BAAL BONE
UNDERGROUND

GLENCORE

Annual Review 2016

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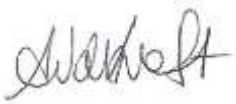
Name of Operation	Baal Bone Colliery
Name of Operator	Baal Bone Colliery
Project Approval Number	09_0178
Name of Holder of Project Approval	The Wallerawang Collieries Ltd
Mining Lease Number/s	CCL749, MPL261, CL391, ML1302, ML1382, ML1607
Name of Holder of Mining Lease/s	The Wallerawang Collieries Ltd
Water Licence Number/s	10BL601816, 10BL601817, 10BL601877, 10BL601970, 80BL236132, 80BL236134, WAL27887, WAL34952.
Name of Holder of Water Licence/s	The Wallerawang Collieries Ltd
MOP Start Date	29th February 2016
MOP End Date	31st December 2019
Annual Review Start Date	1st January 2016
Annual Review End Date	31st December 2016

I, Angela van der Kroft, certify that this audit report is a true and accurate record of the compliance status of Baal Bone Colliery for the period 1st January 2016 to 31st December 2016 and that I am authorised to make this statement on behalf of Baal Bone Colliery.

Note.

a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).

Name of Authorised Reporting Officer	Angela van der Kroft
Title of Authorised Reporting Officer	Environmental Coordinator
Signature of Authorised Reporting Officer	
Date	17 May 2017

Abbreviations:

ACMA – Australian Communications and Media Authority
BOD –Biochemical Oxygen Demand
CCL – Consolidated Coal Lease
CL – Coal Lease
CMRA – Coal Mines Regulation Act 1982
DP&E – Department of Planning & Environment
DPI – Department of Primary Industry
DRE -Department of Industry, Division of Resources & Energy
EC – Electrical Conductivity
EPA – Environmental Protection Authority
EPL – Environment Protection Licence
MBAS – Metheleyne Blue Active Substances
ML – Mining Lease
MOP – Mining Operations Plan
MPL – Mining Purposes Lease
OEH – Office of Environment and Heritage
REA - Refuse Emplacement Area
TPH – Total Petroleum Hydrocarbons
TRH – Total Recoverable Hydrocarbons
TSS – Total Suspended Solids

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Table of Contents

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1 Introduction

1.1 Overview

An Annual Review is prepared annually by Baal Bone Colliery (Baal Bone), to fulfil the reporting requirements of various regulatory departments. Baal Bone is operated by The Wallerawang Collieries Ltd (TWCL). The reporting period for this Annual Review is 1 January 2016 to 31 December 2016.

On 14 January 2011, Baal Bone received Project Approval (PA 09_0178) for the continuation of mining activities at Baal Bone via Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project Approval granted approval for the continuation of mining operations at Baal Bone until 14 December 2014, and included:

- continuation of underground mining of Longwalls (LW) 29-31 in accordance with the approved Subsidence Management Plan (SMP) and Mining Operations Plan (MOP);
- continued operation of associated surface infrastructure;
- saleable coal production of 2.0 Mtpa (equating to 2.8 Mtpa run of mine (ROM) coal);
- continued transport of prepared saleable coal to markets by rail, and up to 900,000 tonnes per annum (tpa) by road; and
- mining of other isolated Remnant Areas within existing workings.

Underground mining at Baal Bone ceased on 3 September 2011, with the site entering into care and maintenance.

During 2012 and 2013 Baal Bone Colliery was utilised as a training facility for Glencore Xstrata employees. Underground workers completed a twelve week training course including classroom tutorials, and equipment familiarisation. The objective of the training program was to provide employees with experience and skills in an underground mining environment. Until the current down turn in the industry, Baal Bone had trained over 270 new industry entrants from Glencore's Ulan West Mine and Blakefield South Mine.

The management and administration of Glencore's NSW generic induction program has been carried out from the Baal Bone site since June 2013. In February 2014 Baal Bone also took over the management and administration of the QLD generic induction program.

In February 2015, DP&E approved amendment to the Project Approval to extend the life of mine for an additional three years until 31 December 2019 to allow the Remnant Areas to be mined. Mining methods would remain the same as that currently approved, namely, through use of continuous miner using bord and pillar/partial extraction mining methods. In December 2015, DP&E approved a second modification to the Project Approval to allow Ben Bullen Creek to remain in its current alignment.

Glencore is continuing to conduct feasibility studies for potential future uses of the mine.

1.2 Scope of this Annual Review

The layout of this Annual Review has been aligned to the DP&E's *Post- approval requirement for state significane mining developments - Annual Review Guideline (October 2015)*.

This Annual Review has also been prepared to address the requirements of Schedule 5, Condition 3 of Baal Bone's Project Approval (PA 09_0178). Schedule 5, Condition 3 of the project approval requires a report to be submitted to DP&E reviewing the annual environmental

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performance of the project. The requirements of Schedule 5, Condition 3 of the Project Approval and where these are addressed in the Annual Review are listed in **Table 1.1**. References to the environmental assessment (EA) in **Table 1.1** and throughout this report refer to the document titled *Baal Bone Colliery Environmental Assessment* dated March 2010 (AECOM, 2010).

This document is also intended to fulfil the requirements of Condition 4 of both CL 391 and ML 1302. These conditions require the submission of an annual Compliance Report. The requirements of Condition 4 of CL 391 and ML 1302 and where these are addressed in the Annual Review are listed in **Table 1.2**.

Table 1.1: Requirements of Schedule 5, Condition 3 of Project Approval 09_0178

Schedule 5, Condition 3 requirement	Annual Review Section
a) describe the works that were carried out in the previous calendar year, and the works that are proposed to be carried out over the current calendar year.	Section 4 and Section 12
b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against: • the relevant statutory requirements, limits or performance measures/criteria; • the monitoring results of previous years; and • the relevant predictions in the EA.	Sections 6, 7 and 8
c) identify any non-compliance over the previous calendar year, and describe what actions were (or are being) taken to ensure compliance;	Sections 2 and 11
d) identify any trends in the monitoring data over the life of the project;	Sections 6, 7 and 8
e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and	Sections 6, 7 and 8
f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the project.	Section 12

Table 1.2: Requirements of Condition 4 of CL 391 and ML 1302

CL 391 and ML 1302, Condition 4 requirement	Annual Review Section
(i) the extent to which the conditions of this mining lease or any provisions of the Act or the regulations applicable to activities under this mining lease, have or have not been complied with.	Section 2
(ii) particulars of any non-compliance with any such conditions or provisions.	Section 10
(iii) the reasons for any such non-compliance;	Section 10
(iv) any action taken, or to be taken, to prevent any recurrence, or to mitigate the effects, of that non-compliance.	Section 10

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The Annual Review will be submitted to the following authorities:

- Department of Industry, Skills and Regional Development, Division of Resources & Energy (DRE);
- NSW Department of Planning and Environment (DP&E)
- Forestry Corporation of NSW (FCNSW);
- Lithgow City Council (LCC);
- Department of Primary Industries (DPI) Water;
- Environment Protection Authority (EPA); and
- Sydney Catchment Authority (SCA).

The reporting period for this Annual Review is 1 January 2016 to 31 December 2016.

It should be noted that this Annual Review does not necessarily provide a comprehensive description of each individual operation or environmental control that is currently employed at Baal Bone; this level of detail is available in the MOP. Rather, this Annual Review focuses on providing a succinct review of the significant operational and environmental activities undertaken throughout the year. It also examines the performance of key site operations and environmental controls throughout the 2016 reporting period.

Included is a summary of monitoring data (as applicable), a discussion regarding the level of compliance achieved, together with an overview of initiatives proposed and actions planned for the 2017 reporting period.

1.3 Mine Contacts

Baal Bone Colliery can be contacted via telephone on (02) 6350 6900 and fax (02) 6359 0530. The postal and street addresses are as follows:

Postal: Baal Bone Colliery
PO Box 13
Lithgow NSW 2790

Street: Baal Bone Colliery
Off Castlereagh Highway
Cullen Bullen NSW 2790

Personnel responsible for environmental management at Baal Bone Colliery are shown below:

Table 1.2: Mine Personnel Contact Details

Contact Person	Position	Contact Details
Mark Bulkeley	Operations Manager	Ph: (02) 6350 6943 Email: Mark.Bulkeley@Glencore.com.au Fax: (02) 6359 0530
Gary Linford	Technical Services Manager	Ph: (02) 6350 6945 Email: Gary.Linford@Glencore.com.au Fax: (02) 6359 0530
Angela van der Kroft	Environmental Coordinator	Ph: (02) 6350 6920 Email: Angela.vanderKroft@Glencore.com.au Fax: (02) 6359 0530

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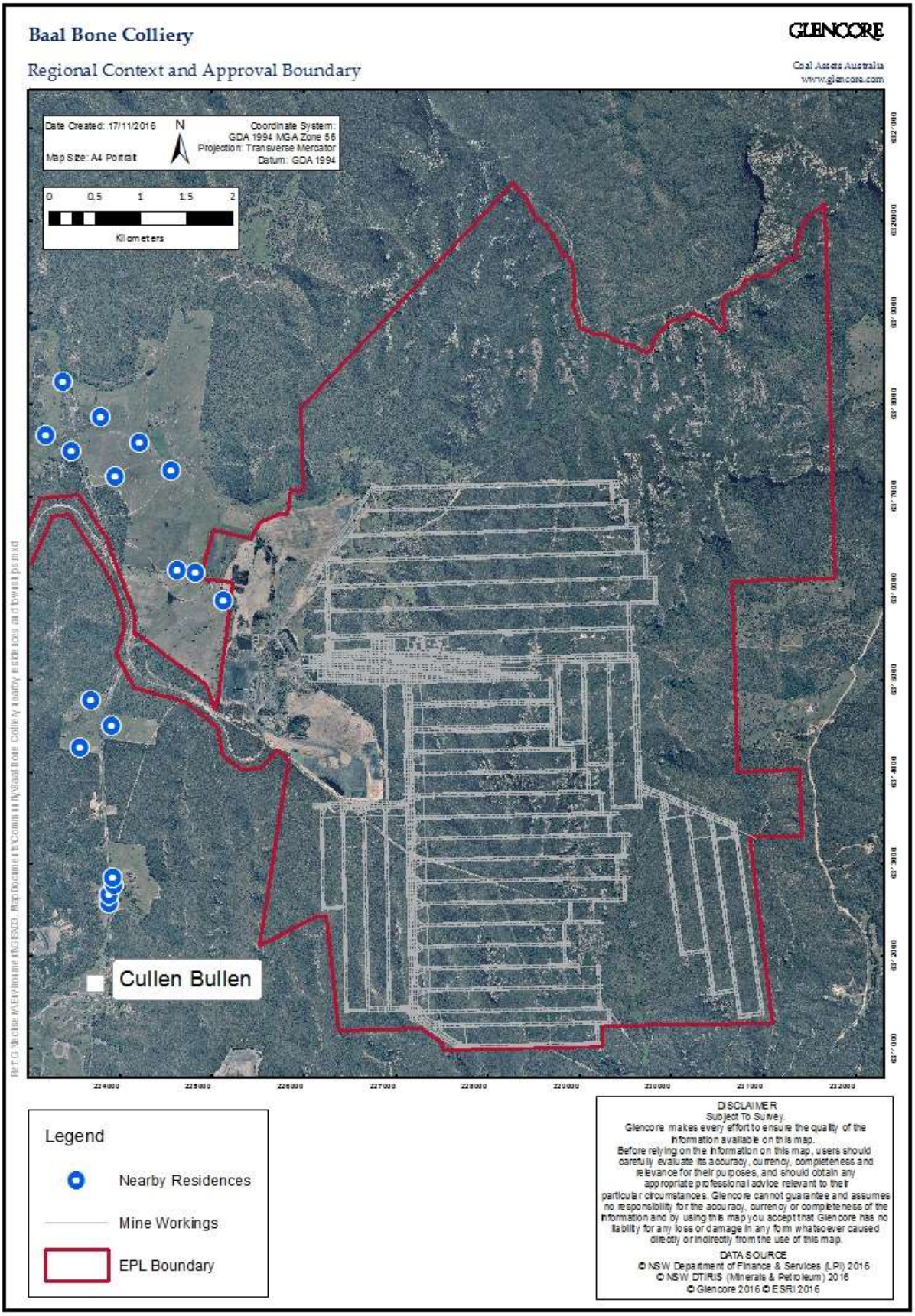

Figure 1.1: Locality plan showing approval boundary.

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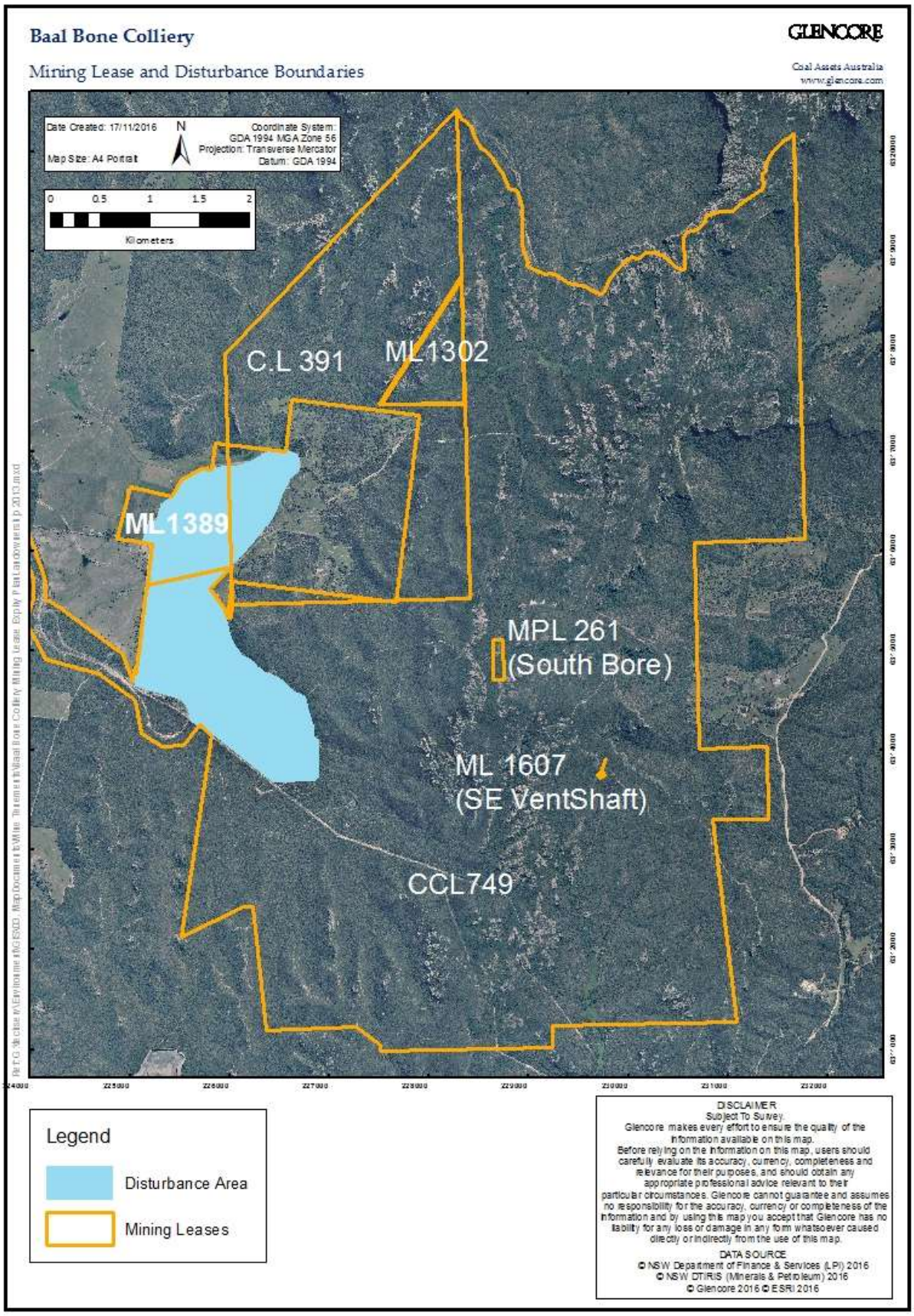

Figure 1.2: Mining lease boundaries and disturbance area.

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2 Approvals and Compliance Statement

A list of all current consents, leases, licences and approvals are included below in Table 2.1 along with their compliance status for the 2016 calendar year.

Table 2.1: Consents, Leases, Licences and Approvals.

Type	Regulatory Authority	Approval Number	Holder	Issue Date	Expiry/ Review Date	Scope	Were all Approval Conditions Complied With?
Project Approval	DP&E	09_0178	The Wallerawang Collieries Ltd	01/12/15 Mod 2 Dec 2015	31/12/2019 (Mining operations)	s75W modification to maintain alignment of Ben Bullen Creek.	No
	DP&E	09_0178	The Wallerawang Collieries Ltd	14/01/2011 Mod 1 Feb 2015	31/12/2019 (Mining operations)	Part 3A Project Approval for continued operations at Baal Bone Colliery until 31 December 2019.	
	DP&E	07_0035	The Wallerawang Collieries Ltd	24/10/2007	Perpetuity	Part 3A Project Approval for the Ventilation Shaft and Power Line Project.	Yes
Environment Protection Licence	EPA	765	Wallerawang Collieries Pty Ltd	1/08/2013	1/8/2018	Premises and Scheduled Activity (Coal Mining/ Washery) Licence	Yes
Mining Operations Plan	DRE	09/2520	Wallerawang Collieries Pty Ltd	29/02/2016	31/12/2019	MOP for Baal Bone Colliery Suspension of Mining Operations.	Yes

Type	Regulatory Authority	Approval Number	Holder	Issue Date	Expiry/ Review Date	Scope	Were all Approval Conditions Complied With?
Mining Leases	DRE	CCL 749[1]	Wallerawang Collieries Pty Ltd	05/04/1990	11/3/2030	Mining Entitlement (Consolidates CL 209, CL 246, CL 329, CL 330, CL331 and CL332) Various depths	Yes
	DRE	Consolidated Coal Lease (CCL) 770 (Part)	The Wallerawang Collieries Ltd	10/03/1992	11/12/2024	Mining Entitlement (Consolidates ML424, ML536, ML570, ML571, ML572, ML581, ML640, ML1033, ML1125, PLL120, PLL132, PLL149, PLL144, PLL145, PLL203, CL124, CL338, CL593, CL606, MPL468, MPL72, PLL1951, PLL1952, PPL1953 and PLL1954) Various depths	Yes
	DRE	MPL 261 (Act 1973)	Wallerawang Collieries Pty Ltd	22/08/1990	22/08/2032	Mining Entitlement (Southern mine dewatering bores)	No

[1] In October 2015, Baal Bone Colliery lodges an Application for Suspension of Mining Operations & Conditions (Labour & Expenditure) for CCL 749, CL 391, ML 1302, ML1389 with DRE. No response to this application has been receivied.

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Type	Regulatory Authority	Approval Number	Holder	Issue Date	Expiry/ Review Date	Scope	Were all Approval Conditions Complied With?
						Parish: Ben Bullen, Depth: Surface - 10m	
	DRE	CL 391[1] (Act 1973)	Wallerawang Collieries Pty Ltd	24/02/1992	11/03/2030	Mining Entitlement Parish: Ben Bullen Depth: > 20m	No
	DRE	ML 1302[1] (Act 1992)	Wallerawang Collieries Pty Ltd	29/09/1992	11/03/2030	Mining Entitlement Parish: Ben Bullen Depth: >20m	No
	DRE	ML 1389[1] (Act 1992)	Wallerawang Collieries Pty Ltd	09/05/1996	08/05/2017	Mining Entitlement Parish: Ben Bullen Depth: Surface – unlimited Surface - 20m	Yes
	DRE	ML1607	Wallerawang Collieries Pty Ltd	08/01/2008	08/01/2018	Mining Lease (Purposes) Parish: Cox Depth: Surface – 10m	No
S126(1) Approval	DRE	3175243060 01	Baal Bone Colliery	14/11/2005	Perpetuity	Section 126(1) of the CMRA (1982) for the construction and operation REA 5	Yes
S100(1) Approval	DRE	3175512910 01	Baal Bone Colliery	12/02/2008	Perpetuity	Section 100(1) of the CMH&SA (2002) for the construction and operation of REA 6	Yes

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Type	Regulatory Authority	Approval Number	Holder	Issue Date	Expiry/ Review Date	Scope	Were all Approval Conditions Complied With?
Occupation Permit	Forestry Corporation of NSW	14719	Baal Bone Colliery	05/03/1991	Perpetuity	Occupation permit relevant to the power line route from the company's freehold land to Mining Purposes Lease (MPL) 261 (LW 1 mine dewatering bore); includes various subsequent extensions (LW 19 dewatering bore).	Yes
		14161	Baal Bone Colliery	08/03/1991	Perpetuity	Occupation Permit for the powerline that supplies power to the railway loop -western edge of Ben Bullen SF.	Yes
Water Access Licence	DPI Water	WAL27887[2]	Wallerawang Collieries Pty Ltd	17/7/2007	17/7/2017	Water Access Licence (under water management Act 2000) replaces bore licences: 80BL135509 (near rail loop) and 80BL136703 (near UC1)	

[2] Extraction of water allocated to Wallerawang Collieries Limited by WAL27887 will be undertaken by Ulan Coal Mines Limited until 18 May 2018, facilitated under the DPI Water '*Application to change water access licence*' process. As such, all conditions of this licence are the responsibility Ulan Coal Mines Linited.

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Type	Regulatory Authority	Approval Number	Holder	Issue Date	Expiry/ Review Date	Scope	Were all Approval Conditions Complied With?
	DPI Water	WAL34952	Wallerawang Collieries Pty Ltd	24/06/2013	TBA[3]	Water Access Licence (under water management Act 2000) replaces bore licence 80AL716835	Yes
Bore Licences	DPI Water	80BL236132	Wallerawang Collieries Pty Ltd	18/01/1995	Perpetuity	Section 115 of the Water Act 1912. Bore – Mine dewatering LW 1 (South Bore 1).	Yes
	DPI Water	80BL236134	Wallerawang Collieries Pty Ltd	18/01/1995	Perpetuity	Section 115 of the Water Act 1912. Bore – Mine dewatering LW 1 (South Bore 2).	Yes
	DPI Water	80BL239077	Wallerawang Collieries Pty Ltd	19/06/2006	18/06/2016 [4]	Section 115 of the Water Act 1912. Bore – Mine dewatering LW 19 (North Bore).	Yes
	DPI Water	10BL601877	Wallerawang Collieries Pty Ltd	08/06/2007	Perpetuity	BBN175; LW29-31 groundwater monitoring piezometer	Yes
	DPI Water	10BL601816	Wallerawang Collieries Pty Ltd	08/06/2007	Perpetuity	BBN176; LW29-31 groundwater monitoring piezometer	Yes

[3] Awaiting DPI Water to issue the licence under the *Water Management Act 2000* following conversion from the *Water Act 1912* licence.

[4] DPI Water confirms water can continue to be pumped as originally authorised by 80BL239077. It is recognised this licence has expired, however this is an administrative issue being addressed by DPI Water as per e-mail correspondence dated 20/06/2016.

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Type	Regulatory Authority	Approval Number	Holder	Issue Date	Expiry/ Review Date	Scope	Were all Approval Conditions Complied With?
	DPI Water	10BL601817	Wallerawang Collieries Pty Ltd	08/06/2007	Perpetuity	BBN177; LW29-31 groundwater monitoring piezometer	Yes
	DPI Water	10BL601970	Wallerawang Collieries Pty Ltd	05/09/2007	Perpetuity	BBN 179; LW29-31 groundwater monitoring piezometer	Yes
Water Licences	DPI Water	80SL046064	Wallerawang Collieries Pty Ltd	17/07/2007	17/07/2017	Section 12 of the Water Act 1912. Diversion works, 2 pumps, overshot and block dams, bywash dam.	Yes
Acknowled-gement of Notification of Dangerous Goods on Premises	Work Cover Authority of NSW	NDG023231	Wallerawang Collieries Pty Ltd	13/02/2015	Reviewed Annually	Dangerous Goods Licence.	Yes
		XSTR 100123	The Wallerawang Collieries Ltd		19/06/2017	Dangerous Goods Licence	Yes
Radiation Gauge	EPA	29207	Wallerawang Collieries Pty Ltd	27/7/2013	16/01/2017	To sell and possess – Radiation Control Act 1990. Coal quality sensing device	Yes
Apparatus Licence	ACMA	95441	Wallerawang Collieries Pty Ltd	27/7/2013	26/07/2017	Land Mobile (Two way Radio)- Radio Communicatio ns Act 1992	Yes

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2.2 Amendments During the Reporting Period

There were no modifications to PA 09_0178 during the reporting period.

During 2016, mining lease renewals was sought for ML 1389, which expires on the 9th May 2017 and ML 1607, which expires on the 8th January 2018. These renewals were approved with both Leases now expiring on the 11 March 2013.

As the existing Mining Operations Plan (MOP) was due to expire on the 29th February 2016, an updated MOP was submitted to DRE on the 1st February 2016. This document was approved on the 9th May 2016 and will be completed on the 31st December 2019.

3 Operations Summary

3.1 Exploration

There was no exploration activity conducted during the reporting period.

3.2 Land Preparation

No land clearing, vegetation removal or soil removing activities were undertaken during the reporting period.

3.3 Construction

No construction activities were undertaken during the reporting period. The existing administration, amenities, workshops and coal handling infrastructure associated with the Baal Bone Colliery remained unchanged. Surface facilities and infrastructure are shown in appendices as Plan 1.

3.4 Mining

There was no underground mining extraction or transportation of coal product at Baal Bone during the reporting period.

Underground mining operations at Baal Bone ceased in September 2011 and entered care and maintenance. Coal washing operations were completed in December 2011. Transportation of coal product ceased in April 2012.

Following the completion of mining of Longwall 31 on 3 September 2011, underground mining operations were suspended. A notice of the suspension of operations was provided to DTI on 31 August 2011. Approval from the Department for the suspension of mining operation and labour/expenditure conditions of CCL 749, CL 391, ML 1302 and ML 1389 was received on 27 September 2012 for a period of three years. On 28 September 2015, Baal Bone Colliery lodged a request for a four year extension to the suspension to align with the MOP period.

The equipment fleet utilised for care and maintenance during 2016 is outlined below.

Table 3.1: Equipment Fleet

Equipment Type	Number of Units
Toyota Landcruiser Utility/ Troop Carrier	3
Manitou Forklift	1
Bobcat Skid Steer Loader	1
130 Eimco	2
Domino Road Grader	1
PJB Man transports	2

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3.5 Mineral Processing

3.5.1 Production, Processing and Waste Summary

Underground mining ceased in September 2011 and coal washing activities were completed in December 2011. When operational, Baal Bone produced three grades of washed coal, principally for the export market; these being 9%, 14% and 18% ash coal.

3.5.2 Product Destination and Transportation

The transport of saleable product coal off-site via rail was completed on 25 April 2012.

The Project Approval permits transport of up to 900,000 tonnes per annum (tpa) of saleable coal by public road to the Mount Piper and Wallerawang Power Stations. No product coal was transported by road during the reporting period.

3.5.3 Ore and Product Stockpiles

The maximum working capacity of the Baal Bone coal stockpiles (both ROM and product) is approximately 1,000,000 tonnes. During the reporting period there was no stockpiled ROM coal.

3.5.4 Mineral Waste Management

Processing and washing of coal was completed in December 2011. As such, no mineral waste was produced during the reporting period.

3.5.5 CHPP Waste and Reject Emplacement

Historical CHPP waste comprised a mixture of high ash coal and non-coal materials, such as sedimentary rock and clay. These materials occur both within the coal seam and as floor or roof materials extracted during the mining operation. They are rejected during the beneficiation process on a specific gravity basis. CHPP waste is managed through disposal in an on-site reject emplacement area (REA).

Former REAs historically used at Baal Bone have been fully rehabilitated and capped, with the exception of REA 6 (refer **PLAN 1**). It is intended to retain and maintain REA 6 until a decision regarding the future activity at Baal Bone has been determined. As such REA 6 has been bunded for safety and security. REA 6 has 3 Mt of coarse reject capacity remaining and 300 m^3 within cell 2 of fine reject capacity remaining.

3.5.6 Reject Material

Coarse reject at Baal Bone has a particle size ranging from 100 millimetres (mm) to 100 micron (µm) with fine reject being less than 100 µm. Analysis of the coarse reject material has previously confirmed that it is generally non-saline with a near neutral pH and negligible acid producing capacity. It has been shown to exhibit poor physical characteristics with a coarse texture and low water holding capacity. Even though it is chemically benign, this material is not suitable for use as a growth medium. All reshaped areas are therefore covered with a minimum of 300 mm of soil (freedig) material to provide a layer in which a sustainable and protective vegetative cover is established.

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3.6 Water Management

3.6.1 Process Water Circuit

The process water system at Baal Bone Colliery consists of water that has had the potential to be in contact with coal or carbonaceous material and therefore has the potential to be saline. Mine water is captured on site and stored in water storages within the mine water management system before being discharged off-site. The system also allows for the reuse and recycling of water throughout the operation.

The 2015 process water system consists of:

- groundwater inflows and outflows;
- rainfall/runoff into mine pit;
- runoff from unsealed roads; and
- dirty water runoff from CHPP, pit top facilities, stockpiles and rail load out facilities.
-

A network of water transfer pipelines is used to transfer water across the Baal Bone Colliery site.

As at 31 December 2016, approximately 68.5 ML of water was held within the process water circuit, see Table 3.2.

Table 3.2: Stored Water at Baal Bone Colliery – simulated using Goldsim model

	Volume Held			
Location	**Start of Reporting Period**	**End of Reporting Period**	**Volume lost/gained**	**Maximum Storage Capacity**
Dirty Water Dam	10 ML	10 ML	Remained even	37 ML
Process Water Dam	55 ML	55 ML	Remained even	55 ML
Box Cut Sump	3.5 ML	3.5 ML	Remained even	6.9 ML
Controlled Discharge Water (Salinity Trading Schemes)	Nil	Nil	Nil	Nil
Contaminated Water	Nil	Nil	Nil	Nil

Water from both the north and south boreholes is piped back to the pit top's 'Dirty Water' management system. After discharge through an iron aeration system and retention in Lake Tegan, water overflows into Ben Bullen Creek and then leaves site through LDP1 at the overshot dam. An overview of the current water management and monitoring system can be seen in Plan 1 and Drawing 1 and locations of the north and south de-watering bores in Drawing 2 (supplied as appendices to this report).

3.6.2 Potable Water

Potable water is purchased from State Water and is supplied through a connection into the Fish River Water Supply Pipeline. This connection services the administration centres and bathhouses. Drinking water is also taken underground in containers.

Potable water usage for the 2016 reporting period was 2.4 ML, a decrease of 17% compared to the 2.9 ML of potable water usage in 2015.

3.6.3 Sewage Treatment and Disposal

Sewage and grey water effluent from site facilities, including the administration building, bathhouse, CHPP and amenities are collected in a sump and directed through macerator pumps to an on-site sewage treatment plant (STP). The waste is treated by an activated sludge treatment process then is discharged into two maturation ponds, with a total residence time of approximately 20 days.

Following treatment and maturation the overflow from the second pond discharges onto a well vegetated transpiration bed; this is an EPL discharge location (LDP2) and monitoring point. The location of the STP and maturation ponds is shown on **Plan 1**.

With the completion of mining at Baal Bone and the reduced number of employees on site, the discharge of LDP2 has been greatly reduced, with no discharge recorded during monthly monitoring in 2016.

3.6.4 Water Balance

The net water discharge from site has historically been in the order of 1,500 ML/year (AECOM, 2010). The majority of this water is intercepted within the underground mine workings and goaf, which is then discharged through the north and south boreholes.

During mining operations all runoff from the pit top area, stockpile area and CHPP area was used within the mine as process water as required (AECOM, 2010). Process water was supplemented with water from mine Adit No. 5 and surface runoff and seepage collected from the Boxcut Sump as required (AECOM, 2010).

Approximately 50% of leachate from the Tailings Dam was returned to the process system (AECOM, 2010). Recycled process water used on site comprising leachate return water and wash down water from the CHPP, coal stockpile and pit top areas, historically contributed approximately 63% of all process water used (AECOM, 2010).

Potable water used on site has historically accounted for approximately 4% of all water used.

The annual site water balance takes into account the following:

- water sources (including rainfall, groundwater and potable water);
- demands and losses;
- the change in the inventory of water stored underground and in surface dams; and
- discharge of water off site

Major inputs for the 2016 reporting period were:

- 2.4 ML potable water from Fish River Water Supply;
- 191 ML runoff from pit top and CHPP areas;
- 1502 ML mine dewatered from southern and northern underground mining areas; and
- 266 ML mine dewatering from Adits 2 and 5.

Major outputs of the 2016 reporting period were:

- 1502 ML groundwater dewatered via north and south boreholes (leaving site via overshot dam LDP1); and

- 2236 ML overflow from the Overshot Dam (not including southern and northern de-watering bores).

For comparison, the major inputs for the 2015 reporting period were:

- 2.9 ML potable water from Fish River Water Supply (decreased by 17% in 2016);
- 181 ML runoff from pit top and CHPP areas (increase by 5.5% in 2016);
- 1222 ML mine dewatered from southern and northern underground mining areas (increased by 23% in 2016); and
- 554 ML mine dewatering from Adits 2 and 5 (decreased by 51% in 2016).

For comparison, the major outputs of the 2015 reporting period were:

- 1222 ML groundwater dewatered via north and south boreholes (leaving site via overshot dam LDP1) (increased by 23% in 2016); and
- 3417 ML overflow from the Overshot Dam (not including southern and northern de-watering bores) (decreased by 35% in 2016).

3.7 Hazardous Material Management

3.7.1 Status of Licence

Baal Bone holds an *Acknowledgement of Notification of Dangerous Goods on Premises* (NDG023231). In order to be granted a licence to store explosives, in accordance with the Explosives Regulation (2005), Baal Bone has nominated suitable persons to hold an Unsupervised Handling Licence following appropriate state and federal security background check. Accordingly the Explosive and Detonator Magazine was also included in the Acknowledgement.

Details of hazardous materials stored on-site during the reporting period are provided in **Table 3.3**. Location of the storage of hazardous goods can be found on **Plan 1**.

Table 3.3: Hazardous Materials Stored On Site

Storage ID	Storage Type	Maximum Storage Capacity
1	Underground Tank: Diesel	50 000 L
2	Above Ground Tank: LPG	37 750 L
3	Above Ground Tank: LPG	37 750 L
4	Above Ground Tank: LPG	5 000 L

3.7.2 Safety Data Sheets

Under Baal Bone's Environmental Management Strategy (EMS) there is a Hazardous Substance Standard (BBN SD STD 0007 – Hazardous Substances), which deals with the safe storage, handling and disposal of chemicals and other hazardous substances. Safety Data Sheets (SDS) are made available to all employees at the store facility.

Baal Bone also has a comprehensive online "ChemAlert" database, which provides all employees easy access to information on all chemicals held on site. Information includes but is not limited to:

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the safe handling of products, Personal Protective Equipment (PPE) requirements, storage, use and disposal of the materials and spill response procedures. ChemAlert is available on most PCs including the one for general employee use in the lamp room.

3.8 Other Infrastructure Management

The location of existing infrastructure is shown on **Plan 1**. During the 2016 reporting period there were no significant alterations or additions to processes or infrastructure.

3.9 Site Security

A number of safety measures have been adopted on site to ensure employee and public safety throughout all aspects of operations at Baal Bone. These security measures include:

- licensed security contractor with regular patrols during hours of non-operation;
- change of security locks;
- CCTV surveillance of key areas of site;
- lockable gates across all portals;
- perimeter fencing;
- compulsory surface and underground inductions for those working on site; and
- all visitors must be signed in and out and must be accompanied around the site by authorised personnel.

3.10 Activities during Suspension of Mining.

A notice of the 'Suspension of Operations' was provided by Baal Bone Colliery to the Department of Resources and Energy on 30 August 2011. Recognition from the Department was received on 16 September 2011. Approval from the Department for the suspension of mining operation and labour/expenditure conditions of CCL 749, CL 391, ML 1302 and ML 1389 was received on 27 September 2012, with the suspension taking effect four working days after the date of the letter for a period of three years. On 28 September 2015, Baal Bone Colliery lodged a request for a four year extension to the suspension to align with the MOP period.

A Suspension of Operations MOP was developed and submitted to the then Department of Trade and Investment (DTI) on 14 June 2012. Recognition from DTI of the acceptance of the MOP was received on 18 June 2012. A revision to the MOP was requested from DTI in February 2013 to accommodate mine de-watering activities and the incorporation of information from the Baal Bone Colliery draft Mine Closure Plan. On 18 November 2013, DTI approved amendments to the MOP including changes to the water management system at site, removal of the South East Ventilation fan and an update on the training mine status at site.

On 1 February 2016, Baal Bone submitted a new Care and Maintenance MOP to DRE for review. The new MOP period is 29 February 2016 to 31 December 2019 to align with the approved modification to PA09_0178 to extend the timeframe for mining of remnant coal until 31 December 2019.

A summary of the activities associated with the care and maintenance activities is provided in the sections below. Refer to the Baal Bone Colliery MOP for further information.

3.10.1 Salvage of Selected Underground Equipment

During the reporting period, the salvage of plant and equipment from the mine workings was continued. Salvaged plant and equipment has been cleaned and is stored on the pit top or cut throughs close to the mine entrance. Where appropriate, equipment that has been salvaged may be sold within the Glencore Group.

Salvaged equipment that has no residual value may be scrapped and recycled.

3.10.2 Maintenance of Services

Baal Bone is proposing to continue operation of the pit top (1 adit) ventilation fan throughout suspended operations and therefore the current MOP period.

Baal Bone has developed a Care and Maintenance Mine Inspection Program Matrix. This will be used as a guideline for maintenance scheduling and inspection frequencies.

The box cut fan (North) has been switched off and it is not anticipated to operate again during the care and maintenance period. A High Risk Activity Notification for the decommissioning and sealing of this fan shaft was lodged with DRE on 9 August 2016. The South East ventilation fan has been removed, and the shaft filled and capped.

Electricity, water, compressed air and communications services to the underground mine, building and pit top infrastructure will continue to operate and be maintained, subject to continued mine operations. All powerlines to the site will remain to supply buildings and offices power during the care and maintenance phase of the mine. All mine related unsealed roads, monitoring sites and dewatering bore compounds on Forestry Corporation of NSW (FCNSW) land will be maintained during the care and maintenance phase.

Baal Bone Colliery currently has three mine dewatering bores, two groundwater supply bores and four shallow piezometer monitoring bores licenced with DPI Water. Pumping from the dewatering bores will cease during the first half of 2017, should the decision be made to close and decommission the mine. Should Baal Bone decide to seal any borehole, detailed sealing designs will be submitted to DI for approval prior to the commencement of works.

Gas bag samples to monitor underground methane gas levels will continue to be taken during the MOP period.

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4 Actions Required from Previous Annual Review

There was no Annual Review meeting or site inspection held during 2015. The Baal Bone Colliery Environmental representative contacted all the recipients of the Annual Review to discuss the proposed site inspection, and to suggest postponing the inspection until early 2016 to enable review and discussion of the Ben Bullen Creek Modification and new MOP concurrently.

Given the care and maintenance status of Baal Bone Colliery the government agency representatives were either not interested in carrying out an inspection, or preferred for a site inspection to be carried over until 2016. An invite for a 2016 site inspection accompanied 2015 Annual Review submission and was scheduled for 10 May 2016 but postponed to the 12 July with a representative from DRE and Senior Compliance Officer Chris Schultz of DP&E present.

From this reporting period onwards Baal Bone Colliery will organise site inspections only at the request of government agencies, rather than pre-organising a joint site inspection each year.

Acceptance of the 2015 Annual Review was received from the Department of Planning & Environment (DPE) via written correspondence on 21 April 2016. DP&E considered the Review to be generally in accordance with the conditions of the approval and had the following requirements for future submissions (Table 4.1) and comments (Table 4.2):

Table 4.1: Further details required in future Annual Review submissions

Requirement	Section in Annual Review
Statement of Compliance – include a Statement of Compliance in accordance with the *Annual Review Guideline*.	Section 2.0
Complaints – a discussion of compliant trends in relation to previous years is to be provided.	Section 8.1
Reporting – ensure the format of the report reflects the requirements of the *Annual Review Guideline*, published by the NSW Government in October 2015.	Entire Document

Table 4.2: Further notes on the 2015 Annual Review

Comments	Status
Ben Bullen Creek Rehabilitation – in accordance with Schedule 3, Condition 25A, the Ben Bullen Creek Rehabilitation Plan is required to be submitted to the Department by 31 May 2016.	Extension granted until 22 December 2016, submitted to DP&E on 13 December 2016.
Independent Environmental Audit – in accordance with Schedule 5, Condition 7, an IEA is required to be undertaken by 31 December 2016.	Site component of Audit occurred on 6 and 7 December 2016
Access to Information - in accordance with Schedule 5, Condition 9, please ensure that all documents as required by the approval, including but not limited to the following, are uploaded to the company website by 12 May 2016; • Water Management Plan; • Rehabilitation Management Plan; and • Mine Closure Plan.	Water Management & associated Plans were uploaded to the website on 19 September 2016 following DP&E approval.

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	Rehabilitation Management Plan is incorporated into the MOP as approved by DP&I on 7 November 2011. Mine Closure Plan is under development and expected to be complete in March 2017.

5 Environmental Performance

Baal Bone Colliery maintains and operates an Environmental Management System (EMS), which has been prepared to reflect industry best practice and to specifically address Project Approval conditions, Environmental Protection Licence conditions and other statutory requirements.

Detailed plans of management and performance standards for a wide range of environmental elements have subsequently been developed. These Plans and Standards detail relevant control measures, management strategies, monitoring requirements, reporting procedures and performance expectations/criteria. Management plans can be found on the Baal Bone public website here: http://www.glencore.com.au/EN/WHO-WE-ARE/BAAL-BONE/Pages/other-publications.aspx.

It should be noted that this section of the Annual Review does not necessarily provide a comprehensive description of each individual environmental control mechanism that is currently employed at Baal Bone; this level of detail is available in the Baal Bone MOP (Suspension of Mining Operations) February 2016 to December 2019 and management plans.

This section will focus on providing a succinct review of the performance and/or modification of key control measures throughout the 2016 reporting period. Also included is a review of significant activities undertaken or actions completed throughout the year, a summary of monitored data (as applicable), a discussion regarding the level of compliance achieved; together with an overview of initiatives proposed and actions planned for the 2017 reporting period.

5.1 Air Pollution

5.1.1 Wind speed and direction

The Ben Bullen Range (and State Forest) provides Baal Bone with reasonable shelter from winds with the exception of those from the north-west which have a clear fetch of approximately 12 km upwind of the site. However, strong winds from the southwest and southeast may funnel through the gaps in the Ben Bullen Range and along the valleys towards the site.

Wind speed and direction at Baal Bone is comparable to the wind conditions from the Lithgow (Birdwood Street) Weather Station approximately 25 km south-east of the site. Historic seasonal wind roses for this weather station are found in **Figure 5.1**.

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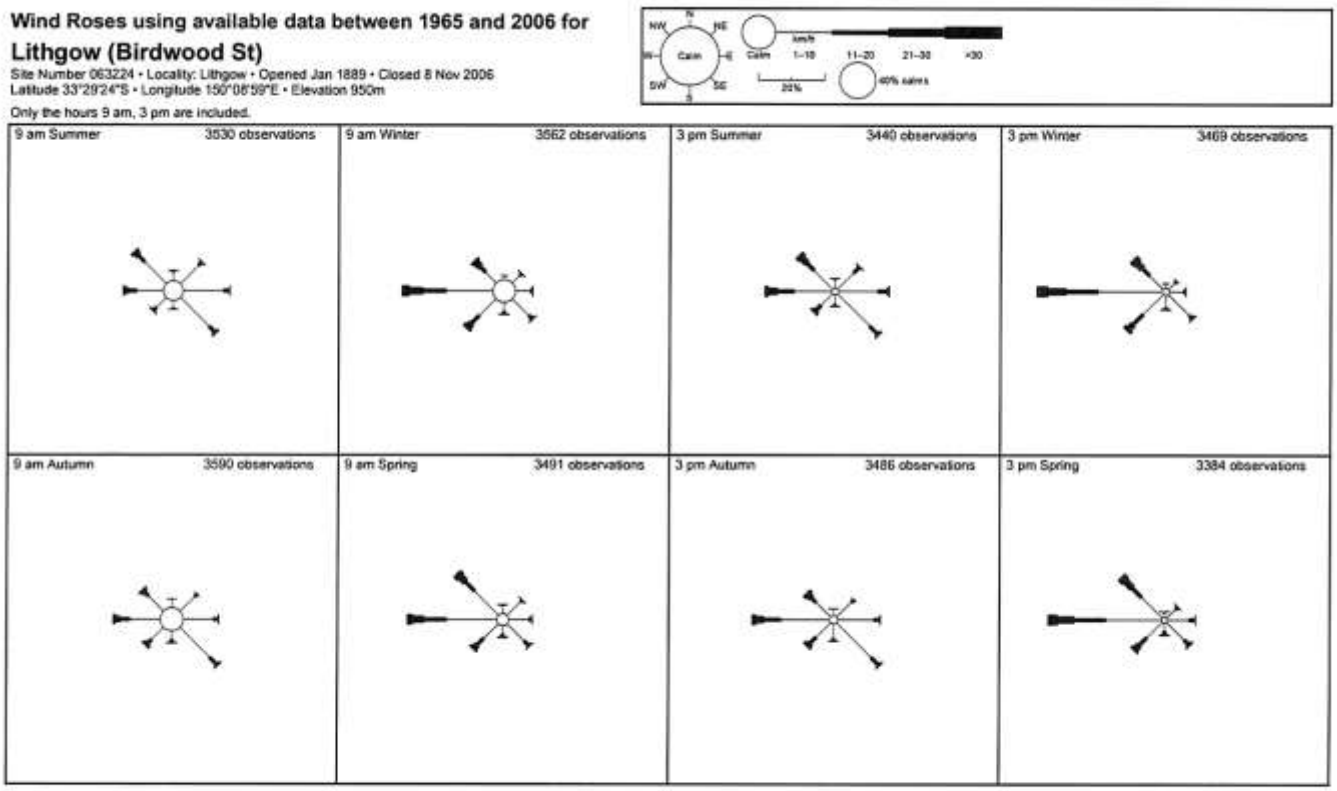
Figure 5.1: Historic Wind Roses for the Lithgow Weather Station (Birdwood Street)



5.1.2 Dust Monitoring and Sample Locations

Monthly dust fall-out monitoring is carried out in accordance with Australian Standard AS3580.10.1 and EPL requirements. 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 four 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 (EPL monitoring point No. 16) was removed from the EPL in February 2014 following consultation with the EPA regarding site dust monitoring and risks.

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

5.1.3 Review and interpretation of dust monitoring results

Schedule 3, Condition 10 of PA 09_0178 includes air quality impact assessment criteria for the project which are summarised in below. The pollutants to be monitored include deposited dust, TSP and PM_{10}.

Table 5.1: 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
		Maximum Total	
TSP	Annual (suspended)	90 $\mu g/m^3$	
PM_{10}	24 hour (suspended)	50 $\mu g/m^3$	
	Annual (suspended)	30 $\mu g/m^3$	

Levels of deposited dust were monitored in accordance with the air quality impact assessment criteria. Results of deposited dust monitoring conducted during the 2016 reporting period provided below.

Table 5.2: Deposited dust monitoring results for 2016 (g/m2/month)

Month	DM1	DM2	DM3	DM4
January	0.5	0.8	0.9	0.6
February	0.9	1.0	0.8	0.5
March	0.8	7.5*	0.6	0.4
April	0.5	0.8	0.3	0.3
May	0.4	0.2	0.4	0.2
June	0.3	0.2	0.2	< 0.1
July	0.2	0.2	0.2	0.2
August	0.3	0.1	0.1	0.1
September	0.3	< 0.1	0.3	0.1
October	0.4	0.3	0.5	0.6
November	0.3	03	0.4	0.4
December	0.7	0.6	0.9	0.7

* The March dust monitoring result for DM2 recorded an abnormally high result of 7.5 g/m^2/month. The sample was microscopically analysed to determine the source of particles. The analysis was undertaken by the ALS Group Environmental Division, a NATA Accredited laboratory and results indicated that the insoluble matter was comprised predominately of insects, bird droppings and vegetation. Therefore the high reading is most likely from non-mining related sources.

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All dust monitoring results for 2016, are below the maximum allowable annual average dust level of 4 g/m^2/month, in accordance with Schedule 3, Condition 10 of Project Approval 09_0178.

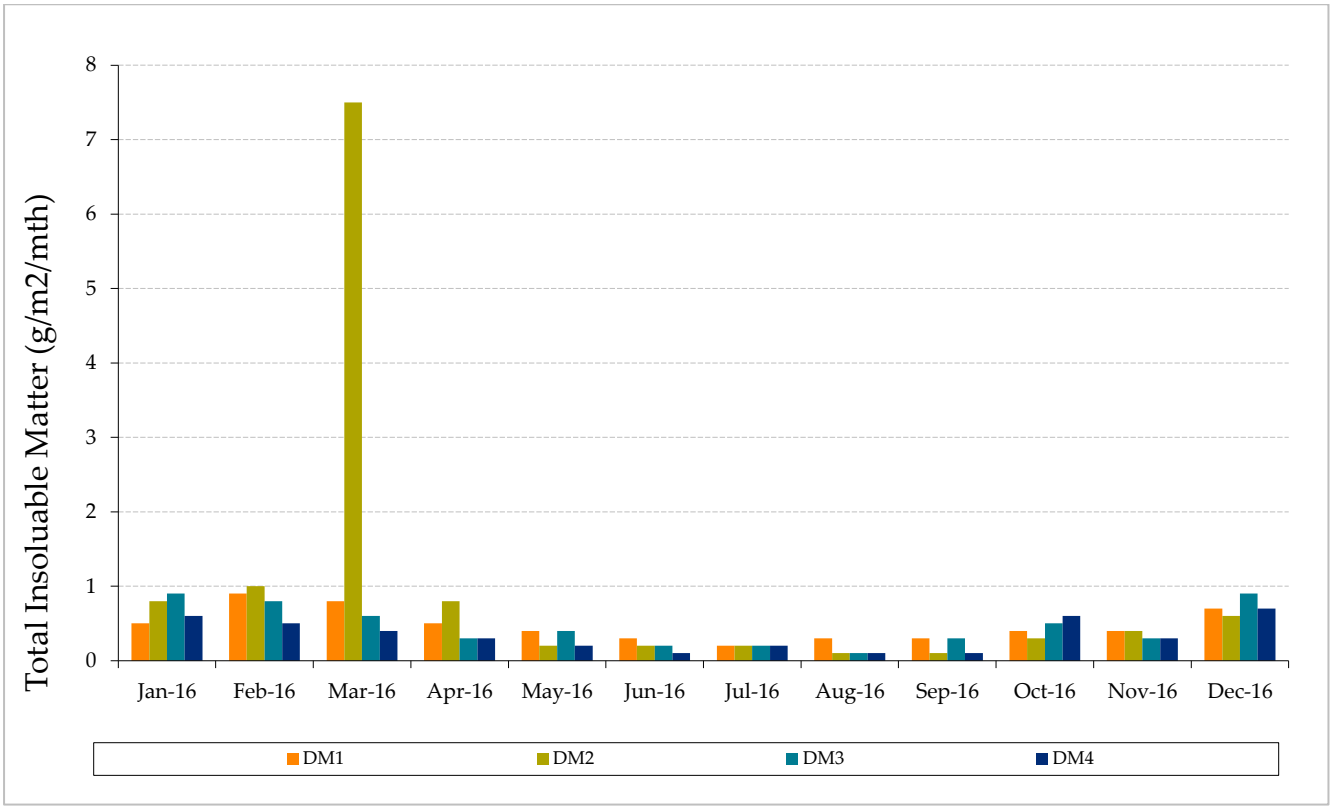

Figure 5.2: 2016 Deposited Dust Monthly Monitoring Results

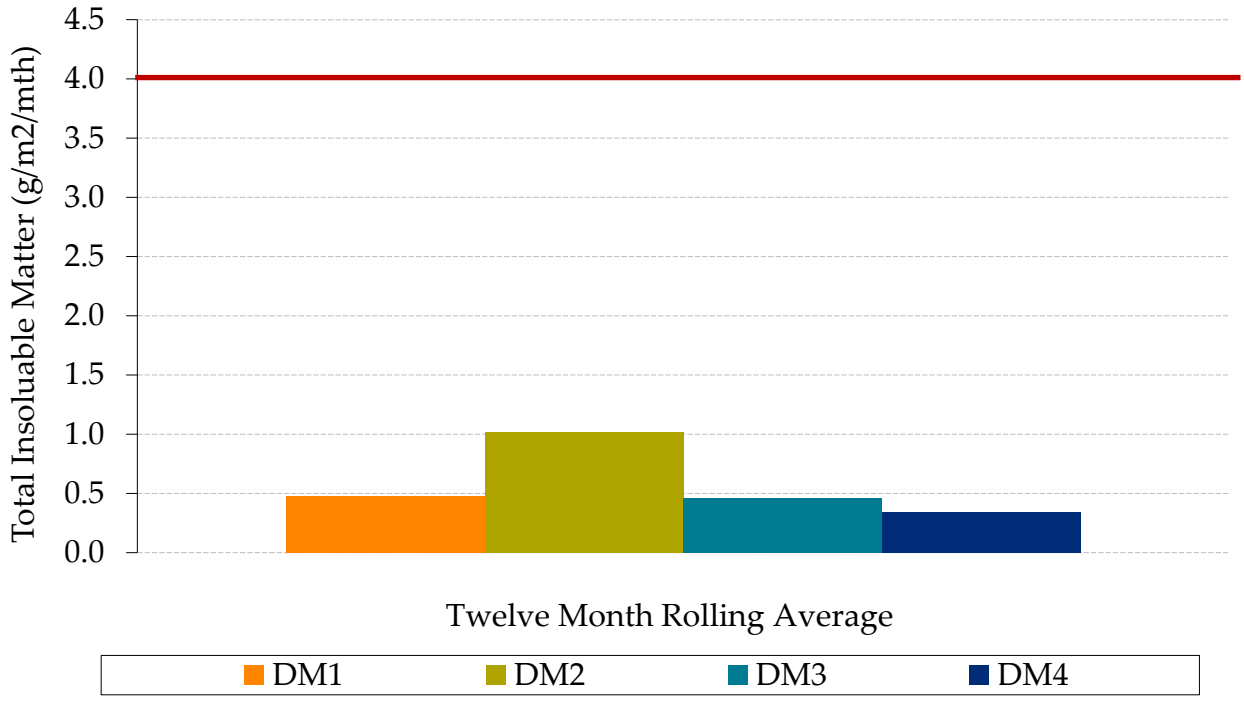

Figure 5.3: 2016 Annual Average Deposited Dust Results

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All dust monitoring results for 2016, are below the maximum allowable annual average dust level of 4 g/m^2/month, in accordance with Schedule 3, Condition 10 of Project Approval 09_0178.

5.1.4 Comparison against previous Annual Reviews

As can be expected with the continuing of Baal Bone on care and maintenance, dust deposition results have continued to remain low across the site. Results of deposited dust monitoring conducted during the 2015 reporting period are provided in **Figure 5.4** below. As with 2016, all dust monitoring results for 2015 were below the maximum allowable annual average dust level of 4 g/m^2/month, in accordance with Schedule 3, Condition 10 of Project Approval 09_0178.

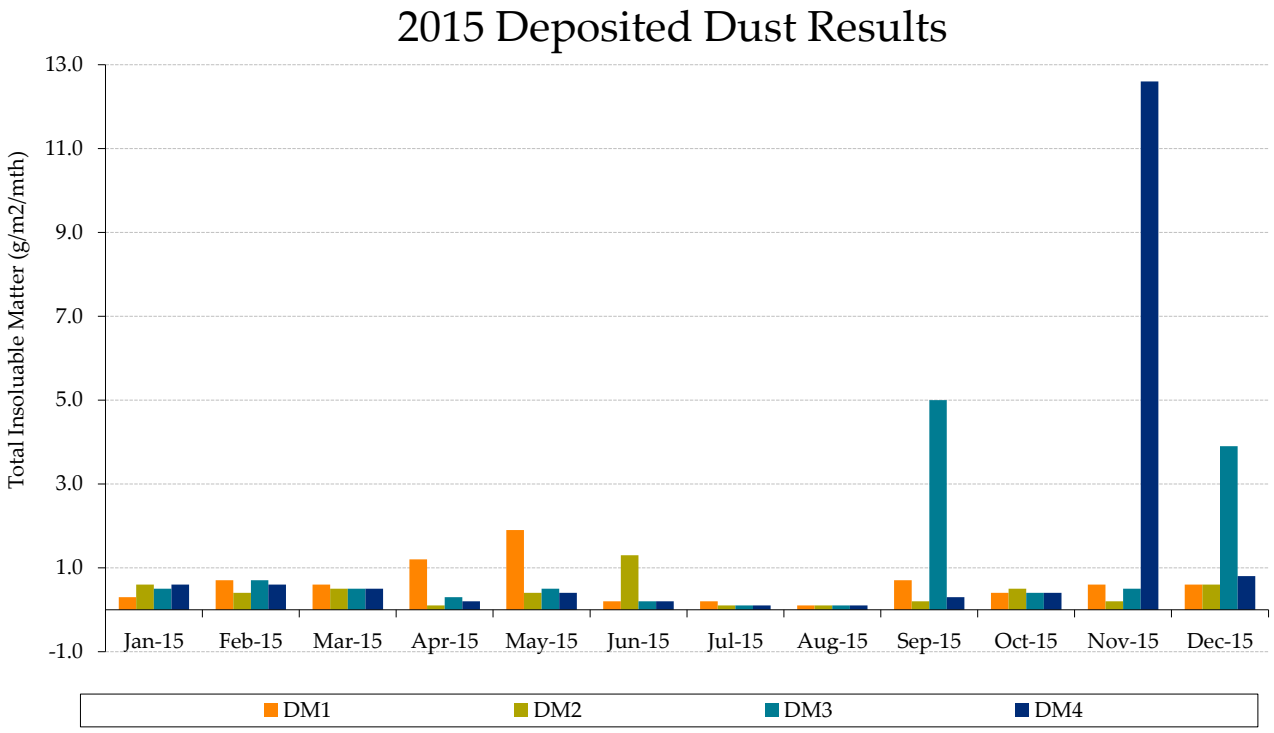

Figure 5.4: 2015 Deposited Dust Monitoring Results

Historically, deposited dust results have remained below the maximum allowable annual average dust level of 4 g/m^2/month. **Figure 5.5** shows the annual averages for DM1 – DM5 for the period 2011 to 2016.

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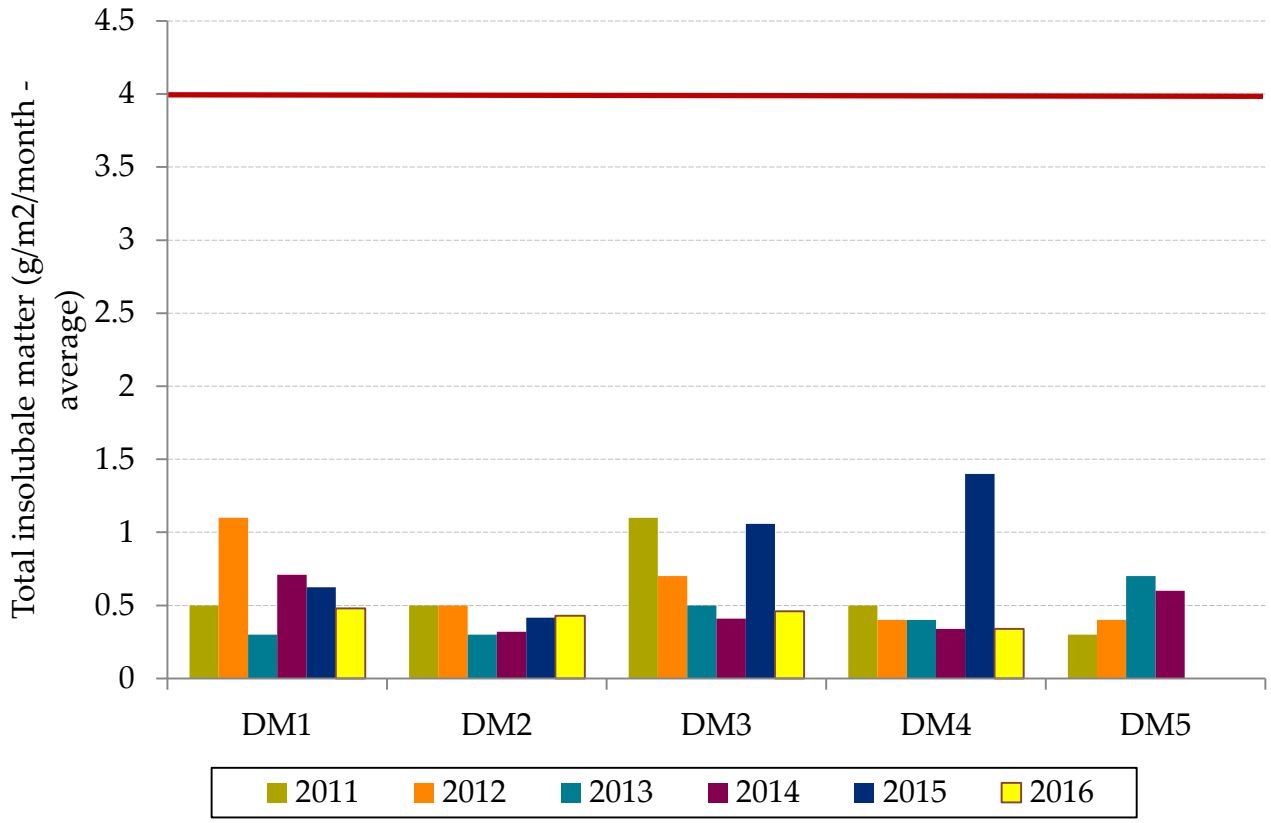

Figure 5.5: 2011 – 2016 Annual Average Deposited Dust Results

5.1.5 Comparison against EA

Levels of air quality pollutants as predicted under the EA are presented in below. **Table 13** shows the predicted cumulative pollutant concentration (which includes the predicted concentration from Baal Bone plus the background concentration). Deposited dust criteria are expressed as deposition rates and not concentrations. The predicted levels were all below the specified criteria.

Predicted odour levels are presented in below, and were assessed in the EA (AECOM 2010). Odour is not monitored as part of site operations; however no odour complaints were received during the reporting period.

Table 5.3: Maximum predicted pollutant results at the discrete sensitive receptors

Receptor Number	TSP (ug/m^3)		PM_{10} (ug/m^3)			Deposited Dust (g/m^2/month)		Odour (OU)
	Annual	Annual cumulative*	Annual	Annual cumulative*	24 hour	Annual	Annual cumulative*	One Second
1	13.5	58.5	5.0	23.0	36.2	0.76	3.3	2.6
2	7.4	52.4	2.6	20.6	23.2	0.4	3.0	1.8
4	3.3	48.3	1.2	19.2	12.5	0.2	2.8	1.0
5	4.2	49.2	1.5	19.5	16.1	0.2	2.8	0.9
6	4.5	49.5	1.7	19.7	13.2	0.2	2.8	2.1

Receptor Number	TSP (ug/m^3)		PM_{10} (ug/m^3)			Deposited Dust (g/m^2/month)		Odour (OU)
	Annual	Annual cumulative*	Annual	Annual cumulative*	24 hour	Annual	Annual cumulative*	One Second
7	2.5	47.5	0.9	18.9	13.6	0.2	2.8	1.3
8	2.6	47.6	1.0	19.0	16.4	0.2	2.8	1.8
9	5.2	50.2	1.7	19.7	26.5	0.4	3.0	1.1
10	5.4	50.4	1.8	19.8	19.4	0.4	3.0	2.5
11	3.8	48.8	1.3	19.3	13.0	0.2	2.8	0.7
12	3.3	48.3	1.1	19.1	18.5	0.2	2.8	1.5
13	2.8	47.8	0.8	18.8	10.6	0.2	2.8	0.7
Criteria	90 ug/m^3		30 ug/m^3		50 ug/m^3	4 g/m^2/month		5 OU

* Includes the predicted concentration from Baal Bone plus ambient background concentrations

The monitoring results at DM2 for all pollutants are likely to be representative of predicted pollutant results at receptor number 2 listed in **Table 13**. The dust monitoring results for all pollutants at DM2 during the reporting period, presented in **Section 3.1.3**, are consistently lower than the maximum predicted pollutant levels within the EA, as well as below the relevant criteria.

Therefore, the air quality impacts associated with Baal Bone's operations are consistent with the predicted impacts in the EA.

5.2 Erosion and Sediment Control

In non-active areas of the mining lease, there have been negligible levels of erosion and sedimentation. A portion of suitable non-active mining area is available for livestock agistment.

All active surface mining and rehabilitation areas fall within Baal Bone's Water Management System which is subdivided into 'clean water' and 'dirty water' systems. Features of the 'clean water' system includes upslope diversion banks, levee banks, lined channels and drains and reed beds within the Ben Bullen Creek; features of the 'dirty water' system include graded contour banks, containment bunds, primary arrestor/grit traps, sediment dams, water treatment plant and settlement dams.

The Overshot Dam is located on the Colliery's northern boundary and is the final point of containment / retention for the clean water system. It also provides an additional opportunity for settlement and/or other treatment if required. The discharge from the Overshot Dam is Licenced Discharge Point LDP1 within EPL 765 (monitoring point 11). LDP1 discharged water off-site during all months of the reporting period.

5.3 Contaminated Land

Known contaminated or polluted lands at Baal Bone are limited to those affected by hydrocarbons. Hydrocarbon contamination is discussed in **Section 5.15**.

There were no environmental incidents recorded or additional areas of contaminated land identified during the reporting period.

5.4 Flora

Following the completion of mining on 3 September 2011, no routine flora monitoring of the LW29-31 area was completed during the subsequent reporting periods as it was no longer required by the Subsidence Management Plan.

5.5 Fauna

Following the completion of mining on 3 September 2011, no routine fauna monitoring of the LW29-31 area was completed during the subsequent reporting periods as it was no longer required by the Subsidence Management Plan.

5.6 Weeds

Weed management at Baal Bone continued during 2016. In line with the annual land management review of the Baal Bone site conducted by DnA Environmental, a comprehensive weed spraying program targeting Blackberry was undertaken. The findings of the 2016 land management review will be used to assist in informing weed management activities for the next reporting period.

5.7 Blasting

No blasting was conducted at Baal Bone during the reporting period.

5.8 Operational Noise

For the purpose of assessing the compliance status of site with licence noise limits a site attended audit and noise measurements were conducted in August 2016 By Atkins Acoustics & Associates.

The audit report concluded that:

"During the daytime audit noise from the mine ventilation fan was audible at the Muldon residence (R1). Other noise sources identified included local domestic activities, wind in the trees, insects, aircraft and distant road traffic. During the evening and night audits noise from the ventilation fan was audible at both the Muldon (R1) and Desch (R2/3) residences.

During the site-attended audits noise from the ventilation fan would not be described as tonal, impulsive, irregularity or with low frequency content. Accordingly no 'modifying factor' corrections are required to satisfy EPL 765 (L4.7). From the audit measurements and assessment, the LAeq, 15 min noise contributions from BBC during the day, evening and night assessment periods satisfied the long-term licence noise limits.

Baal Bone Colliery related LAmax noise levels were not observed to cause exceedances of the licence noise limits at measurement locations for the duration of the audit."

Full noise audit reports can be accessed from the Baal Bone publications webpage at: http://www.glencorecoal.com.au/EN/Operations/Baalbone/Pages/EPLreportingBaalBone.aspx

There were no complaints regarding operational noise received during the reporting period.

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5.8.1 Comparison against EA and previous Annual Reviews

The EA predicted $L_{Aeq\ 15\ minute}$ dB(A) noise levels at residences R1 and R2/R3, both with and without the dozer operating on the ROM stockpile. The EA also predicted $L_{A1,\ 1min}$ dB(A) intermittent noise levels at R1 and R2/R3 at night. The results of the attended noise audits confirm that Baal Bone Colliery noise levels are consistent with the EA predicted noise levels.

During the 2011 Annual Review period one complaint was received from a residence adjacent to Baal Bone in relation to noise generated by surface plant operations. The complaint coincided with an environmental compliance noise audit for Baal Bone in October 2011. The October 2011 audit found that during evening hours when the dozers were operating on the ROM stockpiles, the long term licence noise limits specified under Schedule 3, Condition 4 of the Development Consent were exceeded at R1 and R2/3. However, when the dozer was not operating on the ROM stockpiles the operations would comply with the long term licence noise limits. Modification were made to equipment and stockpile orientation, and no further noise complaints have been received.

Noise audits carried out from 2012 onwards have found that 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 related LAmax noise levels were not observed to cause exceedances of the licence noise limits at measurement locations for the duration of the audits.

5.9 Visual, Stray Light

All lighting associated with the CHPP and the UC1 conveyor/ROM stockpile has been designed and constructed so as to minimise glare and stray light to sensitive receivers. During 2012, a review of lighting requirements during care and maintenance was conducted and where appropriate lighting was minimised.

No complaints have been received during the 2016 reporting period in respect to lighting.

5.10 Aboriginal and European Heritage

5.10.1 Aboriginal Heritage

In early 2007, an Indigenous Heritage Assessment was undertaken in conjunction with preparation of the Longwalls 29-31 Subsidence Management Plan (SMP) application. This assessment identified a potential rock shelter site (BBC-RS1) located above Longwall 30 in the Ben Bullen State Forest. An Aboriginal Cultural Heritage Management Plan (ACHMP) for the potential rock shelter site BBC-RS1 was developed by OzArk Environmental & Heritage Management Pty Ltd in 2008, based on the findings of the Indigenous Heritage Assessment. The ACHMP was workshopped by the Registered Aboriginal Parties and representatives of the former Department of Environment, Climate Change and Water (now OEH).

Schedule 3, Condition 26 of the Project Approval granted in January 2011 required that the ACHMP be updated in accordance with the EA. The ACHMP was subsequently revised in July 2011 in accordance with Condition 26.

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5.10.2 European Heritage

No European Heritage Sites have been identified within the Baal Bone mining lease.

5.10.3 Comparison against EA

The EA predicted that, while subsidence may occur, it is unlikely to impact currently undetected Aboriginal sites such as open sites. Potential impacts to Aboriginal heritage associated with the mining of Longwalls 29-31 have been assessed in previous surveys (OzArk 2007a; 2010). No significant impacts were predicted in this area, however, subsidence monitoring was to be undertaken during extraction. The rock shelter site BBC-RS1 was also required to be managed in accordance with an ACHMP.

Extraction of Longwall 30 beneath BBC-RS1 occurred in July 2010. During this time, Baal Bone inspected the site twice weekly. Following extraction beneath BBC-RS1, the area was resurveyed and movement vectors were calculated. Subsidence monitoring during the reporting period has confirmed the predictions in the EA. The data showed that the rock which forms the main shelter (overhang) moved 536 mm in a westerly direction and subsided approximately 717 mm (10 mm accuracy). However, there was no visible damage caused to BBC-RS1 as a result of the extraction of Longwall 30.

5.11 Natural Heritage

No natural heritage sites have been identified within the Baal Bone mining lease. However, the Gardens of Stone National Park lies approximately 5 km north-east of Baal Bone and the Greater Blue Mountains World Heritage Area is located approximately 80 km to the south-east of Baal Bone. These areas are not expected to be affected by the operations at Baal Bone. The Ben Bullen State Forest covers much of the lease area.

5.12 Spontaneous Combustion

No spontaneous combustion events occurred in 2016.

Whilst under care and maintenance no stockpiling of coal products is occurring. The last of Baal Bone's ROM stockpiles were transported off site in April 2012.

Baal Bone has a Spontaneous Combustion TARP for the ROM stockpile. The TARP principally involves regulating the duration of ROM storage on the stockpile to reduce residence time and therefore potential oxidation as well as monitoring of internal stockpile temperatures.

5.13 Bushfire Management

In the event that a bushfire is ignited on company owned land, or where bushfire poses a threat to the mining operations, the Baal Bone's Bushfire Emergency Preparedness System will be activated. In addition, site management will ensure that:

- all boundary roads around the land within the Colliery freehold area are maintained in a condition suitable for use as fire breaks and access tracks during an emergency situation;
- main access road and helipad are maintained suitable for use by emergency services;
- dams, voids and any other areas that may be utilised as watering points can be accessed by firefighting equipment;
- portable radios are used at the time of emergency solely by the emergency response team who are trained and are provided with protective clothing;

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- site earthmoving equipment can be utilised; and
- emergency phone, fire extinguishers and fire depots are located at strategic locations around the surface facilities.

Bushfire preparedness has also been included in Baal Bone's Biodiversity and Land Management Plan.

5.14 Mine Subsidence

5.14.1 Current Approvals

The SMP for development and extraction of Longwalls 29-31 expired on 1 December 2014 with mining operations in the Longwall 29-31 area completed on 3 September 2011.

5.14.2 Longwalls 29-31 Subsidence Development (Summary of Survey Results)

Surveys of various subsidence monitoring lines were undertaken during mining of Longwalls 29-31. Maximum results of surveys conducted since 2009 are listed below.

Table 5.6 : LW 29-31 Subsidence Survey Data Summary

Parameter	Predicted Results	Maximum measured result		
		2009	2010	2011
Vertical subsidence (mm)	1400 - 1600	1341	1538	1726
Horizontal movement (mm)	400	450	188	538
Strain (mm/m)	9 - 21	11.7	13.7	14.2
Tilt (mm/m) K=5.0	32 - 52	25.6	23.2	43.7

As per the Longwall 29-31 SMP, a final post longwall 31 subsidence survey was carried out in May 2012. Summarised results are listed below**.** Results from previous surveys can be found in Subsidence Status Reports published on the Baal Bone website here: http://www.glencorecoal.com.au/EN/Operations/Baalbone/Pages/EPLreportingBaalBone.aspx.

Table 5.7: 2012 LW29-31 Subsidence Survey Data (8 May 2012)

Line	Measured Subsidence (mm)	Measured Strain (mm/m)	Measured Tilt (mm/m)	Measured Horizontal Movement (mm)
SMP Prediction (mm)	1400 – 1600	9 - 21	32 - 52	400
E Line (LW 31)	1742 (LW30)	13.3	43.2	280
Northern Pinch Point Reflectors	+9			33
Northern Pinch Point Prisms	13			24
Southern Pinch Point Reflectors	14			9
Southern Pinch Point Prisms	2			8

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The minor exceedance on E Line over LW30 has previously been reported in the 2011 Annual Review. The post mining survey conducted on 8 May 2012 noted a further increase of 14 mm to a total of 142 mm. The distance where this occurred is limited to a length of less than 50 metres.

5.15 Hydrocarbon Contamination

A six monthly review of the groundwater monitoring wells at Baal Bone was undertaken by Carbon Based Pty Ltd during May 2016. The results of this monitoring program acknowledged that previous activities at the site, have resulted in contamination of shallow groundwater. The contamination was localised and associated with known point sources such as fuel storage areas.

The May 2016 report concluded that:

"When compared with the prior groundwater monitoring results from 30 November 2015 there was a significant increase in petroleum hydrocarbon fractions within groundwater bore MW01, and no significant changes in results for groundwater bores MW03 and MW101.

Several groundwater metal and TRH (Total Recoverable Hydrocarbons) concentrations remain above the adopted ecological or Human Health Criteria including:

- *MW01 –Nickel, zinc and three TRH fractions remain above the ecological and human health criteria adopted.*
- *MW03 - Nickel and zinc remain above the ecological criteria adopted.*
- *MW101 – Nickel remains above both the ecological and health criteria adopted and zinc remains above the ecological criteria.*

Groundwater levels decreased between the 30 November 2016 and 30 May 2016 monitoring period across all monitoring wells between approximately 0.01 m to 1.16 m".

On 8 November 2016, Carbon Based Environmental Pty Ltd carried out a six monthly groundwater monitoring event. The November 2016 monitoring concluded:

"When compared with the prior groundwater monitoring results from 30 May 2016 there was a decrease in petroleum hydrocarbon fractions within groundwater bore MW01 however results do remain well above the adopted criteria. There were no significant changes in results for groundwater bores MW03 and MW101.

Several groundwater metal and TRH concentrations remain above the adopted ecological or Human Health Criteria including:

- *MW01 – Arsenic, nickel and three TRH fractions remain above the ecological and human health criteria adopted.*
- *MW03 - Nickel remains above both the ecological and health criteria adopted and zinc remains above the ecological criteria*
- *MW101 – Nickel remains above both the ecological and health criteria adopted and zinc remains above the ecological criteria.*

Groundwater levels increased between the 30 May and 8 November 2016 monitoring period across all monitoring wells by between 0.04 m to 1.99 m. One exception was MW05 which decreased by 0.02 m."

Following the May 2016 identification that petroleum hydrocarbons had increased significantly, GHD were commissioned to undertake a detailed site contamination assessment (GHD, 2017). The report produced from this work noted the following:

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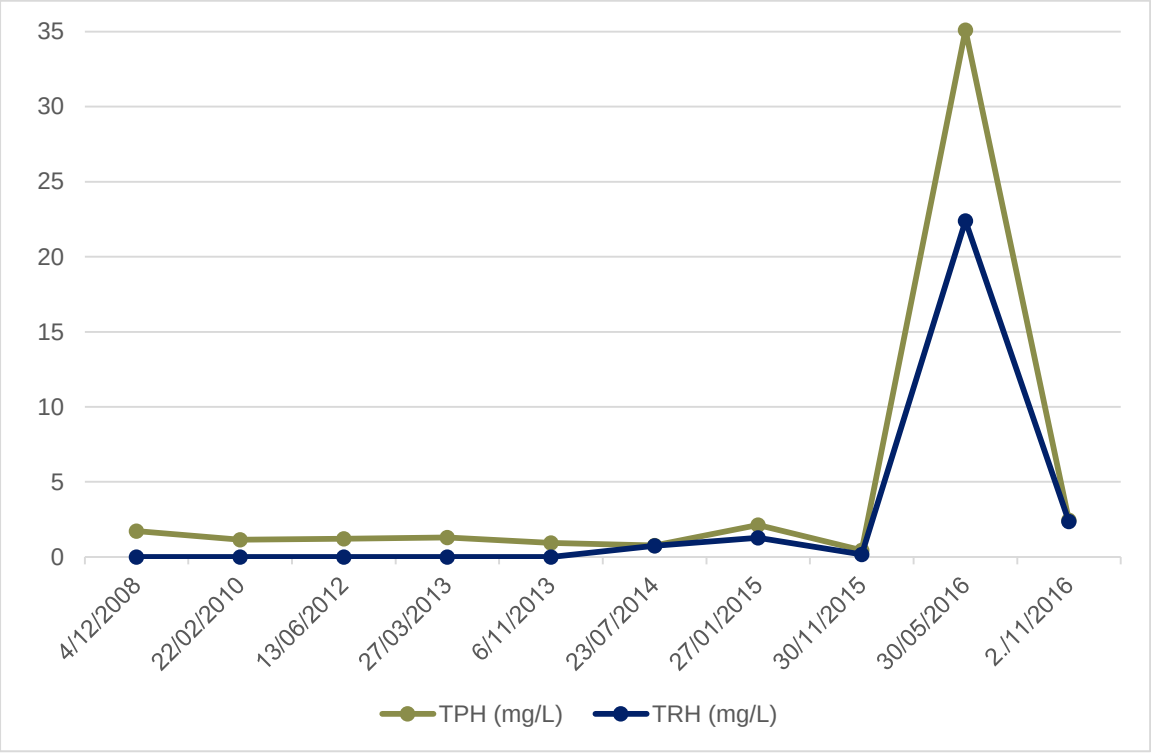
The results of these investigations indicate that TRH concentrations have been consistently decreasing over time with the exception of results from CBE May 2016 which showed a significant increase by an order of magnitude. Those results may have been anomalous as CBE November 2016 and GHD results indicate significantly reduced concentrations.

The detection of elevated TRH in groundwater at MW01 suggests there has been impact to groundwater from the diesel UST. It is expected that levels of contaminants in groundwater will continue to attenuate over time with the planned mine closure, removal of the UST and remediation of the surrounding soils.

Due to the suspicion of an anomalous result indicating contamination in MW01, the extent has not been investigated. MW03, which is approvimately 10 m north of MW01, has remained below the detection limit for both TPH (Total Petroleum Hydrocarbons) and TRH since February 2010, with the exception of one result of 0.11 mg/L for TRH in July 2014. This supports the conclusion that the significant increase in TPH at MW01 is an anomoly.

Figure 5.6 shows the historical TPH and TRH data for MW01. Full analytical results from the November 2016 groundwater sampling event are given in **Appendix A** of this document.

Figure 5.6: 2008 – 2016 TPH and TRH analysis results for MW01



Six monthly hydrocarbon testing will continue in 2017 with a focus on MW01. Contamination within the pit top and CHPP areas will be addressed at mine closure, unless routine monitoring identifies an issue that requires remedial action beforehand.

5.16 Methane Drainage and Ventilation

During the reporting period, monthly gas bag samples from the underground ventilation system were analysed by Coal Mines Technical Services, a NATA accredited company.

Results from the sampling completed throughout the reporting period confirm extremely low levels of methane at Baal Bone (<0.01%). Consequently, methane drainage is not required at Baal Bone.

5.17 Public Safety

Fences are in place around the mining lease area, with all other boundary gates locked and maintained in correct working order. All access points onto the mine area are signposted to warn the public of Baal Bone Colliery's mining operations and of the risks involved. Warning signs have also been erected along public tracks in the Ben Bullen State Forest warning of mine subsidence and prohibiting entry to unauthorised persons.

All employees and contractors who enter the mining operations or workshop areas are inducted and must be suitably trained. All visitors must sign in and be accompanied by an employee or staff member of the mine if they have not been inducted.

Security and safety measures were undertaken in 2011 to prepare for suspension of operations and included the employment of security staff and placing of gates on adits. Grills were placed on conveyors in 2011. A gate lock change also took place in 2011. During 2012, fences were erected in the CHPP area and access roads blocked.

5.18 Other Issues and Risks

5.18.1 National Pollution Inventory

In December 1997, the NSW Parliament passed a number of new legislation that saw the start of the National Pollution Inventory (NPI) reporting process. The NPI is an internet database designed to provide the community, industry and the government with information on the types and amounts of certain substances being emitted to the environment.

Baal Bone Colliery submitted an NPI report on 16 August 2016 for the period of 1 July 2015 to 30 June 2016. The report detailed emissions of listed substances from Baal Bone Colliery to air, water and land requiring collation, analysis and interpretation of site-specific data. Results can be obtained from the NPI website www.npi.gov.au.

5.18.2 Reportable Incidents

All incidents are reported in accordance with Project Approval 09_0178 – schedule 5, condition 5.

Pursuant to Glencore's categorisation of incidents, any incident that falls into the categories below must be reported to the Group Environment and Community Manager, the General Manager for Open Cut or Underground Operations (depending on the type of incident) and the Chief Operating Officer.

Category I: An incident that has caused negligible, reversible environmental impact, requiring very minor or no remediation.

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Category II: An incident that has caused minor, reversible environmental impact, requiring minor remediation.

Category III: An incident that has caused moderate, reversible environmental impact with short-term effect, requiring moderate remediation.

Category IV: An incident that has cause serious environmental impact, with medium-term effect, requiring significant remediation.

Category V: An incident that has caused disastrous environmental impact, with long-term effect, requiring major remediation.

In accordance with the Glencore definitions provided above, there were no reportable environmental incidents recorded by Baal Bone during the reporting period.

There were no fines or penalties recorded during the reporting period.

6 Water Management

6.1 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.

EPL No. 765 currently contains three licensed monitoring points in relation to surface water and groundwater management The EPL licensed monitoring points are provided in the **Table 14** below. The location of monitoring points can be seen **in Drawing 1**.

Table 6.1: EPL Licenced Monitoring Points

EPA Identification No.	Type of Monitoring Point	Description of Location
2	Discharge water quality monitoring	Sewage Transpiration Bed labelled as 'LD2'
11	Discharge to waters	Ben Bullen Creek downstream of active surface mining area, labelled as 'LDP1'
12	Upstream quality monitoring	Ben Bullen Creek upstream of active surface mining area, labelled as 'WMP1'

A copy of EPL 765 can be accessed here: www.epa.nsw.gov.au/prpoeoapp

A description of discharge and monitoring sites, analyses conducted, frequency of sampling and concentration limits (where applicable) are shown below. EPL Monitoring Points are shaded in yellow.

Table 6.2: Baal Bone Colliery water monitoring locations and monthly analysis during 2015

Sample Name	Sample Location	Frequency	Pollutants Analysed	EPL Limits Apply
BBLD2	EPL Monitoring Pt No.2. In sump at discharge from STP maturation pond to transpiration bed area	Monthly during discharge	Oil & grease, TSS, pH, BOD, faecal coliforms, nitrogen, phosphorus	Not specified
BBLDP1	EPL Monitoring Pt No.11 Immediately below the pipe outlet or in stilling pool below spillway of overshoot dam	Monthly during discharge	EC, oil & grease, sulphate, iron, TSS, pH, flow rate, hardness, MBAS, nitrogen, phosphorus	Oil & grease, pH, total iron, TSS
BBWMP1	EPL Monitoring Pt No. 12 Pool within Ben Bullen creek upstream of active surface mining area	Monthly (during flow)	EC, oil & grease, sulphate, iron, TSS, pH, flow rate, hardness, nitrogen, phosphorus	Not specified
BBPOT	Potable water from main kitchen in Administration	Monthly	pH, EC, Hardness, heterotrophic standard plate count, total coliforms, E coli, Pseudomonas	N/A

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BBREAS	Spring on Ben Bullen Creek	Monthly (during flow)	EC, iron, oil & grease, pH, sulphate, nitrogen, phosphorous, and TSS	
BBDW	Dirty water dam	Monthly	EC, Iron, oil & grease, pH, Sulphate, TSS	N/A
BBPRW	Process water dam	Monthly	EC, Iron, oil & grease, pH, Sulphate, TSS	N/A
BBSTP1	STP Maturation Pond No 1 Note: Only sampled if water levels in STP2 are too low.	Monthly	pH, BOD, Faecal coliforms, nitrogen, phosphorus	N/A
BBSTP2	STP Maturation Pond No 2	Monthly	pH, BOD, Faecal coliforms, nitrogen, phosphorus	N/A
BBBC	Box cut sump	Monthly	pH, EC, iron, sulphates	N/A
BBBBC Mid	Ben Bullen Creek mid-way through site	Monthly (during flow)	Flow rate, pH, EC, TSS, iron, sulphates, oil & grease, nitrogen, phosphorus	N/A
BBLT	'Lake Tegan'	Monthly	EC, iron, oil & grease, pH, sulphate, nitrogen, phosphorous, and TSS	N/A
BBJC2	Jews Creek upstream of mining operations, but below dewatering bore discharges	Monthly (during flow)	Flow rate, pH, EC, TSS, iron, sulphates, oil & grease, nitrogen, phosphorus	N/A
BBJCH	Jews Creek headwaters upstream of all mining operations and mine dewatering discharges	Monthly (during flow)	Flow rate, pH, EC, TSS, iron, sulphates, hardness, oil & grease, nitrogen, phosphorus	N/A
BBCR	Cox's River	Monthly (during flow)	Flow rate, pH, EC, TSS, iron, sulphates, oil & grease, nitrogen, phosphorus, Hardness	N/A

6.1.2 Interpretation and Review of Monitoring Results

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:

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Table 6.3: EPL concentration limits

Pollutant	LD2 (EPL Monitoring Point 2)	LDP1 (EPL Monitoring Point 11)	WMP1 (EPL Monitoring Point 12)
Oil and grease (mg/L)	-	10	-
pH	-	6.5-8.5	-
Total Suspended Solids (mg/L)	-	50	-
Iron (dissolved) (mg/L)	-	1.0	-

Monitoring results for Baal Bone's three monitoring points as required by EPL 765 are discussed in **Table 17**, and **Figure 6-9**. Samples were taken monthly during discharge in accordance with the EPL.

Table 6.4: 2016 concentrations as required by EPL 765.

EPL Point	Month	Pollutant									
		EC	O&G	SO_4^{2-}	Fe	TSS	pH	BOD	Faecal Coliform	N	P
		uS/cm	mg/L	mg/L	mg/L	mg/L	-	mg/L	cos/ 100ml	mg/L	mg/L
LD2	Jan	Sample not required	*Dry*	Sample not required		*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	Feb		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	Mar		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	Apr		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	May		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	June		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	July		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	Aug		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	Sep		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	Oct		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	Nov		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
	Dec		*Dry*			*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*
LDP1	Jan	1080	<1	283	<0.05	4	8.1	Sample not required			
	Feb	1060	<1	290	0.07	5	7.5				
	Mar	1110	<2[c]	296	<0.05	6	7.9				
	Apr	1130	3	255	<0.05	6	8.1				
	May	1160	<2	270	0.23	2	8.0				
	June	990	<2	251	<0.05	15	8.0				
	July	1020	2	248	<0.05	6	7.8				
	Aug	1040	5	255	0.07	3	7.8				

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EPL Point	Month	Pollutant									
		EC	O&G	SO_4^{2-}	Fe	TSS	pH	BOD	Faecal Coliform	N	P
		uS/cm	mg/L	mg/L	mg/L	mg/L	-	mg/L	cos/ 100ml	mg/L	mg/L
	Sep	840	<2	219	<0.05	15	7.2				
	Oct	950	<2	296	0.15	4	7.3				
	Nov	1020	<2	239	<0.05	3	7.7				
	Dec	1040	<2	257	0.07	3	8.1				
WMP1	Jan	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	Sample not required			
	Feb	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	Mar	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	Apr	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	May	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	June	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	July	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	Aug	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	Sep	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	Oct	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	Nov	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				
	Dec	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*	*Dry*				

Note [c] – The limit of reporting for Oils and Greases changed from 1 mg/L to 2 mg/L

Legend

BOD = Biological oxygen demand
EC = Electrical conductivity
Fe = Iron (dissolved)
N = Nitrogen
O & G = Oil and Grease
P = Phosphorus
SO_4^{2-} = Sulphate
TSS = Total suspended solids

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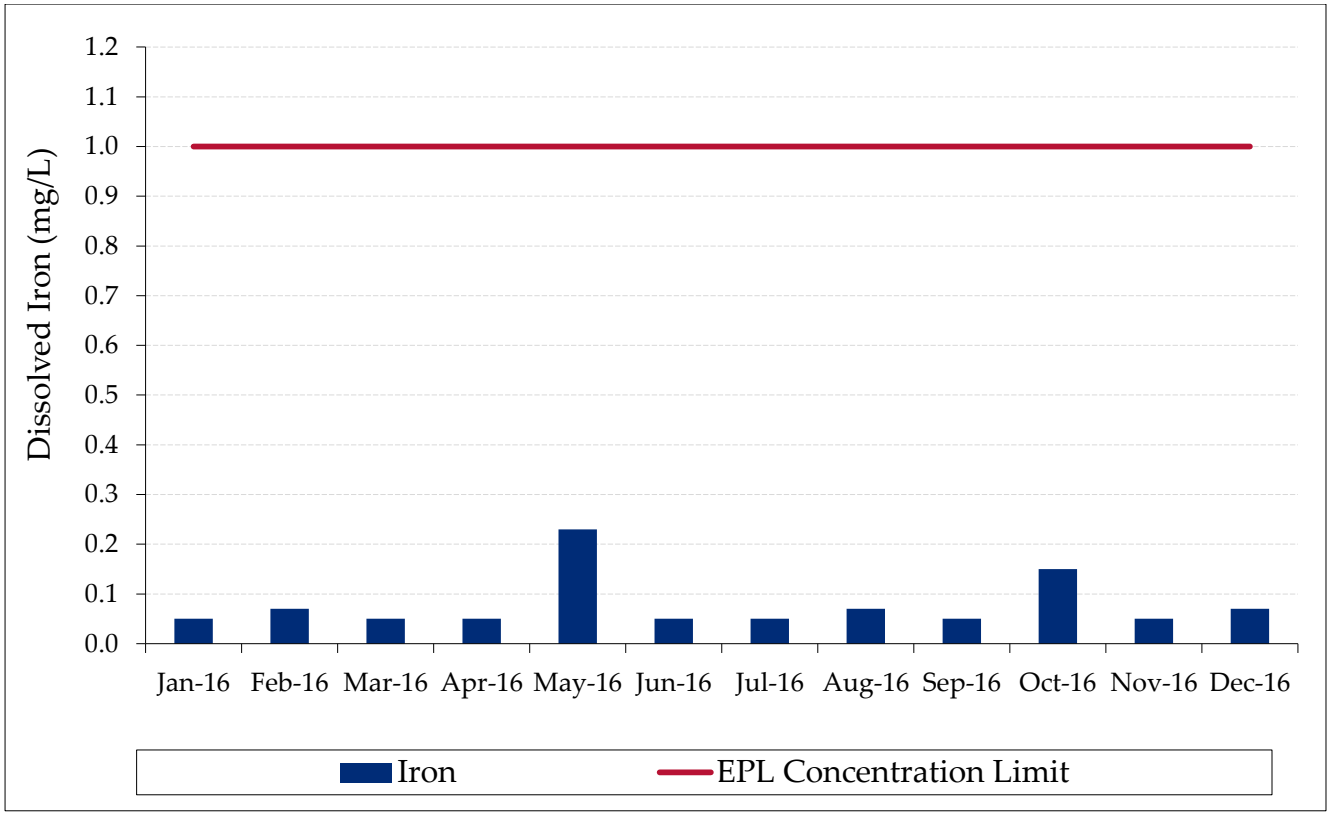

Figure 6.1: Dissolved Iron

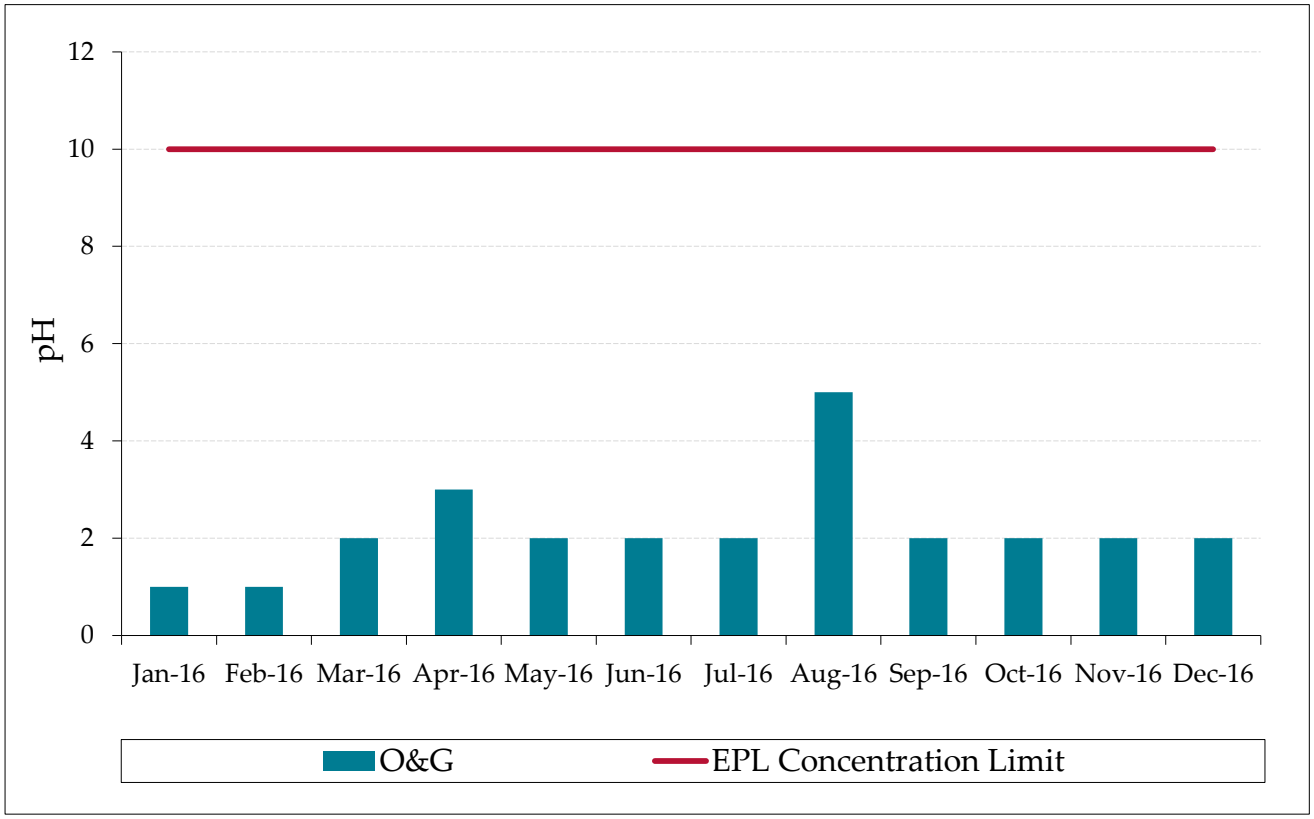

Figure 6.2: Oil & Grease

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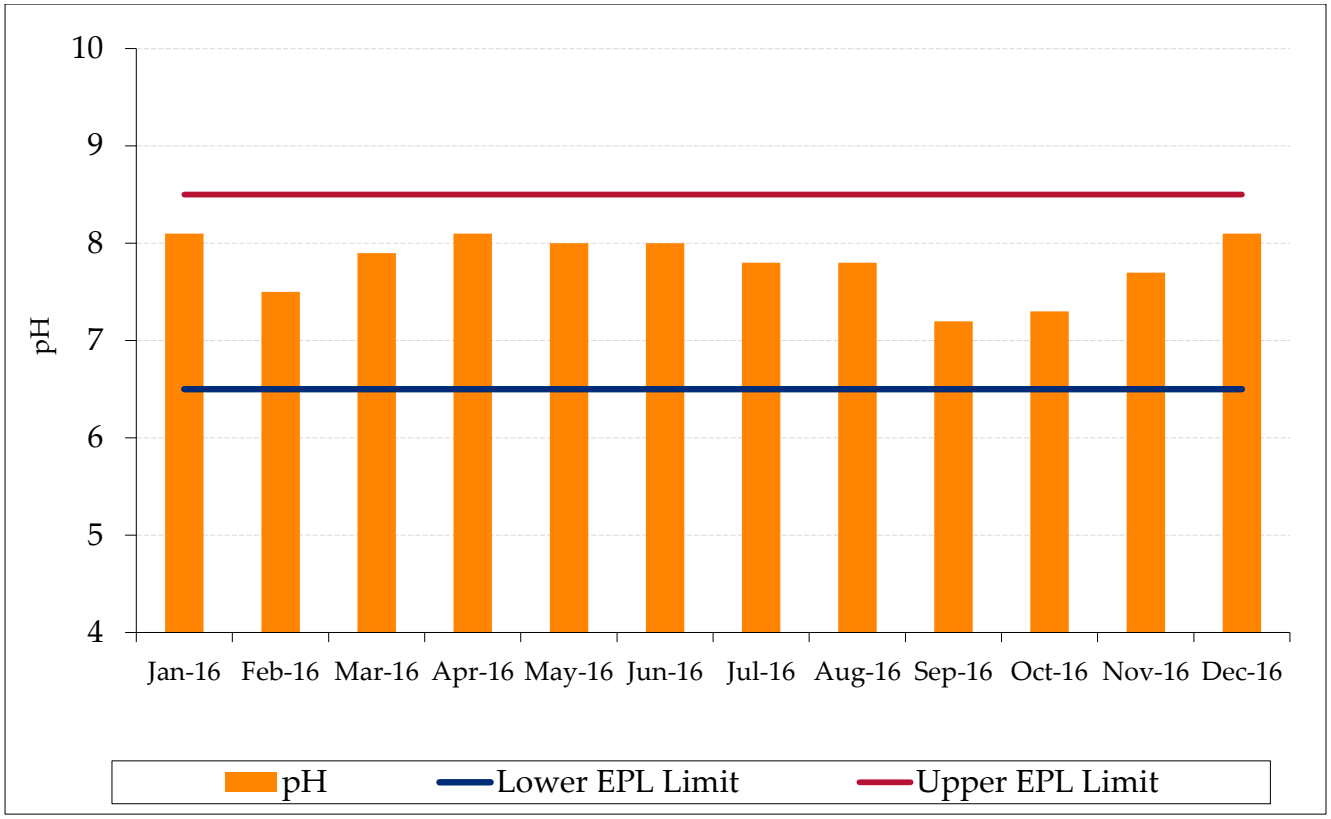

Figure 6.3: pH

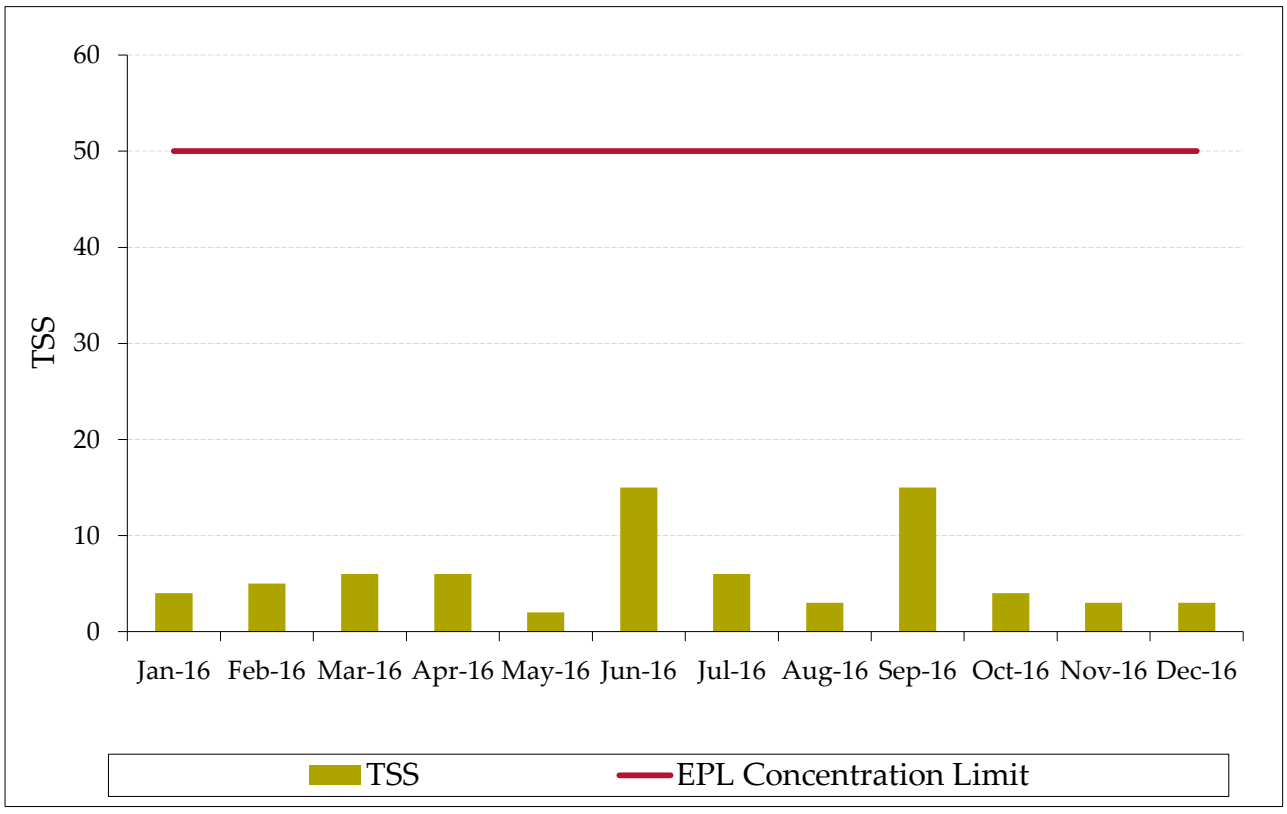

Figure 6.4: Total Suspended Solids

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All samples recorded were within EPL concentration limits during the 2016 reporting period.

A summary of monitoring results for EPL discharge and monitoring points (those with specified concentration limits) can be found below:

- All dissolved iron samples for 2016 were well below the concentration limit of 1 mg/L, with the highest reading of 0.23 mg/L returned in May.
- All oil and grease 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).
- All monthly TSS results were below the EPL concentration limit of 50 mg/L, with the highest reading of 15 mg/L returned in June.

Monthly EPL reporting can be accessed here: http://www.glencore.com.au/EN/who-we-are/baal-bone/Pages/epl-reporting.aspx.

6.1.3 Comparison against previous Annual Reviews

A summary of water quality results from previous Annual Reviews is provided below.

Table 6.5: Water quality results 2006 - 2016

Annual Review Year	Iron	Oil and Grease	pH	TSS
2006	One minor exceedance at LDP1.	Compliant	Compliant	Compliant
2007	One erroneous exceedance at LDP1 of 5.4mg/L in August 2007 – retesting showed compliant level of 0.9mg/L	Compliant	Compliant	One erroneous exceedance at LDP1 of 266mg/L in August 2007 – retesting showed compliant level of 25mg/L
2008	Compliant	Compliant	Compliant	Compliant
2009	Compliant	Compliant	Compliant	Compliant
2010	1 exceedance at LDP1 of 2mg/L in February 2010.	Compliant	Compliant	Compliant
2011	2 exceedances at LD6 in April and October and 1 exceedance at LDP1 in June 2011 of 1.2, 1.2 and 3mg/L respectively.	Compliant	Compliant	Compliant
2012	1 exceedance at LD6 of 2mg/L in September 2012.	Compliant	Compliant	Compliant

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Annual Review Year	Iron	Oil and Grease	pH	TSS
2013	Compliant	Compliant	Compliant	Two Total Suspended Solids (TSS) exceedances at LDP3 (60mg/L) and LDP6 (85mg/L) in February
2014	Total iron recorded in Jan 2014 was 1.11mg/L. However note that EPL limit is for *dissolved iron.* Sampling routine changed to include dissolved iron.	Compliant	Compliant	Compliant
2015	Compliant	Compliant	Compliant	Compliant
2016	Compliant	Compliant	Compliant	Compliant

Occasional exceedances of iron have been recorded in 2006, 2010, 2011, 2012 and 2014. Following further investigations, no apparent relation to mining operations was identified. Furthermore the EPL limit of 1 mg/L is for Dissolved Iron, and the exceedences reported in previous years were Total Iron results. Monitoring was amended during 2014 to include dissolved iron at EPL monitoring points.

Figures 6.5 – 6.8 illustrate the long term trends for dissolved iron, oil and grease, pH and total suspended solids during the period 2011 to 2016 at current EPL monitoring points. Note that there has been no flow recorded at WMP1 during the period. Furthermore EPL monitoring points LD3 and LD6 were removed in 2013.

Figure 6.5 shows the iron level recorded at LDP1 from 2011 to 2016. From 1 August 2013 EPL 765 specifies a *dissolved* iron concentration limit of 1 mg/L at LDP1. Prior to this time, the iron concentration limit at LDP1 was 1 mg/L of *total* iron. Between 2011 and 2016 there has been one exceedance of the EPL iron concentration limit– in June 2011 with a reading of 3 mg/L. An investigation which included follow up testing of LDP1 and examination of water transfers could find no definitive reason for the isolated spike in iron levels.

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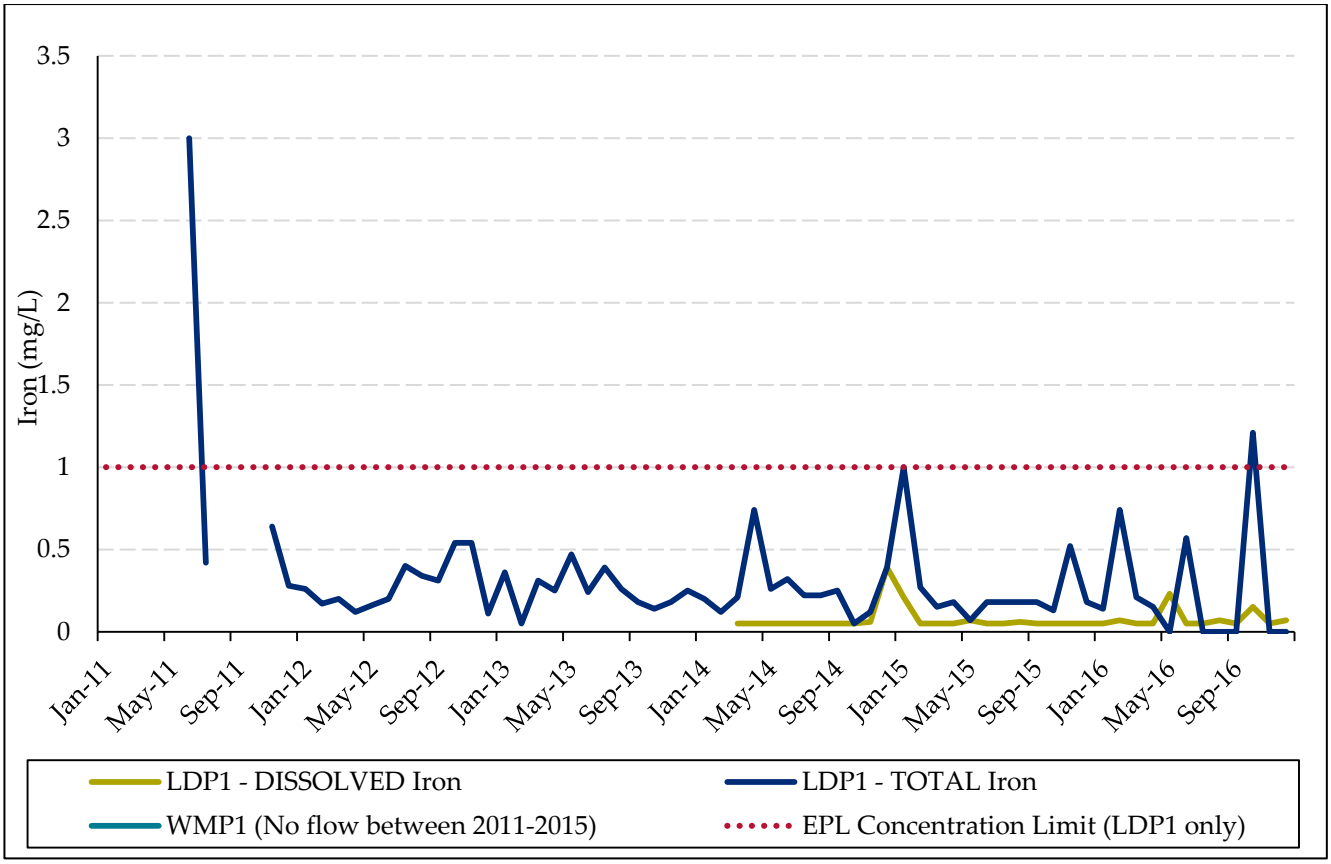

Figure 6.5: 2011 – 2016 Iron – Total and Dissolved.

Figure 6.6 shows oil and grease levels from 2011 to 2016 at LD2 and LDP1. All oil and grease levels at LDP1 during 2011 - 2016 have remained well below the EPL limit of 10 mg/L.

Prior to January 2014, the limit of reporting for oil and grease was < 2 mg/L. From January 2014, limit of reporting value became < 1 mg/L before increasing back to to <2 mg/L in March 2016. These changes in the limit of reporting account for the step change in reported oil and grease levels

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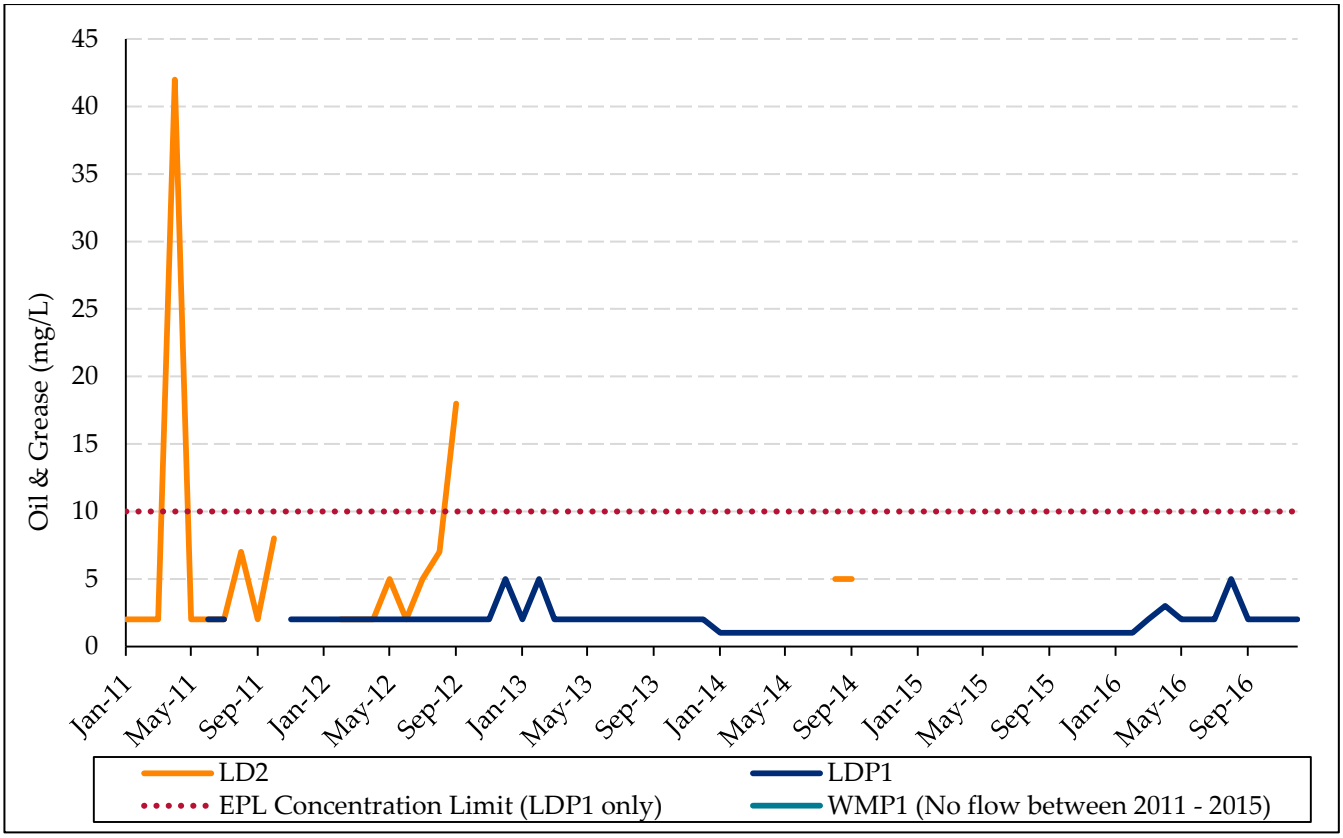

Figure 6.6: Oil and grease levels from 2011 to 2016.

Figure 6.7 shows pH levels at LDP1 and LD2 between 2011 and 2016. All LDP1 pH levels during the reporting period were between the upper and lower EPL pH limits of 6.5 and 8.5. 2012, 2013, 2015 and 2016 saw a decline in pH levels at LDP1 in the summer months – possibly due to seasonal changes.

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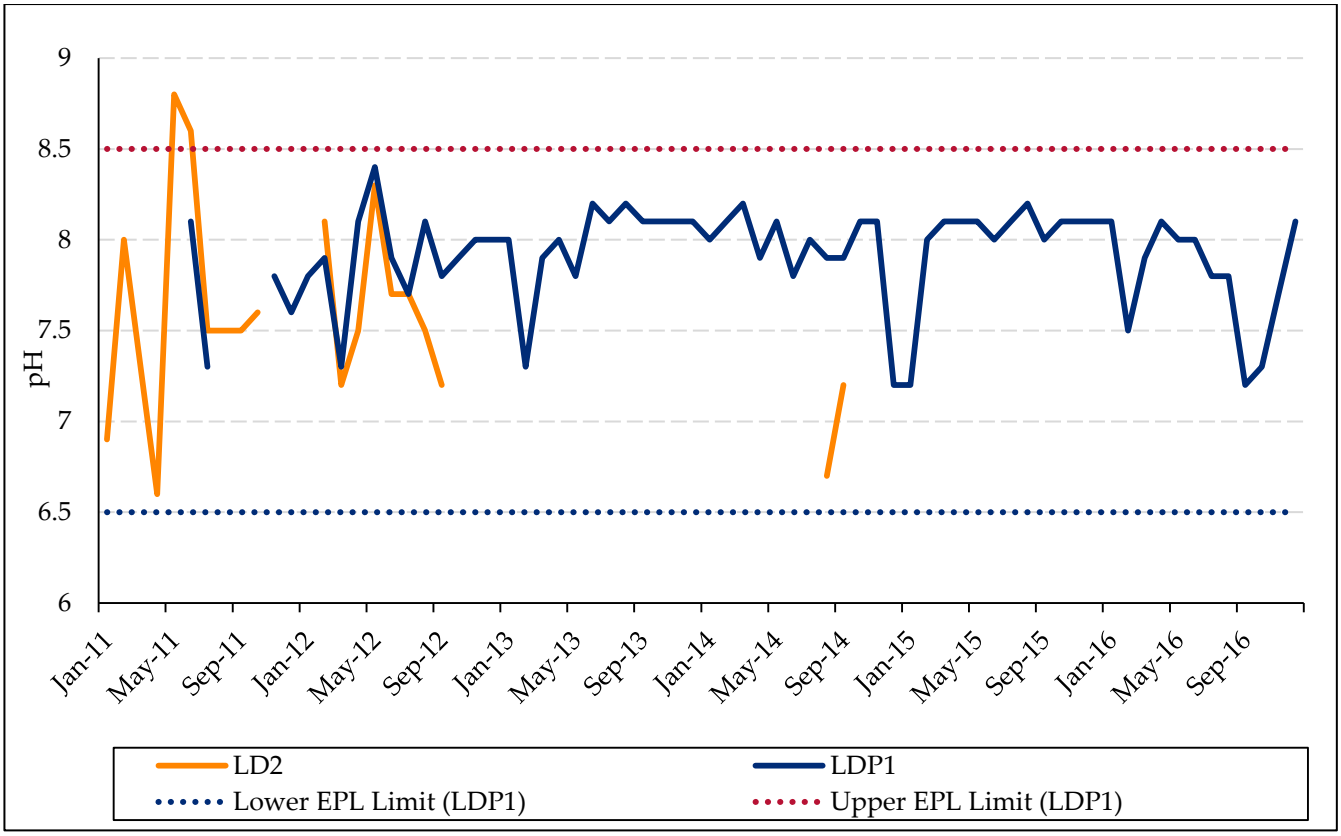

Figure 6.7: pH levels from 2011 to 2016.

Figure 6.8 shows the total suspended solids at LDP1 and LD2 between 2011 and 2016. All results recorded for LDP1 are well below the EPL concentration limit of 50 mg/L. 2013, 2014 and 2015 saw a slight increase in TSS levels at LDP1 during November/December –possibly due to seasonal changes.

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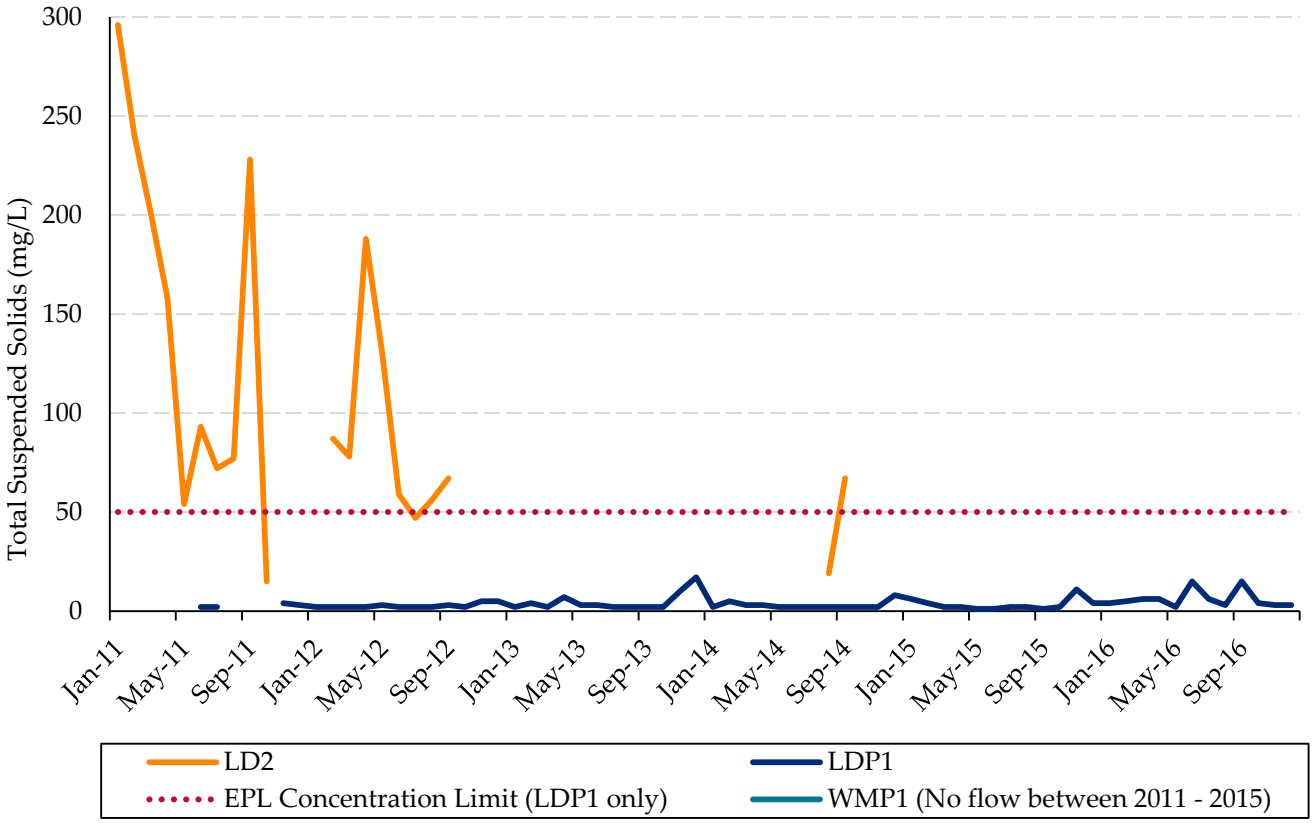

Figure 6.8: Total suspended solids levels from 2011 to 2016.

6.1.4 Comparison against EA

The EA reported that, based on past monitoring results for EPL discharge and monitoring points, water quality was expected to continue to be within the EPL limits during extraction of Longwalls 29-31. This prediction is supported by the results presented in this and past Annual Reviews.

6.2 Groundwater

Baal Bone Colliery currently has three mine dewatering bores, two groundwater supply bores and four shallow piezometer monitoring bores licenced with DPI Water; these are summarised in **Table 18**.

Water quality for the three dewatering boreholes was monitored by ALS on a monthly basis in conjunction with the surface water monitoring program up until July 2013 as described above in **Section 6.1.**

After the relinquishment of LDP3 and LDP6 in July 2013, the north and south de-watering borehole sites were no longer able to be sampled and were removed from the monthly sampling schedule. The two groundwater supply bores WAL27887 (80BK136703 and 80BL135509) are not currently used and samples are therefore not available for testing.

Table 6.6: Licensed bores and piezometers*

Licence Number	Expiry Date	Location / Use
WAL 27887 (80BL136703)	Perpetuity	CHPP water make-up bore near UC1 (not used during reporting period)
WAL 27887 (80BL135509)		Borehole No. 6 near Rail Loop; previously used for dust suppression (low yielding; no longer used)
WAL 34952 (80AL716835)	Perpetuity	Turon Crudine River water source
80BL236132	Perpetuity	Mine dewatering Longwall 1 (South Bore 1)
80BL236134	Perpetuity	Mine dewatering Longwall 1 (South Bore 2)
80BL239077	18/06/2016	Mine dewatering Longwall 19 (North Bore)
10BL601877	Perpetuity	BBN175; LW 29-31 groundwater monitoring piezometer. This piezometer is known as BBPB1, and monitors the sandstone aquifer north of the Coxs River Swamp.
10BL601816	Perpetuity	BBN176; LW 29-31 groundwater monitoring piezometer This piezometer is known as BBPB2, and monitors the sandstone aquifer north of the Coxs River Swamp
10BL601817	Perpetuity	BBN177; LW 29-31 groundwater monitoring piezometer This piezometer is known as BBPB3, and monitors the sandstone aquifer on the eastern side of the Coxs River Swamp
10BL601970	Perpetuity	BBN 179; LW 29-31 groundwater monitoring piezometer This piezometer is known as BBPB4, and monitors the sandstone aquifer on the western side of the Coxs River Swamp

* In addition to the four piezometers licensed with DPI Water (**BBPB1-4**), Baal Bone has two other monitoring piezometers (**BBPB5 and BBPB 6**) which due to the shallowness of the bores do not require licencing.

The six groundwater monitoring piezometers were installed and equipped with data loggers in 2007 to gather background data and to monitor subsidence effects on local groundwater regimes as part of the SMP for Longwalls 29-31.

Data loggers in the piezometers have been monitored on a regular basis to gather data regarding groundwater level fluctuations in the vicinity of the Coxs River Swamp before, during and after mining Longwalls 29-31. Baseline data obtained prior to commencement of mining confirms a strong correlation between groundwater levels and prevailing climatic conditions, in particular a strong relationship to rainfall which is a major source of recharge.

Monitoring data in the six piezometers (four aquifer and two swamp/alluvial) are presented in **Figure 16** to **Figure 22**. Piezometers BBPB1-BBPB4 monitor groundwater levels and chemistry in the deeper sandstone aquifer, while piezometers BBPB5 and BBPB6 monitor groundwater levels and chemistry in the shallower Coxs River Swamp.

Baal Bone's Surface and Groundwater Response Plan includes a Trigger, Action, and Response Plan (TARP), which includes triggers for assessing changes to groundwater levels. Additionally, there are water quality trigger values for a number of water chemistry parameters contained in Baal Bone's approved Groundwater Monitoring Plan. The TARP and trigger levels are used as a measure of impacts to groundwater levels and quality in both the deep sandstone and shallower swamp groundwater aquifers. The groundwater level and qual;ity trigger levels are presented below. Response and rehabilitation methodologies have also been included where appropriate.

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Table 6.7: TARP for variations from Groundwater Model predictions

Trigger	Action	Response	Plan	Timeframe
• Groundwater monitoring results deviate from predictions made in the EA; • Increased groundwater make in the underground workings compared to predictions made in the EA (AECOM, 2010); • Consecutive pressure monitoring data from the regional monitoring network, over a period of 6 months, shows an adverse impact from the previous data or groundwater model predictions; or • Annual review of the depressurisation of the coal measures shows an adverse impact from the previous data or groundwater model predictions.	• Notify the Baal Bone Colliery Environment and Community Officer, or delegate; • Review all groundwater pumping data; • Identify if the installation of additional piezometers is required; • Investigate any external influence which may be affecting the results including climatic data; and • Review operations and investigate for links to operational activities.	• Review the frequency of groundwater monitoring in the affected area; and • Notify and consult with relevant government agencies on investigation and outcomes (e.g. DPI Water, DPE, EPA).	• Amend the groundwater model if required; and • Amend the Groundwater Monitoring Plan if required.	Notification to Secretary and any other relevant agencies (e.g. EPA, DPI Water) as soon as practicable (Schedule 5, Condition 5 of PA 07_0178).

Table 6.8: Groundwater Quality Trigger Levels

Element	Short Term Minor Change Criteria^	Short Term Major Change Criteria^	All Bore 80th Percentile	BBP4 80th Percentile
pH	4.6	4.2	5.0*	5.5*
Electrical Conductivity (µS/cm)	300	300	90	90
Copper (mg/L)	0.041	0.043	0.011	0.007
Iron (mg/L)	15.25	24.28	11	11
Zinc (mg/L)	0.143	0.175	0.098	0.074

Source: ^Aurecon (2012)

*Note: * 20th Percentile*

Note: 300 µS/cm is ANZECC (2000) guideline

Note: Minor change criteria apply for periods of 1 or 2 consecutive months while Major Change Criteria apply for periods or more than 2 months.

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6.2.1 Groundwater Levels

Groundwater levels in the six groundwater monitoring piezometers during 2016 are presented in **Figure 6.9**. Long term trends of groundwater levels are shown in **Figure 6.10**.

Normally, piezometers BBPB2, BBPB3, and BBPB4 display the greatest variation, as they are located on the valley slopes outside the swamp and are predominately influenced by rainfall. This trend has continued in the available data. These piezometers demonstrated a minor rise in groundwater level in response to good rain during December 2015-March 2016. This was followed by distinct reductions in groundwater level in April-May due to very dry weather. Good rain over the June-October period is reflected in distinct rises in the groundwater level in all piezometers with a slight decline in levels occurring after this.

The north – to – south downstream groundwater gradient has been broadly maintained over the current period (highest level observed in BBPB2 and lowest level observed in BBPB4), indicating that an overall flow has been maintained down through the swamp.

The rainfall deficit curve plots the cumulative difference between observed monthly rainfall and the long-term average. From May 2015 rainfall deficit has been trending steadily downward, into increased deficit, due to sustained dry conditions. This trend reversed in July 2016, due to good rain, with a deficit of -350 mm being maintained for the latter part of the year.

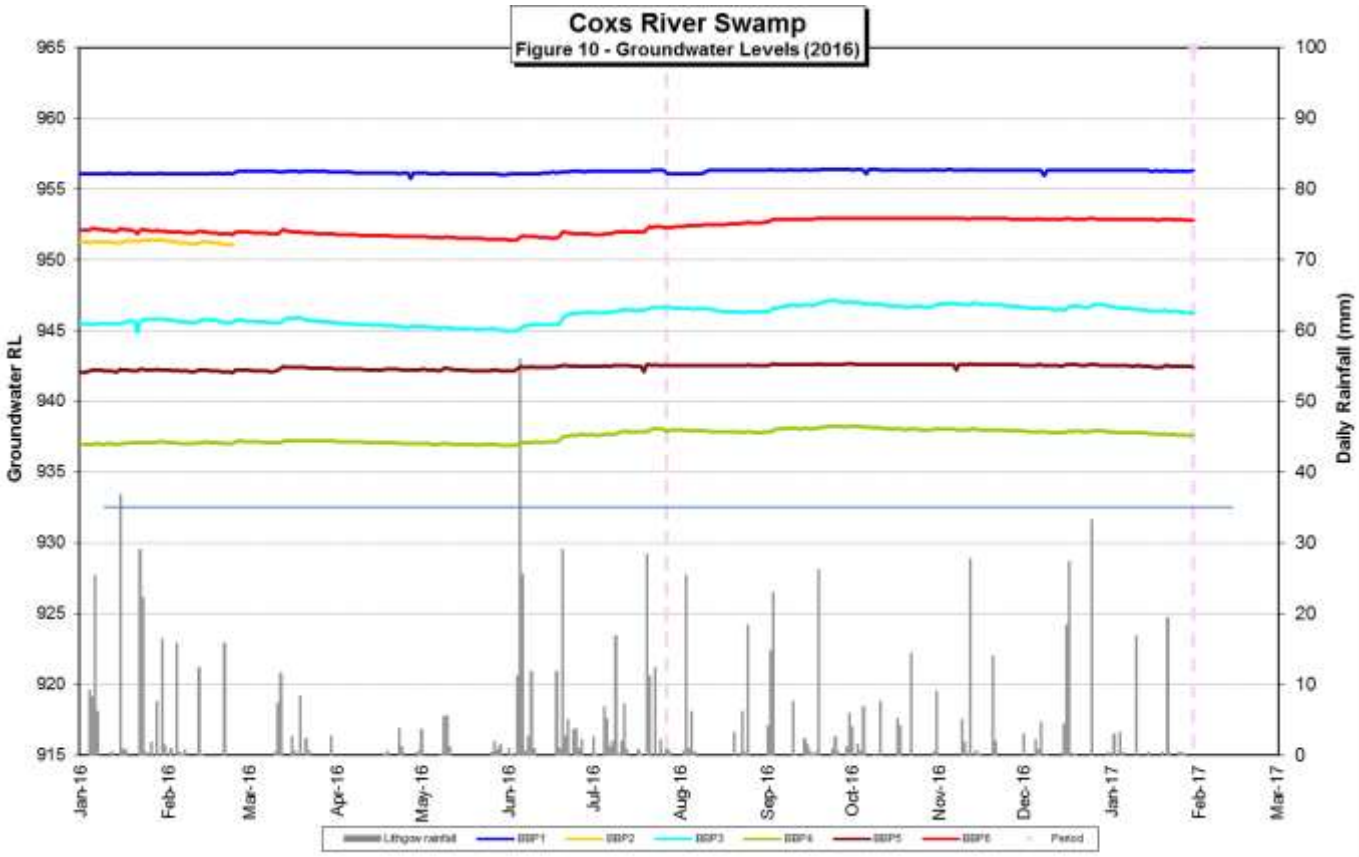

Figure 6.9: Groundwater levels 2016

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6.2.1.1 Comparison against Previous Annual Reviews

Most groundwater levels appear to be approximately at or above pre-mining levels. The only exception is at piezometer BBPB1, where groundwater level has stabilised at RL 956 m (approximately 5 m below pre-mining level).

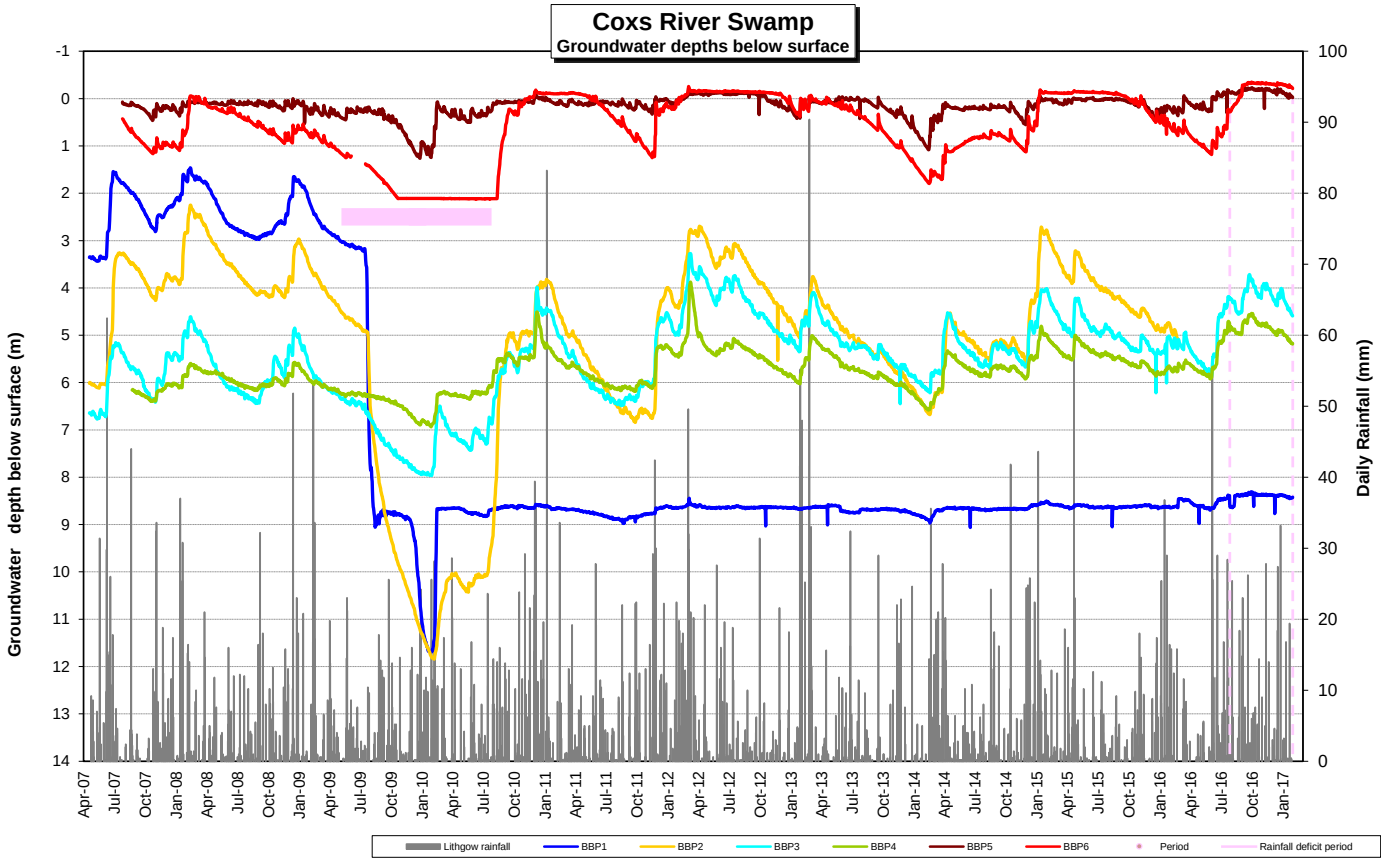

Figure 6.10: Longterm groundwater trends

6.2.1.2 Comparison against EA

The EA concluded that the likelihood of extraction of Longwalls 29-31 resulting in a significant impact on the Coxs River Swamp is considered extremely low.

All groundwater levels appear to be approximately at (or above) pre-mining levels, with the only exception being BBPB1, where groundwater has re-stabilised at RL956 (approximately 5 metres below pre-mining level). BBPB1 has shown a stable groundwater level since February 2010. There is obviously still some influence from the fault zone at this site as the groundwater level is below pre-mining levels. The fault zone lies between the BBPB1 and the swamp, so there is unlikely to be any hydraulic connection between the zone of depleted groundwater and the swamp. The groundwater level at BBPB1 is still higher than the groundwater level in the swamp so that even if there is a connection across the fault, groundwater flow would still be towards the swamp.

Over the long-term, an emerging trend shows that groundwater levels in BBPB2, BBPB3 and BBPB4 all appear to correlate well with the overall cumulative rainfall deficit (difference between the monthly rainfall and the long-term average). The other remaining piezometers (BBPB5 and

BBPB6), all appear resistant to short-term weather variances, due to the location of BBPB5 and BBPB6 in the centre of the swamp, which always remains saturated.

Also refer to **Section 3.4.2.2.**

6.2.2 Groundwater Chemistry

Groundwater chemistry monitoring results for the reporting period are provided below in **Figures 6.11 to 6.15**.

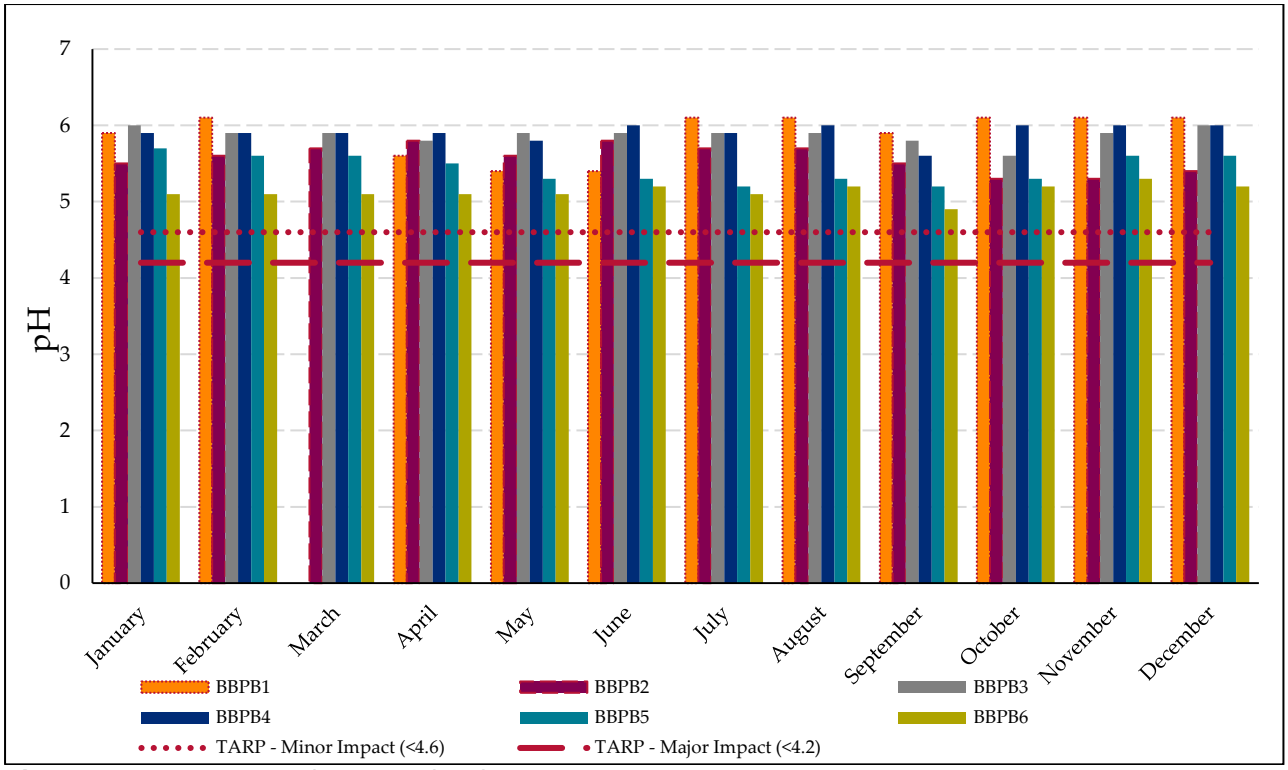

Figure 6.11: 2016 Groundwater pH levels.

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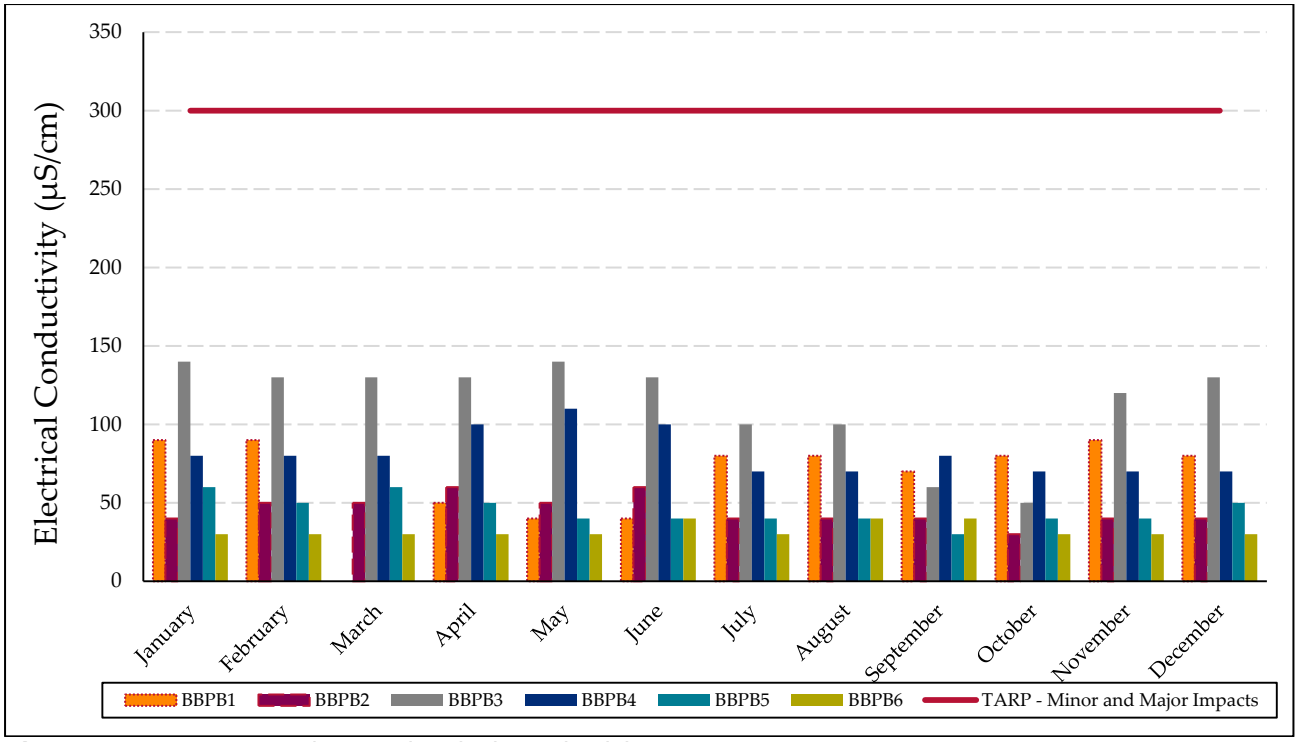

Figure 6.12: 2016 Groundwater Electrical Conductivity.

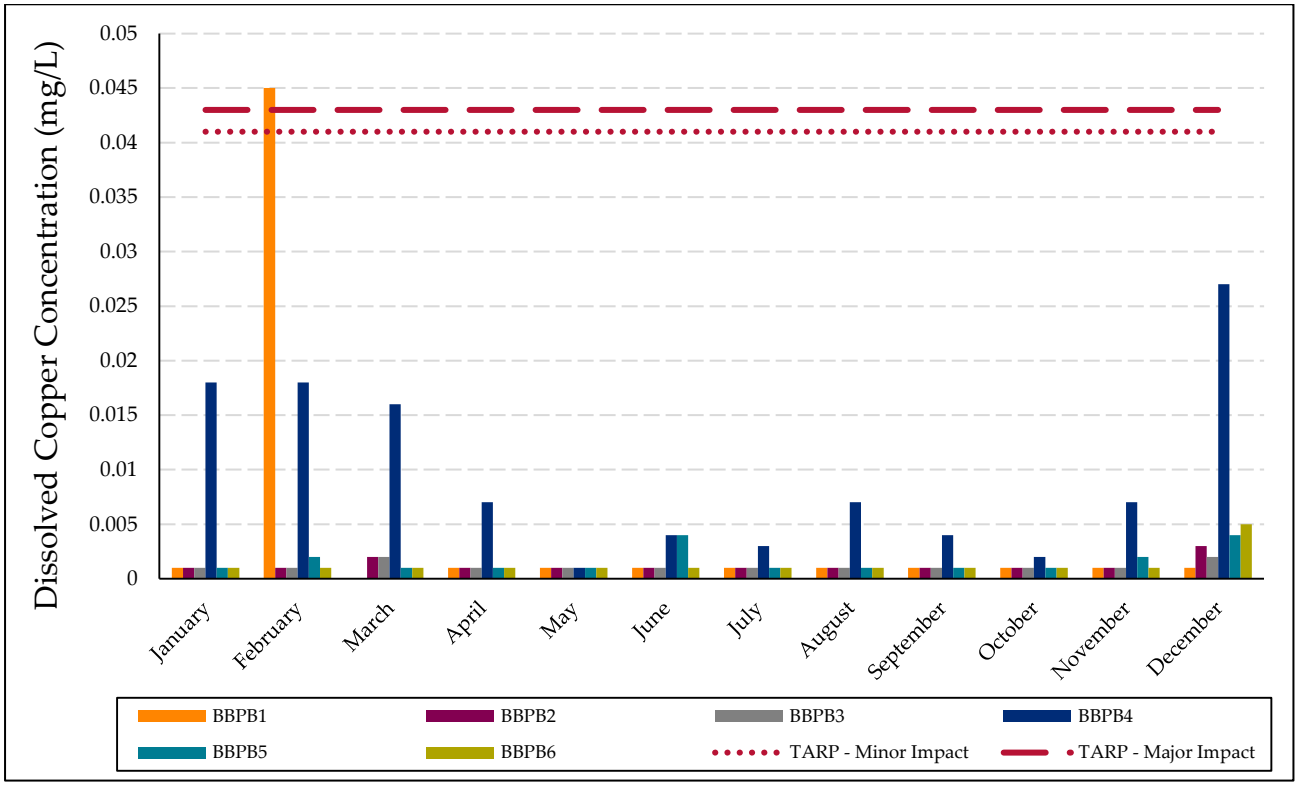

Figure 6.13: 2016 Groundwater Copper levels.

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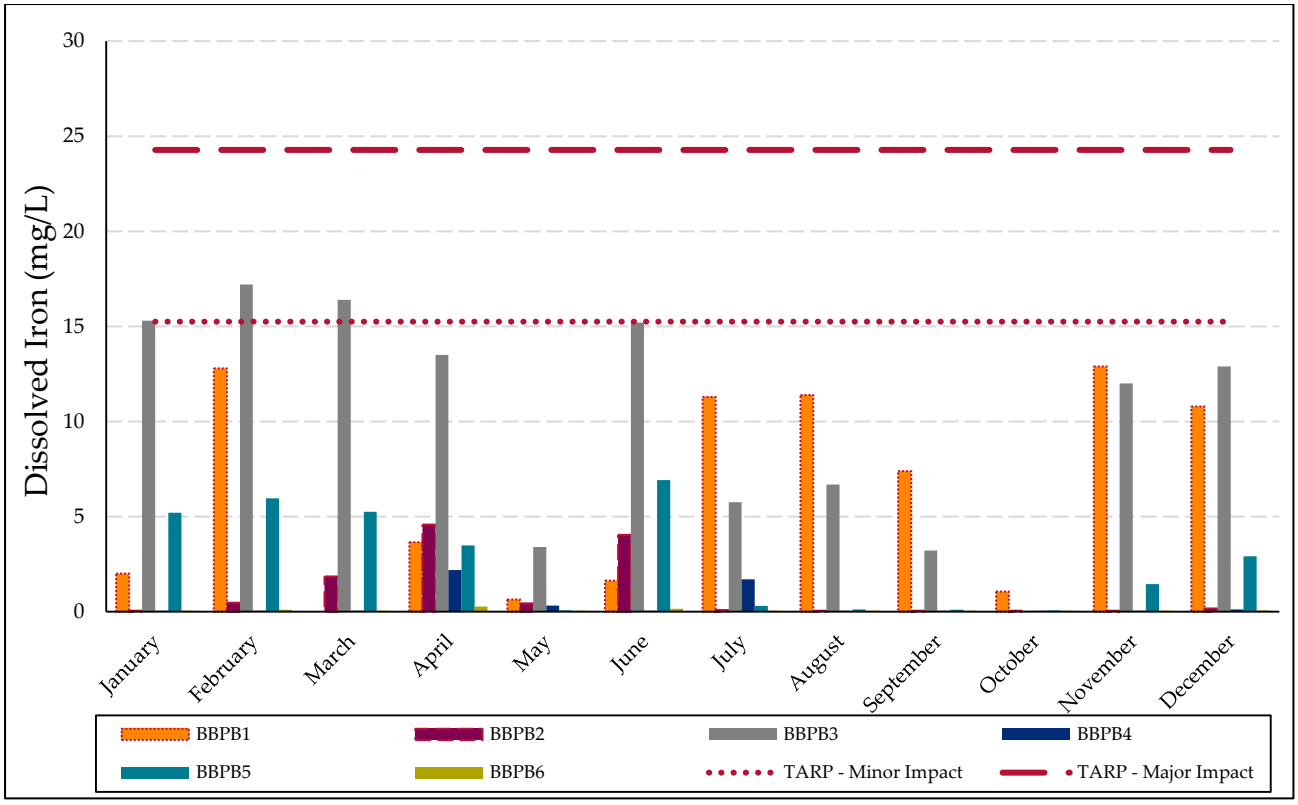

Figure 6.14: 2016 Groundwater Iron levels.

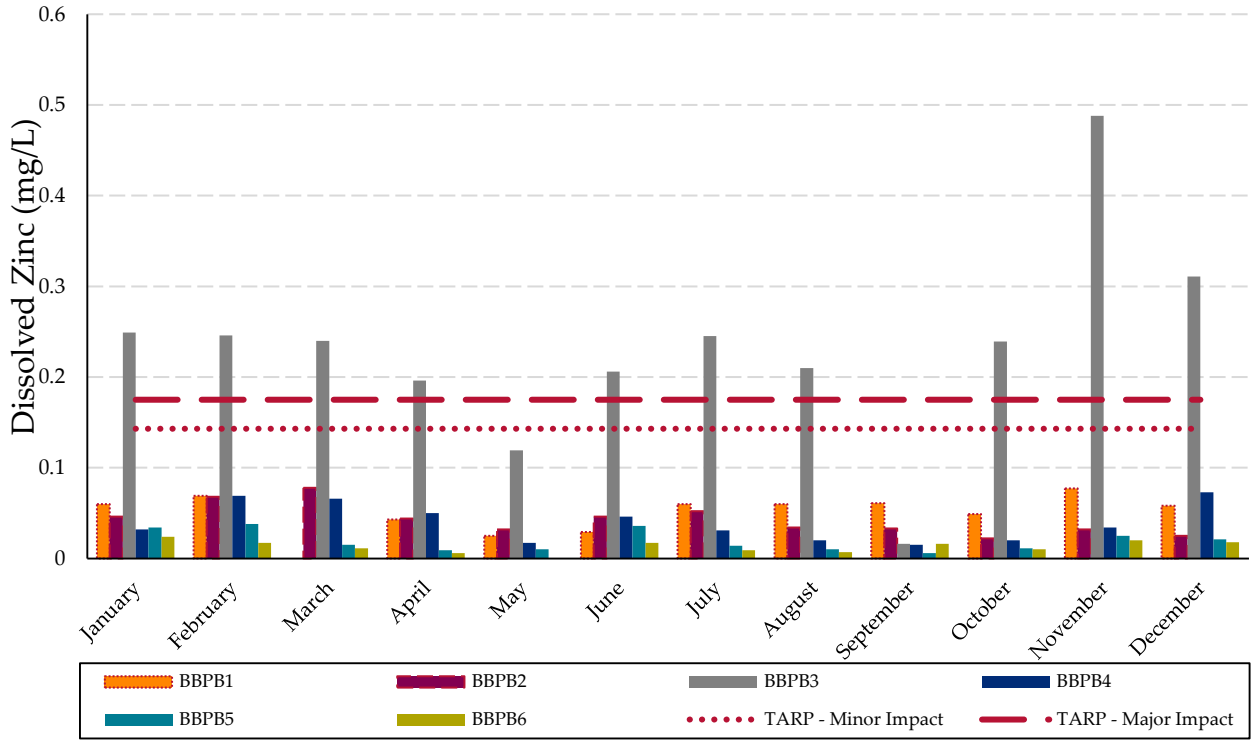

Figure 6.15: 2016 Groundwater Zinc Levels.

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As shown in **Figures 6.11, 6.12** and **6.13** above: pH, electrical conductivity and copper levels were within both the minor and major impact criteria for all groundwater monitoring bores during 2016, except for one anomalous result at BBPB1 in February 2016.

As shown above in **Figure 6.14**, 2016 iron levels were below the minor impact trigger level for all groundwater monitoring wells with the exception of BBPB3. In a number of months during 2016 (Feb and Mar), BBPB3 marginally exceeded the minor impact trigger level. Due to the short nature of these exceedances (≤ 2 consecutive months) this constitutes a minor impact with no response required.

As shown above in **Figure 6.15**, 2016 zinc levels were below the minor impact trigger level for all groundwater monitoring wells with the exception of BBPB3. BBPB3 exceeded the minor and major impact TARP trigger levels during all months in 2016, except for May and September. This major impact TARP event has continued since August 2012. Note that mining in longwalls 29-31 ceased in September 2011.

In 2012 Baal Bone Colliery commissioned a report by Aurecon which investigated groundwater quality and the TARP trigger levels:

Groundwater Level and Water Quality Changes compared to TARP Trigger Values in and around the Coxs River Swamp from 2009 to 2011 for SMP Area LW29-31 (Aurecon, March 2012).

The Aurecon (March 2012) report investigated the increases in zinc at BBPB3 however was unable to find obvious reasons for these increases. The Aurecon investigation suggested that variable rainfall and corresponding changes in groundwater levels could be contributing to changes in zinc levels.

In response to the major impact TARP event at BBPB3, Baal Bone Colliery submitted an initial formal notification to the Principal Subsidence Engineer and Interagency Committee on 5 December 2012. With the continuation of the TARP major impact levels, further formal notifications were issued to the Principal Subsidence Engineer and interagency committee on 17 June and again on 5 December 2013.

6.2.2.1 Comparison against previous Annual Reviews

Table 6.9 summarises previous Annual Review results and any exceedances of TARP trigger levels in BBPB1 – BBPB6 during the period 2011 – 2016.

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Table 6.9: Summary of TARP exceedances and previous Annual Review results

	BBPB1	BBPB2	BBPB3	BBPB4	BBPB5	BBPB6
2011	No TARP exceedance	No TARP exceedance	**Dissolved Iron**: Feb to Dec **Dissolved Zinc**: Jan, Feb, Aug, Nov, Dec	**Dissolved Copper**: Aug - Dec	No TARP exceedance	No TARP exceedance
2012	No TARP exceedance	No TARP exceedance	**Dissolved Iron**: Jan **Dissolved Zinc**: Jan, Jun, Aug to Dec	**Dissolved Copper:** Jan, Jul to Oct **Dissolved Zinc:** Oct	No TARP exceedance	No TARP exceedance
2013	No TARP exceedance	No TARP exceedance	**Dissolved Iron:** Jan, May, Oct to Dec **Dissolved Zinc:** Jan to Dec	**Dissolved Copper:** Sep to Dec **Dissolved Zinc:** Dec	No TARP exceedance	No TARP exceedance
2014	No TARP exceedance	No TARP exceedance	**Dissolved Iron:** Jan to Mar, Jul **Dissolved Zinc:** Jan to Dec	**Dissolved Copper:** Jan, Sep	No TARP exceedance	No TARP exceedance
2015	No TARP exceedance	No TARP exceedance	**Dissolved Iron:** Jan, Feb, Apr, Jun, Dec **Dissolved Zinc**: Jan to Dec	-	No TARP exceedance	No TARP exceedance
2016	**Dissolved Copper:** Feb	No TARP exceedance	**Dissolved Iron:** Feb, Mar **Dissolved Zinc**: Jan, Feb, Mar, Apr, Jun, Jul, Aug, Oct, Dec	-	No TARP exceedance	No TARP exceedance

6.2.2.2 Comparison against EA

The EA concluded that the likelihood of extraction of Longwalls 29-31 resulting in a significant impact on the Coxs River Swamp is considered extremely low.

In terms of groundwater quality, minor and major changes have been noted for pH and trace metals at some bores however electrical conductivity has not exceeded its trigger level of 300 µS/cm. This indicates that the local groundwater has a very low salinity and is consistent with the local background of only 100µS/cm.

With the exception of the major changes for copper and zinc, noted in Section 3.4.2, the other changes to groundwater quality were minor in terms of duration above the trigger levels. The Aurecon (2012) report on groundwater quality concludes that minor changes to groundwater quality can occur by chance in the variable conditions of rainfall and the resulting groundwater level changes.

In terms of both groundwater levels and quality, monitoring confirms that there has been no measurable impact from mining on the swamp.

To assess potential impacts on the swamp, monitoring of vegetation on the surface above longwalls 29 to 31 at Baal Bone Colliery commenced with a baseline survey in 2007 and have continued until 2011 with systematic monitoring of selected sites which are within the area predicted to be affected by subsidence. Gingra Ecological Surveys were engaged to prepare the final report in 2011. The report concluded that: "*There has been no evidence which would indicate an effect of subsidence on vegetation distribution and abundance at the monitoring sites."*

Species richness recorded across all sites during spring and autumn since the recoding commenced is provided **Figure 6.16.** The results show that levels of species diversity recorded in 2011 were at the higher end or above the previously recorded range at each site

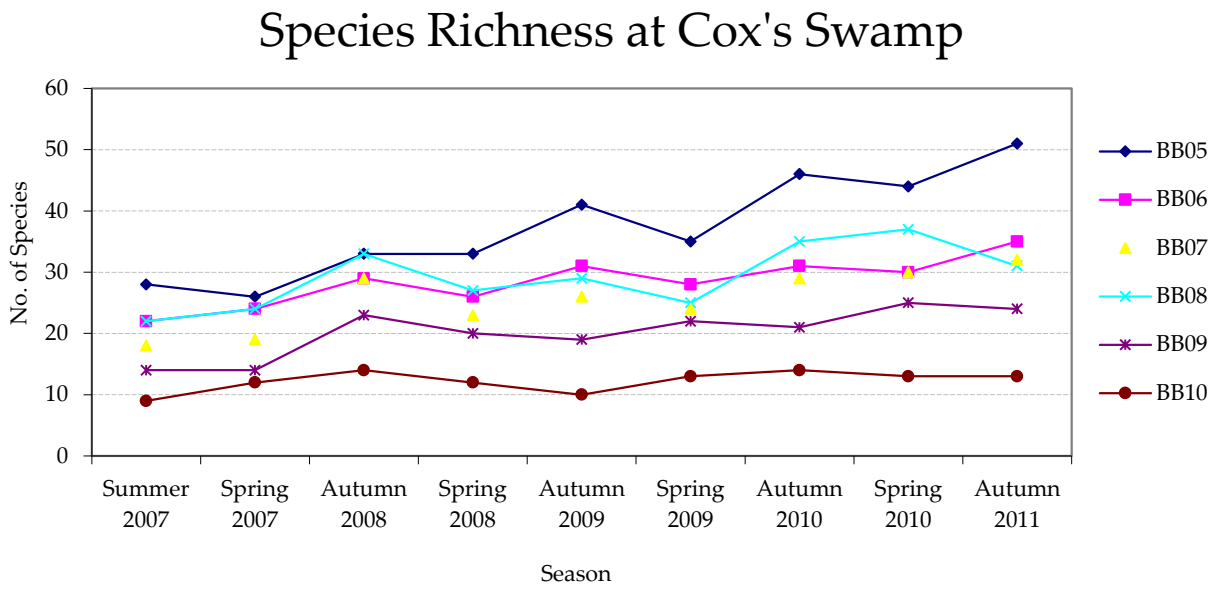

Figure 6.16: Summary of species richness at the monitoring sites

6.2.3 Groundwater Extraction

Mine water and groundwater intercepted by underground mining operations is extracted from both the north (Longwall 19) and south (Longwall 1) boreholes. This water is pumped via a total length of 7 kilometres of pipeline back to the pit top's 'Dirty Water' management system. After discharge through an iron aeration system and retention in Lake Tegan, water overflows into the overshot dam and leaves site through LDP1. Alternatively this water can be discharged into the dirty water dam, after retention time the water is then pumped to the process water dam, overflows onto Ben Bullen Creek and then leaves site through LDP1 at the overshot dam.

Historically discharges from the north and south dewatering bores were discharged via Licence Discharge Points 3 and 6 (LDP3 and LDP6) into the Temperate Peat Swamp of Baal Bone Creek. In late 2012 the EPA requested that Baal Bone Colliery cease discharging into the Temperate Peat Swamp. Due to the requirement to sustain lowered water levels within the underground mine for the purpose of maintaining the current training facility layout, an agreement was reached by the site and the EPA that water from the boreholes would be piped back to the water management system at the pit top and discharged through LDP1 and into Jews Creek. Subsequently LDP3 and LDP6 were relinquished on 31st July 2013.

The total water extraction through the northern borehole (Longwall 19) in 2016 was 634 ML. During 2016, the total amount of water extracted through the south bores (Longwall 1) was 763 ML. **Table 6.10** shows water taken by the Baal Bone operation for the 2016 reporting period.

Table 6.10: Water take for 2016 reporting period.

Water License #	Water sharing plan, source and management zone (as applicable)	Entitlement (ML)	Passive take/ inflows (ML)	Active pumping (ML)	TOTAL (ML)
80BL236132	Not Applicable	-	741	-	741
80BL236134	Not Applicable	-	21	-	21
80BL239077	Not Applicable	-	634	-	634
WAL27887*	NSW Murray Darling Basin Porous Rock Groundwater Sources Sydney Basin MDB Groundwater Source Sydney Basin MDB (Pther) Management Zone	750	-	Not Metered	-

* Extraction of water allocated to Wallerawang Collieries Limited by WAL27887 will be undertaken by Ulan Coal Mines Limited until 18 May 2018, facilitated under the DPI Water '*Application to change water access licence*' process. As such, all conditions of this licence are the responsibility Ulan Coal Mines Linited.

6.2.3.1 Comparison against previous Annual Reviews

Figure 6.17 shows the reported annual extractions for the North and South bores from 2011 to 2016. Since 2012 total groundwater extraction had been steadily decreasing, but experienced an increase in 2016 which was likely due to an increase in rainfall and availability of dewatering equipment.

6.2.3.2 Comparison against EA

The EA concluded that the volume of groundwater removed from the mine in 2008 was representative of the volume of groundwater that would need to be dewatered annually to ensure safe working conditions in the areas to be mined (Longwalls 29 to 31 and Remnant Areas). The volume of groundwater extracted in 2008 was approximately 1.5 GL/annum.

In 2016, 1.40 GL of groundwater was extracted via the north and south dewatering bores – hence within the expected range of groundwater extraction predicted in the EA.

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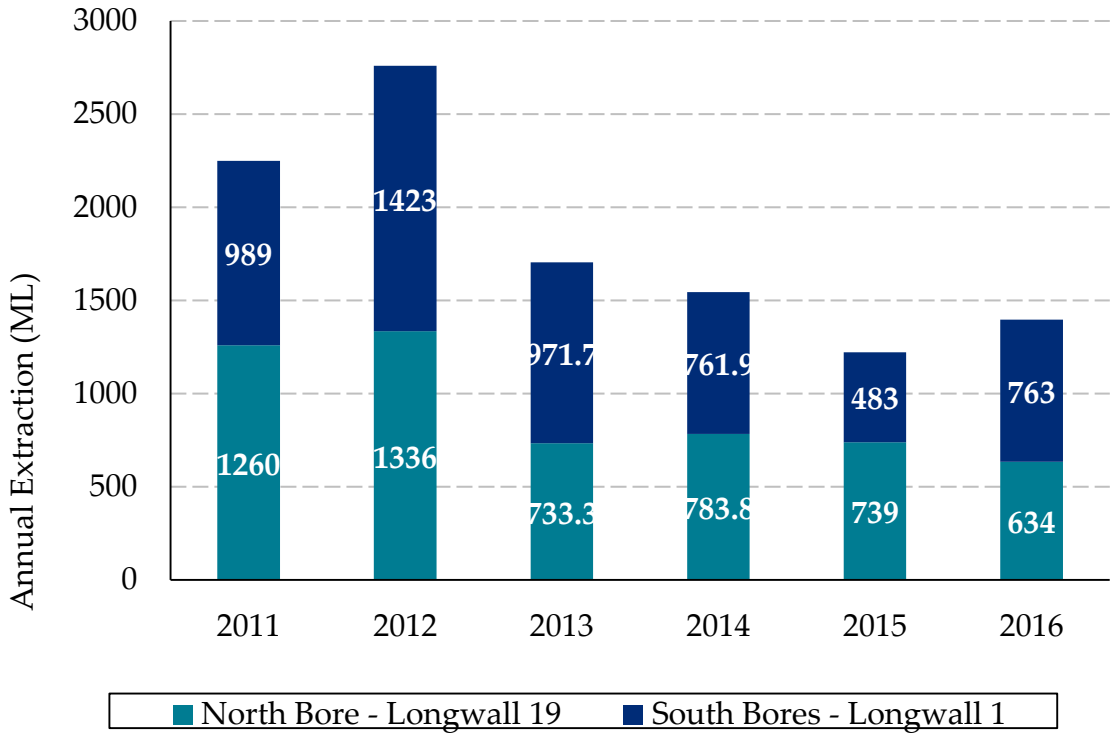

Figure 6.17: Annual extraction from North and South bores from 2011 to 2016

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7 Rehabilitation

7.1 Buildings

No buildings were removed during 2016.

7.2 Rehabilitation of Disturbed Land

The current disturbed footprint of Baal Bone has been systematically and progressively reduced due to substantial rehabilitation carried out in conjunction with and following the recent open cut mining program which concluded in 2007. The current levels of disturbance at the site have been significantly reduced due to these recent rehabilitation works (refer to **Plan 3**).

The capping of REA 5, cell 1 was completed in April 2012 A geotechnical study carried out in November 2013, indicated that REA 5, cell 2 was sufficiently dry and subsequently was capped in August 2014. Contouring and seeding of REA 5, cell 1 and 2 was completed in November 2015. The REA 5 area has now been rehabilitated.

During 2013, the south east ventilation (utilised for longwall panels 29-31) fan was removed and the shaft filled. Site levelling, fence removal and topsoil replacement was completed in June 2013. In consultation with the State Forrest, the area was prepared and seeded in 2014 using a mix of local seeds.

A summary of rehabilitation works for previous, current and next reporting period are detailed in **Table 7.1**.

Table 7.1: Summary of Rehabilitation Performance

Mine Area Type	Previous Reporting Period (Actual) (ha)	This Reporting Period (Actual) (ha)	Next Reporting Period (Forecast) (ha)
	2015	2016	2017
A. Total Mine Footprint	351.36	351.36	351.36
B. Total active disturbance	168.08	168.08	141.08
C. Land being prepared for rehabilitation	6.26	0	27*
D. Land under active rehabilitation	6.26	0	27*
E. Completed rehabilitation	183.28	183.28	210.28

* rehabilitation of the Northern Void and adjacent areas is planned to occur during 2017, should no mining activities occur.
Note: Values at B and C are given as at the end of the reporting period whilst values at C and D reflect areas rehabilitated during the period..

7.3 Rehabilitation Inspections and Monitoring

Three types of rehabilitation monitoring/inspections are undertaken at Baal Bone. These include;

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- Regular inspections by site personnel,
- An annual environmental rehabilitation walk around inspection as per *CAA HSEC FRM 0025 11.16* and
- Annual ecological rehabilitation monitoring which was implemented in 2009.

7.3.1 Annual Environmental Rehabilitation Inspection

The annual environmental rehabilitation inspection was conducted by DnA Environmental in November 2016. Consistent with the 2014 and 2015 inspection, the 2016 inspection identified ongoing improvements in the results of the rehabilitation areas within both the north and south former open cut areas. The inspection noted generally good rehabilitation across all areas, with some isolated areas needing additional work to remediate erosion and rilling.

The dominance of acacias has been critical to the success of the sites, providing valuable ecological services in the short term via the provision of perennial vegetation cover, nitrogen fixation, dead leaf material and additional micro sites and soil surface relief. However, the natural successional processes were evident in the 2016 inspection, with a significant decline in shrub densities as a result of self-thinning and a concurrent increase in ground cover noted. This has resulted in a much more open environment which has promoted an increase perennial ground cover plants and native shrubs. This will lead to an increase in the proportion of eucalypts at the sites to more suitable levels in the longer term.

7.3.2 Annual Ecological Rehabilitation Monitoring

Annual Ecological Rehabilitation Monitoring is undertaken at Baal Bone Colliery to evaluate the success of rehabilitation and Baal Bone Colliery's progress towards fulfilling long term land use objectives. The monitoring program will continue within rehabilitation areas until all rehabilitation closure criteria are satisfied, as well as the requirements of the DRE.

A total of 15 permanent monitoring sites have been established throughout Baal Bone Colliery's land holdings to monitor flora, fauna, landscape function and habitat values aimed at assessing ecosystem function in remnant vegetation and rehabilitation areas. Six sites are located in remnant vegetation and 9 sites are located in rehabilitated areas.

Monitoring of these sites is undertaken annually until rehabilitation areas reach an acceptable levels of establishment, and then monitoring will be undertaken periodically.

Monitoring of these sites assesses:

- Plant community structural attributes;
- Cover, species density, height and structural diversity;
- Species richness (the number of plant species present in each structural layer of each vegetation community);
- The presence and abundance of any weed species; and
- Assessment of natural regeneration/recruitment of new species.

The findings of this monitoring program are used to assist in management recommendations for appropriate rehabilitation works within Baal Bone Colliery holdings. Where necessary, rehabilitation procedures are amended accordingly to continually improve rehabilitation standards.

The results of the 2016 monitoring are summarised below:

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Native woodland rehabilitation sites

The reference sites consisted of deep, well developed litter layers in moderate to extensive states of decomposition, scattered perennial grass tussocks and herbs and a mature eucalypt canopy, often with some scattered shrubs and sub-shrubs. These sites had a very stable humus layer which was building up the soil profile and increased the capacity for moisture retention and protection against erosion.

In comparison, the rehabilitation sites typically had lower levels of perennial ground covers and a reduced level of litter cover and states of decomposition but often had a high perennial plant cover due to the establishing trees and shrubs, especially in the younger sites which had particularly high stem densities. The once loose and unstable soil surfaces have over time developed into stable soil crusts which have become colonised with cryptogams and combined with the increasing protective vegetative cover have become inherently more coherent and stable. In some cases the soils had also demonstrated increased coherency and a reduction in slaking potential due to increased microbial activity and development of a humus layer, especially in the older sites. Despite some periods of high rainfall activity, these increased ecological traits have also resulted in a reduction in the extent of erosion and deposition. This year, the decline in canopy cover as a result of self-thinning has opened up the site and reduced competition effects, subsequently allowing annual and perennial ground covers to increase in abundance. This was observed in many of the older rehabilitation areas.

In NOC1 and SOC2 however, there continued to be patches of limited protective cover, limited soil surface relief and there may have been some slaking of the soils. As these bare patches were presently unstable, plants and cryptogams have not yet been able to establish but the extent of these were tending to decline, except in SOC2 this year. Nonetheless, many ecological attributes have typically improved and have continued to demonstrate an increasing LFA trend since 2009.

Most of the changes being observed are significant positive ecological changes and these are likely to progressively increase the ecological development of the rehabilitation areas over time. While Box Cut and SOC4 sites have previously been slow to establish, there have been significant improvements over the past few years despite small setbacks as a result of unfavourable seasonal conditions. In REA5 heavy macropod grazing has impacted on the development of the site but the site is beginning to stabilise with large patches of cryptogams and scattered plant establishment appearing to occur.

This year no counts of trees and shrubs were made, however, it was evident that there has continued to be self-thinning across extensive areas of the northern and southern open cut rehabilitation areas. The prolonged dry conditions over the summer 2015-2016 were likely to also have had an impact on the populations. This in turn has promoted an increase in perennial ground cover, as the tree canopies have opened up and there has been a reduction in competition effects.

Total ground cover is a combination of leaf litter, annual plants, cryptogams, rocks, logs and live perennial plants (<0.5 m in height) and is given as an average of 10 repeated measurements recorded along the vegetation transect. There continued to be an increasing trend in total ground cover in all of the older rehabilitation sites largely due to the accumulation of leaf litter, increasing perennial ground cover and cryptogam cover. SOC1 and SOC3 continued to meet total ground cover targets however the remaining rehabilitation total ground cover continued to remain low.

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In the rehabilitation sites, leaf litter also continued to be the dominant form of ground cover and the cover provided by perennial ground plants had increased in all sites this year. All of the older rehabilitation sites except Box Cut had more than 13.5% perennial vegetation cover which was the minimum perennial cover target recorded in the reference sites. While cryptogams were particularly important in SOC1 and SOC2 in previous years, these were starting to decline as the deepening litter layers reduce available cryptogam habitat. Scattered rocks were common in all rehabilitation areas however in numerous cases, such as in NOC2 and SOC1, dead leaf litter and ground cover plants became more abundant and had covered them over.

By 2014, all rehabilitation sites except SOC2 contained some vertical structure greater than 6.0 m in height, however, in 2015 none was recorded in NOC1 as numerous taller individuals had died but there continued to be a small amount of 4.0 – 6.0 m high foliage cover this year. In SOC2 none had sufficiently grown and none were taller than 4.0 m in height.

The older rehabilitation site SOC3 has continued to have similar canopy cover as the woodland reference sites, and by 2015 so did SOC1 though it contained a denser understorey. Presently the older rehabilitation area SOC3 has developed into a woodland which has a similar structural composition to the reference sites, while Box Cut, NOC2 and SOC1 appear to be trending in that direction. In REA5, there was presently limited ground cover and there was no vertical structure due to the limited development time.

This year no total floristic diversity assessments in the 20 x 20 m quadrats were undertaken, instead average floristic diversity per m^2 was assessed. There has been no consistent trend in the changes in native species diversity per m^2 across the range of sites and this year there were more native species recorded per m^2 in all sites. Native species were more common per m^2 than exotic species on average in all monitoring sites except the new REA5 rehabilitation site which was weedier than desired. NOC2 was the only rehabilitation to meet these native species diversity targets while SOC2 and SOC3 were the only sites to have an acceptable diversity of exotic species.

In the woodland reference sites, there were relatively few weeds with native species providing 97.3 – 100% of the total live plant cover. This year there was 100% native plant cover recorded in SOC2. While native plants were more dominant than exotics in the other older rehabilitation sites, native plant cover ranged from 71.1% in Box Cut to 97.5% in SOC3. While these sites continued to be weedier than the reference sites there has been an increase in native ground covers in all sites as native ground covers become more abundant. In the new rehabilitation area there was only 15.8% native ground cover.

The most abundant species in the reference sites continued to be the hardy perennial native ground cover Lomandra filiformis (Wattle Mat-rush) and the native grass Joycea pallida (Red-anthered Wallaby Grass), while the native ground covers Gonocarpus elatus (Hill Raspwort) and Hydrocotyle laxiflora (Stinking Pennywort) were also quite abundant in RWood02. The rehabilitation sites were dominated by a different composition of species, with the native perennial grass Microlaena stipoides (Weeping Rice-grass) being recorded in relatively high abundance in all rehabilitation areas, except Box Cut. Other abundant species included Rytidosperma spp. (Wallaby Grass), Pultenaea microphylla, Hypochaeris radicata, Acacia filicifolia (Fern-leaved Wattle) and Cassinia arcuata (Chinese Shrub). In the new rehabilitation site REA5, Conyza bonariensis (Fleabane) an exotic annual was the most abundant species but it is currently provided some ground cover and stabilisation.

Exotic pasture rehabilitation sites

Since 2009 there were significant increases in stability in the pasture rehabilitation sites due to the development of the perennial pasture species, increasing litter and cryptogam cover and

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improvement in numerous other soil attributes up until 2011. Thickets of acacias in NOC3 and NOC4 have become more dense and, with the loss of lower leaves and branches, there was a decline in rain splash protection and a reduction in perennial cover <0.5 m in height. In 2014, NOC3 and NOC4 rehabilitation sites had developed excellent litter layers which had accumulated to some depth due to high leaf fall from the acacia thickets and, within these patches, there tended to be moderate rates of litter decomposition, indicating high levels of microbial and fungal activity. Due to the increased litter layer there was a simultaneous reduction in cryptogams and a decline in soil surface crusting due to the development of a humus layer, with no crusting at all observed in NOC3.

Over the past two years there has been a further loss of mature acacias and the sites have been subjected to heavy macropod grazing. This has resulted in a reduction in canopy and perennial ground covers and there has been a reduction in litter cover with increased soil surface crusting and hardness. In comparison NOC5 has maintained relatively good cover of perennial ground covers but lacked high levels of perennial canopy cover due to the absence of acacias. In NOC5, heavy grazing has continued to affect the abundance of perennial plant covers with increased soil surface crusting and erosion with the exposed soils vulnerable to slaking.

NOC4 presently has an ecological function which was only slightly lower than the pasture reference sites. In NOC5 there continued to be some erosion and slaking of the exposed soils making this the least functional of the pasture rehabilitation sites. All rehabilitation pasture areas however continued to meet the 70% completion LFA targets for stability, infiltration and nutrient recycling.

The rehabilitation pastures areas were tree seeded in an attempt to provide some scattered shade trees and, as a result, there were scattered individuals as well as large thickets of acacias across much of the Northern Open Cut area. Over the past few years numerous individuals have died a result of self-thinning and prolonged dry seasonal conditions. There has been some volunteer recruitment of Cassinia arcuata and last year there was a significant recruitment event of both acacia and cassinia. No measurements of the tree and mature shrub populations were undertaken this year.

Total ground cover is a combination of leaf litter, annual plants, cryptogams, rocks, logs and live perennial plants (<0.5 m in height). All three rehabilitation sites continued to maintain a good cover of exotic pasture species, however, heavy macropod grazing has resulted in a minor reduction in NOC3 and NOC5, while a negligible increase was recorded in NOC4. The rehabilitation sites were largely comprised of perennial plants and dead leaf litter although the proportion of perennial vegetation in comparison to the reference sites was much lower and did not yet meet this important ecological indicator. The rehabilitation sites NOC4 and NOC5 also contained a much larger proportion of annual plants and cryptogams and some scattered rocks. The increasing density and height of the shrubs within NOC3 and NOC4 has resulted in a low percentage of projected foliage cover which were now in the 4.0 – 6.0 m height categories along the vegetation transects. No vertical canopy cover above 2.0 m in height was recorded along the vegetation transect in NOC5 due to the limited occurrence of shrubs.

The rehabilitation sites had a very low diversity of native species. As the final land use of the Northern Open Cut is an area of exotic pasture/grassland with grazing potential, native species diversity is not considered to be a relevant ecological attribute. There were, however, a higher diversity of exotic species and the sites were weedier than desired.

The rehabilitation areas were dominated by a different range of species with the most abundant species being the exotic grass Dactylis glomerata (Cocksfoot) which was sown as part of the rehabilitation. Hypochaeris radicata (Flatweed) and Plantago lanceolata (Ribwort) were also becoming increasingly abundant in the rehabilitation areas, but these species were also quite

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abundant in the native pastures in the Baal Bone area. Acetosella vulgaris (Sheep Sorrel), Lolium rigidum (Wimmera Ryegrass) and Trifolium dubium (Yellow Suckling Clover) also provided some ground cover in some sites, but these species were not particularly dominant.

Ridgetop woodland rehabilitation sites

The Ridgetop woodland reference site contained a mature eucalypt over-storey, scattered shrubs and a well developed litter layer with little evidence of erosion or deposition and had very stable soils. In comparison the rehabilitated vent shaft consisted largely of bare earth with scattered logs, woodchips and scattered annual with perennial plants starting to establish. The soils were quite hard and there was presently little litter development and cryptogams were low in abundance. While the soils were typically stable there was some evidence of erosion and deposition occurring across the site. Over the past year there has been heavy grazing and a theft of Large Woody Debris (LWD) but there was a marginal improvement in the ecological function of the site.

This year no counts of trees and shrubs were made but there was no apparent change in tree densities in the reference site. There was however likely to have been a loss of shrub and juvenile tree densities in both the reference site and the rehabilitation area as a result of the prolonged dry conditions over the summer period, in conjunction with an increase in grazing pressure.

Total ground cover is a combination of leaf litter, annual plants, cryptogams, rocks, logs and live perennial plants (<0.5 m in height). There was presently low total ground cover in the rehabilitation area, which was comprised of 34% dead litter and 0.5% cover of scattered annual plants on average. There was also a minor contribution provided by rocks (2%), logs (1.5%) and scattered perennial plants (8%). There was also a minor contribution from cryptogams this year.

No total floristic diversity assessments in the 20 x 20 m quadrats were undertaken this year, but species diversity per m^2 was assessed. In the Ridgetop woodland reference sites, there was a lower diversity of native species per m^2 this year and there were no exotic species. There was also a decline in native and exotic species per m^2 in the rehabilitation area and, compared to the reference sites, there was a low diversity of native species and a high diversity of exotic species per m^2. Of the live plant cover in the rehabilitation area, 45.2% was provided by native plants and therefore the site was weedier than desired.

The most abundant species in the rehabilitation site was the exotic reed Cyperus eragrostis (Umbrella Sedge) and exotic perennial forb Hypochaeris radicata. While some species were sown onto the rehabilitation as part of the rehabilitation, the data suggest that some native species have colonised the site from adjacent vegetation or have germinated from the soil seed bank. As the rehabilitation site also contained a range of weed species, including several exotic sedges or rushes such as Cyperus eragrostis and Juncus articulatus (Jointed Rush) which would not usually be found in the Ridgetop communities, these are likely to have germinated from topsoil brought into the area as part of the rehabilitation.

Conclusion

Most rehabilitation sites were establishing particularly well despite the extremes in seasonal conditions and increased grazing pressure by resident macropod (and goat) populations. While the developments occurring within the rehabilitation areas were patchy, there tended to be increasing ecological function with most ecological parameters recorded showing positive successional trends, with all sites, except the new rehabilitation area (REA5), meeting most of the 70% LFA Key Performance Indicator Targets that were measured this year.

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The high densities of acacias have been critical to the successional development of the woodland (and pasture) sites, especially in SOC1 which has undergone the most significant transformation within only eight years. This has largely been due to excellent growth and development of the trees, shrubs and cryptogams and accumulating dead leaf litter, which provided increasing levels of protective ground cover. There has also been increasing states of decomposition of the dead leaf litter which indicates there have been increasing microbial and fungal activity. The development of the humus layer had resulted in a reduction in soil surface crusting and an increased soil stability and coherency and subsequently there is less evidence of erosion or deposition across the site. Perennial ground covers were slow to establish however with the loss of lower leaves and branches and self-thinning of the mature acacias, the dense canopy has become more open, allowing perennial ground covers to become established. This process has also been evident in the oldest rehabilitation site SOC3, which has transformed into open eucalypt dominated woodland with many ecological attributes of the remnant reference sites including a native grass understorey, a well developed canopy and natural regeneration of acacias and eucalypt species.

These natural successional processes were evident across the wider NOC and SOC rehabilitation areas and, during 2014 – 2016, there has been a significant decline in shrub densities as a result of self-thinning and a concurrent increase in ground cover. In 2015 there was also a significant natural regeneration event with hundreds of small seedlings of acacias and Cassinia arcuata in many of the rehabilitation sites. While population densities were not counted this year, there has been a high mortality rate and it appears only a small percentage of young seedlings have persisted. These changes in population densities were also reflected in the woodland reference sites suggesting they were the result of natural biophysical processes.

The loss of the mature acacias has resulted in a much more open environment which has promoted an increase perennial ground cover plants, especially the native grass Microlaena stipoides and the native sub-shrub Pultenaea microphylla was also becoming increasingly common. Other native species are being introduced by wind, birds, insects and other wildlife. While Box Cut and SOC4 sites have previously been slow to establish, there have been significant improvements in both sites over the past year. Despite some adverse soil conditions being recorded in the younger woodland rehabilitation areas in previous years, natural succession is likely to see the ongoing transformations in function, structure and composition with little need for direct management intervention across majority of the rehabilitation areas. There were however "hotspots" where development has been slow and these have been identified in the "Annual Rehabilitation Inspection Report".

In the new rehabilitation area, REA5, grazing by wild animals has impacted on the development of the site, but the site is beginning to stabilise with large patches of cryptogams and scattered plant establishment appears to be occurring but it is presently weedier than desired. Volunteer Cassinia arcuata seedlings were commonly encountered, however only a handful of acacia seedlings were found. It is too early to determine if further management intervention is required and regular inspections should be undertaken to identify new tree and shrub seedlings and to determine if seedling densities are likely to be adequate. As a precautionary measure however it is recommended that an additional seeding in autumn 2017 be planned and budgeted for in the event of poor establishment rates.

The pasture rehabilitation sites on the NOC continue to meet many of the primary completion targets and these are also likely to continue to improve unassisted in the absence of disturbance events. Heavy and continued grazing by macropods has however resulted in a decline in perennial grasses and increased abundance of exotic weeds over the past few years. The effects of heavy pressure and adverse soil chemistry have become more apparent in NOC5. Grazing intensity has probably been much more apparent during the prolonged dry conditions over the

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past few years, with more normal grazing intensities returning in better seasonal conditions. Monitoring of macropod (and goat) numbers should be regularly undertaken to determine if management intervention is required.

At the ventilation shaft there has been a loss of large woody debris/habitat logs and site disturbance caused by vehicles by forest users. If possible, entry should be restricted into the cleared ventilation shaft rehabilitation area. Heavy grazing by herbivores is also limiting the development of the site. Exclusion fencing could be erected to reduce grazing impact, however, it is likely to be subjected to vandalism and theft. It would also have to be closely monitored to ensure animals do not end up trapped within the enclosure and therefore fencing may not be practical due to the isolation of the site. Given the more favourable seasonal conditions the site is likely to develop slowly but may require additional seeding during the autumn break.

The impacts of livestock grazing, combined with grazing by other herbivores was also evident in the pasture reference sites and surrounding pastures leased by neighbouring landholders, where the ground cover had been grazed very low. There seems to have been an increase in exotic species in these areas as the pastures have been weakened and the livestock were in poor condition. Recommendations include removing the livestock or reducing stocking rates and/or implement rotational grazing to improve pasture health and vigour.

Noxious weeds including Rubus fruticosus (Blackberry), Rosa rubiginosa (Sweet Briar) and Hypericum perforatum (St John's Wort) were becoming increasingly common. Hypericum perforatum was noted mostly growing along the roadsides but was beginning to appear in rehabilitation areas. It will be important to implement targeted weed control programs with the intent to eradicate these noxious species from site before they develop into extensive infestations.

The addition of artificial fertilisers is not encouraged on the woodland rehabilitation area as unnatural increases in fertility levels are more likely to promote growth of undesirable weeds rather than invigorate growth of desirable native species which are adapted to naturally low fertility soils. The exotic pasture area on the NOC may benefit from the application of artificial fertilisers in order to maintain and promote the growth of the desired exotic pasture species.

7.4 Works Outstanding to Date

The areas which have not yet been rehabilitated are generally limited to the current surface infrastructure areas, including the pit-top area, CHPP, mine adits, transmissions lines, pipelines, various water management structures and the southern REA, including REA 6 and the Course Reject Emplacement Area (Plan 3). These areas will be rehabilitated at the end of the approved mine life.

Survey has confirmed that approximately 331,000 m^3 of freedig (clay loam) material has been stockpiled for capping and covering these areas following mine decommissioning. Three dimensional modelling indicates that approximately 150,000 m^3 is required to provide a 500 mm cover over the former southern open cut area and approximately 127,500 m^3 will be required to provide a 300 mm cover over the remaining surface infrastructure area.

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7.5 Ben Bullen Creek Rehabilitation Project

Stabilisation and restoration works have been completed along two sections of the Ben Bullen Creek including riparian vegetation (tube stock) planting in sections 1 and 3. These works have been specifically designed and constructed using the philosophy of natural channel design.

Under Project Approval 09_0178, Baal Bone was required to review its water management systems which included a review of the Ben Bullen Creek Natural Channel Design and Restoration Plan, originally prepared in 2007.

A review of the Ben Bullen Creek Natural Channel Design and Restoration Plan during 2012/2013 indicated that remediation of the current Ben Bullen Creek diversion through the pit top area may be optimal to the reinstatement of the creek to its pre-disturbance pathway (approximately pathway post Ben Bullen Mine 1952).

URS were commissioned in 2013 to carry out a Phase 1 assessment of Ben Bullen Creek to consider the options of rehabilitating the current diversion verse reinstatement of the creek to its approximate pre-disturbance pathway.

Findings from the assessment recommend that the existing diversion be maintained for Ben Bullen Creek.

"The current ecological values along the existing alignment are high, with successful rehabilitation works along a large portion of the creek line. This has provided structured vegetation, a diverse mixture of flora species and fauna habitat potential. With some further remedial works, including further rehabilitation works along eastern bank (e.g. mulch, plantings and installation of woody debris) the ecological value of the creek line will improve. If any civil works are required (e.g. batter the high wall, removal of native vegetation or removal of pipelines/culverts), an impact assessment will be required to assess the effects to threatened species habitat that is currently present.

The pre-disturbance alignment for the creek line traverses the existing pit top area and consequently currently contains low ecological value. It would require substantial rehabilitation works to replicate the ecological value of the current creek alignment. This alignment is not preferred, and potential re-alignment may have impacts upon the ecological values (in-stream vegetation and flora species) of the current creek system.

The remediation of the existing course can commence in a timely manner following receipt of required approvals, allowing for additional benefits. Once the construction works are complete, the revegetation effort can begin. If the site is operational, staff will be available to review the progress of the vegetation on a regular basis. This will allow any issues to be identified and remedial action to be taken in a timely manner. Whilst this would still occur after mine closure, the time between inspections would be much greater and duration of monitoring would be shorter. It is likely that this would impact on the success of the revegetation process.

The existing course is geomorphologically stable and requires only minor adjustments to improve the geotechnical stability and revegetation potential of the banks. The modelling is a conservative estimate of channel conditions, but this also suggests the channel is stable.

The longer path of the existing course suggests that the creek will have less erosive power and is therefore more likely to remain stable in the long term. The pre-disturbance path also passes close to the adits, posing a potential risk of flood waters entering the underground workings."

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Following discussions were held with DP&E in 2014, a modification was sought by Baal Bone to modify the approved final landform plan and associated conditions for the Baal Bone Coal Project under Project Approval 09_0178. The modification was sought under Section 75W of the Environmental Planning and Assessment Act 1979 (EP&A Act), and will facilitate the changes to final alignment and rehabilitation of Ben Bullen Creek. In December 2015, DP&E approved the modification to allow Ben Bullen Creek to remain in its current alignment.

On the 13 December 2016, the Ben Bullen Creek Rehabilitation Plan was submitted to DP&E for review and approval. It was also sent to OEH, Fisheries NSW, DRE and DPI Water for consultation purposes as required by PA 09_0178.

7.6 Other Infrastructure

No other rehabilitation was undertaken during 2016 as a result of construction or decommissioning of site infrastructure.

7.7 Rehabilitation Trials and Research

There has not been any formal rehabilitation trials or research carried out at Baal Bone during the reporting period.

7.8 Finalisation of a Detailed Mine Closure Plan

7.8.1 Mine Closure Planning

In accordance with Glencore Coal NSW Sustainable Development Annexure 0038, 10.1 Mine Closure, Baal Bone is currently preparing a Detailed Mine Closure Plan.

Activities completed and/or initiated include the following:

- Desktop Constraints and Opportunities Analysis for Mine Closure (Umwelt Australia);
- Final Landuse Options Workshop and Risk Register (GSSE Environmental);
- Preparation of draft closure objectives and completion criteria for final Landuse options;
- Phase 1 and Phase 2 Contamination Survey and Assessment (ENSR Australia);
- Hazardous Materials Survey and Site Register (SP Solutions);
- Completion of a Demolition and Dismantlement Closure Study for the site (Liberty Industrial);
- Finalisation of Mine Seal Design (Burke Engineering Services) and submission of High Risk Activity Notification to DRE;
- Indicative market valuation of final Landuse options and accompanying cost to benefit and economic analysis of Landuse options (Trevor Hudson and Associates);
- Mine Closure Social Impact Assessment (Coakes Consulting);
- Development and progressive implementation of Mine Closure Consultation Strategy;
- Contaminated Site Assessment (GHD);
- Water Modelling Report – Mine Closure Water Balance (GHD); and
- Ben Bullen Creek Rehabilitation Plan (GHD).

As a result of these activities, a decommissioning plan has been developed for each domain within the mine area. The plan is to be revised yearly in accordance with any changes that may occur with company goals, legislation and planning. The domain areas which require decommissioning activities are dominated by the current infrastructure areas associated with

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Domain 1 – Northern Void, Domain 3 – Infrastructure, Domain 4 – Central Pit Top Area, Domain 6 – Southern Void and Domain 7 – Subsidence areas. Decommissioning of current infrastructure is the first step to meet the Mine Closure criteria.

During 2017 the detailed Mine Closure Plan will be prepared and, following its completion, elements of the Plan and Ben Bullen Creek Rehabilitation Plan will be included in the Mine Closure MOP.

7.8.2 Rehabilitation Liability Estimate

Baal Bone's rehabilitation liability estimate was increased in early 2012 to a total of $13,022,000 increasing from $9,723,000 at the end the 2011 reporting period.

An internal review of Baal Bone's rehabilitation liability estimate carried out in December 2012 further increased the liability estimate to $18,770,763. The revised estimate was submitted to DTI for approval together with the 2012 Annual Review.

A further review of the rehabilitation liability estimate carried out in December 2015 increased the estimate to $23,256,120. The revised estimate was submitted to DRE for approval in February 2016 together with the revised Mining Operations Plan 2016 -2019.

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8 Community

8.1 Environmental Complaints

In accordance with the Baal Bone BBN SD PRO 0012 - Community Complaints Management Procedure, Baal Bone Colliery has a comprehensive system in place to document and respond to community complaints in a timely manner and to maintain a comprehensive complaints database.

Consistent with conditions of Baal Bone's EPL, Baal Bone maintains a telephone complaints line for the purposes of receiving and responding to complaints from members of the public in relation to activities conducted at Baal Bone.

Upon receipt of a complaint, the following details are obtained from the complainant:

- Date of complaint;
- Notification method;
- Date of incident;
- Name of complainant;
- Contact details of complainant;
- Type of complaint;
- Actions taken;
- Persons notified; and
- Details of follow up actions taken, if required.

Following the receipt of a complaint, a thorough investigation of the complaint is undertaken and the complainant advised of the results of the investigation. Any action to be taken to prevent a recurrence is undertaken as soon as practicable.

During the 2016 reporting period there were no complaints received. This is consistent with 2013, 2014 and 2015 during which no formal complaints were recorded. One complaint was recorded in both 2011 and 2012, being noise and subsidence complaints, respectively. As the site is in care and maintenance, it is expected that complaint levels will remain negligable.

8.2 Community Liaison

8.2.1 Community Initiatives

Funding is allocated for community involvement activities annually.

During 2016 Baal Bone Colliery made a donation to the Cullen Bullen Rural Fire Service to assist with the purchase of equipment.

8.2.2 Community Consultative Committee

The Baal Bone Colliery Community Consultative Committee (CCC) has been established to provide a formal conduit for exchange of information and views between the local community and Baal Bone's Management Team.

Membership of the 2016 Baal Bone CCC:

- Ray Blackley (Resident);
- Barbara Milne (Resident);

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- Karen Desch (Adjacent landholder);
- Representative from Lithgow City Council;
- Representative from Cullen Bullen Public School;
- Mark Bulkeley (Operations Manager); and
- Elizabeth Fishpool (Environment and Community Officer).

A CCC meeting was held during the reporting period in July 2016.

The meeting was well attended by members and the following items were presented by Baal Bone:

- Ben Bullen Creek remediation planning; and
- REA 5 and Thistle Hill rehabilitation.

Regular agenda items included:

- Operations Manager's update;
- Health and Safety update;
- Environment and Community update; and
- General Business and any other issues of concern from the community.

9 Independent Audit

Baal Bone Colliery underwent an Independent Environmental Audit, as per Schedule 5, Conditon 7 of PA 09_0178. The site component of the audit was conducted on 6 and 7 December 2016 with the final audit report received on 22 February, 2017. The key audit outcomes were listed in the Conclusion of the audit report which is replicated below;

The following areas of good performance were noted during the audit:

- *The majority of non - compliances were administrative;*
- *The management plans have been prepared based on the site being in care and maintenance and reflect current operations;*
- *Environmental monitoring has generally been completed as per the requirements of the Project Approval, EPL and management plans;*
- *Reporting during the audit period has generally been compliant including the submission of Annual Reviews, Annual Returns and monthly environmental monitoring;*
- *Established rehabilitation is of a good standard with there being diversity of species and generally a quality ground cover in areas of established rehabilitation. Additional work is required in newly established rehabilitation with comments provided in this report; and*
- *A Final Closure Plan is being developed for the site. This Final Closure Plan should take into account the recommendations from this audit.*

Some of the key areas for improvement during the audit process include:

- *There is still a large amount of infrastructure and unwanted material required to be removed from the site;*
- *There are some minor updates required to management plans;*
- *Recommendations for work associated with surface water management including the Ben Bullen Creek Restoration Project as per Section 6.2 and 6.3;*
- *Subsidence repair of shallow cover areas is required as per Section 6.4;*
- *Continued weed management required; and*
- *There are some recommendations relating to updates within future Annual Reviews.*

Non-compliances identified as a result of this audit and Baal Bone's action plan to address these are detailed in **Section 10**, below. As the audit report was received and the Action Plan developed after the cole of the reporting period, no progress was made of these actions during the period.

In addition to those described below, non-compliances against EPL 765, and Scheule 2, Condition 14 of PA 10_0178 were noted during the audit for an exceedance of total iron at LDP011 in January 2014. Total iron was recorded at 1.11 mg/L where the lomit was 1 mg/L.

The next Independent Environmental Audit of Baal Bone Colliery will occur in December of 2019.

10 Incidents and Non-Compliances During the Reporting Period

No incidents or non-compliances occurred during the reporting period other than the following administrative non-compliances identified as a result of the Independent Environmental Audit, as described in **Section 9**. Table 10.1 details the non-compliances from the Audit that are applicable to the reporting period.

Table 10.1: Summary of non-compliances

Sch and Cond Number	Nature	Cause	Action Plan
Project Approval 09_0178			
Sch. 3, Cond. 12	Air Quality Monitoring Program is prepared for the Care and Maintenance phase of mining operation. No provision has been made for proposed rehabilitation activities.	Oversight during document preparation.	Include note in Plan that air quality will be assessed for future proposed rehabilitation activities with identified air quality controls as deemed necessary at this time to be implemented.
Sch. 3, Cond. 22	The groundwater TARP in Section 2.6 of the Surface and Groundwater Response Plan is different to that in Section 3.4 of the 2015 Annual Review.	The groundwater TARP in Section 3.4 of the 2015 Annual Review was sourced from a consultant report for use prior to approval of Water Management and associated Plans.	The groundwater TARP in future Annual Reviews will be updated to reflect the TARP in the approved Surface and Groundwater Response Plan.
Sch. 5, Cond. 1	Dispute resolution has not been covered in the EMS.	Oversight during document preparation.	Include reference to Baal Bone's Conflict Resolution Procedure in EMS at next review.
Sch 5, Cond. 2	All management plans required under the Project Approval are to have input or be prepared by a qualified expert who has been endorsed by the Secretary of the DP&E and Contingency Plans.	Oversight during document preparation.	Seek endorsement of experts that have had input in preparing all management plans required under the Project Approval. Contingency Plans be included at next review.
Sch 5, Cond. 3	Annual Reviews have been completed to the former guidelines. Monitoring results have been prepared against EA predictions.	Oversight during document preparation.	This and future Annual Reviews to be prepared to current guidelines. Include a comparison against key criteria from the MOP in future Annual Reviews to meet this condition if applicable.
Sch. 5, Cond. 4	Management Plan Reviews not completed within 3 months of approval of MOD 2 (December 2015).	Delay in submitting reviewed Management Plans.	Management Plan Reviews were submitted in April 2016.

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Sch and Cond Number	Nature	Cause	Action Plan
Mining Purposes Lease 261			
Condition 5	Too little detail regarding reporting against compliance with the MOP in the Annual Reviews completed during the audit period.	Lack of firm commitments in the MOP to report against due to suspended operations/care and maintenance status of operation.	Include more detail of compliance with MOP in future Annual Reviews.
Mining Lease 1302 and Coal Lease 391			
ML 1302 - Condition 4f CL 391 - Condition 3f	Although results of rehabilitation monitoring are provided in the Annual Review there is no comparison against criteria from the MOP.	Rehabilitation monitoring criteria are the same as MOP criteria.	Clarify in future Annual Reviews.
Mining Lease 1607			
Condition 5	Although results of rehabilitation monitoring are provided in the Annual Review there is no comparison against criteria from the MOP.	Rehabilitation monitoring criteria are the same as MOP criteria.	Clarify in future Annual Reviews.

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11 Activities to be Completed in the Next Reporting Period

11.1 Operations and Systems

Projects and targets for the 2017 reporting period include the following:

- Finalisation and approval of the Ben Bullen Creek Remediation Plan;
- Finalisation of the detailed Mine Closure Plan; and
- Design and confirmation of the Final landform Design.

11.2 Care and Maintenance Period

Baal Bone entered a care and maintenance period following the cessation of mining operations in 2011. During the 2017 Annual Review period, required infrastructure will remain intact and the site will continue to be managed and maintained for potential future mining or industrial land use.

The potential utilisation of the Baal Bone site for future mining activities including mining, mine training facility and/or use of the coal processing, rail loop or coal emplacement areas will be considered, however have not been confirmed as a future land use.

11.3 Pit-top Facilities

During the 2017 Annual Review period all infrastructure will be maintained to an operational standard. In the event that a full mine closure is decided, a rehabilitation strategy for pit top facilities will be detailed in a Mining Operations Plan and Mine Closure Plan.

As the current future of mining operations at Baal Bone is uncertain, a standby strategy has been adopted for the CHPP. This has allowed the CHPP to be temporarily decommissioned, and then restarted in the future should investigations identify suitable and economically viable reserves for extraction.

Reclaim tunnels and other infrastructure have been man-proofed.

11.4 ROM and Product Stockpiles

All stockpiles have been depleted, cleaned of carbonaceous material and left in a stable condition. No activities are proposed for the 2017 Annual Review period.

11.5 Mine Ingress/Egress

The main ingress to the underground operations is provided through the No.4 adit. The primary ingress to each previous longwall is provided through the maingate roadways. Secondary egress is provided through the tail gate of each longwall panel.

All adits have been secured with steel gates. With the exception of No.4 adit, all adits will be kept locked throughout the 2017 Annual Review period. The main ingress through No.4 adit is only open during operating hours and access is only be available to approved underground operators for completion of routine underground maintenance, statutory inspections and possible training

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activities. Should a decision be made to commence Mine Closure during 2017, the first planned activity is to seal the adits as per the High Risk Activity Notification submitted to DRE on 9 August 2016.

11.6 Voids

It is intended to retain and maintain REA 6 for future use should Baal Bone decide to continue operations in accordance with its Project Approval. Final rehabilitation of this area will occur after mine closure.

11.7 Other Infrastructure

Other infrastructure associated with Baal Bone or in the immediate vicinity includes powerlines, access tracks, boreholes and monitoring sites. All powerlines to the site will remain to supply buildings and offices power during the care and maintenance phase of the mine. All mine related access tracks and monitoring sites present on Forestry Corporation of NSW land will be maintained during the care and maintenance phase of the mine.

11.8 Rehabilitation

The principal objective for the rehabilitation of mined land at Baal Bone is to return the site to a condition where its landforms, soils, hydrology, flora and fauna are self-sustaining, and compatible with the surrounding land fabric.

The proposed end land use for the site includes a combination of grazing and bushland/wildlife habitat. The stated land use combination is compatible with adjoining lands. The overriding principle is to create the most beneficial future use of rehabilitated land, which can be sustained in view of the range of limiting factors. The post-mining landscape will be dominated by Class IV (grazing – occasional cultivation) and Class VI (grazing – no cultivation) Rural Land Capability Classification. Drainage paths, contour drains, ridgelines, and emplacements are to be shaped in undulating informal profiles in keeping with natural landforms of the surrounding environment. The rehabilitation work completed to date is illustrated in Plan 3.

The areas which have not yet been rehabilitated are generally limited to the current surface infrastructure areas; these include the pit-top area, CHPP, mine adits, transmissions lines, pipelines, various water management structures, northern void as well as the southern void and reject emplacement area (Plan 3). These areas will not be decommissioned and rehabilitated until after a decision to commence mine closure occurs.

Survey has confirmed that approximately 331,000 m^3 of freedig (clay loam) material has been stockpiled for capping and covering these areas following mine decommissioning. Three dimensional modelling indicates that approximately 150,000 m^3 is required to provide a 500 mm cover over the southern REA and approximately 127,500 m^3 will be required to provide a 300 mm cover over the remaining central infrastructure area.

Further rehabilitation of 27 ha in the Northern Void and adjacent areas is planned to occur during 2017, should no mining activities occur. Rehabilitation activities that may occur include sealing of thje 4 adits in the northern void, stabilisation of the highwall, recontouring of the area and placement of growth medium material. The growth medium material will be treated as required and seeded with pasture species. In addition to this, the remaining 7 adits (11 in total) as well as the LW19 ventilation shaft may be decommissioned, filled and capped.

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It should also be noted that the southern REA including REA 6 will be maintained during the suspension of operations period. Whilst it may be progressively or temporarily rehabilitated if the opportunity arises, final rehabilitation will be completed concurrent with mine closure. Approximately 178,000 m^3 of freedig (clay loam) covering material has been stockpiled in readiness. Species used in this rehabilitation will match the species composition that was used in the Southern Area.

To ensure Baal Bone will be able to meet the final rehabilitation objectives, the preferred rehabilitation monitoring methodologies to be used include a combination of Landscape Function Analyses (LFA), biennial accredited soil analyses and an annual rehabilitation walkover inspection. Baal An annual rehabilitation walkover inspection of previously rehabilitated sites will be completed by a suitably qualified external environmental professional and will ensure that any land management issues such as weeds and erosion are raised and addressed. Inspections by site personnel will also be undertaken on monthly basis for rehabilitation, with pit top inspections occurring at least fortnightly.

11.9 Community Relations

Community relations projects for the 2017 Annual Review reporting period include the following:

- Hosting a CCC meeting if required; and
- Distribution of at least one community newsletter if required.

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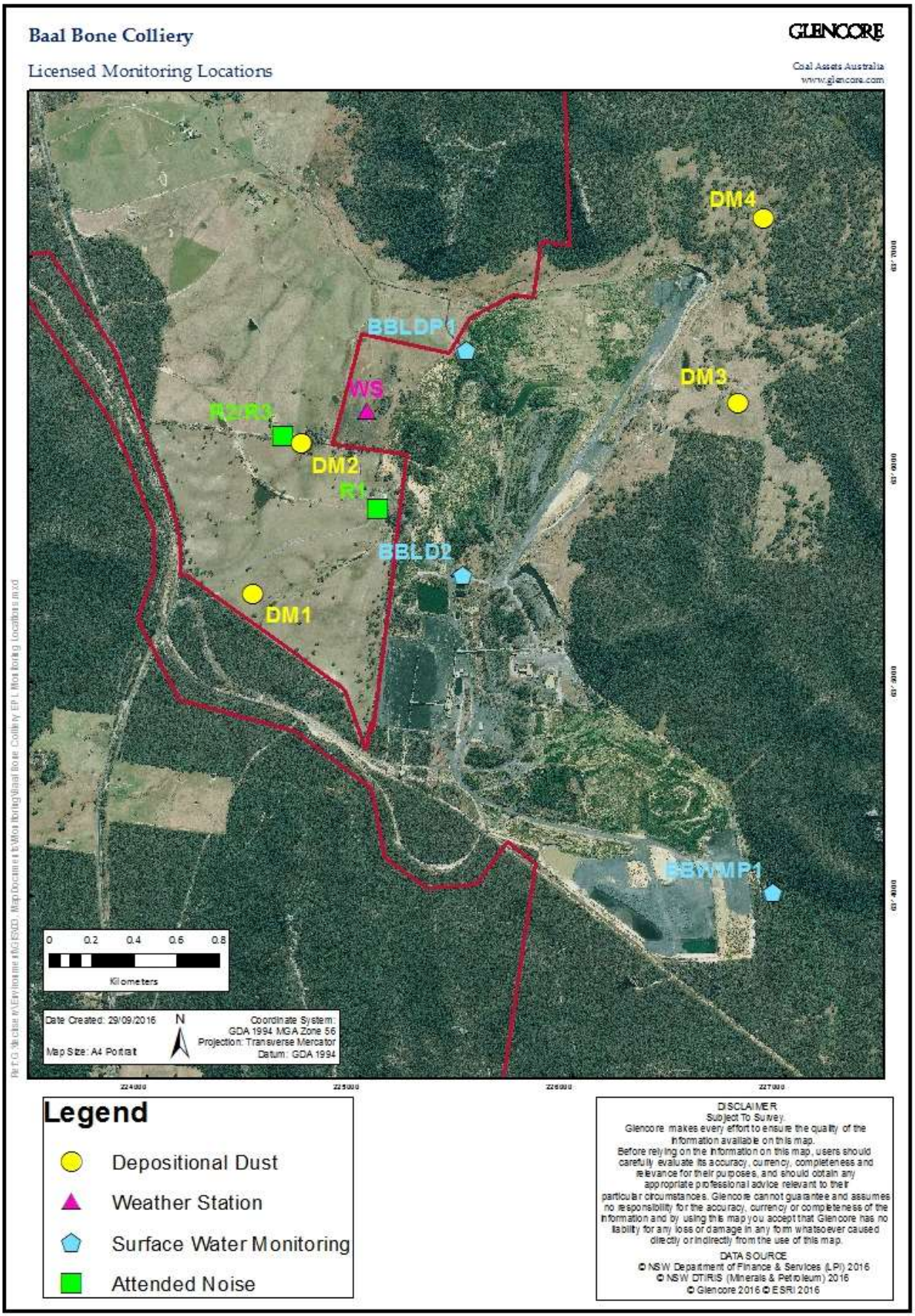

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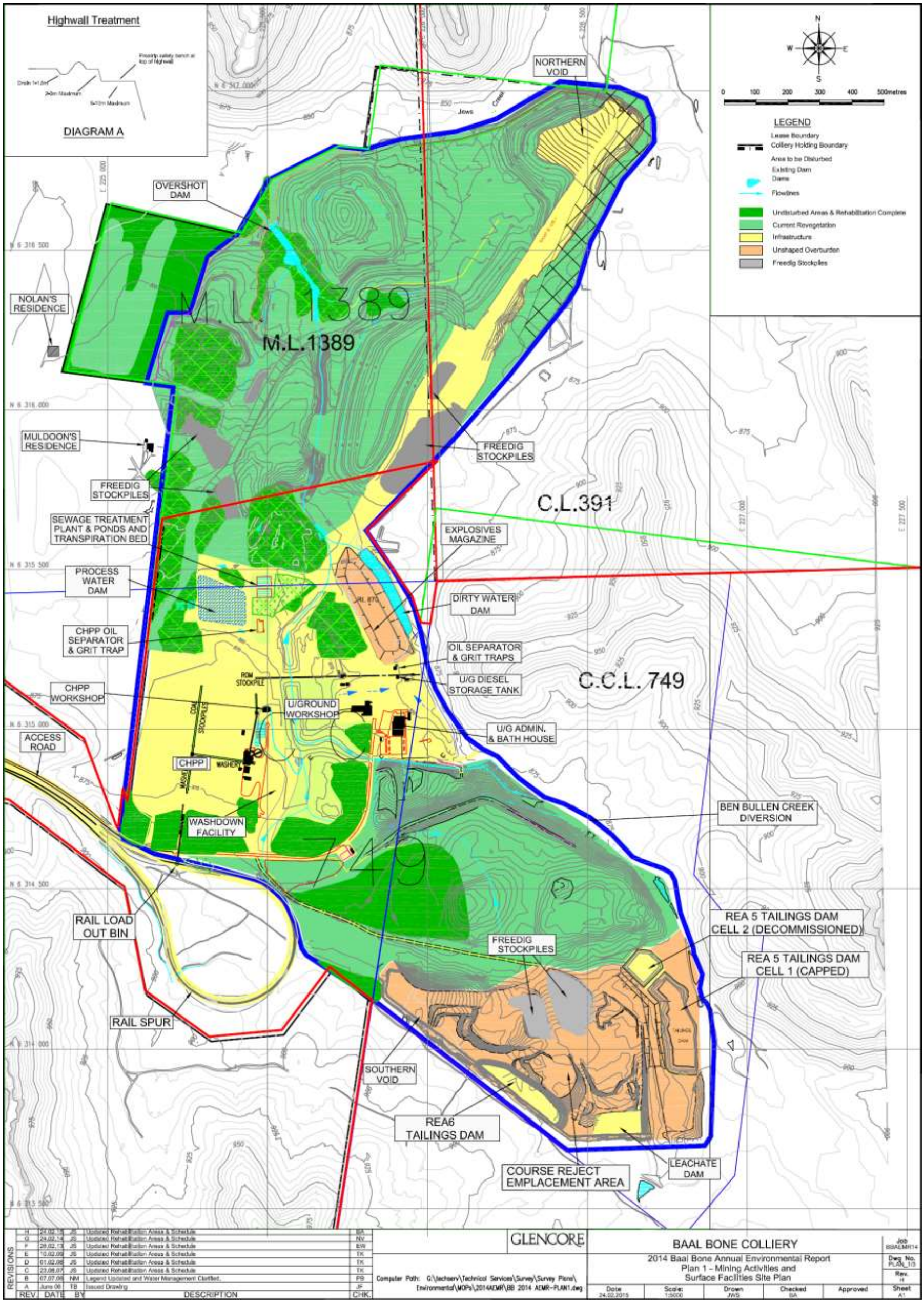

Note: Since this drawing was created, REA5 Cell 2 has been capped and both REA5 Cell 1 and 2 have been rehabilitated. Updated Plans will be produced during the next reporting period.

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Appendix A

			Nutrients					Metals								TRH - NEPM 2013						BTEX & MAH						PAH																				
			Ammonia as N	Nitrite + Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Total Phosphorous as P	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	C6-C10 minus BTEX (F1)	>C10-C16 minus Naphthalene (F2)	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Polycyclic aromatic hydrocarbons	Pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo[a]pyrene	Benzo[b+j]fluoranthene	Benzo[k]fluoranthene	Benzo[g,h,i]perylene	Chrysene	Dibenzo[a,h]anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Benzo(a)pyrene TEQ (zero) - Lab Calc
			mg/L					mg/L	µg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL								0.001	0.1	0.001	0.001	0.001	0.1	0.001	0.005	20	100	100	100	100	1	2	2	2	2	2	0.5	1	1	1	1	1	0.5	1	1	1	1	1	1	1	1	1	1	0.5
NEPM 2013 Table 1C GILs, Fresh Waters			**0.9**				**0.03**	**0.013**	**0.2**	**0.001**	**0.0014**	**0.0034**	**0.06**	**0.011**	**0.008**	**440*** **	**640*** **				**950**			**350**	**200** **																	**16**		
NEPM 2013 Table 1C GILs, Drinking Water								0.01	2	0.05*	2	0.01	1	0.02						1	800	300			600						0.01												
Field	**Location**	**Sample Date**																																													
Groundwater																																															
Pit Top Area																																															
MW01	MW01	2/11/2016						0.005	<0.1	<0.001	<0.001	<0.001	<0.1	**0.022**	<0.005	<20	**1280**	1090	<100	2370	<1	<2	<2	<2	<2	<2	1.2	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	1.2	<1	<1	<1	<0.5
MW02	Not located	-																																													
MW03	MW03	3/11/2016						<0.001	<0.1	<0.001	<0.001	<0.001	<0.1	**0.022**	**0.032**	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
MW101	MW101	2/11/2016						0.002	<0.1	<0.001	<0.001	<0.001	<0.1	**0.025**	**0.029**	<20	TRH/PAH bottle broke during transport				<1	<2	<2	<2	<2	<2	TRH/PAH bottle broke during transport to lab																			
MW102	MW102	3/11/2016						<0.001	<0.1	<0.001	<0.001	<0.001	<0.1	**0.016**	0.007	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
MW103	No located	-																																													
CHPP Area																																															
MW04	MW04	2/11/2016						<0.001	<0.1	<0.001	<0.001	<0.001	<0.1	0.005	0.007	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
MW05	MW05	2/11/2016						<0.001	<0.1	<0.001	<0.001	<0.001	<0.1	0.007	**0.013**	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
MW06	MW06	2/11/2016						0.001	<0.1	<0.001	0.001	<0.001	<0.1	**0.015**	**0.01**	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
MW07	MW07	2/11/2016						<0.001	<0.1	<0.001	**0.002**	<0.001	<0.1	0.003	**0.016**	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
MW08	MW08	2/11/2016						<0.001	<0.1	<0.001	<0.001	<0.001	<0.1	0.01	0.007	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
Surface Water																																															
ST Ponds																																															
STP1-1		7/11/2016	0.08	0.03	6.2	6.2	**0.47**	<0.001	<0.1	<0.001	**0.002**	<0.001	<0.1	<0.001	<0.005																															
STP2-1		7/11/2016	0.02	0.22	10.5	10.7	**2.15**	0.002	<0.1	<0.001	<0.001	<0.001	<0.1	0.002	**0.012**																															
CHPP Separator																																															
SP7w		7/11/2016						<0.001	<0.1	<0.001	<0.001	<0.001	<0.1	0.002	<0.005	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
Pit Top Separators																																															
SP8-1w		7/11/2016						<0.001	<0.1	<0.001	<0.001	<0.001	<0.1	**0.018**	**0.038**	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
QASW		7/11/2016						0.001	<0.1	<0.001	<0.001	<0.001	<0.1	**0.017**	**0.015**	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
SP8-2w		7/11/2016						<0.001	<0.1	<0.001	<0.001	<0.001	<0.1	**0.016**	**0.013**	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5

* Vaue is for Cr VI

** Value is for p-xylene only

*** Values are from California Water Boards Environmental Screening Levels - Summary of Groundwater ESLs - Aquatic Habitat Goal Levels - Freshwater Ecotox

Relative Percent Differences (%RPD)

SP8-1w		7/11/2016						<0.001^	<0.1	<0.001	<0.001	<0.001	<0.1	0.018	0.038	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
QASW		7/11/2016						0.001	<0.1	<0.001	<0.001	<0.001	<0.1	0.017	0.015	<20	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
% RPD								0	NC	NC	NC	NC	NC	6	87	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

^ Where one results below the laboraotry limit of reporting (LOR), the %RPD has been calculated using a value equal to the LOR.

%RPD above 30% for inorganics and 50% for organics

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