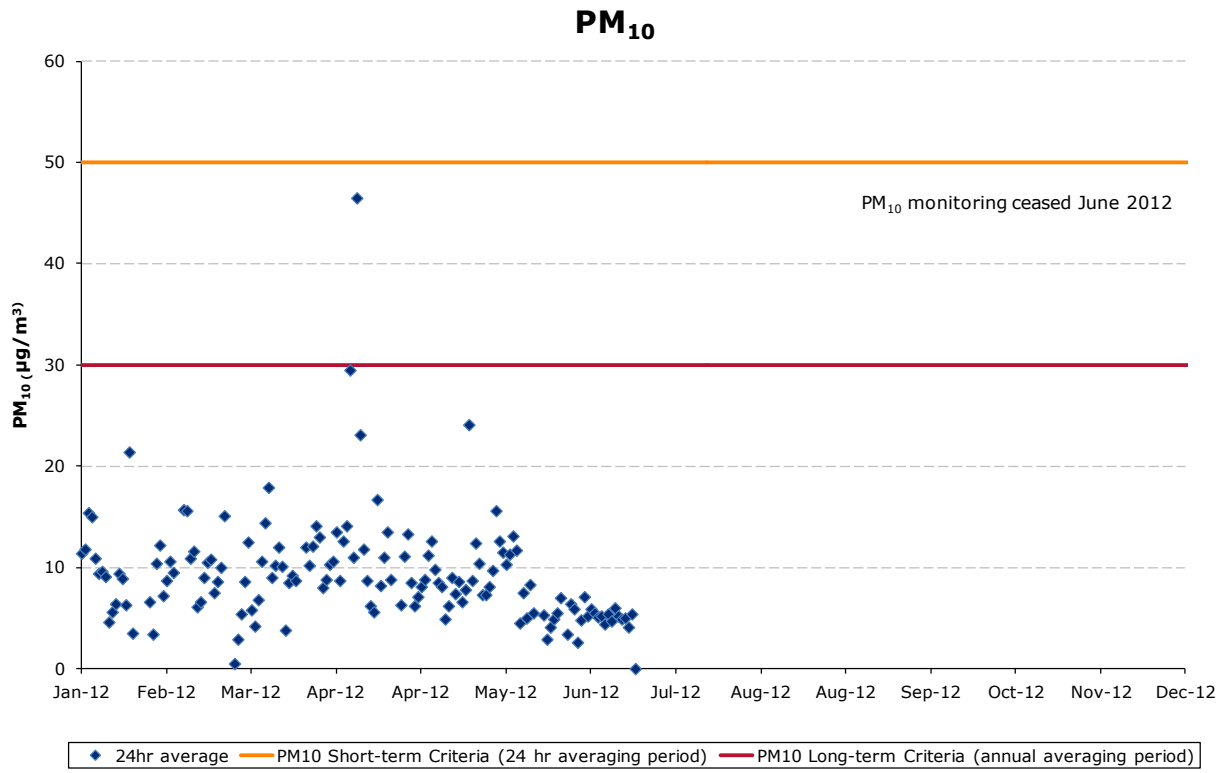



Figure 2.7: $PM_{10}$ 24 hour average results for the reporting period

As illustrated in **Figure 2.7** the $PM_{10}$ levels during the reporting period were below the short-term assessment criteria (50 µg/m$^3$).

As the TEOM was installed in October 2011, the annual rolling average is not available. However the average 24hr $PM_{10}$ level for the six months until end June 2012 was 9.8 µg/m$^3$, well below the long-term assessment criteria of 30 µg/m$^3$.

In accordance with the 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.

# 3. 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.

Baal Bone maintains a network of five licensed discharge and monitoring points in accordance with EPL 765 (viz. LD2, LD3, LD6, LDP1 and WMP1)(**Drawing 1 and Drawing 2**).

A copy of EPL 765 can be accessed here: http://www.environment.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=31065&SYSUID=1&LICID=765.

## 3.1 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 | - |

## 3.2 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**.

**Table 3.2: Water quality results for the reporting period**

| EPL Point [1] | 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/100mls | N mg/L | P mg/L |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LD2 | Jan[2] | - | - | - | - | - | - | - | - | - | - |
| | Feb | - | <2 | - | - | 87 | 8.1 | 37 | 320 | 8.8 | 4.19 |
| | Mar | - | <2 | - | - | 78 | 7.2 | 35 | <10 | 6.5 | 1.87 |
| | Apr | - | <2 | - | - | 188 | 7.5 | 49 | 40 | 6.6 | 2.01 |
| | May | - | 5 | - | - | 130 | 8.3 | 56 | 40 | 6.7 | 1.03 |
| | June | - | <2 | - | - | 59 | 7.7 | 16 | 9 | 8 | 1.08 |
| | July | - | 5 | - | - | 47 | 7.7 | 26 | 28 | 6.5 | 0.6 |
| | Aug | - | 7 | - | - | 56 | 7.5 | 28 | 321 | 10.7 | 1.14 |
| | Sept | - | 18 | - | - | 67 | 7.2 | 32 | 4 | 17.3 | 2.55 |
| | Oct[2] | - | - | - | - | - | - | - | - | - | - |
| | Nov[2] | - | - | - | - | - | - | - | - | - | - |
| | Dec[2] | - | - | - | - | - | - | - | - | - | - |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LD3 | Jan | 1450 | <2 | 350 | 3.0 | 6 | 6.7 | - | - | - | - |
| | Feb | 1430 | <2 | 298 | 2.8 | 7 | 7.0 | - | - | - | - |
| | Mar | 1350 | <2 | 170 | 0.4 | 3 | 7.0 | - | - | - | - |
| | Apr | 1190 | <2 | 177 | 5.02 | 5 | 7.1 | - | - | - | - |
| | May | 1330 | <2 | 176 | 3.6 | 5 | 7.4 | - | - | - | - |
| | June | 1340 | <2 | 266 | 4.14 | 2 | 6.8 | - | - | - | - |
| | July | 1410 | <2 | 290 | 3.79 | 8 | 7.1 | - | - | - | - |
| | Aug | 1360 | <2 | 300 | 4.01 | 5 | 7.1 | - | - | - | - |
| | Sept | 1390 | <2 | 319 | 3.74 | 9 | 7.1 | - | - | - | - |
| | Oct | - | - | - | - | - | - | - | - | - | - |
| | Nov | 1440 | <2 | 331 | 3.27 | 9 | 6.8 | - | - | - | - |
| | Dec | 1470 | <5 | 332 | 2.58 | 8 | 6.8 | - | - | - | - |
| LD6 | Jan | 1280 | <2 | 271 | 0.37 | 2 | 6.7 | - | - | - | - |
| | Feb | 1310 | <2 | 239 | 0.2 | <2 | 7.4 | - | - | - | - |
| | Mar | 1440 | <2 | 354 | 0.16 | <2 | 7.6 | - | - | - | - |
| | Apr | 1610 | <2 | 537 | 0.14 | <2 | 7.4 | - | - | - | - |
| | May | 1700 | <2 | 446 | 0.17 | <2 | 7.9 | - | - | - | - |
| | June | 1660 | <2 | 430 | 0 .45 | <2 | 7.3 | - | - | - | - |
| | July | 1590 | <2 | 444 | 0.62 | 3 | 7.3 | - | - | - | - |
| | Aug | 1510 | <2 | 461 | 0.2 | <2 | 7.4 | - | - | - | - |
| | Sept | 1550 | <2 | 401 | 2 | 11 | 7.6 | - | - | - | - |
| | Oct | - | - | - | - | - | - | - | - | - | - |
| | Nov | 1460 | <2 | 395 | 0.31 | <2 | 7.5 | - | - | - | - |
| | Dec | 1610 | <5 | 403 | 0.25 | <5 | 7.2 | - | - | - | - |
| LDP 1 | Jan | 1160 | <2 | 408 | 0.26 | <2 | 7.8 | - | - | 8.6 | 0.02 |
| | Feb | 1180 | <2 | 393 | 0.17 | 2 | 7.9 | - | - | 0.1 | 0.09 |
| | Mar | 880 | <2 | 213 | 0.2 | 2 | 7.3 | - | - | 0.3 | <0.01 |
| | Apr | 1240 | <2 | 436 | 0.12 | <2 | 8.1 | - | - | 0.4 | <0.01 |
| | May | 1390 | <2 | 451 | 0.16 | 3 | 8.4 | - | - | 0.3 | <0.01 |
| | June | 1160 | <2 | 378 | 0.2 | 2 | 7.9 | - | - | 0.3 | <0.01 |
| | July | 1040 | <2 | 310 | 0.4 | < 2 | 7.7 | - | - | 0.3 | 0.14 |
| | Aug | 1110 | <2 | 355 | 0.34 | <2 | 8.1 | - | - | 0.2 | 0.04 |
| | Sept | 1150 | <2 | 348 | 0.31 | 3 | 7.8 | - | - | 0.1 | <0.01 |
| | Oct | 1080 | <2 | 373 | 0.54 | 2 | 7.9 | - | - | 0.2 | 0.01 |
| | Nov | 1100 | <2 | 388 | 0.54 | 5 | 8 | - | - | 0.2 | 0.02 |
| | Dec | 1190 | <5 | 399 | 0.11 | <5 | 8 | - | - | 0.3 | 0.17 |

1. No samples taken at WMP1 during 2012 as sample location was dry.
2. No sample taken in January, October, November or December as LD2 was dry.
3. No sample taken at LD3 and LD6 during October 2012 due to no access to sampling point.

## 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

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

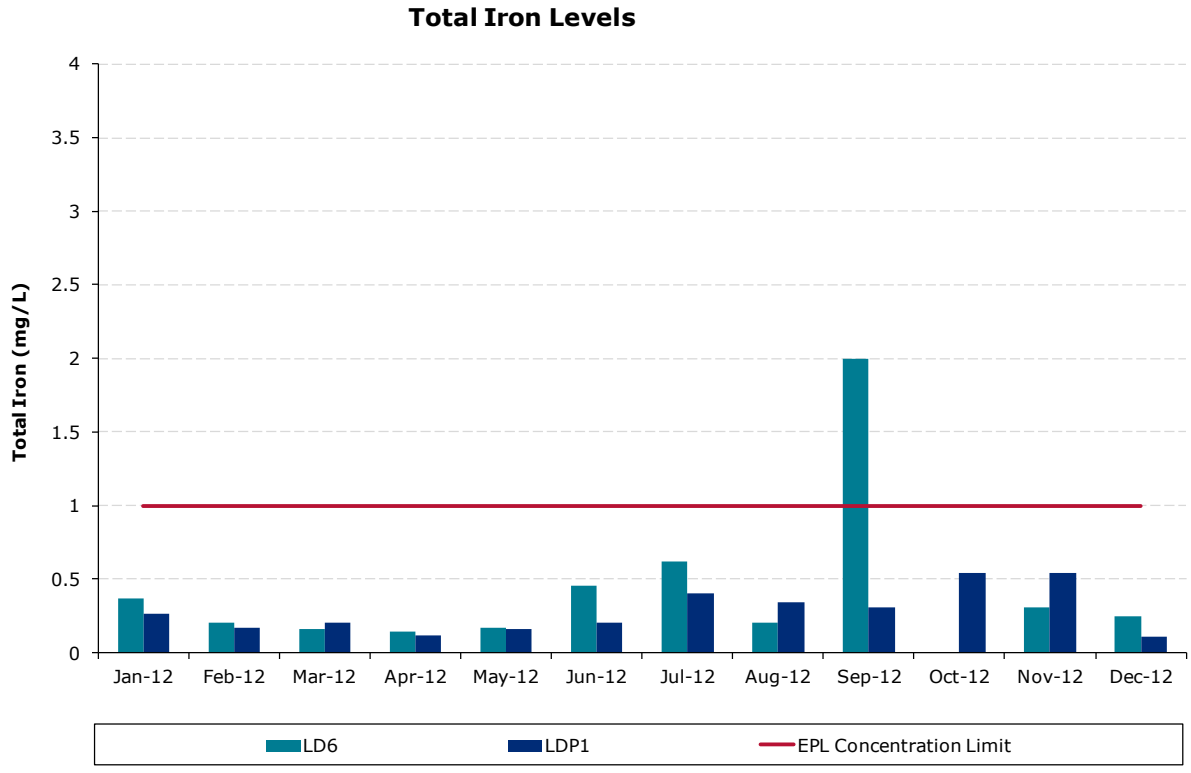



Figure 3.1: Total iron levels

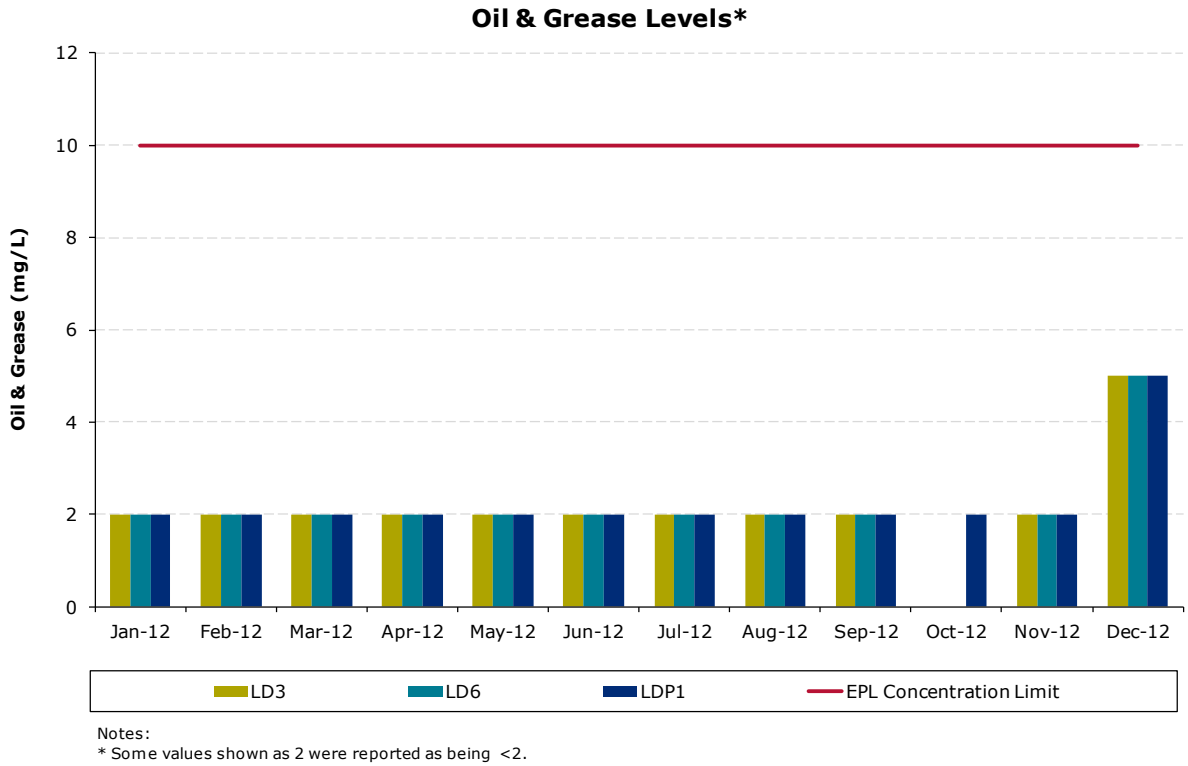



Figure 3.2: Oil and grease levels

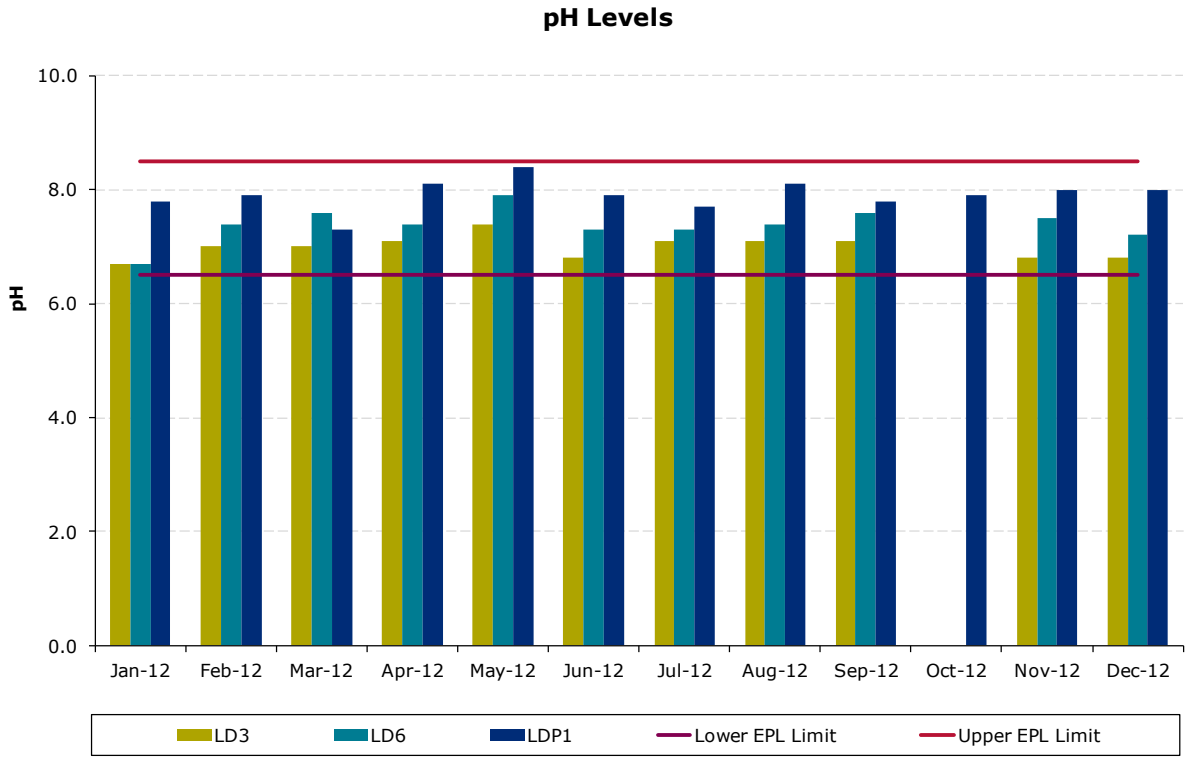



Figure 3.3: pH levels

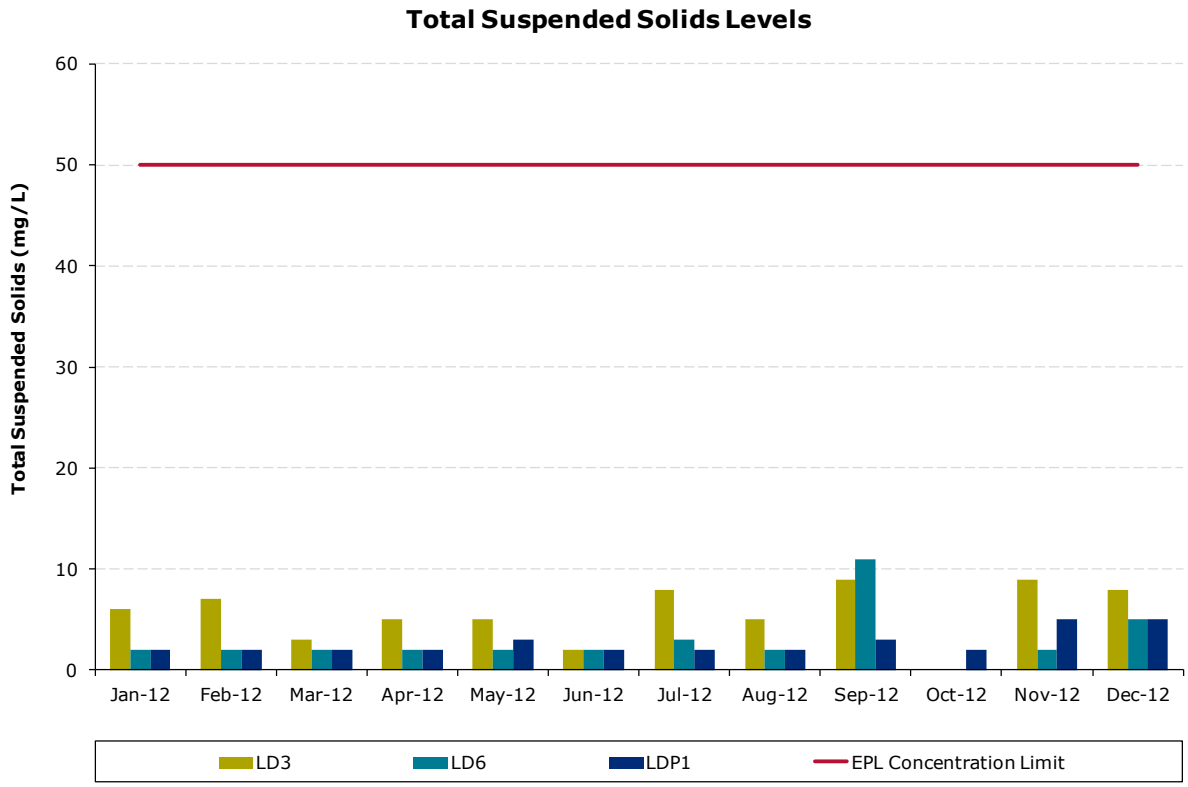



Figure 3.4: Total suspended solids levels

All samples recorded were within EPL concentration limits during the reporting period. Due to a site access issue, no samples were able to be collected from October 2012 at LD3 or LD6.

A summary of other monitoring results for EPL discharge and monitoring points (those with specified concentration limits) during the October to December 2012 period can be found below:

- The highest iron sample for the period was 0.54 mg/L (recorded at LDP1 in November 2012), well below the concentration limit of 1 mg/L.
- All samples for oil and grease at returned levels of 5 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).
- The highest TSS result for the period was 9 mg/L (recorded at LD3 in November 2012), well below the concentration limit of 50 mg/L.

# 4. GROUNDWATER

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

During the October to December 2012 period, discharges from LD6 did not exceed the daily limit, with an average daily discharge at LD6 of 3.2 ML per day, and a maximum daily discharge of 4.3 ML.

# 5. 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.

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), attended monitoring is undertaken on a quarterly basis at receptors R1 and R2/R3 (**refer to Drawing 3**).

## 5.1 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<br>dB(a) $L_{Aeq(15\ min)}$ | Night<br>dB(a) $L_{A1(1\ min)}$ |
|---|---|---|
| R1 | 46 | 47 |
| R2 | 41 | 48 |
| R3 | 41 | 48 |
| All other privately-owned land | 35 | 45 |

## 5.2 Noise Audit Results

During the reporting period an environmental compliance noise audit was conducted by Atkins Acoustics & Associates on Thursday 22 November between 4.30pm 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 (4.00pm to 6.00pm) - Thursday 22 November | | | | |
| Location R1 (1725 hours) | <30 | 46 | dBA | BBC vent fan (<30), highway traffic, breeze in trees, insects, birds. |

| | | | | |
|---|---|---|---|---|
| Location R1 (1740 hours) | <30 | 46 | dBA | BBC vent fan (<30), highway traffic, rooster, breeze in trees, insects, birds. |
| Location R2/3 (1645 hours) | <30 | 41 | dBA | Breeze in trees, insects, birds. |
| Location R2/3 (1700 hours) | <30 | 41 | dBA | Breeze in trees, insects, birds, plane, highway road traffic. |

| Location (Start time) | Measured Predicted Colliery Noise $L_{Aeq}$ | Limit | Unit | Comments |
|---|---|---|---|---|
| Evening Audit (6.00pm to 7.45pm) - Thursday 22 November 2012 | | | | |
| Location R1 (1800 hours) | <30 | 46 | dBA | Insects, BBC vent fan (<30), breeze in trees, insects, birds. |
| Location R1 (1815 hours) | <30 | 46 | dBA | Insects, BBC vent fan (<30), breeze in trees, insects , birds. |
| Location R2/3 (1838 hours) | <30 | 41 | dBA | Highway traffic, insects, BBC vent fan (<30), breeze in trees, insects, birds. |
| Location R2/3 (1852 hours) | <35 | 41 | dBA | Rooster, highway traffic, insects, BBC vent fan (<30), breeze in trees, insects, birds. |

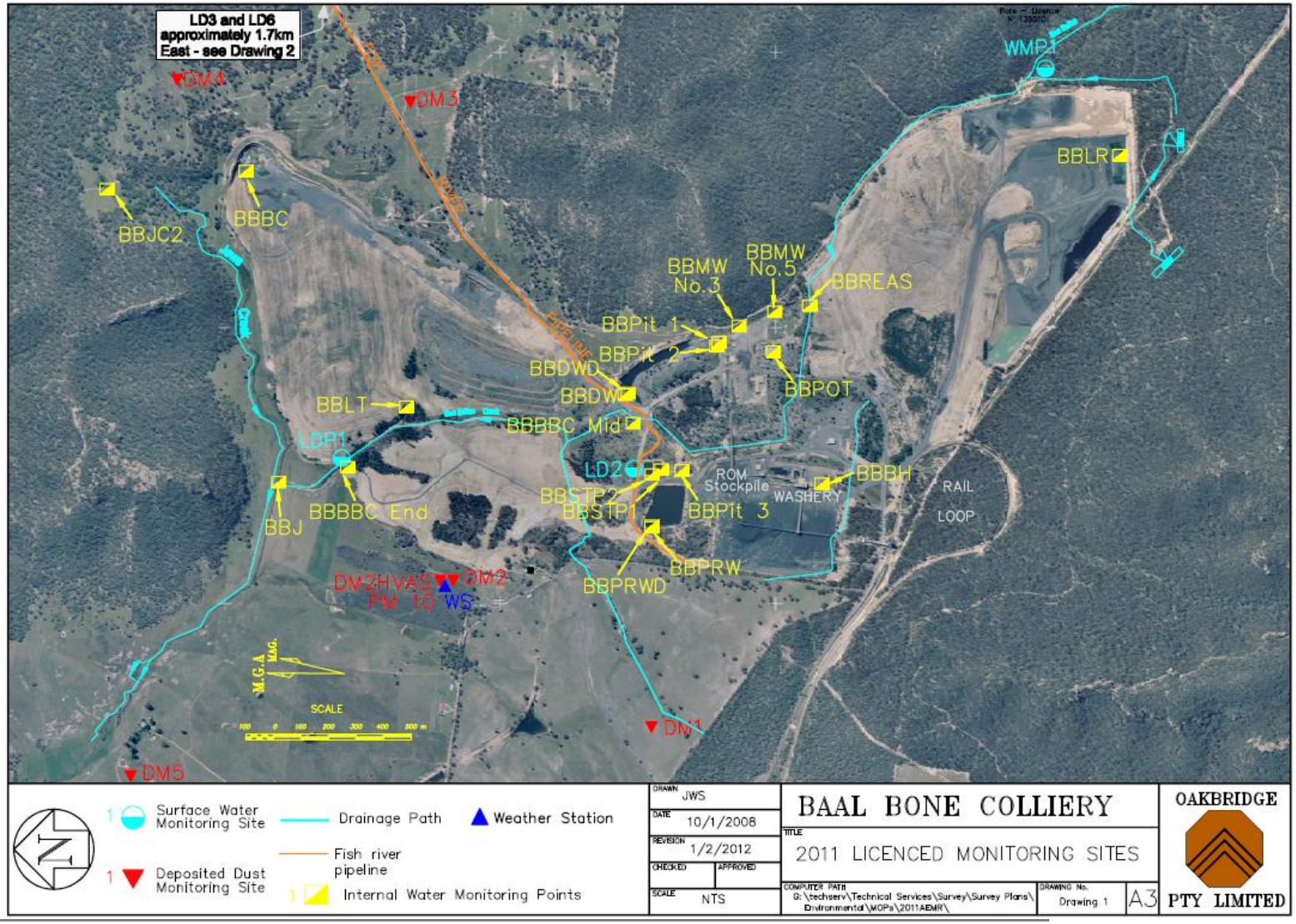
| Location (Start time) | Measured Predicted Colliery Noise | | Limit | | Unit | Comments |
|---|---|---|---|---|---|---|
| | $L_{Aeq}$ | $L_{Amax}$ | $L_{Aeq}$ | $L_{Amax}$ | | |
| Night Audit (10.00pm to midnight) – Thursday 22 November 2012 | | | | | | |
| Location R1 (2238 hours) | <30 | <30 | 46 | 47 | dBA | BBC ventilation fan <30dBA; Intermittent highway traffic; insects. |
| Location R1 (2245 hours) | <35 | <30 | 46 | 47 | dBA | BBC ventilation fan <30dBA; Intermittent highway traffic; insects. |
| Location R2/3 (2200 hours) | <30 | <30 | 41 | 48 | dBA | BBC ventilation fan <30dBA; Intermittent highway traffic; insects. |
| Location R2/3 (2215 hours) | <30 | <30 | 41 | 48 | dBA | BBC ventilation fan <30dBA; Intermittent highway traffic; insects. |

The audit report concluded that:

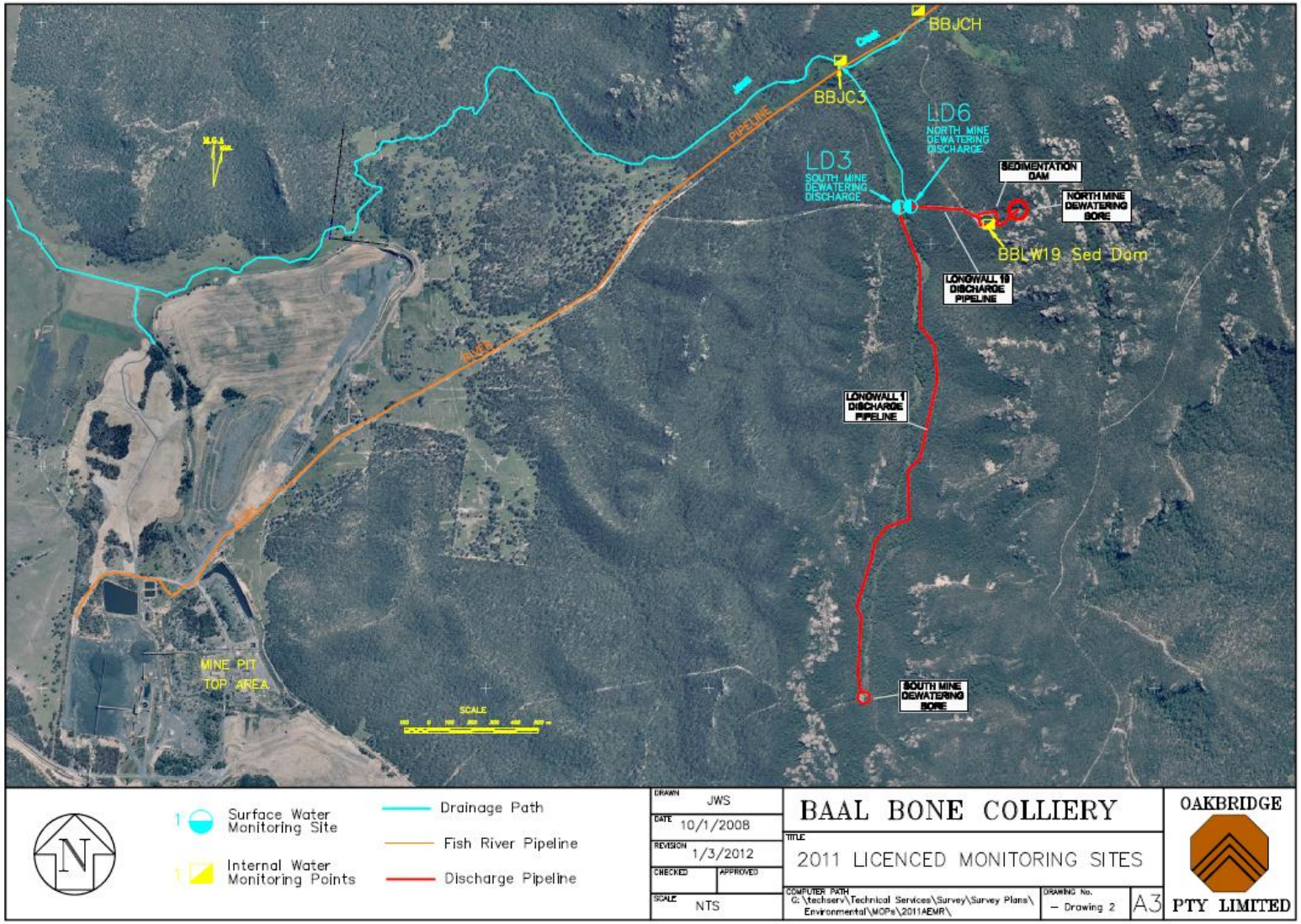
> "From the audit measurements and assessment the LAeq, 15 min noise contributions from Baal Bone Colliery during the day, evening and night assessment periods satisfied the long-term licence noise limits.
>
> Baal Bone Colliery related $LA_{max}$ noise levels were not observed to cause exceedances of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

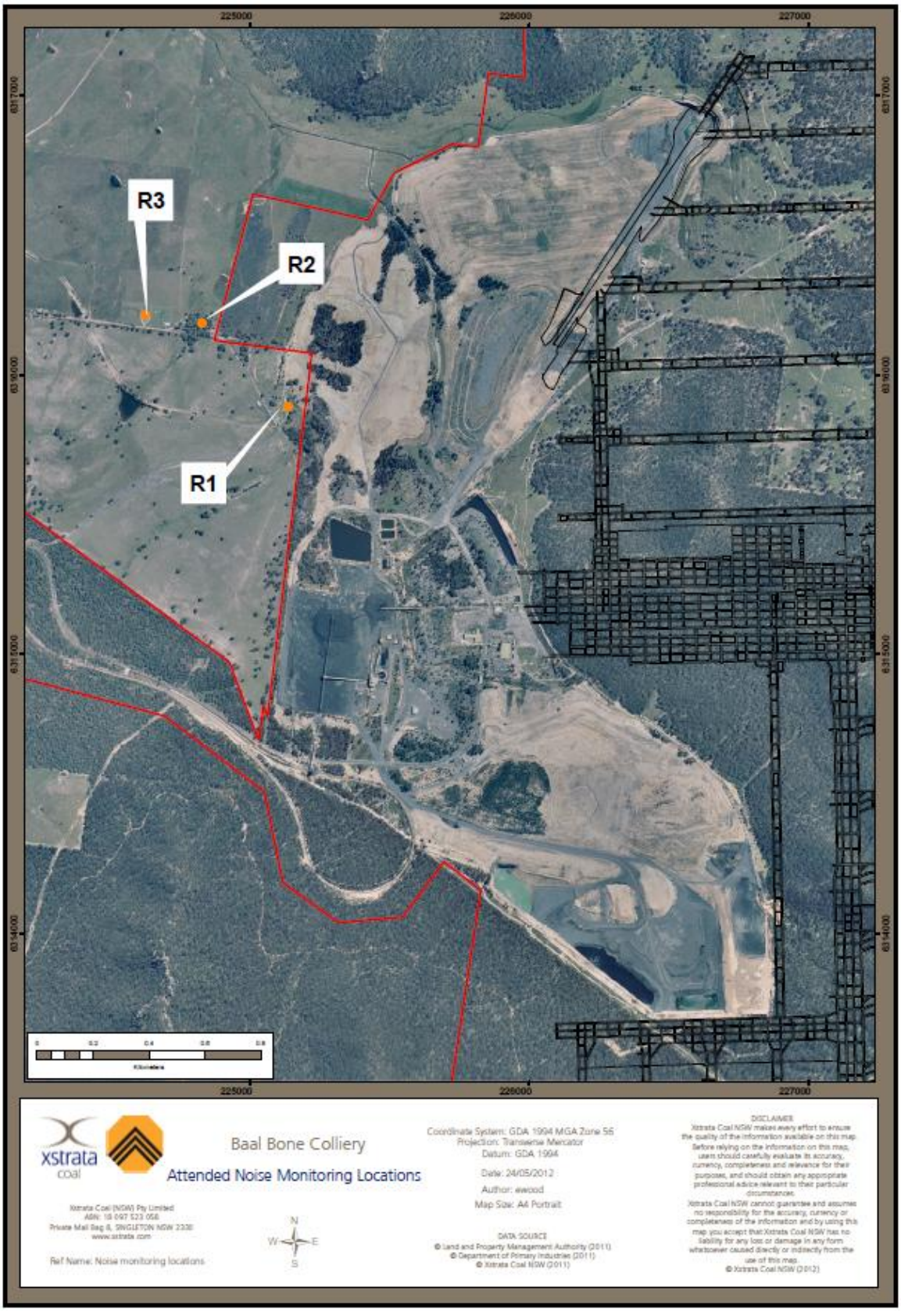
**Drawing 1**


LD3 and LD6 approximately 1.7km East - see Drawing 2
DM4
DM3
WMP1
BBLR
BBJC2
BBBC
BBMW No.3
BBMW No.5
BBREAS
BBPit 1
BBPit 2
BBDWD
BBDW
BBPOT
BBLT
BBBBC Mid
LDP1
LD2
ROM Stockpile
WASHERY
BBBH
RAIL LOOP
BBSTP2
BBSTP1
BBPit 3
BBBBC End
BBJ
BBPRW
BBPRWD
DM2HVAS PM 10
DM2
WS
DM1
DM5
SCALE
Surface Water Monitoring Site
Deposited Dust Monitoring Site
Drainage Path
Fish river pipeline
Internal Water Monitoring Points
Weather Station
DRAWN JWS
DATE 10/1/2008
REVISION 1/2/2012
CHECKED
APPROVED
SCALE NTS
BAAL BONE COLLIERY
TITLE
2011 LICENCED MONITORING SITES
COMPUTER PATH G:\techserv\Technical Services\Survey\Survey Plans\Environmental\MOPs\2011AEMR\
DRAWING No. Drawing 1
A3
OAKBRIDGE PTY LIMITED

**Drawing 2**


BBJCH
BBJC3
LD6
NORTH MINE DEWATERING DISCHARGE
LD3
SOUTH MINE DEWATERING DISCHARGE
PIPELINE
SEDIMENTATION DAM
NORTH MINE DEWATERING BORE
BBLW19 Sed Dam
LONGWALL 19 DISCHARGE PIPELINE
LONGWALL 1 DISCHARGE PIPELINE
SOUTH MINE DEWATERING BORE
MINE PIT TOP AREA
SCALE
Surface Water Monitoring Site
Internal Water Monitoring Points
Drainage Path
Fish River Pipeline
Discharge Pipeline
DRAWN JWS
DATE 10/1/2008
REVISION 1/3/2012
CHECKED
APPROVED
SCALE NTS
BAAL BONE COLLIERY
TITLE
2011 LICENCED MONITORING SITES
COMPUTER PATH G:\techserv\Technical Services\Survey\Survey Plans\Environmental\MOPs\2011AEMR\
DRAWING No. – Drawing 2
A3
OAKBRIDGE
PTY LIMITED

**Drawing 3**


R3
R2
R1
225000
226000
227000
6317000
6316000
6315000
6314000
Baal Bone Colliery
Attended Noise Monitoring Locations
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
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Ref Name: Noise monitoring locations
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