BAAL BONE
UNDERGROUND

GLENCORE

# Annual Review 2019

| | |
|---|---|
| **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, ML1389, 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** | 20th December 2019 |
| **MOP End Date** | 31st December 2025 |
| **Annual Review Start Date** | 1st January 2019 |
| **Annual Review End Date** | 31st December 2019 |

I, Elizabeth Fishpool, certify that this audit report is a true and accurate record of the compliance status of Baal Bone Colliery for the period 1st January 2019 to 31st December 2019 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** | Elizabeth Fishpool |
| **Title of Authorised Reporting Officer** | Environment and Community Coordinator |
| **Signature of Authorised Reporting Officer** |  |
| **Date** | 31 March 2020 |

**Abbreviations:**

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

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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 2019 to 31 December 2019.

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 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, then 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, 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.

During 2017 and 2018, Glencore was engaged in negotiations to sell the Baal Bone Colliery site. Sale negotiations ceased in late 2018, and the site will remain under Glencore ownership. A firm commitment to progress into mine closure has been made by Glencore. Accordingly, a Mine Closure MOP was developed and submitted to the Resources Regulator within the NSW Department of Planning, Industry and Environment (Resources Regulator) in late 2019. On 20 December 2019, the Resources Regulator approved the Mine Closure MOP until 31 December 2025.

In early 2020 demolition of infrastructure on the Baal Bone site commenced.

## 1.2 Scope of this Annual Review

The layout of this Annual Review has been aligned to the DP&E *Post- approval requirement for state significant 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), which requires a report to be submitted to the Secretary reviewing the annual environmental 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).

**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:<br>• the relevant statutory requirements, limits or performance measures/criteria;<br>• the monitoring results of previous years; and<br>• 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** |

The Annual Review will be submitted to the following authorities:

- NSW Department of Planning, Industry and Environment (DPIE)
- Resources Regulator with the NSW Department of Planning, Industry and Environment – (Resources Regulator)
- Forestry Corporation of NSW (FCNSW);
- Lithgow City Council (LCC);
- Environment Protection Authority (EPA); and
- Water NSW

The reporting period for this Annual Review is 1 January 2019 to 31 December 2019.

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 2019 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 2020 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
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<br>Email: Mark.Bulkeley@Glencore.com.au<br>Fax: (02) 6359 0530 |
| Mark Munro | Mine Manager | Ph: (02) 6350 6900<br>Email: Mark.Munro@Glencore.com.au<br>Fax: (02) 6359 0530 |
| Elizabeth Fishpool | Environment and Community Coordinator | Ph: (02) 6350 6945<br>Email: Elizabeth.Fishpool@Glencore.com.au<br>Fax: (02) 6359 0530 |
| Greg Peard | Environment and Community Coordinator | Ph: (02) 6350 6920<br>Email: Greg.Peard@Glencore.com.au<br>Fax: (02) 6359 0530 |

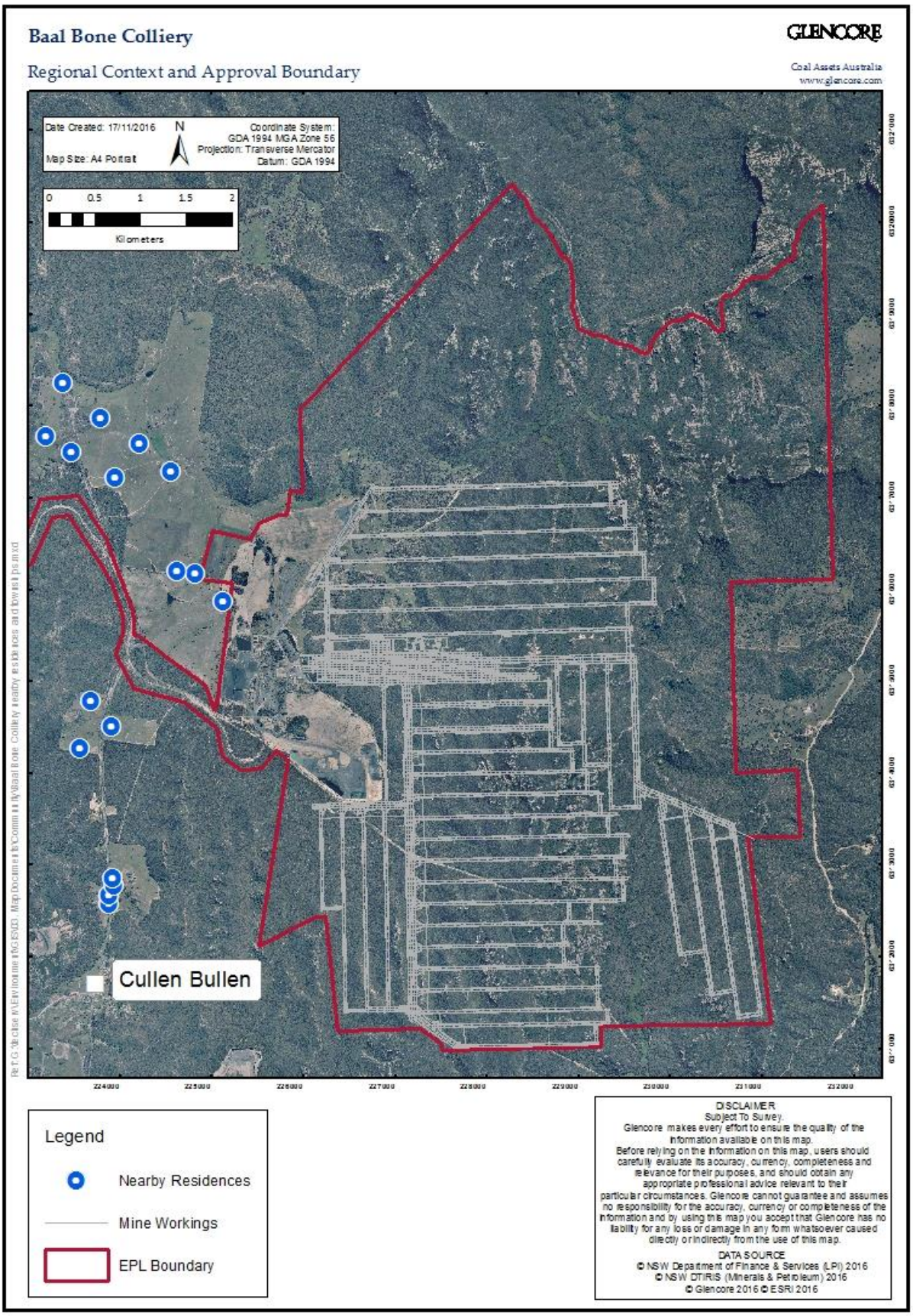



**Figure 1.1:** Locality plan showing approval boundary.

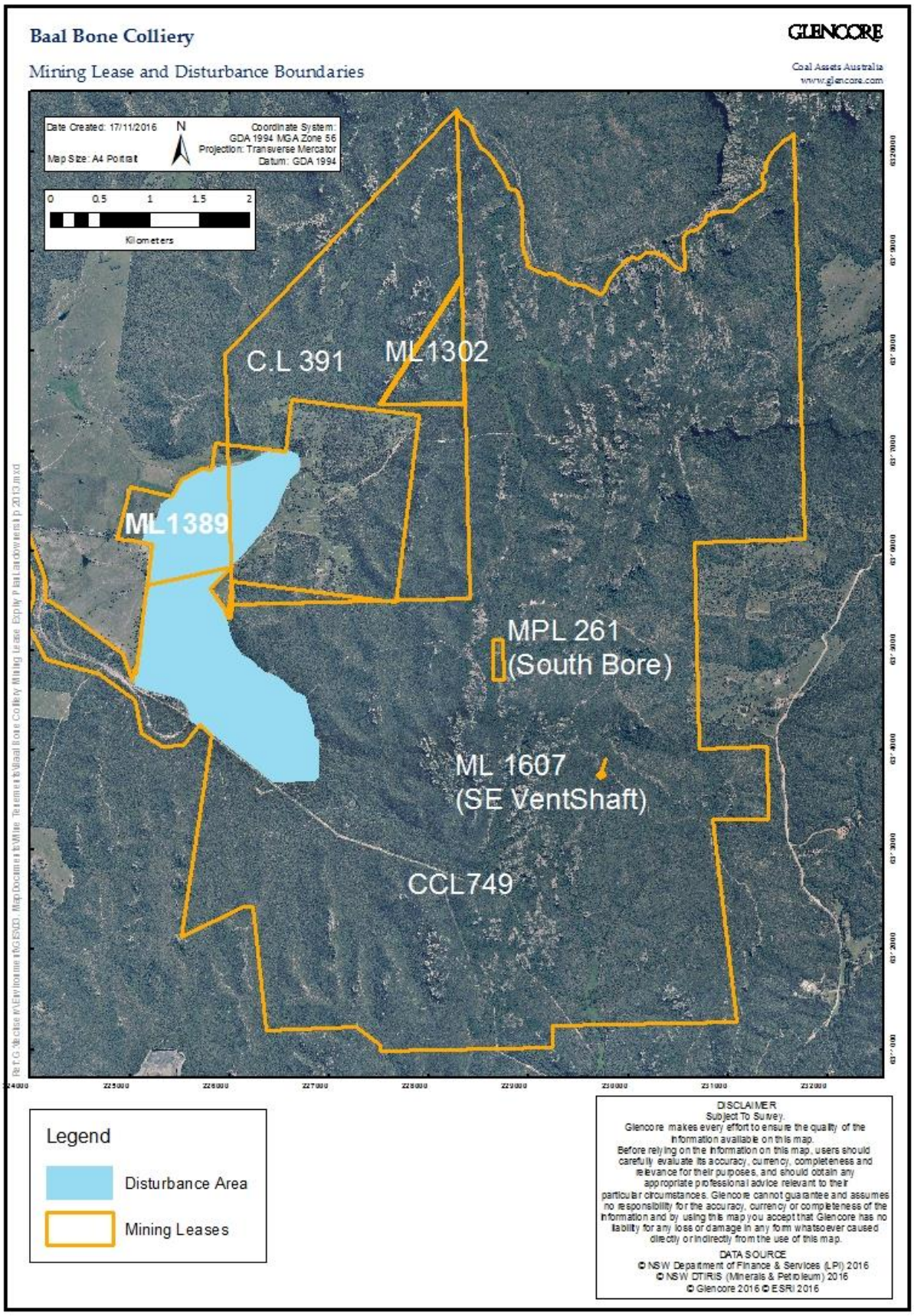



**Figure 1.2:** Mining lease boundaries and disturbance area.

# 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 2018 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 | DPIE | 07_0035 | The Wallerawang Collieries Ltd | 24/10/2007 | Perpetuity | Part 3A Project Approval for the Ventilation Shaft and Power Line Project. | **Yes** |
| | DPIE | 09_0178 | The Wallerawang Collieries Ltd | 14/01/2011 | 31/12/2014 (Mining operations) | Part 3A Project Approval for continued operations at Baal Bone Colliery. | **Yes** |
| | DPIE | 09_0178 (MOD 1) | 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. | **Yes** |
| | DPIE | 09_0178 (MOD 2) | The Wallerawang Collieries Ltd | 01/12/2015 Mod 2 Dec 2015 | 31/12/2019 (Mining operations)[1] | s75W modification to maintain alignment of Ben Bullen Creek. | **No – refer to Table 2.2 and Section 10.** |
| Environment Protection Licence | EPA | 765 | The Wallerawang Collieries Pty Ltd | 21/02/2020 | Until surrendered, suspended or revoked. | Premises and Scheduled Activity (Coal Mining/ Washery) Licence | **No – refer to Table 2.2** |
| Mining Operations Plan | Resources Regulator | 09/2520 | The Wallerawang Collieries Pty Ltd | 20/12/2019 | 31/12/2025 | Mine Closure MOP for Baal Bone Colliery | **Yes** |
| Mining Leases | Resources Regulator | CCL 749 | The Wallerawang | 05/04/1990 | 11/03/2030 | Mining Entitlement | **No – refer to Table 2.2** |

1 Expiry date relates only to mining operations. As per PA 09_0178: "*Under this approval, the Proponent is required to rehabilitate the site and perform additional undertakings to the satisfaction of the Secretary and DRE. Consequently this approval will continue to apply in all other respects other than the right to conduct mining operations until the site has been properly rehabilitated".*

| Type | Regulatory Authority | Approval Number | Holder | Issue Date | Expiry/ Review Date | Scope | Were all Approval Conditions Complied With? |
|---|---|---|---|---|---|---|---|
| | | | Collieries Pty Ltd | | | (Consolidates CL 209, CL 246, CL 329, CL 330, CL331 and CL332)<br>Various depths | |
| | Resources Regulator | MPL 261<br>(Act 1973) | The Wallerawang Collieries Pty Ltd | 22/08/1990 | 22/08/2032 | Mining Entitlement<br>(Southern mine dewatering bores)<br>Parish: Ben Bullen,<br>Depth: Surface - 10m | Yes |
| | Resources Regulator | CL 391<br>(Act 1973) | The Wallerawang Collieries Pty Ltd | 24/02/1992 | 11/03/2030 | Mining Entitlement<br>Parish: Ben Bullen<br>Depth: > 20m | Yes |
| | Resources Regulator | ML 1302<br>(Act 1992) | The Wallerawang Collieries Pty Ltd | 29/09/1992 | 11/03/2030 | Mining Entitlement<br>Parish: Ben Bullen<br>Depth: >20m | Yes |
| | Resources Regulator | ML 1389<br>(Act 1992) | The Wallerawang Collieries Pty Ltd | 09/05/1996 | 11/03/2030 | Mining Entitlement<br>Parish: Ben Bullen<br>Depth: Surface – unlimited<br>Surface - 20m | Yes |
| | Resources Regulator | ML1607 | The Wallerawang Collieries Pty Ltd | 08/01/2008 | 11/03/2030 | Mining Lease (Purposes)<br>Parish: Cox<br>Depth: Surface – 10m | Yes |
| S126(1) Approval | Resources Regulator | 31752430 6001 | Baal Bone Colliery | 14/11/2005 | Perpetuity | Section 126(1) of the CMRA (1982) for the construction and operation of REA 5 | Yes |
| S100(1) Approval | Resources Regulator | 31755129 1001 | Baal Bone Colliery | 12/02/2008 | Perpetuity | Section 100(1) of the CMH&SA (2002) for the construction and operation of REA 6 | Yes |
| Occupation Permit | Forestry Corporation of NSW | PB 03805<br>(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 | Yes |

| Type | Regulatory Authority | Approval Number | Holder | Issue Date | Expiry/ Review Date | Scope | Were all Approval Conditions Complied With? |
|---|---|---|---|---|---|---|---|
| | | | | | | mine dewatering bore); includes various subsequent extensions (LW 19 dewatering bore). | |
| | | PB 03800 (14161) | Baal Bone Colliery | 08/03/1991 | Perpetuity | Occupation Permit for the power line that supplies power to the railway loop -western edge of Ben Bullen SF. | Yes |
| Water Access Licence | DPI Water | WAL27887 | The Wallerawang Collieries Pty Ltd | 17/7/2007 | Perpetuity | Water Access Licence (under Water Management Act 2000) replaces bore licences: 80BL135509 (near rail loop) and 80BL136703 (near UC1) | Yes |
| | DPI Water | WAL34952 | The Wallerawang Collieries Pty Ltd | 27/07/2013 | Perpetuity | Water Management Act 2000 licence – replaces bore licence 80SL046064 | Yes |
| Bore Licences | DPI Water | 80BL236132 | The 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 | The 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 | The Wallerawang Collieries Pty Ltd | 19/06/2006 | 18/06/2016[2] | Section 115 of the Water Act 1912. Bore – Mine dewatering LW 19 (North Bore). | Yes |
| | DPI Water | 10BL601877 | The Wallerawang | 08/06/2007 | Perpetuity | BBN175; LW29-31 groundwater monitoring piezometer | Yes |

[2] 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 19/12/2017. Dewatering from this bore ceased on 17/12/2019 in accordance with EPL 765.

| Type | Regulatory Authority | Approval Number | Holder | Issue Date | Expiry/ Review Date | Scope | Were all Approval Conditions Complied With? |
|---|---|---|---|---|---|---|---|
| | | | Collieries Pty Ltd | | | | |
| | DPI Water | 10BL601816 | The Wallerawang Collieries Pty Ltd | 08/06/2007 | Perpetuity | BBN176; LW29-31 groundwater monitoring piezometer | Yes |
| | DPI Water | 10BL601817 | The Wallerawang Collieries Pty Ltd | 08/06/2007 | Perpetuity | BBN177; LW29-31 groundwater monitoring piezometer | Yes |
| | DPI Water | 10BL601970 | The Wallerawang Collieries Pty Ltd | 05/09/2007 | Perpetuity | BBN 179; LW29-31 groundwater monitoring piezometer | Yes |
| Acknowledgement of Notification of Hazardous Chemicals on Premises | SafeWork NSW | NDG023231 | The Wallerawang Collieries Pty Ltd | 13/02/2015 | Perpetuity | Dangerous Goods Licence – UG diesel tank and 3 LPG tanks. | Yes |
| Licence to Store | SafeWork NSW | XSTR100123 | The Wallerawang Collieries Pty Ltd | 19/05/2017 | 19/06/2022 | Licence to possess and store explosives. | |
| Apparatus Licence | ACMA | 95441/1 | **The** Wallerawang Collieries Pty Ltd | 27/7/2013 | 26/07/2020 | Land Mobile (Two way Radio) - Radio Communications Act 1992 | Yes |

**Table 2.2** Details of non-compliances in 2019.

| Relevant Approval | Condition # | Condition description | Risk | Comment | Reference |
|---|---|---|---|---|---|
| PA 09-0178 | Schedule 2, Condition 11 | Demolition in accordance with AS 2601-2001. | Administrative non-compliance | 2019 Independent Environmental Audit (IEA) found that: “Although a detailed JSA was available which references ‘MDG6001 Guidelines for permanent filing and capping of surface entries to coal seams’ it does not reference AS 2601-2001 the demolition of structures. | **Section 9** and **Section 10** |

| | | | | | |
|---|---|---|---|---|---|
| PA 09-0178 | Schedule 3, Condition 21 | Groundwater Monitoring Plan | Low | Ongoing exceedance of Water Quality Trigger Level for dissolved zinc (0.175mg/L) at BBPB3. | **Section 6.2.2** and **Section 9** |
| EPL 765 | P1.3 | Monitoring Points | Administrative non-compliance | 2019 IEA found that: "Although current monitoring plan appears consistent with the current EPL text, "2008 Licenced Monitoring Sites – Drawing 2" dated 10/01/2008 does not show EPL monitoring sites." | **Section 9** and **Section 10** |
| EPL 765 | M2.2 | Air Monitoring Requirements | Low | In January 2019, a depositional dust gauge bottle was broken. Therefore no results were available.<br><br>In May 2019 and September 2019, Baal Bone's four depositional dust gauges were exposed outside the standard of 30 ± 2 days (exposed for 27 days and 34 days respectively). | **Section 5.1.3** and **Section 9** |
| CCL749 | Condition 34 | Consultation with District Soil Conservationist | Low | Consultation with the District Soil Conservationist Lithgow has not occurred at a minimum of six-monthly intervals. | **Section 9** and **Section 10** |

Refer to **Section 9** for details of all findings from 2019 Independent Environmental Audit.

## 2.1 Amendments during the Reporting Period

Mining Operations Plan
On 20 December 2018, Baal Bone Colliery submitted a revised MOP 2016 -2019 to the Resources Regulator for approval. The revised MOP:

- provided further details and engineer plans for the sealing of the LW19 ventilation fan and shaft, and underground adits 1 – 11.
- extended the completion date for the ~28 ha of rehabilitation in the Northern Void and Northern Rehabilitation area until end 2019.

On 13 February 2019, approval for the revised MOP was granted by the Resources Regulator.

In late 2019 a Mine Closure MOP was submitted to the Resources Regulator. On 20 December 2019, the Resources Regulator approved the Mine Closure MOP until 31 December 2025.Environment Protection Licence
On 15 April 2019, EPL 765 was varied to require Baal Bone Colliery to cease all discharge at LDP11 by 31 December 2019.

In September 2019, Baal Bone Colliery representatives met with the EPA in Bathurst and discussed the fact that during rainfall events some water could still flow over at LDP11.

Accordingly, EPL 765 was varied on 22 October 2019 to clarify that "all underground mine water discharge from licensed discharge point 11" must cease by end 2019. On 17 December 2019 dewatering from the three dewatering bores was ceased in accordance with EPL 765.

# 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 remain unchanged. Surface facilities and infrastructure are shown in appendices as **Plan 1**.

## 3.4 Demolition

During 2019, eleven entries into the underground mine, and the Longwall 19 ventilation shaft were filled and sealed in accordance with *MDG6001 Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams.* Adits 1-5 and 8-11 required the demolition of concrete collars. Adit 1 (Main Fan) and Longwall 19 also required the dismantlement of ventilation fans.

## 3.5 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 LW31 on 3 September 2011, underground mining operations were suspended. A notice of the suspension of operations was provided to the Department of Trade and Investment (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.

In October 2015, Baal Bone Colliery lodged requests to further extend the suspension of mining and labour/expenditure conditions. Accordingly, the Department of Resources and Geoscience (DGR) approved the suspension of labour and expenditure conditions until 3 October 2019; and the application to suspend mining operations/extraction has been approved until 12 July 2021.

Note: In 2018, DRG varied CCL749 to remove the labour and expenditure condition (Condition 9). Labour/expenditure conditions were removed from other mining leases during renewals: CL391 in 2014, ML1389 in 2017 and ML1302 in 2014.

The equipment fleet utilised for care and maintenance during 2019 is outlined below.

**Table 3.1:** Equipment Fleet

| Equipment Type | Number of Units |
|---|---|
| Toyota Landcruiser Utility/ Troop Carrier | 3 |
| Manitou Forklift | 1 |
| 130 Eimco | 2 |
| PJB Man transports | 1 |

# 3.6 Mineral Processing

## 3.6.1 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.

## 3.6.2 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.

## 3.6.3 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.

## 3.6.4 Mineral Waste Management

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

## 3.6.5 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**). 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. REA 6 will be capped during mine closure.

### 3.6.6 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 forming potential. 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 soil (freedig) material to provide a layer in which a sustainable and protective vegetative cover is established.

## 3.7 Water Management

### 3.7.1 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 2019 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 2019, approximately 52 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 | 16.3 ML | 0.7 ML | Volume lost | 37 ML |
| Process Water Dam | 55 ML | 50.3 ML | Volume lost | 55 ML |
| Box Cut Sump | 0.7 ML | 0.9 ML | Volume gained | 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 the Licenced Discharge

Point 1 (LDP1) at the Overshot Dam. An overview of the current water management and monitoring system can be seen in **Plan 1** and **Plan 2** (supplied as appendices to this report).

## 3.7.2 Potable Water

Potable water is purchased from Water NSW and is supplied through a connection into the Fish River Water Supply Pipeline. This connection services the administration centre and bathhouses.

Potable water usage for the 2019 reporting period was 231 kL, a decrease compared to the 3036 kL of potable water usage in 2018.

## 3.7.3 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 and is then 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 reduced to a point whereby no discharge has occurred since September 2014.

## 3.7.4 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 as required within the mine as process water (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 2019 reporting period were:

- 0.23 ML potable water from Fish River Water Supply;

- 1460 ML runoff and rainfall reporting to water stores;
- 1376 ML mine dewatered from southern and northern underground mining areas; and
- 86.6 ML mine dewatering from Adit 5 during 2019 (pipeline was decommissioned in August 2019).

Major outputs of the 2019 reporting period were:

- 1376 ML groundwater dewatered via north and south boreholes (leaving site via Overshot Dam LDP1); and

For comparison, the major inputs for the 2018 reporting period were:

- 3.04 ML potable water from Fish River Water Supply;
- 1539 ML runoff and rainfall reporting to water stores;
- 1002 ML mine dewatered from southern and northern underground mining areas; and
- 164 ML mine dewatering from Adits 2 and 5.

For comparison, the major outputs of the 2018 reporting period were:

- 1002 ML groundwater dewatered via north and south boreholes (leaving site via overshot dam LDP1).

# 3.8 Hazardous Material Management

## 3.8.1 Status of Licence

Baal Bone holds an *Acknowledgement of Notification of Hazardous Chemicals on Premises* (NDG023231). Details of hazardous chemicals stored on-site during the reporting period are provided in **Table 3.3**.

**Table 3.3:** Hazardous Chemicals 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 |

Baal Bone also holds a Licence to Store explosives (XSTR100123). 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.Note: There are currently no explosives stored onsite.

Location of hazardous chemicals and the explosive magazine can be found on **Plan 3**.

### 3.8.2 Safety Data Sheets

Under Baal Bone's Environmental Management Strategy there is a Hazardous Substance Standard (BBNNUG-882012935-1976 – 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: 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 onsite.

## 3.9 Other Infrastructure Management

The location of existing infrastructure is shown on **Plan 1**. During the 2019 reporting period, eleven entries into the underground mine, and the Longwall 19 ventilation shaft were filled and sealed in accordance with *MDG6001 Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams.* Adits 1-5 and 8-11 required the demolition of concrete collars. Adit 1 (Main Fan) and Longwall 19 also required the dismantlement of ventilation fans.

## 3.10 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:

- offsite licensed security contractor who responds to alarms immediately;
- change of security locks;
- CCTV surveillance of key areas of site;
- lockable gates across all portals until sealing complete;
- 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.

## 3.11 Activities during Suspension of Mining

Suspension of Mining Operations/Suspension of Labour & Expenditure Conditions

A notice of the 'Suspension of Operations' was provided by Baal Bone Colliery to the Division of Resources and Energy (DRE) 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.

In October 2015, Baal Bone Colliery lodged requests to further extend the suspension of mining and labour/expenditure conditions. On the 22 June 2017 the Department of Planning and Environment – Division of Resources and Geoscience (DRG) approved the suspension of labour and expenditure conditions until 3 October 2019; and on 18 July 2017, the application to suspend mining operations/extraction was approved until 12 July 2021.

Note: In 2018, DRG varied CCL749 to remove the labour and expenditure condition (Condition 9). Labour/expenditure conditions were removed from other mining leases during renewals: CL391 in 2014, ML1389 in 2017 and ML1302 in 2014.

Mining Operations Plan (MOP)

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 was 29 February 2016 to 31 December 2019 and this aligned with the approved modification to PA09_0178 to extend the timeframe for mining of remnant coal until 31 December 2019.

On 20 December 2018, Baal Bone Colliery submitted a revised MOP 2016 -2019 to the NSW Resources Regulator for approval. The revised MOP:

- provided further details and engineer plans for the sealing of the LW19 ventilation fan and shaft, and underground adits 1 – 11.
- extended the completion date for the ~28 ha of rehabilitation in the Northern Void and Northern Rehabilitation area until end 2019.

On 13 February 2019, approval for the revised MOP was granted by the NSW Resources Regulator.

In late 2019 a Mine Closure MOP was submitted to the Resources Regulator. On 20 December 2019, the Resources Regulator approved the Mine Closure MOP until 31 December 2025.

A summary of the activities associated with the care and maintenance activities is provided in the sections below.

## 3.11.1 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.

## 3.11.2 Maintenance of Services

Baal Bone has developed a Care and Maintenance Mine Inspection Program Matrix. During 2019 this was used as a guideline for maintenance scheduling and inspection frequencies.

Electricity, water, compressed air and communications services to the buildings and pit top infrastructure were continued to be operated and maintained during 2019. All mine related unsealed roads, monitoring sites and dewatering bore compounds on Forestry Corporation of NSW (FCNSW) land were maintained during 2019.

Baal Bone Colliery currently has three mine dewatering bores, two groundwater supply bores and four shallow piezometer monitoring bores licenced with DPI Water. These bores were maintained during 2019. On 17 December 2019 dewatering from the three dewatering bores was ceased in accordance with EPL 765.

In March 2019, the Longwall 19 ventilation fan was dismantled, and works commenced to fill and cap the shaft. Capping and rehabilitation of the shaft and surrounding area was finished in mid-April 2019.

Works to seal underground entries (adits) 1 – 11 commenced in April 2019. Sealing of the eleven adits was completed on 23 October 2019.

Mine closure works will commence in 2020 in line with the Mine Closure MOP approved by the Resources Regulator on 20 December 2019.

Works to be commenced during 2020 will include:

- demolition of the coal handling and preparation plant,
- demolition of overhead conveyors,
- demolition of the workshop,
- removal of three dewatering bores, and
- removal of the rail loop infrastructure.

# 4 Actions Required from Previous Annual Review

The 2018 Baal Bone Annual Review was submitted on 25 March 2019. In correspondence dated 4 July 2019, the Department of Planning, Industry & Environment requested that additional information be included in the 2018 Annual Review (see **Table 4.1**). The 2018 Annual Review was resubmitted on 6 August 2019, and subsequently accepted by the Department on 20 August 2019.

There was no Annual Review meeting or site inspection held during 2019.

**Table 4.1:** Further requirements for the 2018 Annual Review

| Requirement | Status |
|---|---|
| "Under Section 7.4.1 and 7.4.2 the information provided in the Annual Review indicates that the Annual Environmental Rehabilitation Inspection was undertaken by DnA Environmental from the 20-21 January 2019".<br><br>"…provide a response as to whether the timeframe in which the Annual Rehabilitation Inspection was undertaken, being the 20-21 January 2019, was carried out in accordance with the requirements of the approval and/or any management plans". | Complete.<br>Refer to **Section 2 (Table 2.2), Section 7.4.2** and **Section 10** of the resubmitted **2018 Annual Review**. |

# 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 at: http://www.glencore.com.au/en/who-we-are/energy-products/baal-bone/Pages/other-publications.aspx.

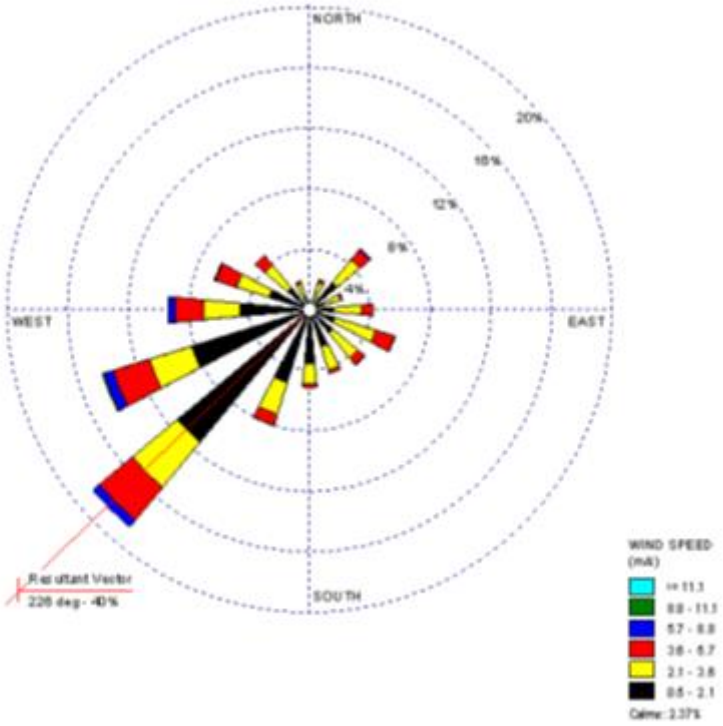
It should be noted that this section of the Annual Review does not necessarily provide a comprehensive description of each individual environmental control mechanism that is currently employed at Baal Bone; this level of detail is available in the Baal Bone Mine Closure MOP - December 2019 to December 2025 and management plans.

This section will focus on providing a succinct review of the performance and/or modification of key control measures throughout the 2019 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 2020 reporting period.

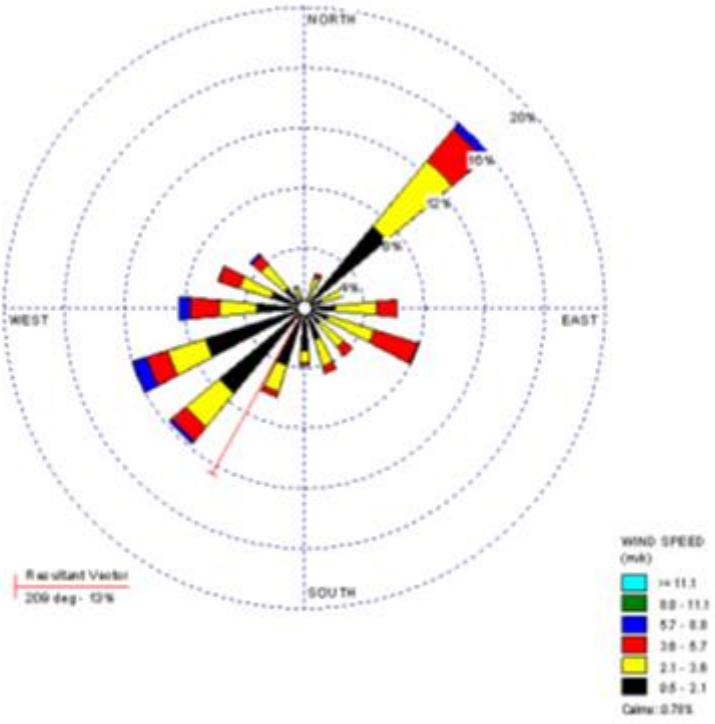
## 5.1 Air Pollution

### 5.1.1 Wind speed and direction

As discussed in the **Air Quality Monitoring Program**, local meteorological data for the area was sourced from the Mt Piper Power Station monitoring station to ensure consistency with previous air quality reports. The data shows a predominant northeast / southwest wind axis, although the northeast portion is predominant in the summer months. The annual and summer wind roses are shown in **Figure 5.1**.




Annual Wind Rose




Summer Wind Rose

**Figure 5.1**: Wind Roses (Mt Piper Power Station Meterological Station)

## 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. From October 2017 onwards Baal Bone has carried out sample collection in house and has engaged ALS Group Environmental Division Lithgow, a NATA Accredited laboratory, to undertake the monthly monitoring and analysis. Prior to October 2017, Baal Bone Colliery employed ALS Group Environmental Division Mudgee to carry out sample collection and undertake monitoring and analysis of samples.

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 **Plan 2.**

## 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 2019 reporting period provided below.

**Table 5.2:** Deposited dust monitoring results for 2019 (g/m$^2$/month)

| Collection Date | EPL Point 7<br>DM1 | EPL Point 13<br>DM2 | EPL Point 14<br>DM3 | EPL Point 15<br>DM4 |
|---|---|---|---|---|
| 3/01/2019 | 3.0 | * | 2.3 | 3.3 |
| 4/02/2019 | 2.4 | 1.3 | 3.3 | 1.4 |
| 6/03/2019 | 3.8 | 1.2 | 1.5 | 1.2 |
| 3/04/2019 | 1.0 | 0.7 | 1.2 | 1.7 |
| 2/05/2019 | 2.4 | 3.8 | 0.9 | 0.5 |
| 29/05/2019 | 0.6 | 1.2 | 0.6 | 0.5 |
| 26/06/2019 | 12.1 | 1.2 | 0.9 | 0.6 |
| 24/07/2019 | 1.1 | 0.5 | 0.4 | 0.3 |
| 22/08/2019 | 0.5 | 0.1 | 0.3 | 0.2 |
| 25/09/2019 | 1.8 | 1.4 | 1.4 | 1.2 |
| 23/10/2019 | 0.8 | 1.0 | 1.2 | 0.8 |
| 20/11/2019 | 2.2 | 3.1 | 1.7 | 1.9 |
| 19/12/2019 | 1.2 | 1.9 | 2.0 | 1.4 |

*January 2019 sample collected, however sample subsequently lost by laboratory during analysis.

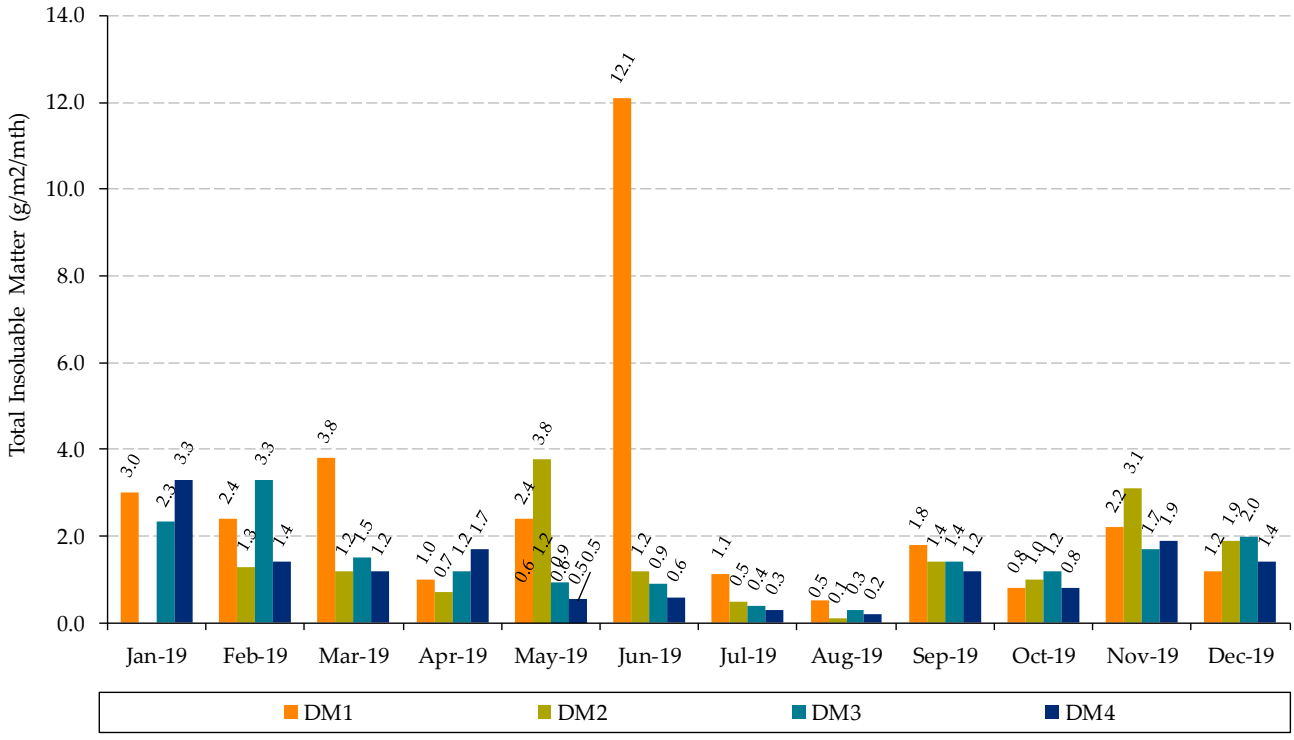



**Figure 5.2:** 2019 Deposited Dust Monthly Monitoring Results

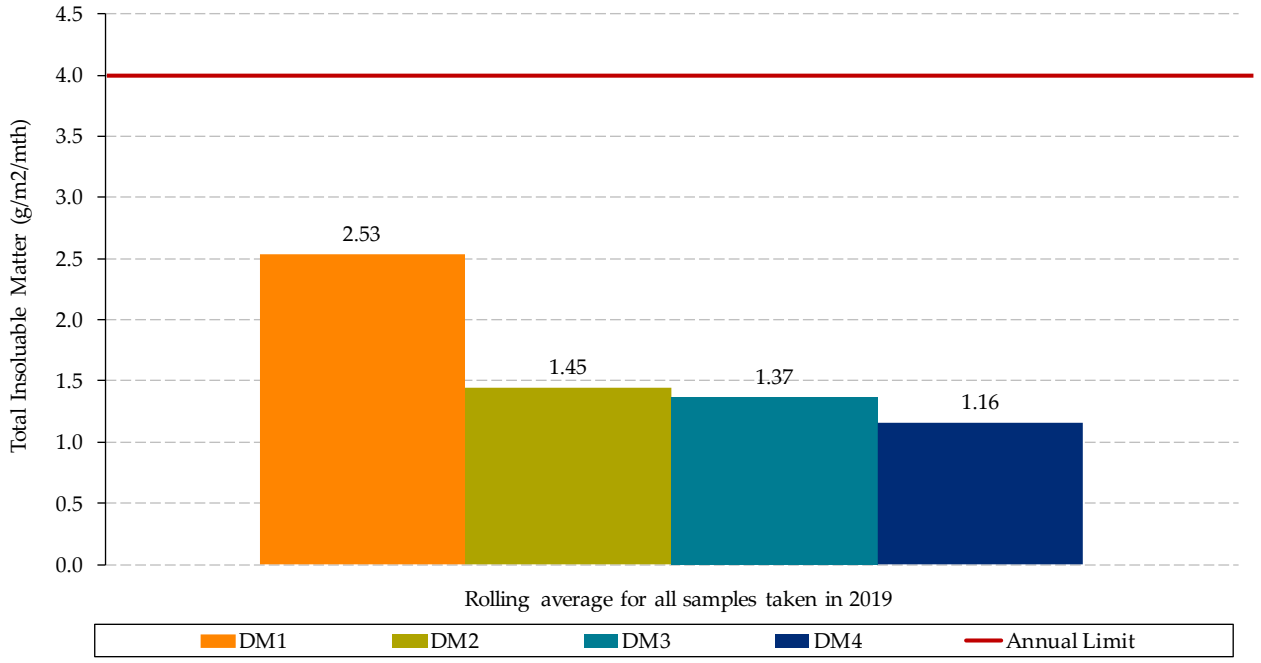



**Figure 5.3:** 2019 Annual Average Deposited Dust Results

All monthly dust monitoring results for 2019 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.

(Note: while DM1 in June 2019 returned a result above the monthly maximum total deposited dust level of 4 g/m$^2$/month, when the annual average is applied all results are well within Project Approval limits –refer to **Figure 5.3**).

### 5.1.4 Comparison against previous Annual Reviews

Historically, deposited dust results have remained 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** shows the annual averages for DM1 – DM5 for the period 2011 to 2019.

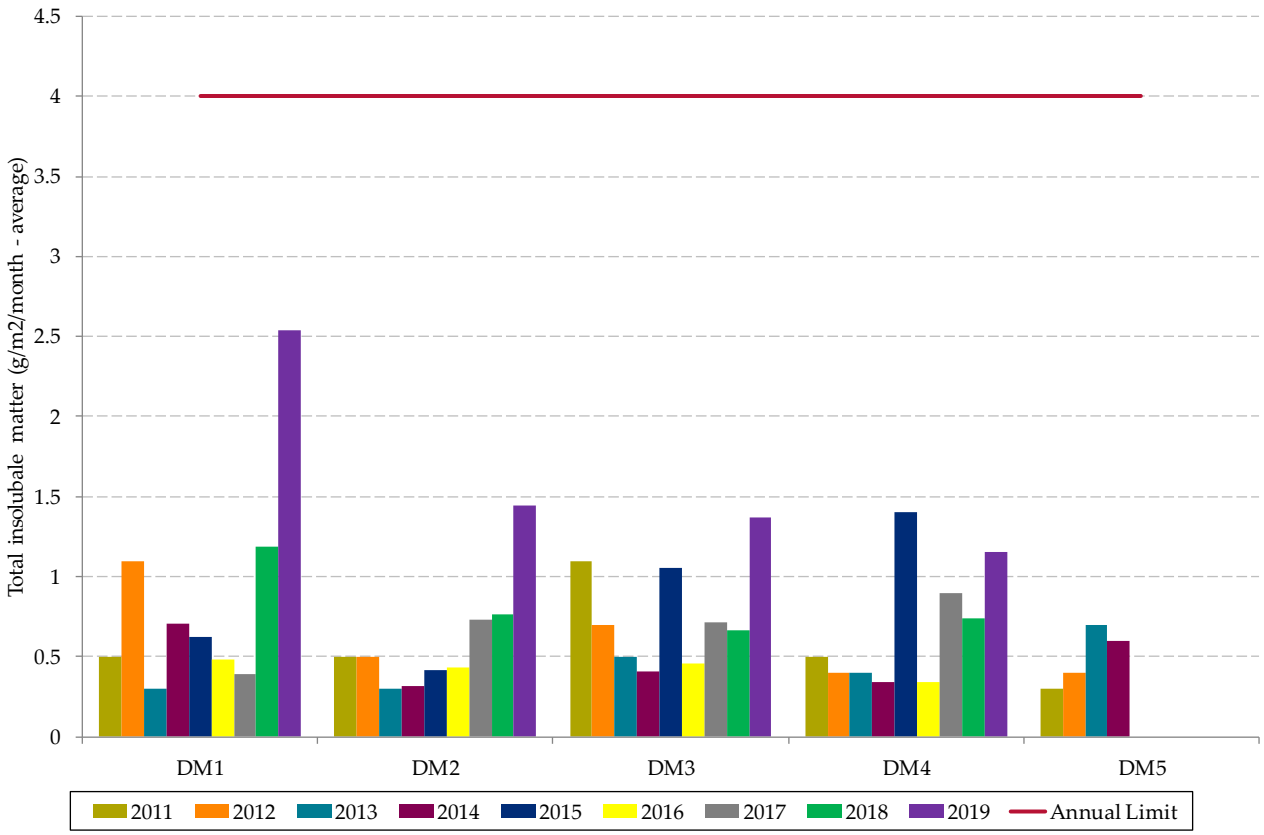



**Figure 5.4**: 2011 to 2019 Deposited Dust Monitoring Results

## 5.1.5 Comparison against EA

Levels of air quality pollutants as predicted under the EA are presented in below. **Table 5.3** 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 **Table 5.3** 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 (AECOM, 2010).

| 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 |

| 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 |
| **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 |
| **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 deposited dust are likely to be representative of predicted deposited dust results at receptor number 2 listed in **Table 5.3**. The deposited dust monitoring results at DM2 during the reporting period, presented in **Section 5.1.3**, 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.

Note: Due to the care and maintenance status of Baal Bone Colliery, monitoring for TSP and $PM_{10}$ ceased in 2012 in accordance with the approved Air Quality Monitoring Plan.

## 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 BBLDP16 within EPL 765. BBLDP16 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. Refer to **Section 7.4** for Rehabilitation Inspection and Monitoring results.

## 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 2019. In line with the Annual Land Management Review of the Baal Bone site conducted by DnA Environmental, a weed spraying program targeting Blackberry was undertaken. The findings of the Q4 2019 Land Management Review will be used to assist in informing weed management activities for the 2020 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 on Tuesday 25 June 2019, during the day, evening and night periods by Global Acoustics.

The audit report concluded that:

*"Attended monitoring was conducted in accordance with relevant EPA guidelines and Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise'. The duration of each measurement was 15 minutes. The survey purpose is to quantify and describe the existing acoustic environment around BBC and compare results with relevant limits.*

*Noise levels from BBC complied with the LAeq, 15minute and LA1, 1minute development consent criteria at all monitoring locations during the June 2019 survey."*

Full noise audit reports can be accessed from the Baal Bone publications webpage at: https://www.glencore.com.au/en/who-we-are/energy-products/baal-bone/Pages/epl-reporting.aspx. There were no complaints regarding operational noise received during the reporting period.

### 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. It is anticpated that this lighting will be removed as part of mine closure activities in 2020.

No complaints have been received during the 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 LW29-31 SMP application. This assessment identified a potential rock shelter site (BBC-RS1) located above LW30 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. The ACHMP was last reviewed during 2019.

### 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 LW29-31 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 LW30 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 LW30.

## 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 a signification portion of the lease area.

## 5.12 Spontaneous Combustion

No spontaneous combustion events occurred during the reporting period. 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.

## 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;
- 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.

During December 2019, the Gospers Mountain fire burnt through areas of Baal Bone Collieries leases (CCL749, CL391 and ML1302) in Colliery freehold land and Ben Bullen State Forest. During

this time the RFS and other emergency services utilised roads within the Colliery freehold area as well as Colliery dams for firefighting purposes.

## 5.14 Mine Subsidence

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

Subsidence results can be found in Subsidence Status Reports published on the Baal Bone website in the following location: http://www.glencore.com.au/en/who-we-are/energy-products/baal-bone/Pages/other-publications.aspx.

## 5.15 Hydrocarbon Contamination

In accordance with the GCAA Protocol - 11.07 Hydrocarbon Management, Baal Bone Colliery conducts six-monthly testing of groundwater monitoring wells in the vicinity of the underground diesel storage tank (UST). Refer to **Plan 3** and **Plan 4** for locations.

Six-monthly testing of the groundwater monitoring wells has occurred since 2013. The results of this monitoring program acknowledge that previous activities at the site have resulted in contamination of shallow groundwater. The contamination is localised and associated with the known point source, the fuel storage area.

During the 2017 testing of groundwater monitoring wells (MW) in the vicinity of the underground diesel UST results it was concluded that when compared with the prior groundwater monitoring results there was an increase in total recoverable hydrocarbon (TRH) fractions within MW01 (the MW closest to the UST) and results were above the adopted criteria. There were no significant changes in results for MW03 and MW101.

Given the high concentrations of TRH in the 22 November 2017 testing at MW01, the bore was resampled by Baal Bone personnel on 19 December 2017 and 29 January 2018. The results showed that the concentrations of TRH decreased in December 2017, however increased in January 2018.

Following three consecutive high concentrations of TRH, MW01 was purged and flushed with fresh water to remove potential residual petroleum hydrocarbon contamination. The bore was then retested on 1 March 2018 by ALS Lithgow. MW03 and MW101 were also retested at this time. The results returned significantly higher concentrations of TRH in MW01. MW03 and MW101 returned consistently low concentrations of TRH.

Given the high concentrations of TRH at MW01, integrity testing of the 50,000L diesel UST and lines was conducted on 9 April 2018. The integrity test found no issues with the tank, however noted a small leak in a line and hand nozzle. A replacement line and hand nozzle was fitted the week following the integrity test. Further investigations on site detected a leak in a second fitting (banlaw fitting) – only evident when the line was pressurised. Subsequently, that line and banlaw fitting was removed.

Groundwater monitoring wells were sampled again in June 2018. The June 2018 sampling found that TRH levels at MW01 had increased significantly since the March 2018 sampling. MW03 and MW101 continued to return consistently low concentrations of TRH. Due to the continued increases of TRH at MW01, use of the underground diesel storage tank was discontinued in mid-2018 and an alternate small capacity above ground tank was utilised.

The groundwater monitoring wells were sampled again in November 2018, demonstrating a significant decrease in TRH levels at MW01.

In May 2019, use of the diesel UST was recommenced due to mine closure works and increased diesel usage. Groundwater monitoring wells were sampled on an increased frequency during the remainder of 2019 and into 2020. Results show that MW03 has continued to return consistently low concentrations of TRH (MW101 has been unable to be sampled since mid-2019 due to damage to the well). MW01 TRH levels during 2019 and early 2020 were broadly consistent with historical levels, with the exception of an increase noted in November 2019. Since November 2019 TRH levels at MW01 have steadily declined. Regular sampling will continue during 2020.

Results for TRH at MW01 are presented in **Figure 5.6** below.

As part of mine closure activities, GHD were commissioned to undertake a detailed site contamination assessment (GHD, 2017). The report produced from this work noted the following:

*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.*

As per the Mine Closure MOP 2019-2025 the Remedial Action Plan (GHD, 2017) identifies the pit top area and CHPP area as the two locations where potential soil contamination issues have been found. The Remedial Action Plan outlines the proposed remediation, procedures and standards that will be followed during mine closure to ensure the successful remediation of the site.

On the basis of the evaluation presented in the Remedial Action Plan (GHD, 2017), the preferred remediation strategy is bioremediation with re-use of validated land farm materials on site. This method will involve the excavation of all contaminated soils and removal to a designated area onsite which will be configured as a land farm for bioremediation. The validated materials will be re-used on site. The areas to be remediated include the pit top area and CHPP area.

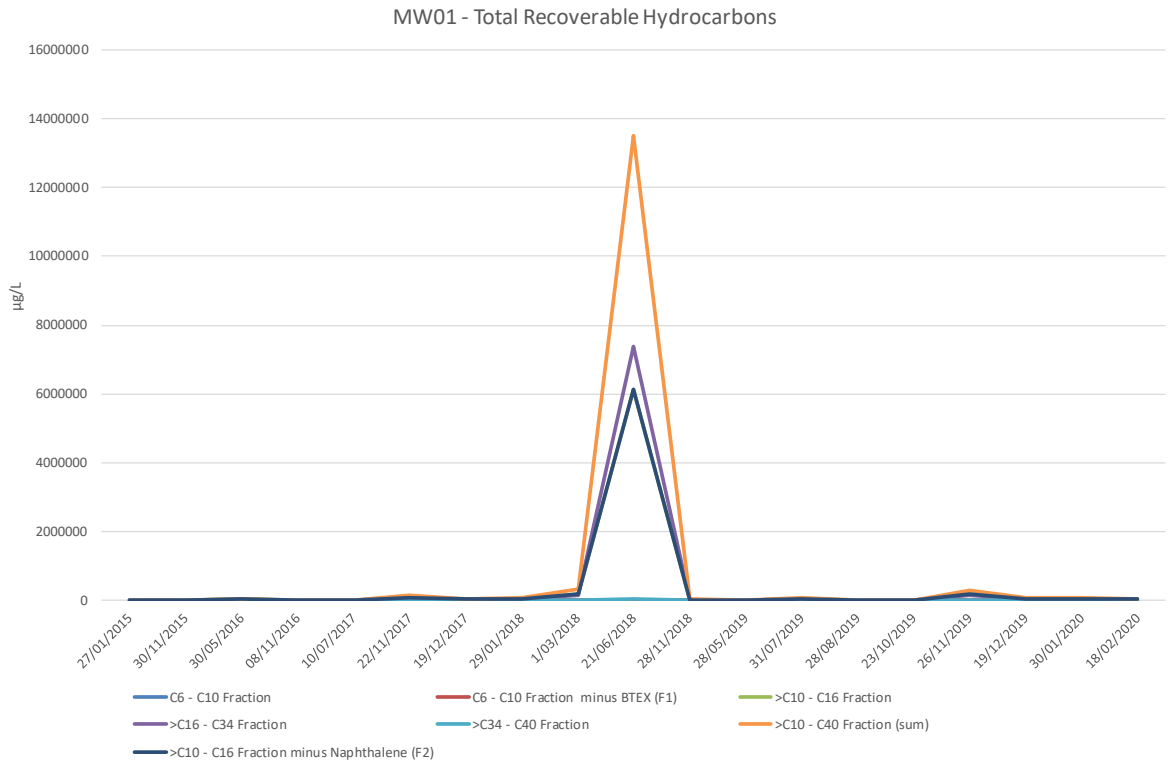



**Figure 5.6**: TRH results for MW01 (2015 to 2020)

# 5.16 Methane Drainage and Ventilation

During the reporting period until mine sealing, monthly gas bag samples from the underground ventilation system were analysed by Coal Mines Technical Services, a NATA accredited company – in accordance with the MOP.

Results from the sampling completed throughout the reporting period confirm extremely low levels of methane at Baal Bone (<0.0001%). Consequently, methane drainage is not required at Baal Bone.

On 16 September 2019, the main ventilation fan was isolated and disconnected. Adits 1-5 were subsequently filled and sealed.

# 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 increased security controls and installing 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.

During 2019, longwall 19 ventilation shaft and underground adits/portals 1 to 11 were filled and sealed.

# 5.18 Other Issues and Risks

## 5.18.1 National Pollution Inventory

In December 1997, the NSW Parliament passed 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 26 August 2019 for the period of 1 July 2018 to 30 June 2019. 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. There were no fines or penalties recorded during the reporting period.

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.

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 were recorded by Baal Bone during the 2019 reporting period.

During the 2017 reporting period, there were two reportable environmental incidents relating to cliff falls in Ben Bullen State Forest over LW3 and LW6. These incidents were reported to the DPE, DRG, and Forestry Corporation NSW. Baal Bone Colliery conducted investigations into the cliff falls, including geotechnical assessments conducted by Strata Control Technologies (SCT). The geotechnical investigations concluded that the falls were caused by rock fractures deep within the strata that was originally caused by subsidence in the area. SCT have indicated that the recent incidents are rare in respect of occurring ~30 years after the area was impacted. Extensive geotechnical assessments have been conducted at Baal Bone Colliery in recent decades which have led to the modifications of subsequent mine designs to minimise the potential for impact upon such features. On 29 May 2018, Baal Bone Colliery received notification from the Resources Regulator that following an investigation into the rockfall events that "the Resources Regulator does not propose to take any further action in relation to this matter" (Investigation Outcome ACES: 0925-2017 DOC18/341492, Resources Regulator – 29 May 2018).

# 6 Water Management

During the reporting period Baal Bone Colliery personnel carried out water sampling and monitoring, and ALS Group Environmental Division Lithgow (a NATA Accredited laboratory), conducted the analysis of a range of surface and subsurface waters.

Prior to September 2017 ALS Group Environmental Division Mudgee carried out monthly sampling, monitoring and analysis.

## 6.1 Surface Water

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 6.1** below. The location of monitoring points can be seen **in Plan 2.**

Note: In February 2020, 'BBLDP11' was replaced with 'BBLDP16'. In 2013 EPL monitoring points BBLD3 and BBLD6 were removed.

**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 'BBLD2' |
| **12** | Upstream quality monitoring | Ben Bullen Creek upstream of active surface mining area, labelled as 'BBWMP1' |
| **16** | Discharge to waters | Ben Bullen Creek downstream of active surface mining area, labelled as 'BBLDP1' |

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 2019

| 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 |
| 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 |
| BBLDP16 (BBLDP1) | EPL Monitoring Pt No.16 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, dissolved iron, TSS |

| Sample Name | Sample Location | Frequency | Pollutants Analysed | EPL Limits Apply |
|---|---|---|---|---|
| | (Previously BBLDP1/EPL Monitoring Pt No. 11) | | | |
| BBPOT | Potable water from main kitchen in Administration | Monthly | pH, EC, Hardness, heterotrophic standard plate count, total coliforms, E coli, Pseudomonas | N/A |
| BBREAS | Spring on Ben Bullen Creek | Monthly (during flow) | EC, iron, oil & grease, pH, sulphate, nitrogen, phosphorous, and TSS | N/A |
| 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<br>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 dissolved iron. These limits are presented below:

**Table 6.3:** EPL concentration limits

| Pollutant | BBLD2 (EPL Monitoring Point 2) | BBWMP1 (EPL Monitoring Point 12) | BBLDP16/BBLDP1 (EPL Monitoring Point 16) |
|---|---|---|---|
| **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 6.4**, and **Figures 6.1 to 6.4**. Samples were taken monthly during discharge in accordance with the EPL.

**Table 6.4:** 2019 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 |
| BB 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* |
| BB WMP1 | Jan | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | Sample not required | | | |
| | Feb | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| | Mar | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| | Apr | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |

| 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 |
| | May | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| | June | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| | July | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| | Aug | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| | Sep | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| | Oct | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| | Nov | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| | Dec | *Dry* | *Dry* | *Dry* | | *Dry* | *Dry* | | | | |
| BB LDP16 (LDP1) | Jan | 1134 | <5 | 295 | <0.05 | <5 | 7.7 | Sample not required | | | |
| | Feb | 1079 | <5 | 256 | 0.06 | 5 | 7.3 | | | | |
| | Mar | 1082 | <5 | 314 | <0.05 | <5 | 6.6 | | | | |
| | Apr | 1019 | <5 | 341 | <0.05 | 5 | 6.8 | | | | |
| | May | 1085 | <5 | 302 | <0.05 | <5 | 7.6 | | | | |
| | June | 1131 | <5 | 265 | <0.05 | <5 | 7.5 | | | | |
| | July | 915 | <5 | 267 | <0.05 | <5 | 7.8 | | | | |
| | Aug | 1145 | <5 | 315 | 0.24 | <5 | 7.0 | | | | |
| | Sep | 1076 | <5 | 316 | <0.05 | <5 | 7.8 | | | | |
| | Oct | 1103 | <5 | 350 | <0.05 | <5 | 7.1 | | | | |
| | Nov | 1059 | <5 | 352 | <0.05 | <5 | 7.0 | | | | |
| | Dec | 1119 | <5 | 318 | <0.05 | <5 | 6.5 | | | | |

**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

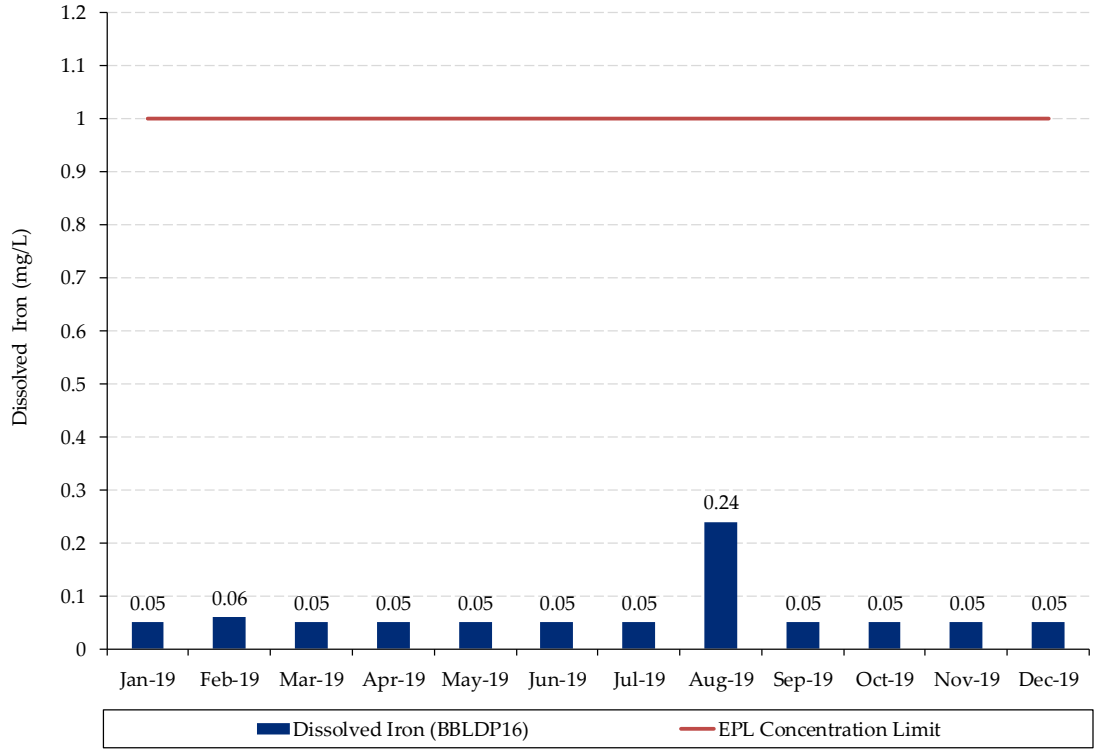



**Figure 6.1:** Dissolved Iron

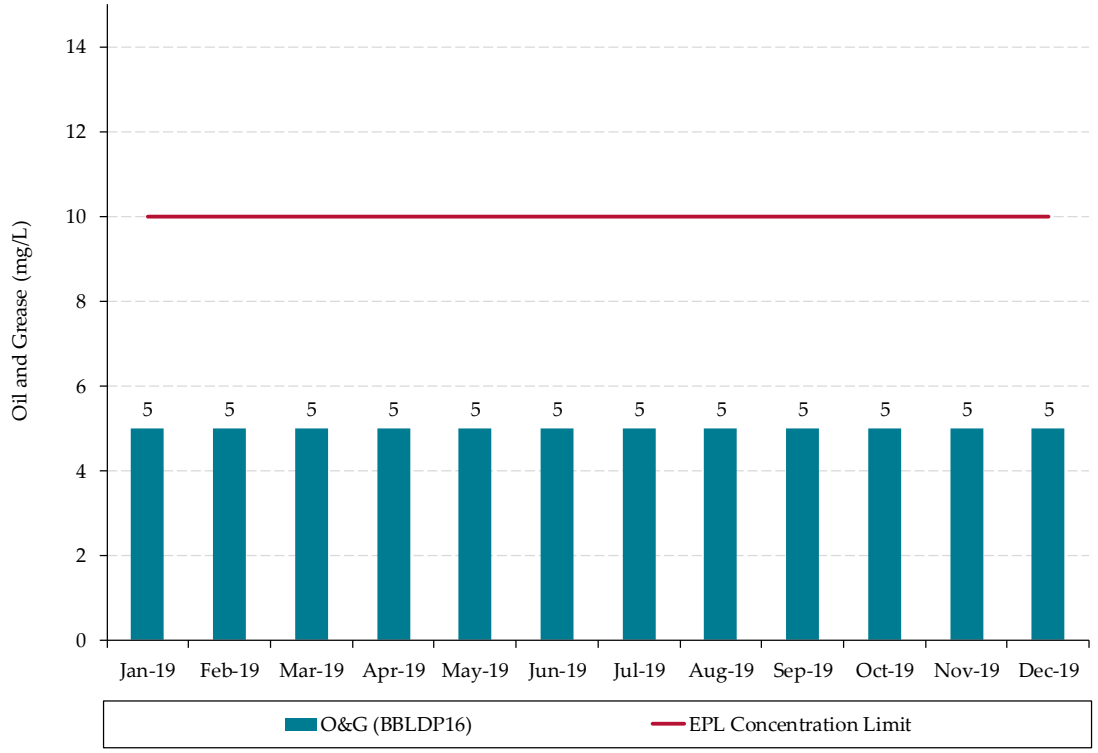



**Figure 6.2:** Oil & Grease

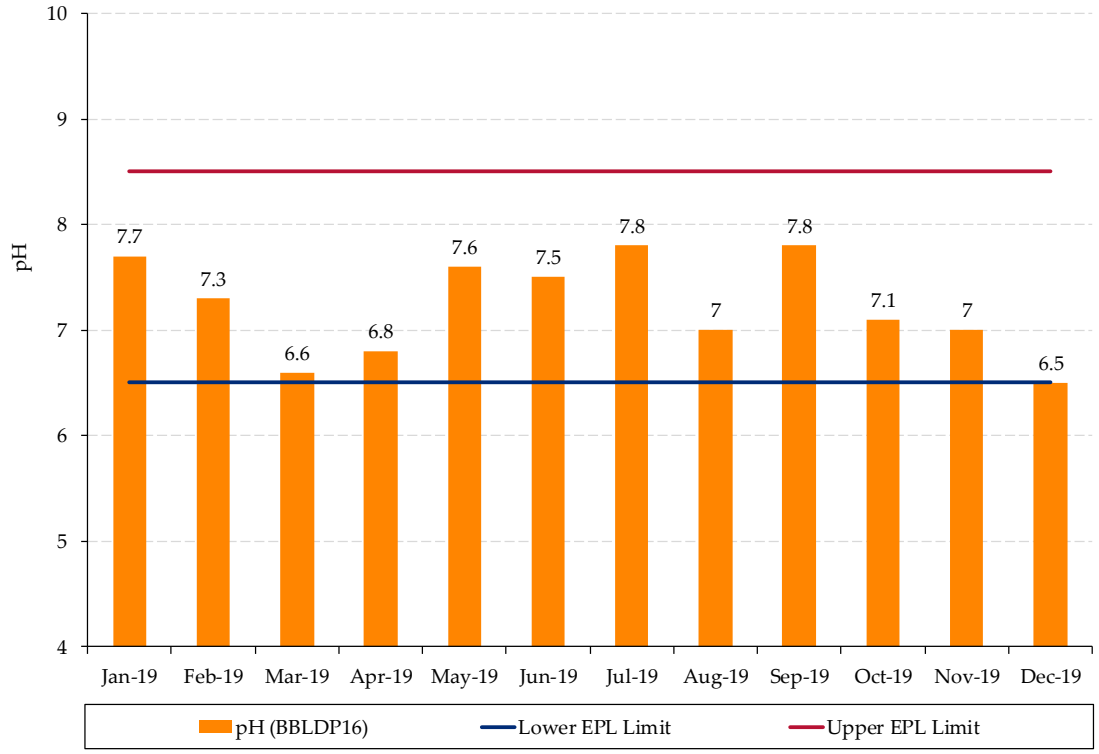



**Figure 6.3:** pH

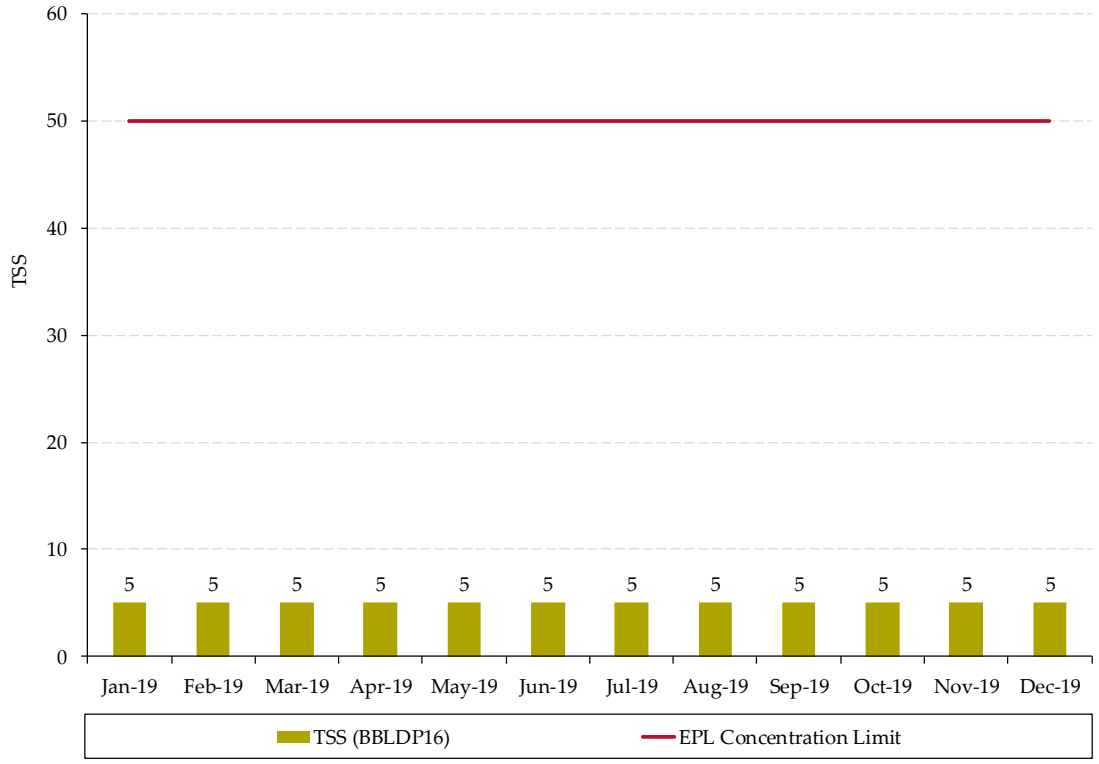



**Figure 6.4:** Total Suspended Solids

All samples recorded were within EPL concentration limits during the 2019 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 2019 were well below the concentration limit of 1 mg/L, with the highest reading of 0.24 mg/L returned in August 2019.
- 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 5 mg/L returned in February 2019 and April 2019.

Monthly EPL reporting can be accessed here: http://www.glencore.com.au/en/who-we-are/energy-products/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 - 2019

| Annual Review Year | Iron | Oil and Grease | pH | TSS |
|---|---|---|---|---|
| 2006 | One minor exceedance at BBLDP16. | Compliant | Compliant | Compliant |
| 2007 | One erroneous exceedance at BBLDP16 of 5.4mg/L in August 2007 – retesting showed compliant level of 0.9mg/L | Compliant | Compliant | One erroneous exceedance at BBLDP1 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 BBLDP16 of 2mg/L in February 2010. | Compliant | Compliant | Compliant |
| 2011 | 2 exceedances at BBLD6 in April and October and 1 exceedance at BBLDP16 in June 2011 of 1.2, 1.2 and 3mg/L respectively. | Compliant | Compliant | Compliant |

| Annual Review Year | Iron | Oil and Grease | pH | TSS |
|---|---|---|---|---|
| 2012 | 1 exceedance at BBLD6 of 2mg/L in September 2012. | Compliant | Compliant | Compliant |
| 2013 | Compliant | Compliant | Compliant | Two Total Suspended Solids (TSS) exceedances at BBLDP3 (60mg/L) and BBLDP6 (85mg/L) in February |
| 2014 | Total iron recorded in Jan 2014 at BBLDP16 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 |
| 2017 | Compliant | Compliant | Compliant | Compliant |
| 2018 | Compliant | Compliant | Compliant | Compliant |
| 2019 | 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 exceedances 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 2019 at current EPL monitoring points. Note that there has been no flow recorded at BBWMP1 and BBLD2 during the reporting period. Furthermore EPL monitoring points BBLD3 and BBLD6 were removed in 2013.

**Figure 6.5** shows the iron level recorded at BBLDP16 from 2011 to 2019. From 1 August 2013 EPL 765 specifies a *dissolved* iron concentration limit of 1 mg/L at BBLDP16. Prior to this time, the iron concentration limit at BBLDP16 was 1 mg/L of *total* iron. Between 2011 and 2018 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.

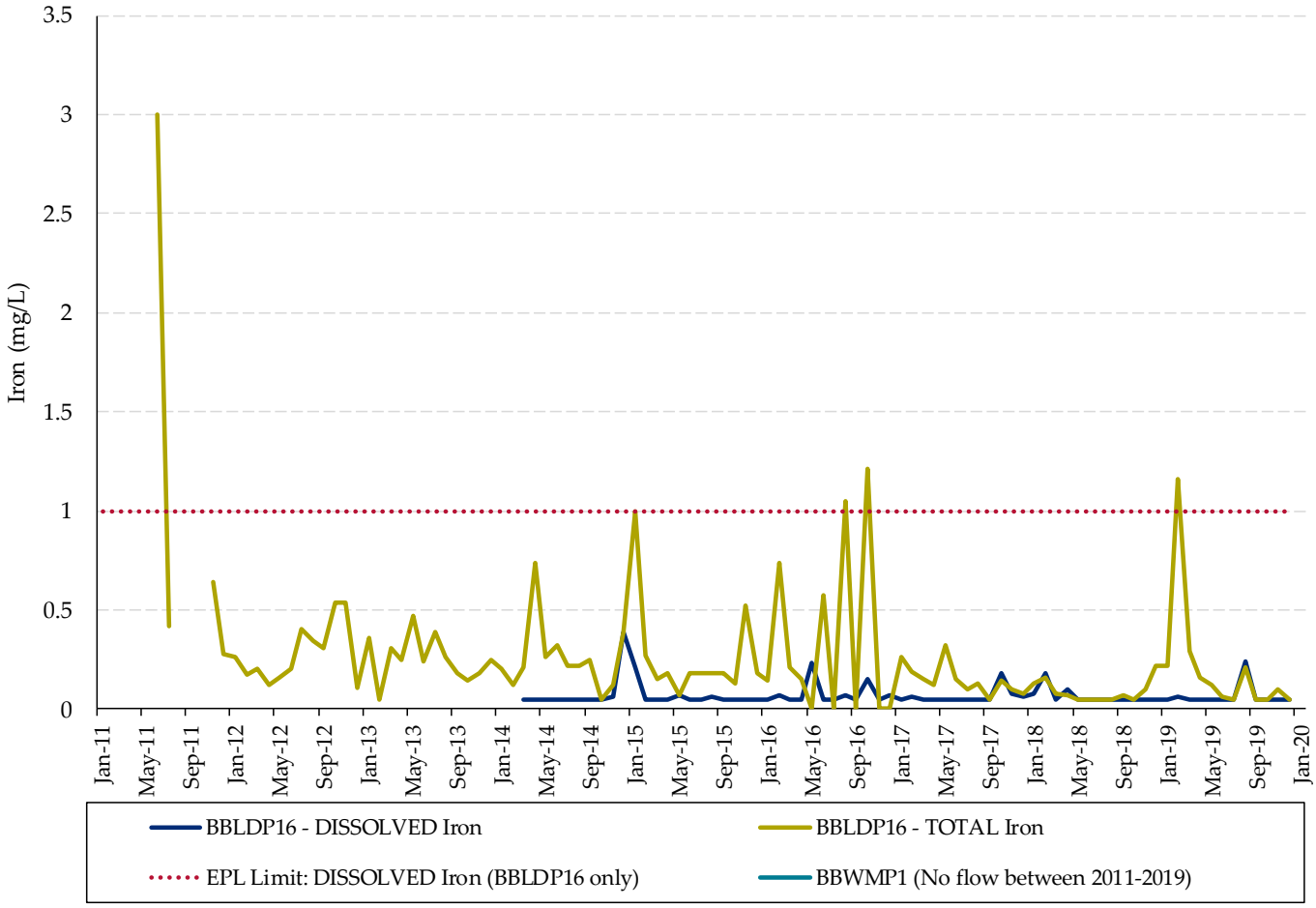



**Figure 6.5**: Iron – Total and Dissolved (2011 – 2019)

**Figure 6.6** shows oil and grease levels from 2011 to 2019 at BBLD2 and BBLDP16. All oil and grease levels at BBLDP16 during 2011 - 2019 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 <2 mg/L in March 2016. From October 2017 the limit of reporting increased to <5 mg/L due to changing to ALS Group Environmental Division Lithgow to undertake the monthly monitoring and analysis.

These changes in the limit of reporting account for the step change in reported oil and grease levels.

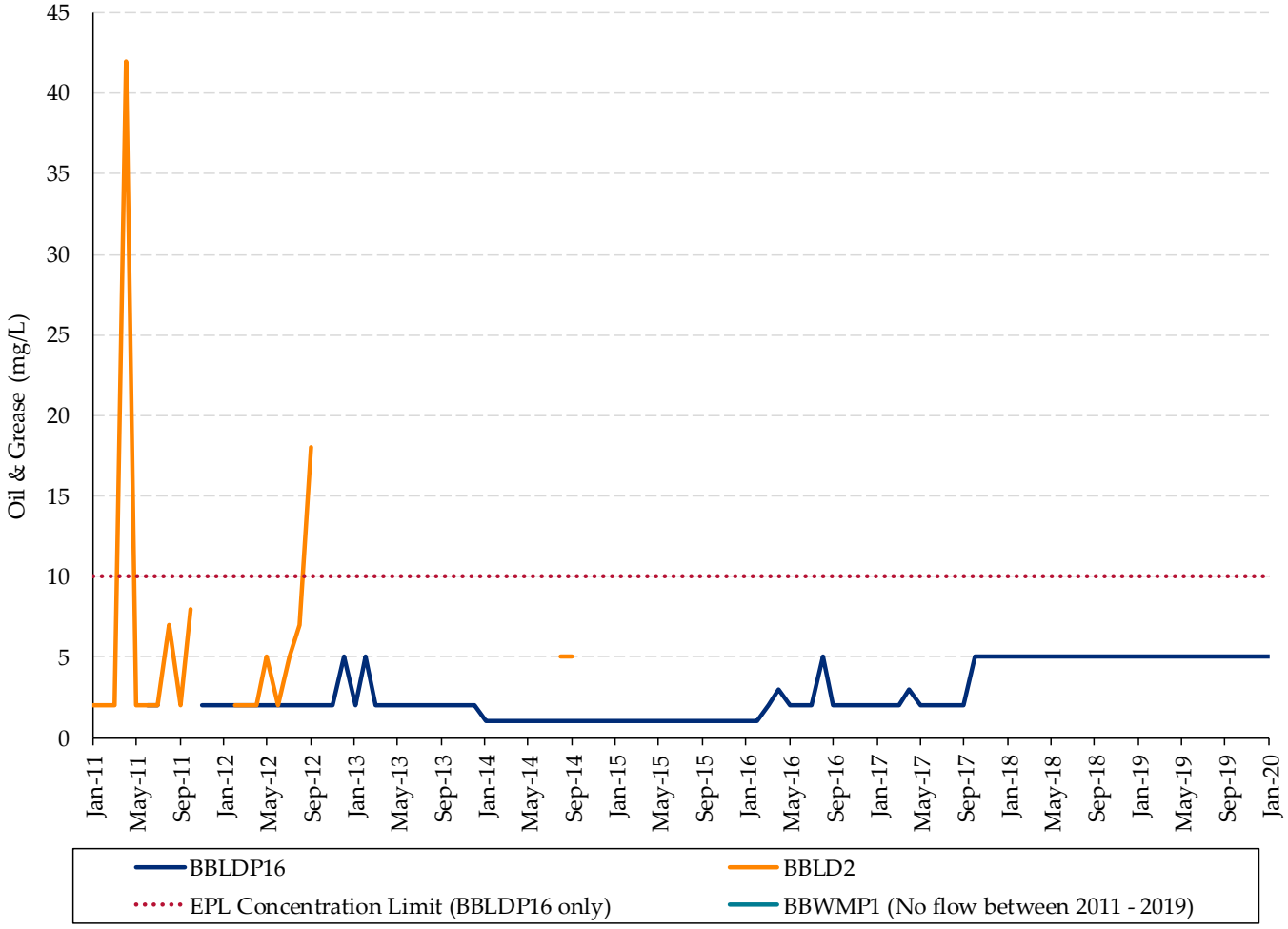



**Figure 6.6:** Oil and grease levels from 2011 to 2019.**Figure 6.7** shows pH levels at BBLDP16 and BBLD2 between 2011 and 2019. All BBLDP16 pH levels during the reporting period were between the upper and lower EPL pH limits of 6.5 and 8.5.

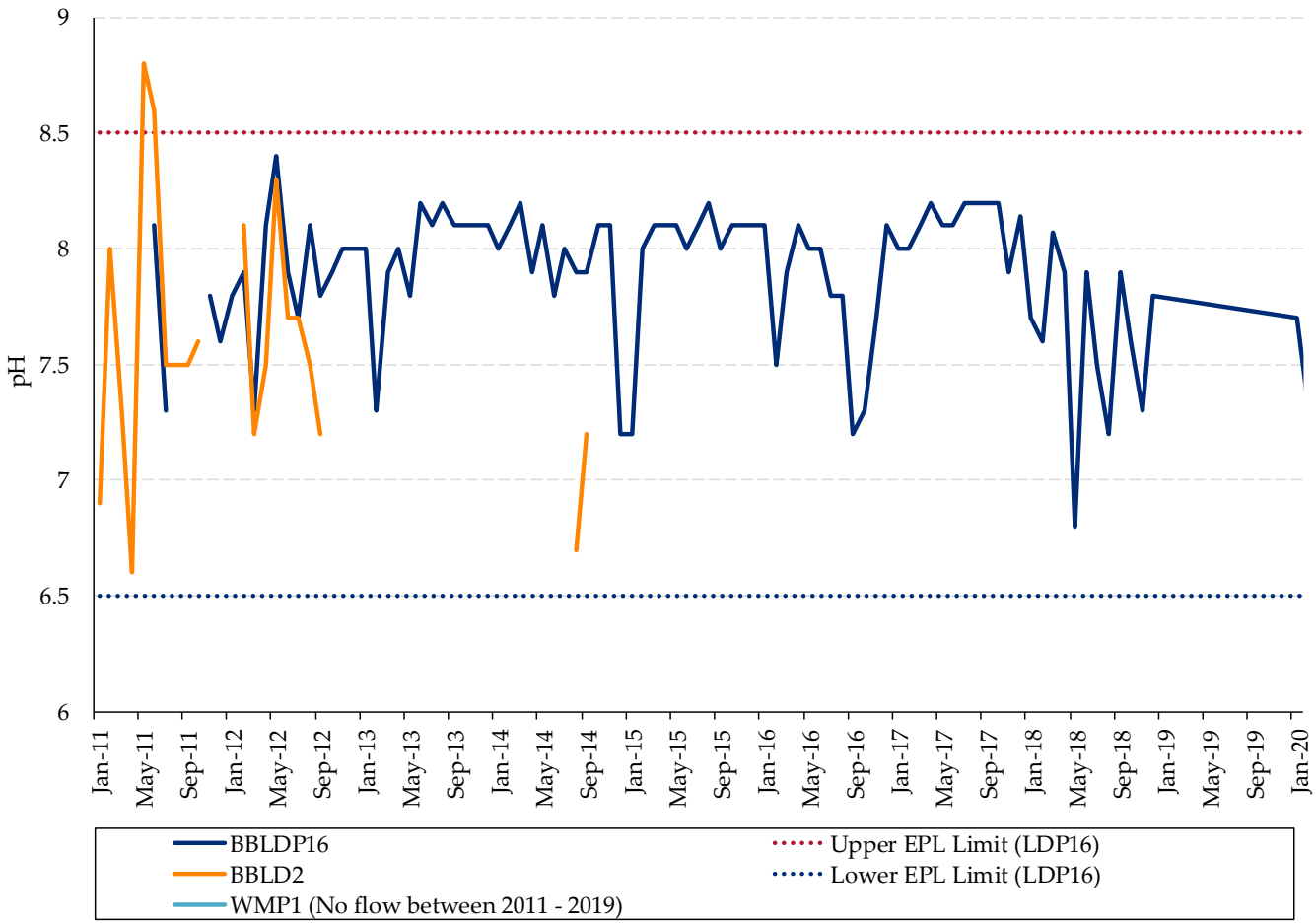



**Figure 6.7:** pH levels from 2011 to 2019.

**Figure 6.8** shows the total suspended solids at BBLDP16 and BBLD2 between 2011 and 2019. All results recorded for BBLDP16 are well below the EPL concentration limit of 50 mg/L.

In 2013, 2014 and 2015 a slight increase in TSS levels at BBLDP16 was noted during November/December, possibly due to seasonal changes.

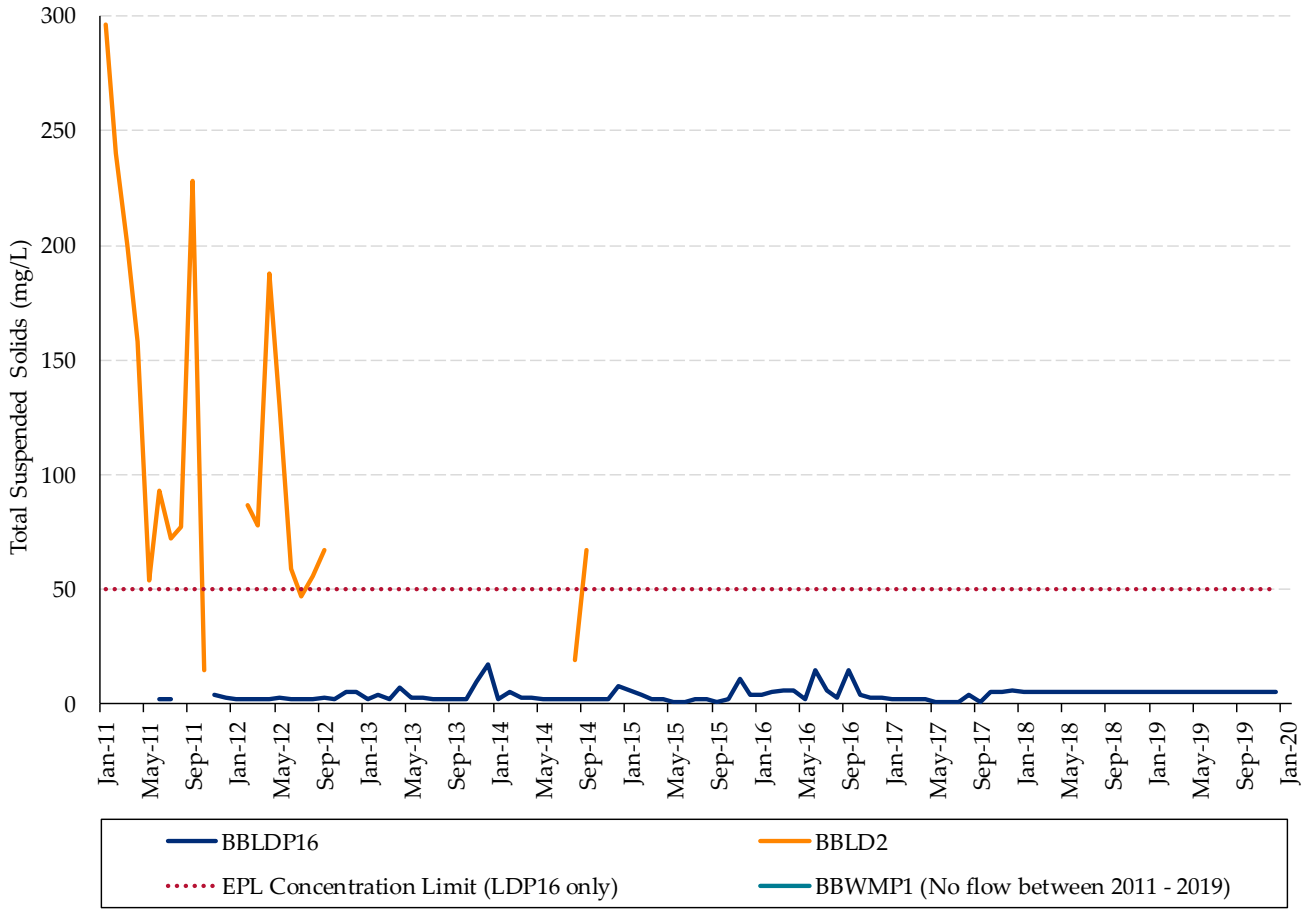



**Figure 6.8**: Total suspended solids levels from 2011 to 2019.

### 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 LW29-31. This prediction is supported by the results presented in the current and past Annual Reviews.

## 6.2 Groundwater

During the 2019 reporting period Baal Bone Colliery maintained and operated three mine dewatering bores, two groundwater supply bores and four shallow piezometer monitoring bores licenced with DPI Water; these are summarised in **Table 6.6**.

After the relinquishment of BBLDP3 and BBLDP6 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 for WAL27887 (80BL136703 and 80BL135509) are not currently used and samples are therefore not available for testing.

Mine water discharge from EPA Licenced Discharge Point LDP11 (now BBLDP16) ceased on 17 December 2019 in accordance with EPL Licence No. 765, Special Condition E2 which required this to occur prior to 31 December 2019.

**Table 6.6:** Licensed bores and piezometers[1]

| 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 LW1 (South Bore 1) |
| 80BL236134 | Perpetuity | Mine dewatering LW1 (South Bore 2) |
| 80BL239077 | 18/06/2016[2] | Mine dewatering LW19 (North Bore) |
| 10BL601877 | Perpetuity | BBN175; LW 29-31 groundwater monitoring piezometer - BBPB1, and monitors the sandstone aquifer north of the Coxs River Swamp. |
| 10BL601816 | Perpetuity | BBN176; LW 29-31 groundwater monitoring piezometer - BBPB2, and monitors the sandstone aquifer north of the Coxs River Swamp |
| 10BL601817 | Perpetuity | BBN177; LW 29-31 groundwater monitoring piezometer - 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 - BBPB4, and monitors the sandstone aquifer on the western side of the Coxs River Swamp |

[1] 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.

[2]. 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 19/12/2017. During 2019 Baal Bone Colliery requested an update from DPI Water on the status of 80BL239077 a number of times, however no response was received from DPI Water. Dewatering from this bore ceased on 17/12/2019 in accordance with EPL 765.

The six groundwater monitoring piezometers in and around Cox's River Swamp (**Appendix A - Plan 5)** 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 LW29-31.

Data loggers in the piezometers were 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 LW29-31. 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.

Following the removal of the data loggers in January 2017 (due to the continued care and maintenance status of Baal Bone Colliery) groundwater levels in the six piezometers are measured manually at least every two months in accordance with the approved Groundwater Monitoring Plan.

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 Trigger, Action, and Response Plans (TARP), which include triggers for assessing changes to groundwater levels and groundwater chemistry. 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 quality trigger levels are presented below. Response and rehabilitation methodologies have also been included where appropriate.

**Table 6.7:** Groundwater Model TARP

| Trigger | Action | Response | Plan | Timeframe |
|---|---|---|---|---|
| • Groundwater monitoring results deviate from predictions made in the EA;<br>• Increased groundwater make in the underground workings compared to predictions made in the EA (AECOM, 2010);<br>• 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<br>• 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 Manager (ECM), or delegate;<br>• Review all groundwater pumping data;<br>• Identify if the installation of additional piezometers is required;<br>• Investigate any external influence which may be affecting the results including climatic data; and<br>• Review operations and investigate for links to operational activities. | • Review the frequency of groundwater monitoring in the affected area; and<br>• Notify and consult with relevant government agencies on investigation and outcomes (e.g. DPI Water, DPIE, and EPA). | • Amend the groundwater model if required; and<br>• 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: Loss of Water Quality TARP**

| Trigger | Action | Response | Plan | Timeframe |
|---|---|---|---|---|
| Monitoring results outside the relevant trigger levels in the SWMP or GWMP:<br>ECM determines that the deviation from background trends and adopted impact assessment criteria could result in environmental harm;<br>three (3) consecutive values are outside the adopted impact | • Notify the Baal Bone Colliery ECM, or delegate;<br>• Review monitoring results against historical monitoring data;<br>• Review recent monitoring results for adjacent monitoring sites;<br>• Review any relevant operational data (i.e. clearing activities, UG mining activities, meteorological data etc.); | • A remedial action plan is developed and implemented to address the investigation findings.<br>• Remedial action plan could include:<br>○ Increase monitoring frequency where relevant;<br>○ Undertake additional monitoring (stream health | • Follow up information is provided to regulatory agencies as requested; and<br>• A summary of monitoring results, investigations and remedial actions plans are provided within the Annual Review.<br>• Monitor the completion of actions to ensure | 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).<br>***Immediate*** reporting of material harm incident required by POEO Act. |

| | | | | |
|---|---|---|---|---|
| assessment criteria; or<br>the measurement varies significantly from background water quality trends. | • Determine if an incident has potentially occurred;<br>• Complete investigation<br>IF<br>Investigation reveals actual or potential material harm to the environment, the EO (together with the Ops Mgr) will initiate the PIRMP[3] immediately.<br>• Inform regulatory agencies as required. | monitoring, etc.) if necessary.<br>○ Corrective/preventative actions based on the outcomes of the investigation and/or additional monitoring; | they have been effective.<br>IF<br>• Material Harm Incident occurred- Internal and External Reporting requirements are completed in accordance with Section 5 of Baal Bone's PIRMP, and reporting obligations detailed in EPL No. 765 and the Project Approval. | |

**Table 6.9:** 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 of more than 2 months.*

## 6.2.1 Groundwater Levels

Rainfall deficit and groundwater levels in the six groundwater monitoring piezometers are presented in **Figure 6.9**. Long term trends of groundwater levels and daily rainfall are shown in **Figure 6.10.**

Rainfall deficit is plotted on **Figure 6.9.** The rainfall deficit uses data from the Lithgow BOM weather stations, and is calculated by accumulating monthly differences between observed and average rainfall. A negative value indicates that the month is drier than average, and a positive value indicates a wetter month. Falling legs on the deficit plot indicate a move towards drought conditions; rising legs indicate a retreat from drought.

[3] PIRMP- Pollution Incident Response Management Plan

Since January 2019, the rainfall deficit has been tracking predominantly downwards. Only two months during 2019 saw monthly rainfall totals above long term averages: January and March. In January 2019 the deficit was -739 mm, falling to -1147 mm by end 2019.

The total rainfall received in Lithgow during 2019 was 466 mm, which is 393 mm less than the long term average annual rainfall in Lithgow of 859 mm, or only 54% of the long term average rainfall.

The water levels in all the bores (BBPB1 – BBPB5) have seen a general decline during 2019, which is interpreted to be due to the very dry conditions. An exception was during Q1 2019 when increasing rainfall in late 2018 and early 2019 saw a corresponding increase in water levels in BBPB1-5.

Note: BBPB6 groundwater levels dropped throughout 2017 in response to the dry conditions, and in February 2018 the piezometer has been recorded as dry. BBPB6 has remained dry from February 2018 until end 2019.

On 18 April 2018 Baal Bone Colliery received a request from the Department of Planning and Environment to undertake a review of groundwater level data, in response to community concern about water levels in the Cox's River Swamp. On 9 May 2018, Baal Bone Colliery provided a report to the Department on Cox's River Swamp groundwater levels and climatic conditions. The report found that the "recent decrease in water levels in the Cox's River Swamp is climate related and does not appear to be mining related" (Cox's River Swamp, Baal Bone Colliery – May 2018). No response from the Department of Planning and Environment has been received to date.

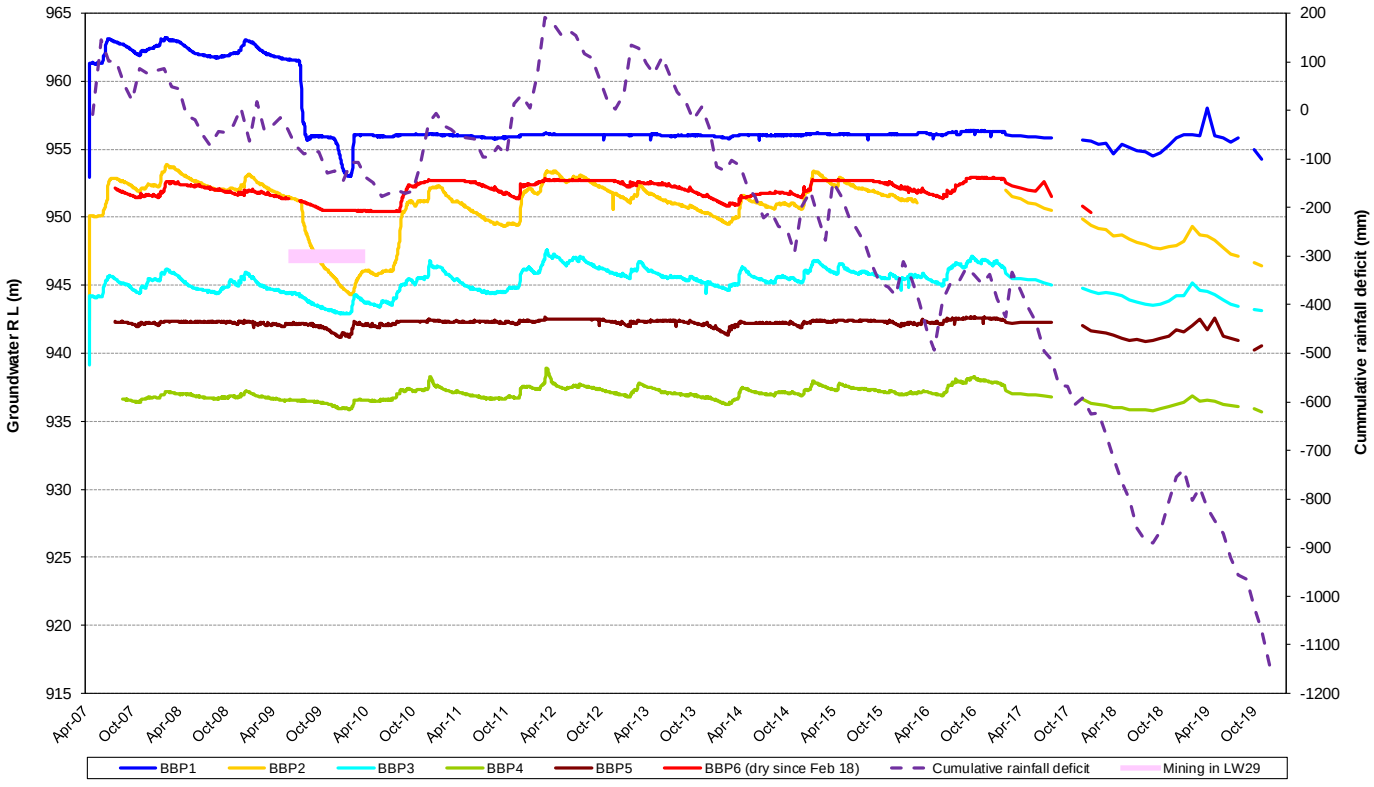



**Figure 6.9:** Coxs River Swamp groundwater levels and rainfall deficit

### 6.2.1.1 Comparison against Previous Annual Reviews

Groundwater data are plotted on **Figure 6.9** and **Figure 6.10**. The north – to – south downstream groundwater gradient has been broadly maintained (highest level observed in BBPB1 and lowest level observed in BBPB4), indicating that overall flow has been maintained down through the swamp.

All groundwater levels appear to be approximately at pre-mining levels, with the only exception being at piezometer BBP1, where a groundwater level has re-stabilised at RL 956 m (approximately 5 m below pre-mining level).

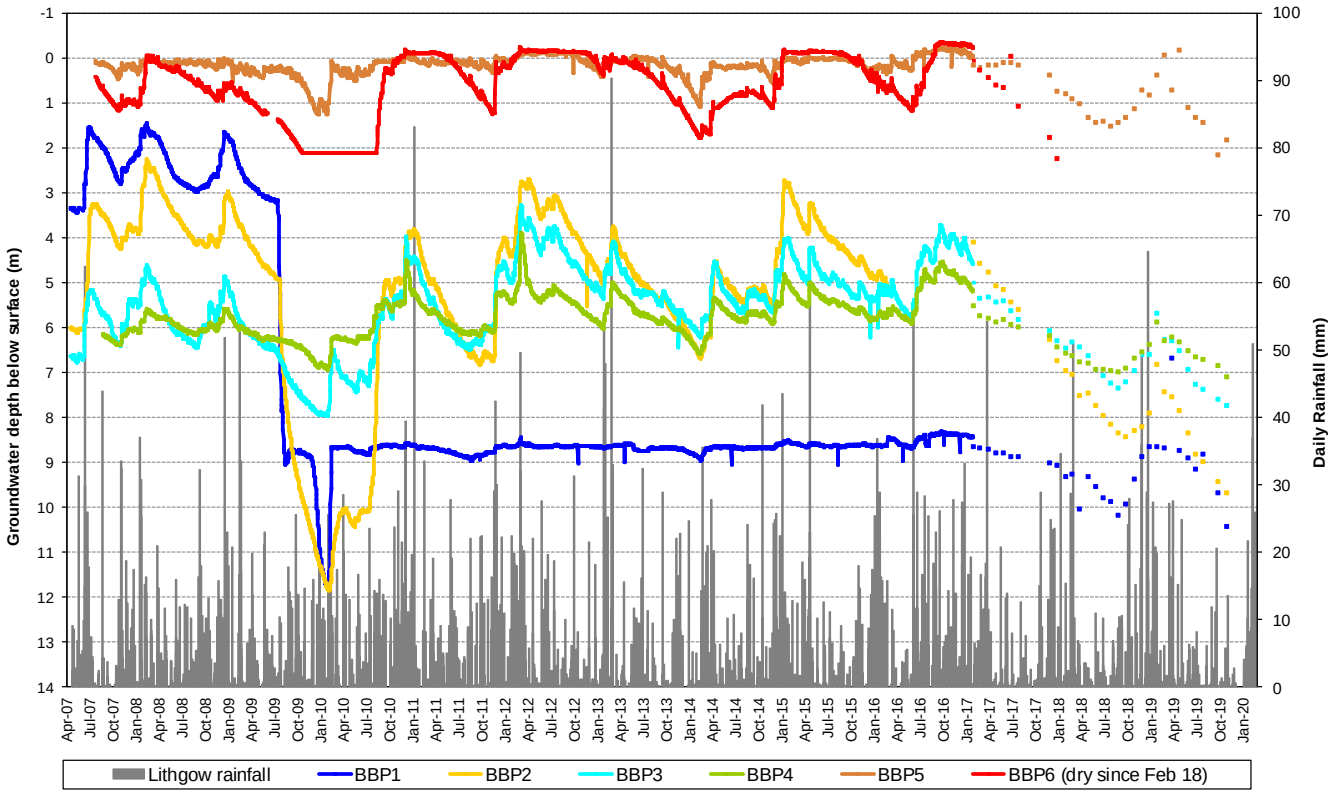



**Figure 6.10:** Longterm groundwater trends

### 6.2.1.2 Comparison against EA

The EA concluded that the likelihood of extraction of LW29-31 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 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 generally remains saturated. The prolonged drought period, as evidenced by the steady rainfall deficit since early 2017, has seen the swamp area around BBPB6 dry considerably, with no water recorded since February 2018.

## 6.2.2 Groundwater Chemistry

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

Due to the Gospers Mountain fire burning through the Ben Bullen State Forest (where BBPB1 to BBPB6 are located) and surrounding areas during December 2019 there were no samples collected in December 2019.

There are no results for BBPB6 for 2019 as the bore was dry.

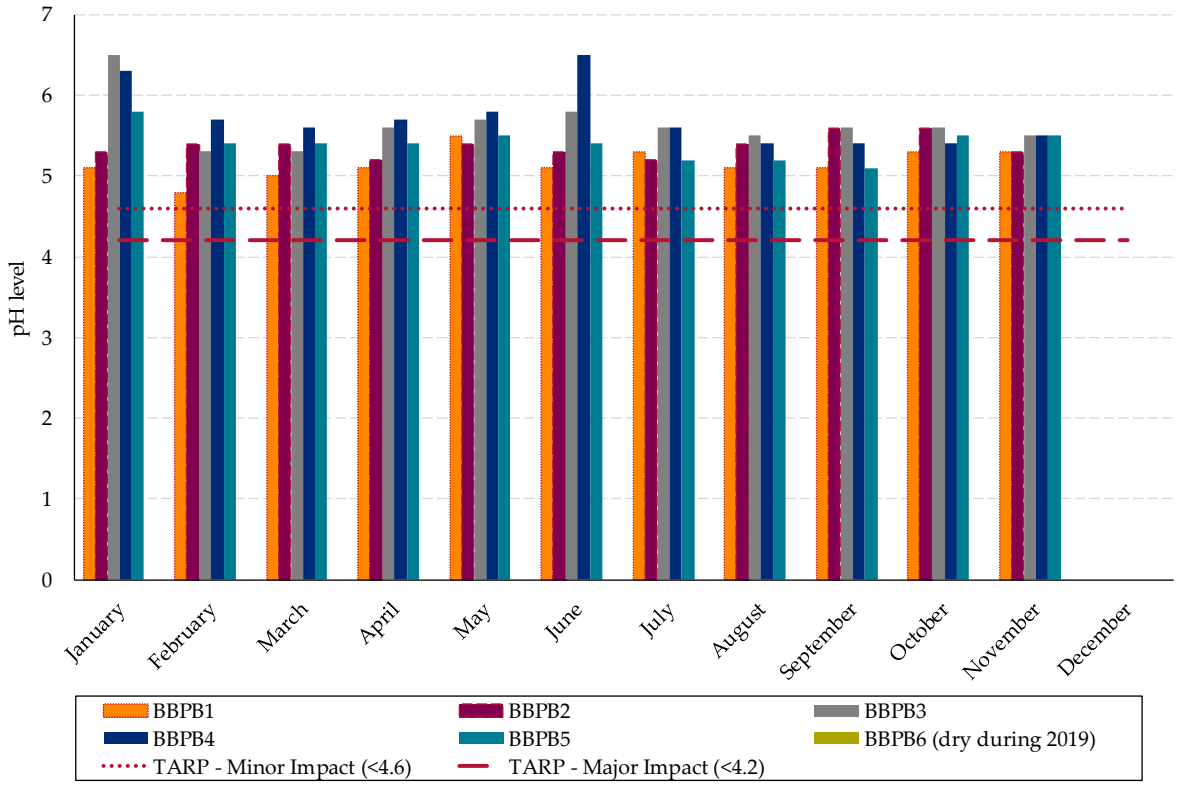



**Figure 6.11:** 2019 Groundwater pH levels.

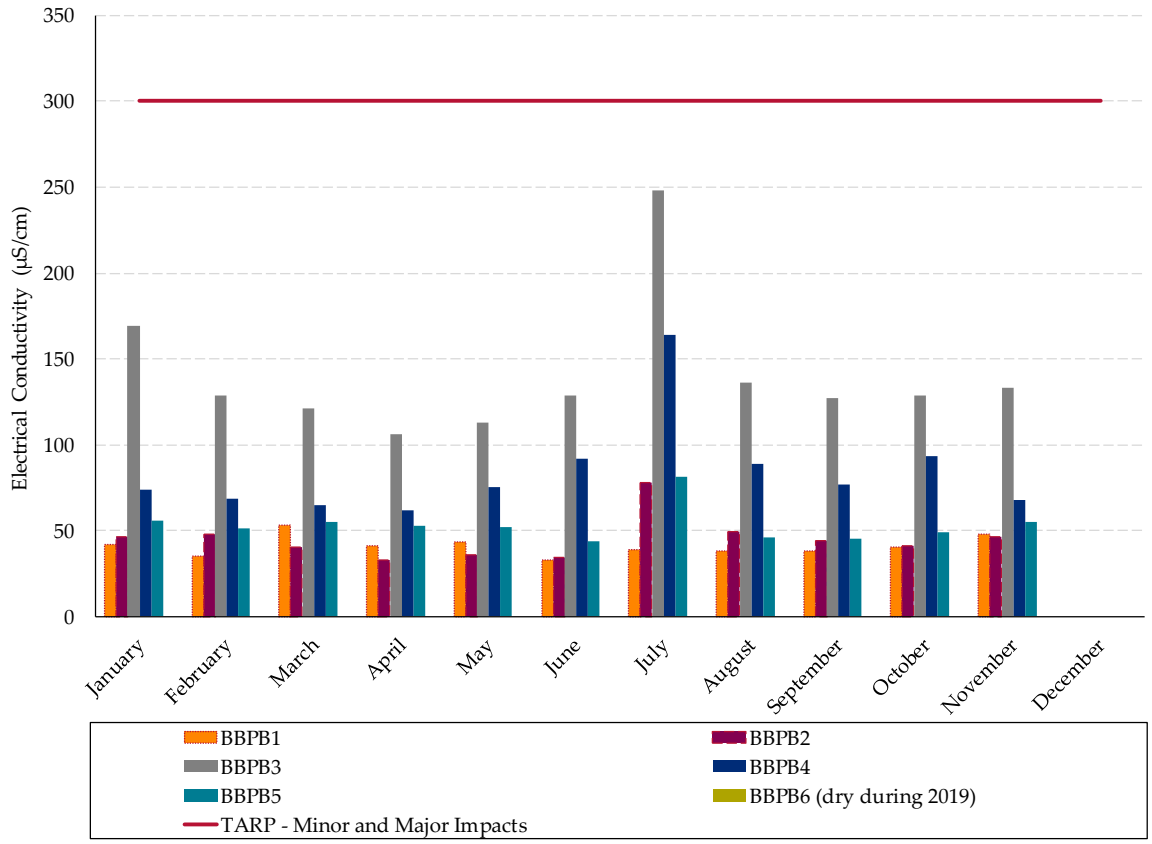



**Figure 6.12:** 2019 Groundwater Electrical Conductivity.

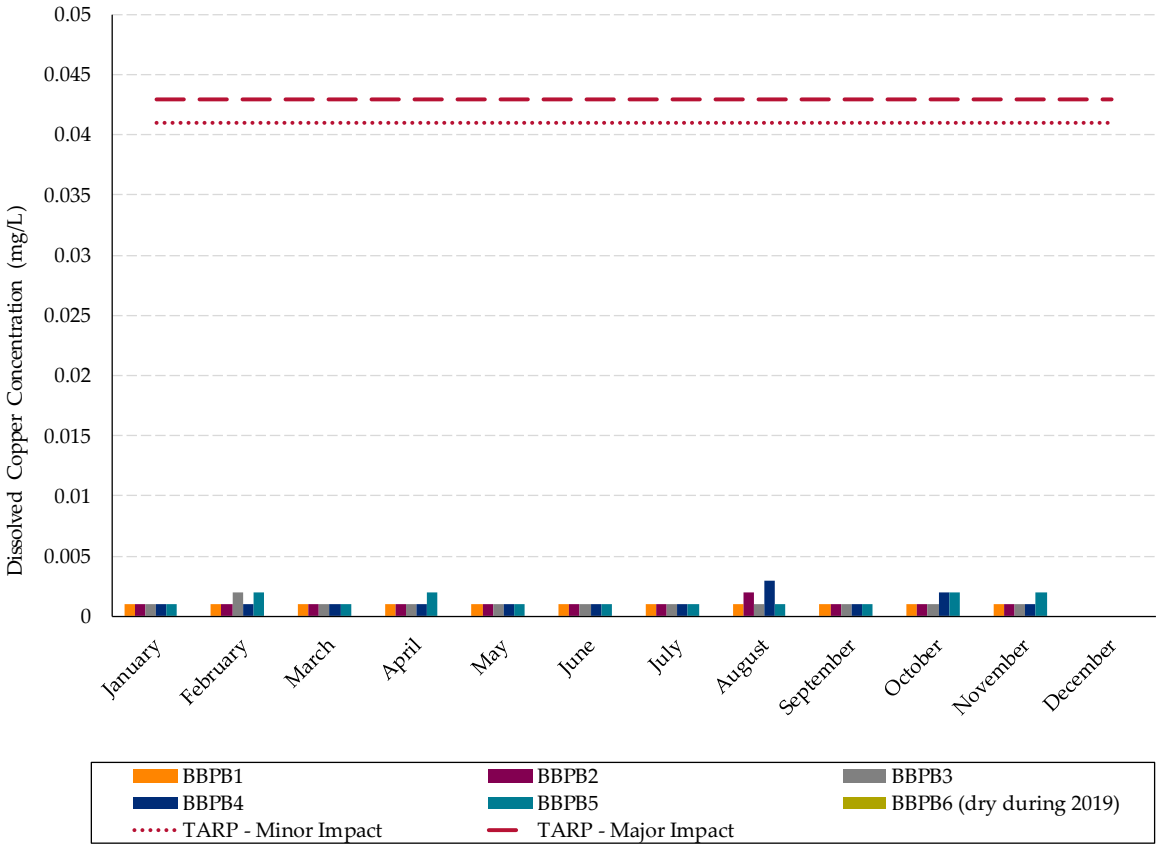



**Figure 6.13:** 2019 Groundwater Copper levels.

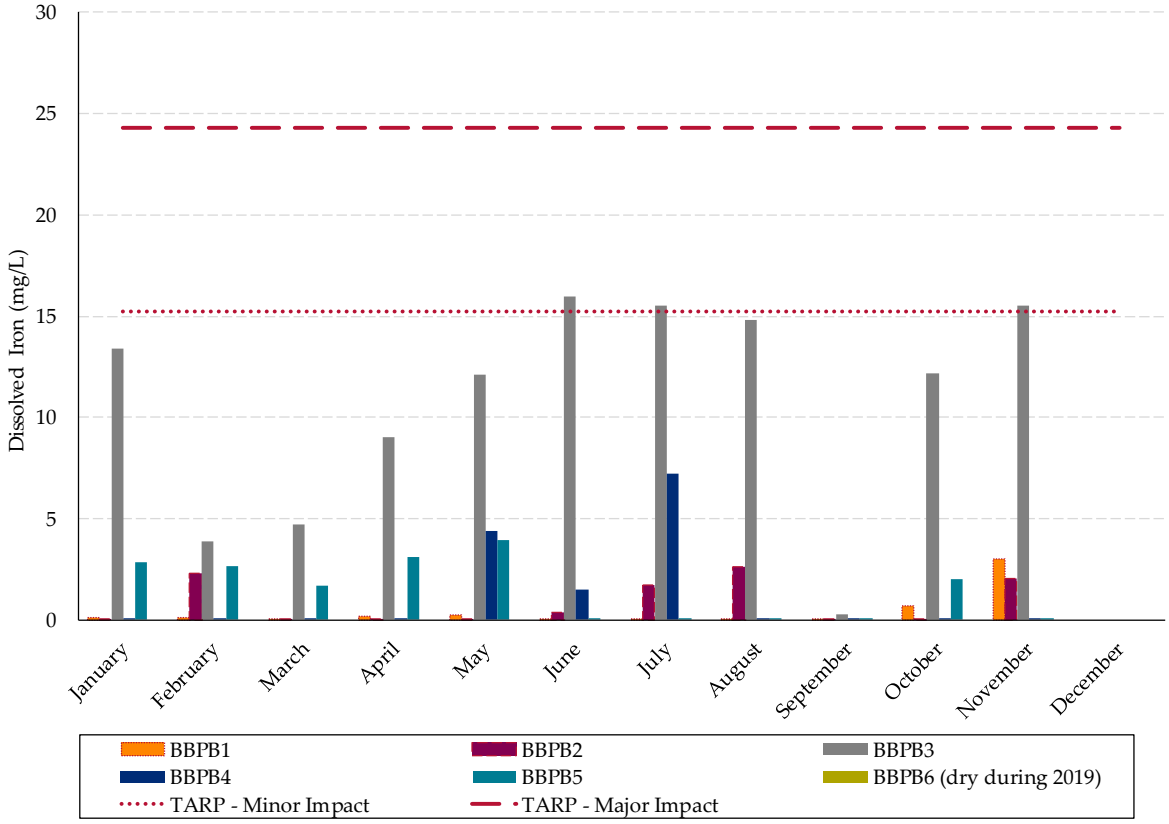



**Figure 6.14:** 2019 Groundwater Iron (dissolved) levels.

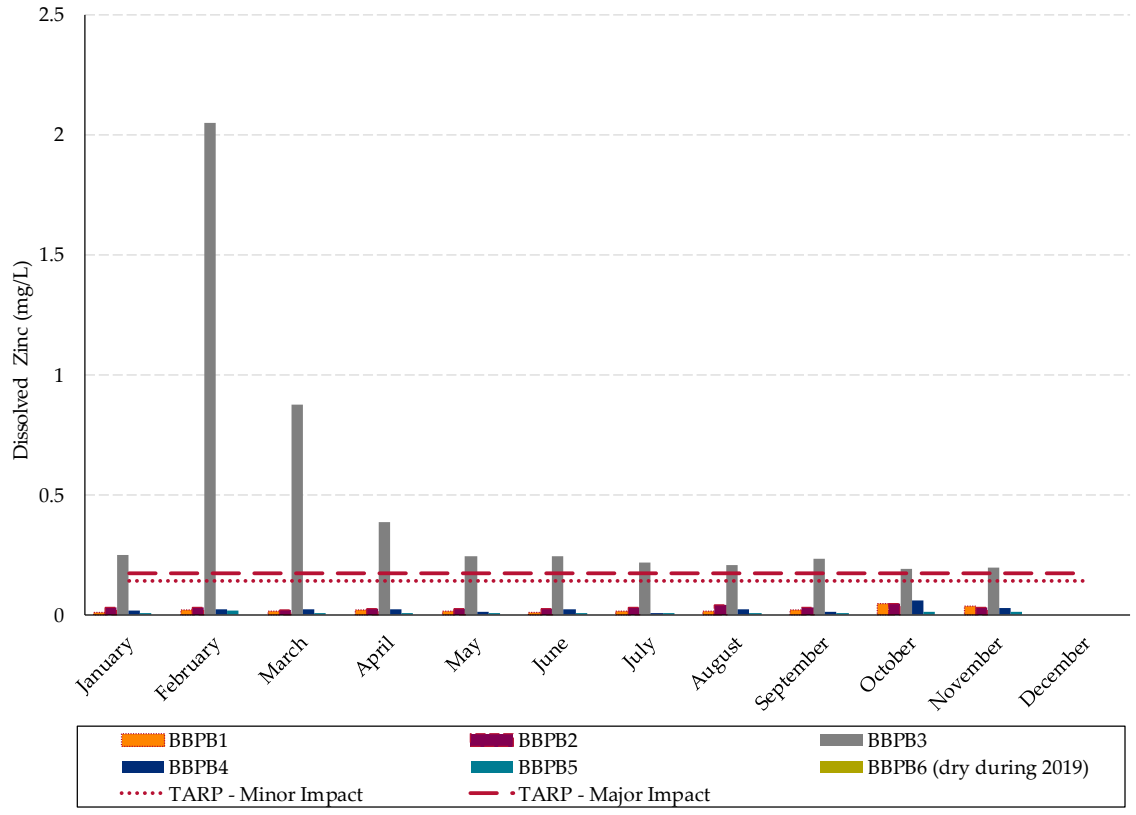



**Figure 6.15:** 2019 Groundwater Zinc Levels.

As shown in **Figure 6.11** above, all pH levels were within both the minor and major impact criteria for all groundwater monitoring bores during 2019.

As shown in **Figure 6.12** above: electrical conductivity (EC) levels were within both the minor and major impact criteria for all groundwater monitoring bores during 2019. All bores (BBPB1 to BBPB5) returned higher EC results in July 2019 compared with preceding and following months.

As shown in **Figure 6.13**, copper levels were also within impact criteria for all groundwater monitoring bores during 2019.

As shown above in **Figure 6.14**, 2019 iron levels were below the minor and major impact trigger levels for all bores except BBPB3. Dissolved iron levels at BBPB3 marginally exceeded the minor impact trigger level in June, July and November 2019. Due to the short duration of these exceedances of the minor impact level, no further action was undertaken.

As shown above in **Figure 6.15**, 2019 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 for zinc for all months when sampling occurred during 2019.

This major impact TARP event has continued since August 2012. Note that mining in LW29-31 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.

The 2019 Independent Environmental Audit (IEA) determined that the ongoing exceedance of Water Quality Trigger Levels for dissolved zinc at BBPB3 was a low risk non-compliance. This was due to no evidence of further notifications being provided to relevant agencies (post-2013), and no other corrective actions undertaken following the original groundwater investigation by Aurecon in 2012. Note: all groundwater chemistry results for BBPB1 to BBPB6 have been reported in the Annual Reviews.

Therefore the IEA recommended that Baal Bone Colliery: “Revisit the zinc trigger levels for BBPB3 in consultation with DPIE for the closure stage”. In the 2019 IEA Action Plan, Baal Bone Colliery committed that by 30 March 2021 a consultant will be engaged to further investigate the exceedance with consideration to be given to calibrating the groundwater triggers to site specific conditions if appropriate.

#### 6.2.2.1 Comparison against previous Annual Reviews

**Table 6.10** summarises previous Annual Review results and any exceedances of TARP trigger levels (minor and major) in BBPB1 – BBPB6 during the period 2011 – 2019.

**Table 6.10:** 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<br>**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<br>**Dissolved Zinc**: Jan, Jun, Aug to Dec | **Dissolved Copper:** Jan, Jul to Oct<br>**Dissolved Zinc:** Oct | No TARP exceedance | No TARP exceedance |
| **2013** | No TARP exceedance | No TARP exceedance | **Dissolved Iron:** Jan, May, Oct to Dec<br>**Dissolved Zinc:** Jan to Dec | **Dissolved Copper:** Sep to Dec<br>**Dissolved Zinc:** Dec | No TARP exceedance | No TARP exceedance |
| **2014** | No TARP exceedance | No TARP exceedance | **Dissolved Iron:** Jan to Mar, Jul<br>**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<br>**Dissolved Zinc**: Jan to Dec | No TARP exceedance | No TARP exceedance | No TARP exceedance |
| **2016** | **Dissolved Copper:** Feb | No TARP exceedance | **Dissolved Iron:** Feb, Mar<br>**Dissolved Zinc**: Jan, Feb, Mar, Apr, Jun, Jul, Aug, Oct, Dec | No TARP exceedance | No TARP exceedance | No TARP exceedance |
| **2017** | No TARP exceedance | **Dissolved Iron**: Oct<br>**Dissolved Zinc:** Oct | **Dissolved Iron**: Oct<br>**Dissolved Zinc:** Jan, Feb, Mar, May, June, July, Aug, Sept, Nov, Dec | No TARP exceedance | No TARP exceedance | **Dissolved Copper**: Nov and Dec<br>**Dissolved Iron**: Oct |
| **2018** | **Dissolved Iron**: July | **pH:** Nov | **Dissolved Iron:** Jan, Mar, Jun, Jul<br>**Dissolved Zinc:** Jan to Jul, Sept to Dec | No TARP exceedance | **Dissolved Iron:** Mar, Jul<br>**Dissolved Copper:** Mar, Jun, Jul | No TARP exceedance **(**BBPB6 dry during 2018) |
| **2019** | **EC:** July | No TARP exceedance | **Dissolved Iron:** Jun, July, Nov<br>**Dissolved Zinc:** Jan to Nov | No TARP exceedance | No TARP exceedance | No TARP exceedance |

### 6.2.2.2 Comparison against EA

The EA concluded that the likelihood of extraction of LW29-31 resulting in a significant impact on the Coxs River Swamp water quality and quantity (levels) 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 zinc, noted in **Section 6.2.2**, 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 LW29-31 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 recording 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.

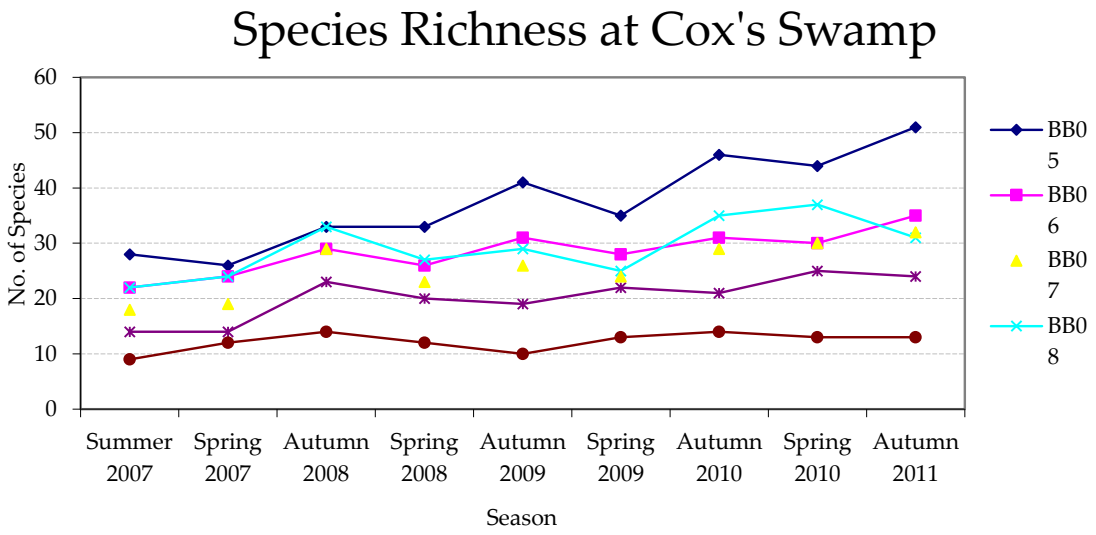



**Figure 6.16: S**ummary of species richness at the monitoring sites

### 6.2.3 Groundwater Extraction

Prior to 17 December 2019, mine water and groundwater intercepted by underground mining operations was extracted from both the north (LW19) and south (LW1) boreholes. This water was 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 overflowed into the overshot dam and left the site through BBLDP1. Alternatively this water could also be discharged into the dirty water dam, where after retention time, the water would be pumped to the process water dam where it would flow onto Ben Bullen Creek and then leave the site through BBLDP1 at the overshot dam.

Historically discharges from the north and south dewatering bores were discharged via BBLDP3 and BBLDP6 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 BBLDP1 and into Jews Creek. Subsequently BBLDP3 and BBLDP6 were relinquished on 31st July 2013.

**Table 6.11** shows water taken by the Baal Bone operation for the 2019 reporting period.

**Table 6.11:** Water take for 2019 reporting period.

| Water License # | Water sharing plan, source and management zone (as applicable) | Entitle-ment (ML) | Passive take/ inflows (ML) | Active pumping (ML) | TOTAL (ML) |
|---|---|---|---|---|---|
| **80BL236132** | Not Applicable | - | - | - | - |
| **80BL236134** | Not Applicable | - | 995 | - | 995 |
| **80BL239077** | Not Applicable | - | 381 | - | 381 |
| **WAL27887*** | NSW Murray Darling Basin (MDB) Porous Rock Groundwater Sources<br>Sydney Basin MDB Groundwater Source<br>Sydney Basin MDB (Other) Management Zone | 750 | - | Not Metered | - |

#### 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 2019. Since 2012 total groundwater extraction had been generally 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 (LW29-31 and Remnant Areas). The volume of groundwater extracted in 2008 was approximately 1.5 GL/annum.

In 2019, approximately 1.4 GL of groundwater was extracted via the north and south dewatering bores – hence within the expected range of groundwater extraction predicted in the EA.

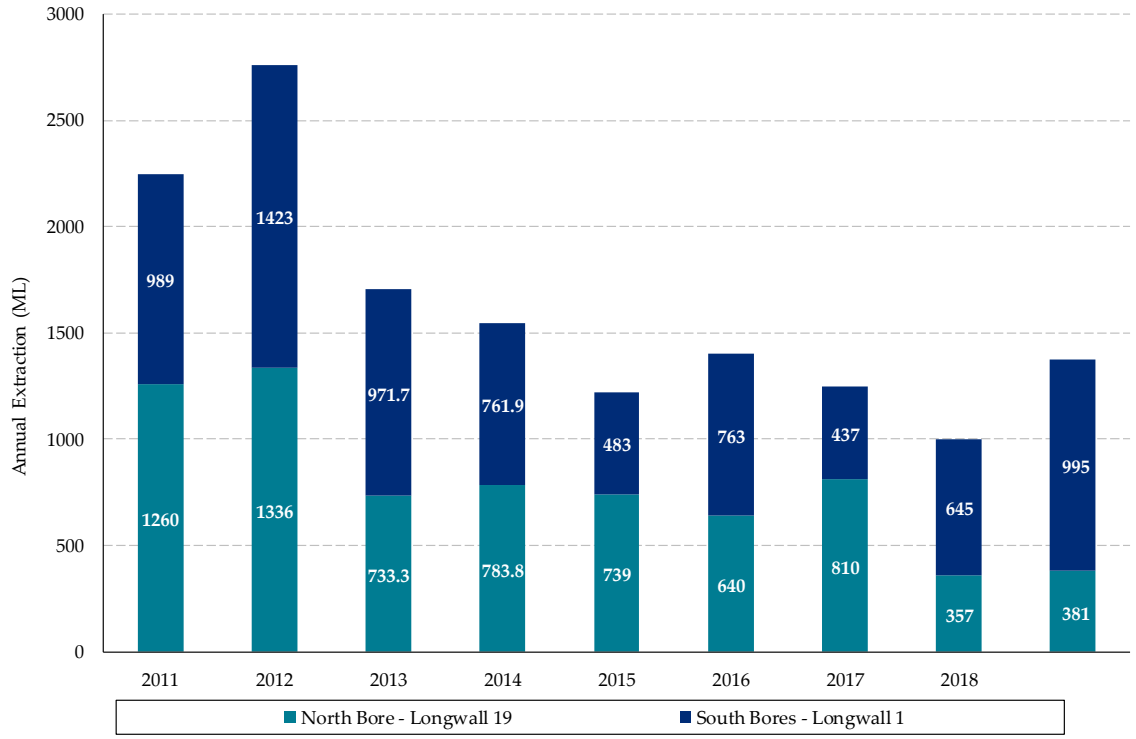



**Figure 6.17:** Annual extraction from North and South bores from 2011 to 2019

# 6.3 Channel Stability Monitoring

The Surface Water Monitoring Plan requires that Channel Stability Monitoring be undertaken annually for Coxs River, Ben Bullen Creek, Baal Bone Creek and Jews Creek to assess the condition of the watercourse.

Channel Stability Monitoring was first undertaken in 2014 (mining ceased in 2011). Following the initial monitoring in 2014, the scope of the monitoring program was limited to only areas of active erosion as identified in the 2014 monitoring program (Stream Health Monitoring Recommendations – Umwelt, dated 30 November 2015).

Therefore, as mining will not recommence, only monitoring locations Co-2, Co-3 and Co-4 on Cox's Creek, Be-2, Be-3, Be-4, Be-5 and Be-6 on Ben Bullen Creek, and Ba-2 and Ba-3 on Baal Bone Creek need to be inspected as part of the annual monitoring program.

Channel Stability Monitoring was undertaken on 20 and 21 August 2019 by Umwelt.

The 2019 Channel Stability Monitoring Report found that:

"*all monitoring points remain in the same or similar condition as at the time of monitoring in 2017 and 2018. All calculated activity ratings are the same as those reported from the 2018 monitoring and, therefore, conclusions regarding the causes of erosion remain consistent with those detailed in Umwelt (2018).*

*The conclusions following the 2019 monitoring are as follows:*

- *The original causes of the erosion are varied, but likely include subsidence, high flow events and other activities that expose slaking and dispersive material and/or concentrate flow paths, namely wombats and motorcycle tracks.*

  *NOTE: Since underground mining ceased approximately eight years ago, no further subsidence is likely to occur that could impact or initiate the exposure of dispersive and/or slaking materials at the monitoring points.*

- *In the case of Ben Bullen Creek and Coxs River, the erosion is believed to be predominantly related to subsidence cracking in proximity to the watercourses.*
- *Once slaking and/or dispersive materials have been exposed in a watercourse, erosive flow events can cause the area of exposed material to increase exponentially, creating a positive feedback loop that will continue until the erosive energy is reduced or physical limits to erosion are reached, e.g. removal of material back to bedrock.*
- *Dry conditions impact the growth of stabilising vegetation. Dying vegetation can leave wall materials more susceptible to erosion from high-energy, erosive flows, although such high flows do not appear to have occurred at the monitoring points in recent years.*

*The recommendations for future management also remain consistent with recommendations presented in Umwelt (2018) and are detailed below.*

*It is recommended that:*

- *areas of 'active' to 'very active' erosion, particularly those along Ben Bullen Creek and the Coxs River continue to be monitored annually, with inspections undertaken in accordance with the Surface Water Management Plan if rainfall events are observed on site*
- *where subsidence caused by mining has caused active erosion sites, remedial works should be undertaken where required with the program of works to be undertaken to be detailed in the mine closure Mining Operations Plan (MOP) developed for the site*
- *options to provide additional scour protection in the incised lateral inflow channels flowing into the Ben Bullen Creek realignment at Be-6 should be investigated*
- *annual channel stability monitoring should continue to ensure that rehabilitation activities have been successful and that any further erosion can be identified and addressed.*
- *Monitoring points Co-1 and Ba-1 be assessed in the 2020 monitoring event to confirm stable conditions are being maintained."*

## 6.4 Stream Health Monitoring

The Surface Water Monitoring Plan required that Stream Health Monitoring be undertaken for Coxs River, Ben Bullen Creek, Baal Bone Creek and Jews Creek to determine the overall health and condition of each of the four watercourses

Stream Health Monitoring was last undertaken in 2014. Following the results of the 2014 monitoring and due to the care and maintenance and now closure phase status of Baal Bone Colliery, annual Stream Health Monitoring has been suspended.

As per advice from Umwelt (Stream Health Monitoring Recommendations – Umwelt, dated 30 November 2015) and the **Surface Water Monitoring Plan**:

*Prior to the commencement of Ben Bullen Creek Rehabilitation works, aquatic fauna monitoring sites will be identified in Jew's Creek and in analogue sites in order to establish baseline completion criteria. Following the completion of physical Ben Bullen Creek rehabilitation works, the monitoring will be extended to sites in the rehabilitated creek line with rehabilitation success being assessed against the analogue site(s).*

# 7 Rehabilitation

## 7.1 Buildings

No buildings were removed during 2019.

## 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 open cut mining program which concluded in 2007. The current levels of disturbance at the site have been significantly reduced due to these rehabilitation works.

During 2012, aerial re-seeding and fertilisation of approximately 15 ha in the Northern Rehabilitation Area was conducted to improve the cover of eucalypts and native grasses.

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 fan (utilised for LW29-31) was removed and the shaft filled. Site levelling, fence removal and topsoil replacement was completed in June 2013. In consultation with State Forest NSW, the area was prepared and seeded in 2014 using a mix of local seeds.

During 2017 and 2018 Baal Bone Colliery commenced locating and capping legacy exploration boreholes across the site.

On 20 December 2018, Baal Bone Colliery submitted a revised MOP 2016 -2019 to the Resources Regulator for approval. The revised MOP:

- provided further details and engineer plans for the sealing of the LW19 ventilation fan and shaft, and underground adits 1 – 11.
- extended the completion date for the ~28 ha of rehabilitation in the Northern Void and Northern Rehabilitation area until end 2019.

On 13 February 2019, approval for the revised MOP was granted by the Resources Regulator.

During 2019, eleven entries into the underground mine, and the Longwall 19 ventilation shaft were filled and sealed in accordance with *MDG6001 Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams.*

In late 2019 a Mine Closure MOP was submitted to the Resources Regulator. On 20 December 2019, the Resources Regulator approved the Mine Closure MOP until 31 December 2025.

In 2020, demolition of infrastructure commenced.

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

**Table 7.1:** Summary of Rehabilitation Performance[4]

| Mine Area Type | Previous Reporting Period (Actual) (ha) | This Reporting Period (Actual) (ha) | Next Reporting Period (Forecast) (ha) |
|---|---|---|---|
| | 2018 | 2019 | 2020 |
| **A. Total Mine Footprint[5]** | 475 | 475 | 475 |
| **B. Total active disturbance** | 197.9 | 197.9 | 153.9 |
| **C. Land being prepared for rehabilitation** | 0 | 0 | 44.6[6] |
| **D. Land under active rehabilitation** | 0 | 0 | 0 |
| **E. Completed rehabilitation** | 172.3 | 172.3 | 216.3 |

## 7.2.1 Subsidence Remediation

Subsidence that occurred historically was in accordance with previous predictions for potential subsidence impacts at Baal Bone Colliery. Minimal impacts occurred to surface features, infrastructure, heritage areas, watercourses, groundwater, swamps, wetlands and flora and fauna. Any subsidence impacts were managed by the SMP required under PA 09-0178.

The SMP for development and extraction of Longwalls 29-31 expired on 1 December 2014, with mining operations in this area completed in early September 2011. The results of final monitoring were presented in the Annual Environment Review 2014 – Baal Bone Colliery. These results were reviewed by a Subsidence Engineer from DT&I, Mine Safety. In light of the results from this assessment and pursuant to Condition 12 of Deputy Director General's approval of the SMP, the request to discontinue subsidence monitoring and remove survey lines and monitoring equipment was approved.

Currently all remediation works for longwalls 29 to 31 have been completed and a number of cracks associated with FCNSW land over longwalls 1 to 28 have also been repaired as part of an ongoing subsidence crack rehabilitation program.

An assessment of residual subsidence impacts was undertaken by Glencore in 2017. The process of the subsidence assessment included:

- Surveys
- Risk assessment
- Consultation with landowners and relevant agencies
- Development of a database
- Identification of appropriate remediation actions.

A number of surveys have been undertaken to identify subsidence cracks that require remediation over the longwall mining area. The first surveys were undertaken through the period of mining LW29 to LW31 (2009 to 2011). The subsequent two surveys concentrated on assessing cracks for longwalls 1 to 28. The first was undertaken in April 2015 and the second conducted between May and June 2016.
From the subsidence crack investigation an initial risk assessment was undertaken to determine the rehabilitation priorities, remediation objectives and methodologies. The assessment was based on three parameters:

[4] Values at A and B are given as at the end of the reporting period whilst values at C and D reflect areas rehabilitated during the period
5 This figure excludes the Subsidence Domain as per Annual Review Guideline (2015).
[6] Total rehabilitation area includes 0.6 ha in previously rehabilitated areas.

- Community safety
- Fauna entrapment
- Soil erosion.

Rehabilitation methodologies were developed in consultation with Forestry Corporation NSW (FCNSW) and the Resources Regulator. This methodology followed similar remediation techniques used previously.

There were no subsidence repairs undertaken during 2019.

The assessment and remediation criteria set out the **Mine Closure MOP 2019-2025 (Section 3.2.5)** will be used as a guide for future remediation activities. Remediation activities will be undertaken in response to regular monitoring until rehabilitation has been achieved.

Each site once rehabilitated will have an inspection and photograph taken to provide evidence that the work has been completed to the required scope of work determined for the closure criteria stage. This information will be recorded and maintained within the subsidence database until tenure relinquishment.

## 7.3 Performance Indicators and Completion Criteria

The Baal Bone Colliery MOP divides the lease area into seven different domains. **Section 6 of the Baal Bone Colliery Mine Closure MOP 2019 - 2025** outlines the rehabilitation performance indicators and closure criteria that must be met to demonstrate that the rehabilitation objectives for each domain have been achieved over the six different rehabilitation phases (i.e. (1) Decommissioning, (2) Landform Establishment, (3) Growth Medium Development, (4) Ecosystem and Land Use Establishment, (5) Ecosystem and Land Use Sustainability, and (6) Relinquished Lands).

A range of different environmental monitoring and inspections are used to measure progress towards the rehabilitation completion criteria for each phase, including; landform surveys and inspections, water monitoring, soil tests, flora and fauna monitoring. In particular the completion criteria outlined in the Ecosystem and Land Use Establishment phase, and Ecosystem and Land Use Sustainability phase are tracked via the Annual Ecological Rehabilitation Monitoring outlined below at **Section 7.4.2.**

## 7.4 Rehabilitation Inspections and Monitoring

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

- 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.

### 7.4.1 Annual Environmental Rehabilitation Inspection

The 2019 Annual Environmental Rehabilitation Inspection was conducted by DnA Environmental from 18-20th November 2019. Consistent with the inspections conducted from 2014-2018, the 2019

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.

### 7.4.2 Annual Ecological Rehabilitation Monitoring

An Annual Ecological Rehabilitation Monitoring program 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 Resources Regulator.

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 (refer to **Appendix A – Plan 6**).

Monitoring of these sites is undertaken annually until rehabilitation areas reach 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 findings of the Annual Ecological Rehabilitation Monitoring program are also used to assess progress towards rehabilitation commitments in the Baal Bone Colliery Mine Closure MOP 2019-2025. **Section 6** in the **Mine Closure MOP 2019-2025** sets out performance indicators and completion criteria. Baal Bone Colliery will demonstrate achievement of all completion criteria prior to seeking relinquishment of the site.

2019 Annual Ecological Rehabilitation Monitoring Results

The results of the 2019 monitoring, undertaken by DnA Environmental from the 18th – 20th November 2019 are summarised below. The table indicates the performance of the mixed eucalypt woodland and exotic pasture rehabilitation monitoring sites against 70% primary completion performance indicators in 2019. The selection of criteria has been presented in order of rehabilitation phases according to the ESG3 MOP guidelines. The range values of the ecological performance targets are amended annually. Rehabilitation sites meeting or exceeding the range values of their representative target community type have been identified with a coloured box and have therefore been deemed to meet these primary completion performance targets this year. Hashed coloured boxes associated with soil condition indicate they may be outside of the reference target ranges, but within acceptable agricultural limits.

Performance of the mixed eucalypt woodland and exotic pasture rehabilitation sites against 70% primary performance indicators in 2019

| Rehabilitation Phase | Aspect or ecosystem component | Completion criteria | Performance Indicators | Unit of measure (*desirable) | NOC3 Pasture | NOC4 Pasture | NOC5 Pasture | Box Cut Woodland | NOC1 Woodland | NOC2 Woodland | SOC1 Woodland | SOC2 Woodland | SOC3 Woodland | SOC4 Woodland | REA5 Woodland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Performance indicators are quantified by the range of values obtained from representative reference sites*** | | | | | 70% meet criteria | 70% meet criteria | 70% meet criteria | 70% meet criteria | 70% meet criteria | 70% meet criteria | 70% meet criteria | 70% meet criteria | 70% meet criteria | 70% meet criteria | 70% meet criteria |
| **Phase2: Landform establishment and stability** | **Landform slope, gradient** | Landform suitable for final landuse and generally compatible with surrounding topography | Slope | < Degrees (°) | 7 | 1 | 1 | 14 | 5 | 5 | 8 | 6 | 6 | 5 | 2 |
| | **Active erosion** | Areas of active erosion are limited | Cross-sectional area of rills | m2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Phase 3: Growth medium development** | **Soil chemical, physical properties and amelioration** | Soil properties are suitable for the establishment and maintenance of selected vegetation species | pH | pH (5.6-7.3) | 5.8 | 5.4 | 7.3 | 6.2 | 5.2 | 4.6 | 5.0 | 5.5 | 5.0 | na | 6.5 |
| | | | EC | < dS/m (<0.150) | 0.053 | 0.034 | 0.061 | 0.083 | 0.027 | 0.077 | 0.050 | 0.024 | 0.035 | na | 0.408 |
| | | | Phosphorous | mg/Kg (50) | 16.1 | 11.5 | 9.5 | 8.9 | 7.9 | 8.5 | 9.2 | 7.9 | 9.2 | na | 20.0 |
| | | | Nitrate | mg/Kg (>13) | 1.5 | 1.4 | 0.9 | 5.7 | 1.4 | 0.3 | 1.3 | 0.9 | 1.6 | na | 5.9 |
| | | | ESP | % (<5) | 1.0 | 1.3 | 1.3 | 2.2 | 0.7 | 0.5 | 2.3 | 1.7 | 1.1 | na | 12.0 |
| **Phase 4: Ecosystem&** | **Landscape Function Analysis (LFA):** | Landform is stable and performing as it was designed to do | LFA Stability | % | 62.0 | 70.5 | 68.1 | 63.4 | 69.1 | 72.0 | 66.5 | 66.8 | 66.5 | 66.6 | 73.0 |

| Rehabilitation Phase | Aspect or ecosystem component | Completion criteria | Performance Indicators | Unit of measure (*desirable) | NOC3 Pasture | NOC4 Pasture | NOC5 Pasture | Box Cut Woodland | NOC1 Woodland | NOC2 Woodland | SOC1 Woodland | SOC2 Woodland | SOC3 Woodland | SOC4 Woodland | REA5 Woodland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Landuse Establishment | Landform stability and organisation | | LFA Landscape organisation | % | 100 | 100 | 76 | 88 | 96 | 100 | 100 | 89 | 100 | 91 | 100 |
| | Herbage Biomass | Pasture productivity is comparable to analogue sites. | Green Dry Matter Biomass | kg/ha | 400 | 400 | 0 | na | na | na | na | na | na | na | na |
| | Vegetation diversity | Vegetation contains a diversity of species comparable to that of the local remnant vegetation | Diversity of shrubs and juvenile trees | species/area | 4 | 3 | 2 | 10 | 13 | 11 | 10 | 8 | 17 | na | 10 |
| | | | | % population | 100 | 100 | 100 | 97 | 99 | 100 | 100 | 100 | 96 | na | 99 |
| | | | Total species richness | No./area | 14 | 19 | 12 | 35 | 33 | 27 | 27 | 25 | 27 | na | 32 |
| | Vegetation density | Vegetation contains a density of species comparable to that of the local remnant vegetation | Density of shrubs and juvenile trees | No./area | 199 | 180 | 10 | 1372 | 612 | 354 | 852 | 2044 | 593 | na | 407 |
| | Ecosystem composition | The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation | Tree species | No./area | 0 | 1 | 0 | 7 | 7 | 10 | 6 | 4 | 12 | na | 6 |
| | | | Shrub species | No./area | 4 | 2 | 2 | 8 | 13 | 7 | 8 | 9 | 8 | na | 4 |
| | | | Herb species | No./area | 7 | 12 | 5 | 10 | 6 | 2 | 8 | 6 | 1 | na | 17 |

| Rehabilitation Phase | Aspect or ecosystem component | Completion criteria | Performance Indicators | Unit of measure (*desirable) | NOC3 Pasture | NOC4 Pasture | NOC5 Pasture | Box Cut Woodland | NOC1 Woodland | NOC2 Woodland | SOC1 Woodland | SOC2 Woodland | SOC3 Woodland | SOC4 Woodland | REA5 Woodland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase 5: Ecosystem & Landuse Sustainability** | **Landscape Function Analysis (LFA): Landform function and ecological performance** | Landscape Function Analysis (LFA): Landform function and ecological performance | LFA Infiltration | % | 47.8 | 54.5 | 31.5 | 43.7 | 43.4 | 53.9 | 51.4 | 40.5 | 46.9 | 39.6 | 36 |
| | | | LFA Nutrient recycling | % | 46.4 | 52.9 | 35.2 | 41.0 | 42.7 | 56.4 | 52.4 | 42.5 | 48.3 | 42.9 | 40.4 |
| | **Protective ground cover** | Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation | Perennial plant cover (< 0.5m) | % | 12.0 | 15.5 | 0.0 | 15.0 | 21.0 | 34.0 | 10.0 | 14.0 | 8.0 | na | 12.0 |
| | | | Total Ground Cover | % | 100.0 | 99.0 | 84.5 | 77.0 | 95.5 | 98.5 | 99.0 | 75.0 | 99.5 | na | 94.5 |
| | **Ground cover diversity** | Vegetation contains a diversity of species per square meter comparable to that of the local remnant vegetation | Native understorey abundance/m2 | > species/$m^2$ | 0.4 | 1.0 | 0 | 3.8 | 4.2 | 2.4 | 2.2 | 3.4 | 2.2 | na | 1.2 |
| | | Native ground cover abundance is comparable to that of the local remnant vegetation | Percent ground cover provided by native vegetation <0.5m tall | % | 10.0 | 18.5 | 0 | 75.0 | 97.6 | 96.7 | 94.1 | 100.0 | 100.0 | na | 34.6 |
| | **Ecosystem growth and** | The vegetation is maturing and/or natural recruitment is occurring at rates | shrubs and juvenile trees 0 - 0.5m in height | No./area | 119 | 37 | 6 | 1180 | 352 | 62 | 408 | 1756 | 447 | na | 108 |

| Rehabilitation Phase | Aspect or ecosystem component | Completion criteria | Performance Indicators | Unit of measure (*desirable) | NOC3 Pasture | NOC4 Pasture | NOC5 Pasture | Box Cut Woodland | NOC1 Woodland | NOC2 Woodland | SOC1 Woodland | SOC2 Woodland | SOC3 Woodland | SOC4 Woodland | REA5 Woodland |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **natural recruitment** | similar to those of the local remnant vegetation | shrubs and juvenile trees 1.5 - 2m in height | No./area | 1 | 4 | 1 | 6 | 20 | 16 | 24 | 4 | 0 | na | 0 |
| | **Ecosystem structure** | The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation | Foliage cover 0.5 - 2 m | % cover | 22 | 27 | 0 | 7 | 14 | 17 | 31 | 12 | 1 | na | 14 |
| | | | Foliage cover 2 - 4m | % cover | 31 | 20 | 0 | 9 | 18 | 20 | 32 | 9 | 8 | na | 0 |
| | | | Foliage cover >6m | % cover | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 25 | na | 0 |
| | **Tree diversity** | Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation | Endemic Species | % population | 100 | 100 | 0 | 92 | 100 | 100 | 100 | 100 | 41 | na | 0 |
| | **Tree density** | Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation | Tree density | No./area | 33 | 18 | 0 | 39 | 28 | 40 | 84 | 24 | 64 | na | 0 |
| | **Ecosystem health** | The vegetation is in a condition comparable to that of the local remnant vegetation. | Healthy trees | % population | 15 | 0 | 0 | 8 | 14 | 10 | 0 | 29 | 17 | na | 0 |
| | | | Flowers/fruit: Trees | % population | 0 | 0 | 0 | 8 | 0 | 0 | 0.0 | 11 | 11 | na | 0 |

The 2019 Annual Ecological Rehabilitation Monitoring Report concludes that:

*" Most rehabilitation sites were establishing particularly well despite the extremes in seasonal conditions and increased grazing pressure by resident macropod and goat populations. Most ecological parameters recorded were showing positive successional trends. However, over the last two years there has been a decline in live plant cover in the understorey and increased trampling and disturbance by wildlife has caused a deterioration of the litter layer that has created small bare patches or increased soil surface crusting in some sites, and this was also recorded in the range of reference sites. This year all rehabilitation sites except Box Cut had a stability which was 100% comparable to the woodland reference sites. Infiltration and nutrient recycling capacities remained low; however, most sites were able to meet most of the 70% LFA performance indicator targets.*

*The high densities of acacias have been particularly important in the development of the soil profile as their stems assist in accumulating mobilised resources, their roots improve soil characteristics and the extensive addition of dead leaves and spent pods add nutrients and improve the extent and decomposition of the litter layers. Over the past few years extensive dieback of the acacias has been observed, allowing the persisting eucalypt trees and ground cover vegetation to grow more effectively. Most trees and mature shrubs across the NOC and SOC rehabilitation areas had diameters ranging from 8 – 14 cm this year. The largest trunk diameter in the rehabilitation sites were recorded in the older site SOC3 with a couple of eucalypts having trunk diameters of 17cm. Mature acacias having been setting seed over a number of years and many of the eucalypts in the older sites were also bearing reproductive structures. In 2015 there was a significant natural regeneration event with hundreds of small acacia and Cassinia arcuata seedlings being recorded in many of the rehabilitation sites, with many of these persisting despite the dry conditions.*

*Over the past two years there has been significant transformation in many of the woodland sites whereby the canopy has opened up considerably and there was an abundance of native perennial grasses and a variety of other native ground covers establishing across significant areas of the NOC and SOC rehabilitation areas. When seasonal conditions have been favourable, there have been a range of other positive indicators observed on various parts of the rehabilitation including the establishment of toadstools, bracket fungi, colonisation by ants and a range of other insects, wombat holes, bird nests and in a sedimentation pond, a turtle was observed to be hunting newly hatched tadpoles. An orchid species was also observed near SOC3 in 2016.*

*The most advanced successional development of the rehabilitation areas has been recorded 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. Significant transformations similar to these are taking place on many areas of the wider NOC and SOC rehabilitation areas with sites SOC1, NOC1 and NOC2 also appearing to be trending in that direction. Some sites have however been slower to develop and include SOC2 and Box Cut. Areas such as these could benefit from some management intervention via the application of organic materials such as native pasture hay (or other weed free mulches), logs and branches and/or selectively cut acacias and spread out across the site to enhance stability and increase nutrients and protective microsites. Re-seeding native grasses may also be beneficial.*

*Despite some adverse soil chemistry in REA5, there has also been a significant increase in function and stability and the areas has become rapidly colonised by Cassinia, however there has been low establishment of other desirable native tree and shrub seedlings and additional intervention is likely to be required. Scarification in areas devoid of native tree and shrubs seedlings followed by reseeding in autumn and/or spring as per recommendations provided in June 2017 are recommended, when more favourable weather conditions return.*

*In the pasture rehabilitation sites there has continued to be heavy grazing by macropods and goats resulting in a decline in perennial grasses and increased abundance of exotic weeds over the past few years. The effects of heavy pressure have become more apparent in the grassy clearings such as in site NOC5. While grazing intensity has probably been much more apparent during the prolonged dry conditions, they are likely to be repeatedly overgrazed by macropods (and goats?) due to the presence of nutritious exotic pasture species, and their close proximity to extensive bushland areas.*

*The results to date indicate that the addition of fertilisers and resowing exotic perennial pastures will be required in order to meet pasture completion criteria, and these are most likely going to need fencing off to reduce grazing pressure. There are no known areas of exotic pasture around Baal Bone, suggesting that the soils are not suitable for sustaining introduced pastures, particularly when they are also subjected to pests and feral animals. As exotic pastures suitable for grazing are unlikely to be sustainable in the longer- term, it would seem that livestock grazing is not a suitable or viable management option for NOC. Rather, it would be more appropriate to replace exotic pasture domains in the NOC for native woodland as a final landuse in the Mine Closure Plan.*

*The newest area of rehabilitation, REA5, had soils that were saline, highly sodic and had excessively high concentrations of sulfur reinforcing the requirement to undertake soil tests of spoil material and topsoil stockpiles prior to constructing any additional rehabilitated landforms. Despite these conditions, the site appears to have developed adequately to date. Smaller areas that continue to have limited ground cover and have been slow to develop may benefit from the application of weed free hay and/or organic mulches. Larger areas that continue to demonstrate extensive sheet and rill erosion may require amelioration by undertaking earthworks, additional topsoil application, slope stabilisation using branches and logs and seeding with native woodland mixes. Some of these areas have been identified on the annual walkover map.*

*Priority weeds including Rubus fruticosus (Blackberry) and Hypericum perforatum (St John's Wort) are becoming increasingly more common. Hypericum perforatum was originally noted mostly growing along the roadsides but is increasing in abundance and distribution in many areas of the rehabilitation and was recorded in five of the seven rehabilitation monitoring sites this year. Targeted weed control programs need to be implemented to control these invasive species before they develop into unmanageable extensive infestations. Pinus radiata (Radiata Pine) and Acacia baileyana (Cootamundra Wattle) are environmental weeds that exist in some areas of the mine site, especially near the CHPP plant and sedimentation ponds and are a legacy of old mining rehabilitation practices. They have however been noted to be regenerating, and pine wildings and acacia seedlings should be controlled to limit their spread into native rehabilitation areas.*

*Cassinia arcuata (Chinese Shrub, Biddy Bush) is a native colonising species and is valuable in mine site rehabilitation and assisting the recovery of degraded or disturbed grazing lands. This species is one which should be appreciated particularly in native woodland rehabilitation areas during their early developmental stages and should not be targeted in weed control programs. Cassinia will however, rapidly colonise weakened and degraded (grazing) pastures, therefore emphasising the need to implement strategic grazing practices that maintain strong perennial pastures which will limit the establishment of Cassinia in grazing pastures where it is not wanted."*

## 7.5 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, buried mine adits, transmissions lines, pipelines, various water management structures and the southern REA, including REA 6. These areas will be rehabilitated during mine closure.

# 7.6 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."*

Following discussions 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. The Ben Bullen Creek Rehabilitation Plan was approved by the DP&E on 13 December 2017.

Ben Bullen Creek will be rehabilitated as part of mine closure.

## 7.7 Other Infrastructure

During 2019, eleven entries into the underground mine, and the Longwall 19 ventilation shaft were filled and sealed in accordance with *MDG6001 Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams.* Adits 1-5 and 8-11 required the demolition of concrete collars. Adit 1 (Main Fan) and Longwall 19 also required the dismantlement of ventilation fans.

## 7.8 Rehabilitation Trials and Research

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

## 7.9 Finalisation of a Detailed Mine Closure Plan

### 7.9.1 Mine Closure Planning

GHD Pty Ltd was commissioned to develop a Project Closure Plan (PCP) (2017) for Baal Bone Colliery in accordance with the requirements of the Glencore Mine Closure Planning Protocol and in consultation with the Resources Regulator.

The PCP presents an overview of the selected strategies for closure execution at Baal Bone Colliery with the aim of meeting all legal and other requirements associated with mine closure. This includes the requirements of the development consent, mining titles, environment protection licence, contracts and other applicable legislation. Where pertinent, the PCP strategies were developed with consideration of technical (regulatory) guidelines and other relevant standards and guidance.

The following assessments, studies, designs, plans and registers were prepared to inform the detailed closure of the site:

- Mine Closure Broad Brush Risk Assessment
- Social Impact Assessment
- Geochemical Assessment
- Contamination Assessments (Preliminary Site Assessment, Contamination Site Assessment, Remediation Options Assessment, and Remedial Action Plan)
- Final Landform Design

- Demolition and Dismantling Management Plan
- Hazardous Materials Survey
- Geotechnical Study
- Geochemical Study
- Surface Water Modelling
- Groundwater Modelling
- Site Water Balance
- Ben Bullen Creek Rehabilitation Design and Rehabilitation Plan
- Ecological Constraints Assessment
- Aboriginal and Non-Aboriginal Heritage Surveys
- Mine Closure Completion Criteria Workshop.

In late 2019 a Mine Closure MOP was submitted to the Resources Regulator. On 20 December 2019, the Resources Regulator approved the Mine Closure MOP until 31 December 2025.

## 7.9.2 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 the Department of Trade and Investment (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 the Division of Resources and Energy (DRE) for approval in February 2016 together with the revised MOP 2016 -2019.

During 2017 a review of the rehabilitation liability estimate was conducted in association with the approval of the Ben Bullen Creek Rehabilitation Plan and was increased to $23,793,000. The revised rehabilitation liability estimate was submitted to the Department of Resources and Geoscience (DRG) in late 2017. In correspondence dated 15 January 2018, the Minister amended the Security held by The Wallerawang Collieries Pty Ltd effective from 19 January 2018.

In correspondence dated 21 January 2020, Baal Bone Colliery received notification that the rehabilitation security has been decreased from $23,793,000 to $23,050,000. This variation will take effect from 1 April 2020.

# 8 Community

## 8.1 Environmental Complaints

In accordance with the **Baal Bone 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.

There were no complaints received during the 2018 or 2019 reporting periods.

During the 2017 reporting period there were three complaints received by Baal Bone Colliery. Two of the complaints originated from one complainant: the occupant of an illegal dwelling adjacent to the Mine boundary. Both complaints were related to Baal Bone Colliery disconnecting power supply to the illegal dwelling – after the Colliery received advice from Endeavour Energy stating that the power cable did not meet AS3000. A third complaint received during 2017 related to overgrown vegetation on Colliery land within Lithgow town limits.

No complaints were received from 2013-2016. 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 negligible.

Further information on complaints can be found here: http://www.glencore.com.au/en/who-we-are/energy-products/baal-bone/Pages/other-publications.aspx.

## 8.2 Community Liaison

### 8.2.1 Community Initiatives

Funding is allocated for community involvement activities annually.

During 2018 Baal Bone Colliery donated $800 to Cullen Bullen Public School to assist with the costs of an overnight school excursion.

During 2017 Baal Bone Colliery made a donation of goods to the Portland District Motor Sports Club for the benefit of the Cullen Bullen Speedway.

## 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 2019 Baal Bone CCC:

- Ray Blackley (Resident);
- Barbara Milne (Resident);
- Karen Desch (Adjacent landholder);
- Representative from Lithgow City Council;
- Representative from Cullen Bullen Public School;
- Mark Bulkeley (Operations Manager);
- Elizabeth Fishpool (Environment and Community Coordinator); and
- Greg Peard (Environment and Community Coordinator).

Two CCC meetings were held during the reporting period on 30 January 2019 and 16 December 2019.

The January 2019 meeting provided CCC members with an update on the unsuccessful sale of Baal Bone Colliery and the future of the site. The December 2019 meeting provided an update on the status of the Mine Closure MOP and closure activities to take place over the following 12 months.

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.

As per the Baal Bone Colliery Mine Closure MOP 2019-2025, CCC meetings will continue to be held at least annually.

# 9 Independent Audit

Baal Bone Colliery underwent an Independent Environmental Audit (IEA), as per Schedule 5, Condition 7 of PA 09_0178 in December 2019. The site component of the audit was conducted on 17 and 18 December 2019 by Hansen Bailey. Baal Bone Colliery received the final audit report from Hansen Bailey on 27 February 2020. The IEA Report Executive Summary concludes that "*Baal Bone Colliery is being managed at a high level of compliance on environmental matters*".

There were five non-compliances identified in the 2019 IEA Report. Three of these non-compliances were determined to be low risk, while two were administrative non-compliances. Refer to **Table 9.1** and **Section 10** for further information. Note that there were only four recommended actions arising from the five non-compliances identified during the IEA.

On 3 March 2020 Baal Bone Colliery provided the IEA Report to DPIE, together with an action plan outlining Baal Bone Collieries response to non-compliances and other recommendations. In correspondence dated 20 March 2020, DPIE accepted the IEA Report and response to recommendations. The response from DPIE noted that:

*"With respect to Schedule 3 Condition 21, the Department notes the action proposed to engage a consultant to further investigate and re-assess the increasing trend of zinc at the monitoring location BBPB3, in which the Water Quality Trigger Level of 0.175mg/L for "Short Term Major Change Criteria" for zinc has been exceeding. Please ensure that you submit to the Department by no later than COB Tuesday 30 March 2021 a copy of the investigation report, including a response to the report addressing any actions/recommendations required as a result of the investigation.*

*Lastly, in accordance with Schedule 5 Condition 9 of Consent, it is requested that the IEA and the response to the audit recommendations is uploaded to the website by no later than one month after the date of this letter."*

On 23 March 2020, the IEA and IEA Action Plan were uploaded to the Baal Bone Colliery webpages at: https://www.glencore.com.au/en/who-we-are/energy-products/baal-bone/Pages/other-publications.aspx.

The next Independent Environmental Audit of Baal Bone Colliery will occur in December of 2022.

**Tables 9.1** and **9.2** outline the current status of actions arising from the 2019 Audit.

**Table 9.1**: Status of actions arising from non-compliances identified during 2019 Independent Environmental Audit

| Sch and Cond Number | Audit Recommendation | Response/Action Plan | Status / Due Date |
|---|---|---|---|
| **Project Approval 09_0178** | | | |
| Schedule 2, Condition 11 | Include reference to AS 2601-2001 Standard and summary of requirements for demolition in relevant documentation for Mine Closure phase. | Reference to AS 2601-2001 to be included in relevant documentation for Mine Closure phase. | Ongoing |
| Schedule 3, Condition 21 | Revisit the zinc trigger levels for BBPB3 in consultation with DPIE for the closure stage. | Consultant to be engaged to further investigate. Consideration to be given to calibrating the groundwater triggers to site specific conditions if appropriate. | 30 March 2021 |
| **Environment Protection Licence 765** | | | |
| P1.3 | Although current monitoring plan appears consistent with the current EPL text, at next EPL Variation, update 2012 figure for 2019020 plan. | EPL 765 was varied on 21 February 2020. The varied licence now refers to an updated monitoring plan. | Complete |
| **Consolidated Coal Lease (CCL749)** | | | |

| Sch and Cond Number | Audit Recommendation | Response/Action Plan | Status / Due Date |
|---|---|---|---|
| Condition 33 | DSCL is consulted six-monthly for site-wide rehabilitation or written exemption sought from DRG if it can be justified. | An action is in place. Consultation recommenced in December 2019 prior to this audit occurring. | Ongoing. |

**Table 9.2**: Status of continual improvement actions from IEA.

| Sch and Cond Number | Audit Recommendation | Response/Action Plan | Status/Due Date |
|---|---|---|---|
| **Project Approval 09_0178** | | | |
| Schedule 2, Condition 11 | Add a note in future Annual Reviews regarding demolition undertaken in the period. | To be included in 2019 Annual Review. | 31st March 2020 |
| Schedule 3, Condition 1 | Create a single register for all known existing subsidence repairs and a clear process for sign-off of each occasion and actions to be documented to completion. | Register and process to be established for any known existing subsidence impacts. | 30 October 2020 |
| Schedule 3, Condition 10 | Consider reduction in the number of air quality monitoring points during Mine Closure. Potential to relocate monitor DM2 to be representative of closest residence and remove others. | Consideration to be given to a reduction in the number of air quality monitoring points during the next management plan review. | 31 July 2020 |
| Schedule 3, Condition 16 (a) | "By 31 December 2019, the licensee must cease all mine water discharge from licenced discharge point 11 (LDP0011)". Update water balance in the Water Management Plan to reflect the change in discharge regime. | Discharge ceased on 17 December 2019. Water balance to be updated as appropriate at next management plan review. | 31 July 2020 |
| Schedule 3, Condition 16 (b) | It is understood that the groundwater model will be updated in early 2020 to incorporate the abovementioned change in discharge. Recommend that following receipt of 2020 report and confirmation of any water take or ongoing discharge required (considered unlikely), confirmation that no security and relinquishment of a relevant groundwater licences under the Water Management Act 2000 is required. | Groundwater model to be reviewed and reflect this change. Identify whether there are any changes required in regards to relevant groundwater licences. | 30 September 2020. |
| Schedule 3, Condition 16 (c) | Although the Water Management Plan was approved, recommend that for future updates where consultation with other regulators is required, that regulators are offered an opportunity to | Future Management Plan updates to allow for thirty day response period by regulators. | Ongoing |

| | | | |
|---|---|---|---|
| | comment for a duration of at least 30 days prior to submission to DPIE for approval. | | |
| Schedule 3, Condition 19 (a) | Minesoils recommends the site forms a register of water management structures with locations shown on Geographic Information Systems (GIS) and linked to original design drawings and maintenance inspections. This should include drop structures, banks, dams, diversion drains and Ben Bullen creek diversion. | To be considered at next management plan review. | 31 July 2020 |
| Schedule 3, Condition 19 (b) | The site visited identified an area requiring bunding between Jews and Baal Bone Creek in the Northern Rehabilitation Area (Plate 10). Recommend this area be urgently reviewed and bunded as required. | This area has now had the bund reinstated. | Complete |
| Schedule 3, Condition 23 | Include a discussion within relevant documentation on bushfire management, specifically in and/or near the Wolgan Escarpment. | To be considered at next review of Bushfire Preparedness System. | 31 December 2020 |
| Schedule 3, Condition 24 (a) | Surface water structures including banks, drop structures and dams need to be inspected and any failures or high-risk items should be repaired. | Monthly Rehabilitation Inspection form has been expanded to include further detail on inspecting dams and other structures as required in Erosion and Sediment Control Plan. | Complete |
| Schedule 3, Condition 24 (b) | It was noted on Thistle Hill, one contour drain was not repaired following a track to the top was installed to bring in and place soil material on the top section. This drain requires immediate attention so water can be transferred to the designed drop structure (Plate 4). | Repairs to be made to this contour drain. | 30 April 2020 |
| Schedule 3, Condition 24 (c) | Weeds were evident onsite including blackberry. It is understood weed maintenance occurs regularly onsite and should continue, an especially high risk period will be following decent rain. | Weed management will continue to occur. | Ongoing |
| Schedule 3, Condition 24 (d) | REA5 showed two areas of complete failure. Minesoils recommends soil tests for Electrical Conductivity (EC), pH, Cation Exchange Capacity (CEC) and Exchangeable Sodium Percentage. It appears these two areas have received and pooled saline water from irrigation which has resulted in an area too salty for most vegetation. Some simple soil tests will indicate if this is true. In the event salinity is the limiting factor it is recommended to either leach the salts through | Consideration to be given to soil testing being undertaken. This area will be subject to rehabilitation efforts as part of the closure phase of the operation. | Ongoing |

| | | | |
|---|---|---|---|
| | the primary root zone via natural rainfall (slow) or irrigate with non-saline water. Alternatively, bring in additional material suitable for growth medium, subject to relevant approvals. | | |
| Schedule 3, Condition 24 (e) | REA5: The remainder of REA5 showed no acacia species established (Plate 6). This is believed to have occurred due to the tree seed not being treated prior to sowing. Most acacia species require a mechanism to break the seedcoat such as boiling, scarifying or low heat fire. It is recommended that low depth (<300mm surface ripping be strategically undertaken to avoid areas already establishing with Eucalypts. Additional seed mix (especially Acacia species) should then be treated, brought in and sown in the newly ripped areas. Recommended REA 5 repair mix includes Capertee Stringybark (as per SoC 31) | This area will be subject to rehabilitation efforts as part of the closure phase of the operation. Capertree Stringybark is listed in the Project Closure Plan Revegetation Species List. | Ongoing |
| Schedule 3, Condition 24 (f) | Overall the rehabilitation is establishing adequately in most areas (Plate 5,7), however recommend additional intervention is required to meet target species composition (especially the lower storey species) within a timeframe suitable for lease relinquishment. | Additional intervention will occur throughout the closure phase of the operation to ensure compliance with completion criteria associated with species composition. | Ongoing |
| Schedule 3, Condition 24 (g) | Recommend that the stockpiles identified in the 2016 IEA (Ref 6.1b of the 2016 IEA Action Plan) be seeded as per 2016 IEA recommendation during rehabilitation / closure period if not used within three months. | Stockpiles to be seeded where required. | 28 May 2020 |
| Schedule 3, Condition 31 | Consistent with previous IEA recommendation, site inspection reviewed significant capacity for ongoing scrap steel recycling and general waste clean-up which should be continued as part of closure, as Glencore indicated is proposed (Plate 15 and Plate 16). | Occurring as part of closure activities. | Ongoing. |
| Schedule 5, Condition 2 (a) | Recommend for closure, re-approve specialists where required. | To be considered at next management plan review. | 31 July 2020 |
| Schedule 5, Condition 2 (b) | Consideration of combining all relevant management plans from this consent into single, reduced Closure Management Plan relevant to closure (Noise, Air Quality, Aboriginal Cultural Heritage, Biodiversity and Land Management, Rehabilitation, Erosion and Sediment Control, Groundwater Monitoring, Surface | To be considered at next management plan review. | 31 July 2020 |

| | | | |
|---|---|---|---|
| | Water Monitoring, Waste and Water, Road Haulage) (with approval from DPIE) and/or include single document as appendix to draft Mine Closure MOP. | | |
| Schedule 5, Condition 2 (c) | In management plan update:<br>• Tabulate condition showing where each point is addressed;<br>• Ensure that all agencies are consulted with during preparation of management plan; and<br>• All technical specialists, where required by conditions of consent to be approved by the Secretary. | To be considered at next management plan review. | 31 July 2020 |
| Schedule 5, Condition 3 (a) | Consider request to DPIE to reduce the content of the Annual Review commensurate with closure status | To be considered for 2020 Annual Review. | 31 March 2021 |
| Schedule 5, Condition 3 (b) | b) replace “comprehensive” with “relevant” and not address i to iii which are not included in the EA; | Consideration to be given to seeking consent to have the recommended changes made to the Project Approval. | 31 March 2021 |
| Schedule 5, Condition 3 (c) | d and e) not address as trends during operations cannot be compared to trends during closure. | Consideration to be given to seeking consent to have the recommended changes made to the Project Approval. | 31 March 2021 |
| **Consolidated Coal Lease (CCL749)** | | | |
| Condition 5 | Going forward, ensure the Domain’s listed table in Section 7.4.2 of the Annual Review correlate to Section 6 of the draft Closure MOP. | To be considered for 2020 Annual Review. | 31 March 2021 |
| Condition 32 | Warragamba Outer Catchment Area be shown on a draft Closure MOP figure to ensure that work in relation to rehabilitation is completed before termination of the authority. | Consideration to be given to having a figure reflect information that is currently available in relation to the Warragamba Outer Catchment Area at the next review of the current MOP. | Ongoing |
| **Previous IEA (2016) Recommendations** | | | |
| 21 | 6.7a) Recommend at next review, that all management plans should include a table cross referencing the requirements in Schedule 5 Condition 2 of the Project Approval, with the relevant sections of management plans, consistent with previous audit recommendation. | To be completed at next management plan review. | 31 July 2020 |
| 23 | 6.7c) The copy of the Biodiversity Management Plan should be provided to OEH for consultation. | To be completed at next management plan review. | 31 July 2020 |

# 10 Incidents and Non-Compliances during the Reporting Period

In accordance with the Glencore definitions provided at **Section 5.18.2**, there were no reportable environmental incidents recorded by Baal Bone during the reporting period.

Incidents and non-compliances during the reporting period are summarised in **Table 10.1** below.

**Table 10.1: Incidents and Non-Compliances**

| Summary | Date | Incident/Non-compliance | Incident Category | Further Information |
|---|---|---|---|---|
| 2019 Independent Environmental Audit (IEA) found that: "Although a detailed JSA was available which references 'MDG6001 Guidelines for permanent filing and capping of surface entries to coal seams' it does not reference AS 2601-2001 The demolition of structures. | Ongoing through 2019 | Administrative non-compliance | NA | **Section 9** |
| Exceedance of Water Quality Trigger Level for dissolved zinc (0.175mg/L) at BBPB3. | Ongoing through 2019 | Non-compliance | NA | **Section 6.2** |
| 2019 IEA found that: "Although current monitoring plan appears consistent with the current EPL text, "2008 Licenced Monitoring Sites – Drawing 2" dated 10/01/2008 does not show EPL monitoring sites." | December 2019 | Administrative non-compliance | NA | **Section 9** |
| In January 2019, a depositional dust gauge bottle was broken. Therefore no result were available.<br><br>In May 2019 and September 2019, Baal Bone's four depositional dust gauges were exposed outside the standard of 30 ± 2 days (exposed for 27 days and 34 days respectively). | January 2019<br><br>May 2019<br><br>September 2019 | Non-compliance | NA | **Section 5.1** |
| Consultation with the District Soil Conservationist Lithgow (DSCL) has not occurred at a minimum of six-monthly intervals. | Ongoing through 2019 | Non-compliance | NA | **Section 9** |

# 11 Activities to be completed in the Next Reporting Period

## 11.1 Operations and Systems

A Mine Closure MOP was developed and submitted to the Resources Regulator within the NSW Department of Planning, Industry and Environment (Resources Regulator) in late 2019. On 20 December 2019, the Resources Regulator approved the Mine Closure MOP until 31 December 2025.

In 2020 Baal Bone entered full mine closure, and demolition of structures commenced.

## 11.2 Pit-top Facilities

Works to be completed during the 2020 reporting period will include:

- demolition of the coal handling and preparation plant,
- demolition of overhead conveyors, and
- demolition of the main workshop.

## 11.3 ROM and Product Stockpiles

All stockpiles have been depleted, cleaned of carbonaceous material and left in a stable condition.

## 11.4 Mine Ingress/Egress

Adits 1 – 11 and Longwall 19 ventilation shaft were sealed and capped during 2019. In 2020 works will be carried out to seal 7 additional underground entries that are currently buried. The adits will be sealed by drilling from the surface, and pumping grout into the adits - in accordance with a design developed in consultation with the Resources Regulator.

## 11.5 Voids

REA 6 will remain open (bunded for safety) during 2020. REA 6 will be remediated in accordance with the mine closure schedule outlined in the 2019-2025 Mine Closure MOP.

## 11.6 Other Infrastructure

Other infrastructure associated with Baal Bone or in the immediate vicinity includes power lines, access tracks, boreholes and monitoring sites. During 2020 works will commence to:

- Remove three dewatering bores, and
- Remove rail loop infrastructure.

## 11.7 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). During 2019 plans for the rehabilitation of these areas will be developed and finalised as part of the Mine Closure MOP.

During 2020, rehabilitation will commence in the following areas in accordance with the approved Mine Closure MOP 2019 – 2025:

- Northern Void (Domain 1): roads and unvegetated areas,
- Infrastructure (Domain 3): rail loop, ROM and product stockpiles,
- Subsidence Area (Domain 7): North and south dewatering pipelines and associated infrastructure

## 11.8 Community Relations

Community relations projects for the 2020 Annual Review reporting period include the following:

- Hosting a CCC meeting; and
- Distribution of a community newsletter (completed in February 2020).

# 12 References

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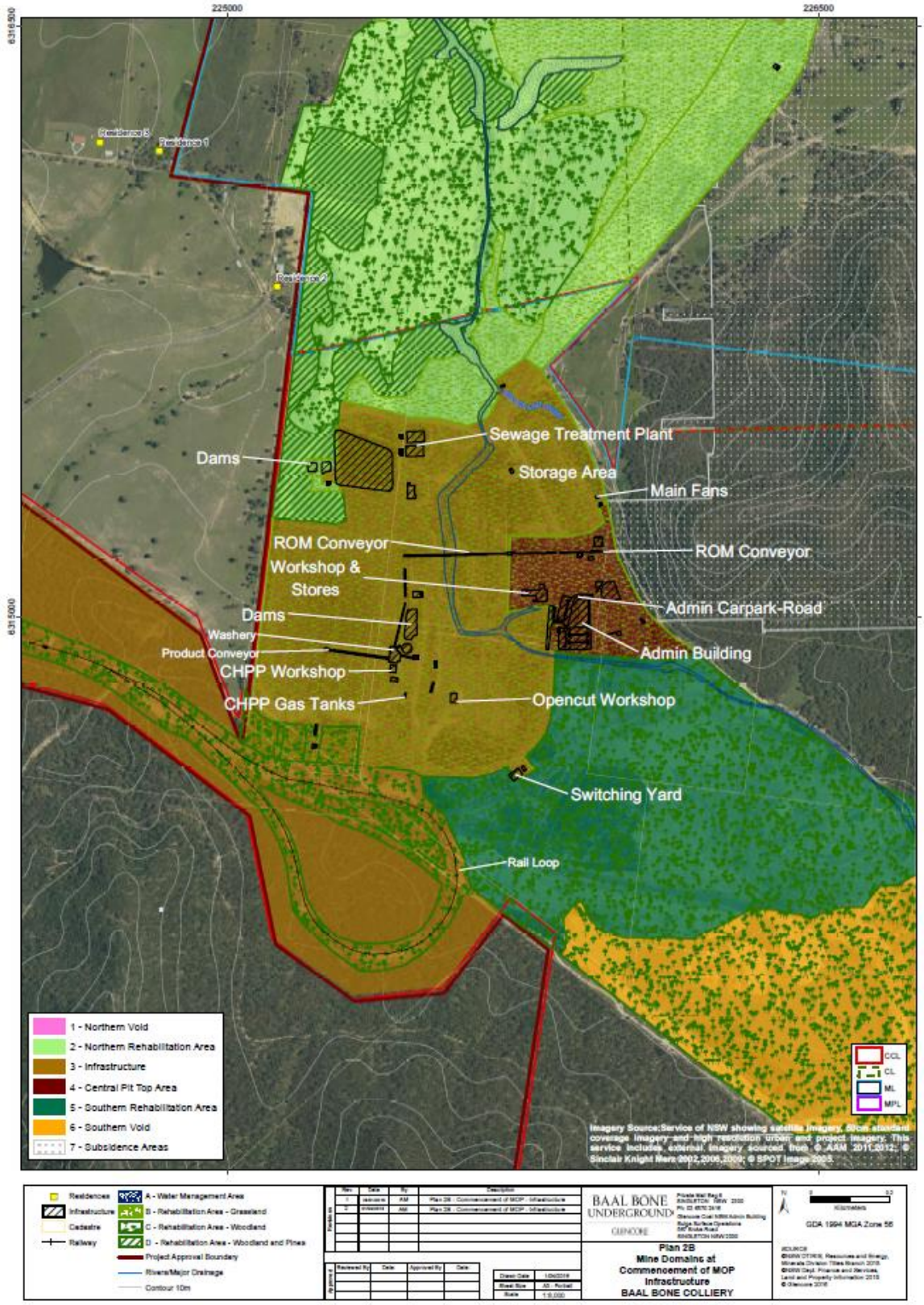
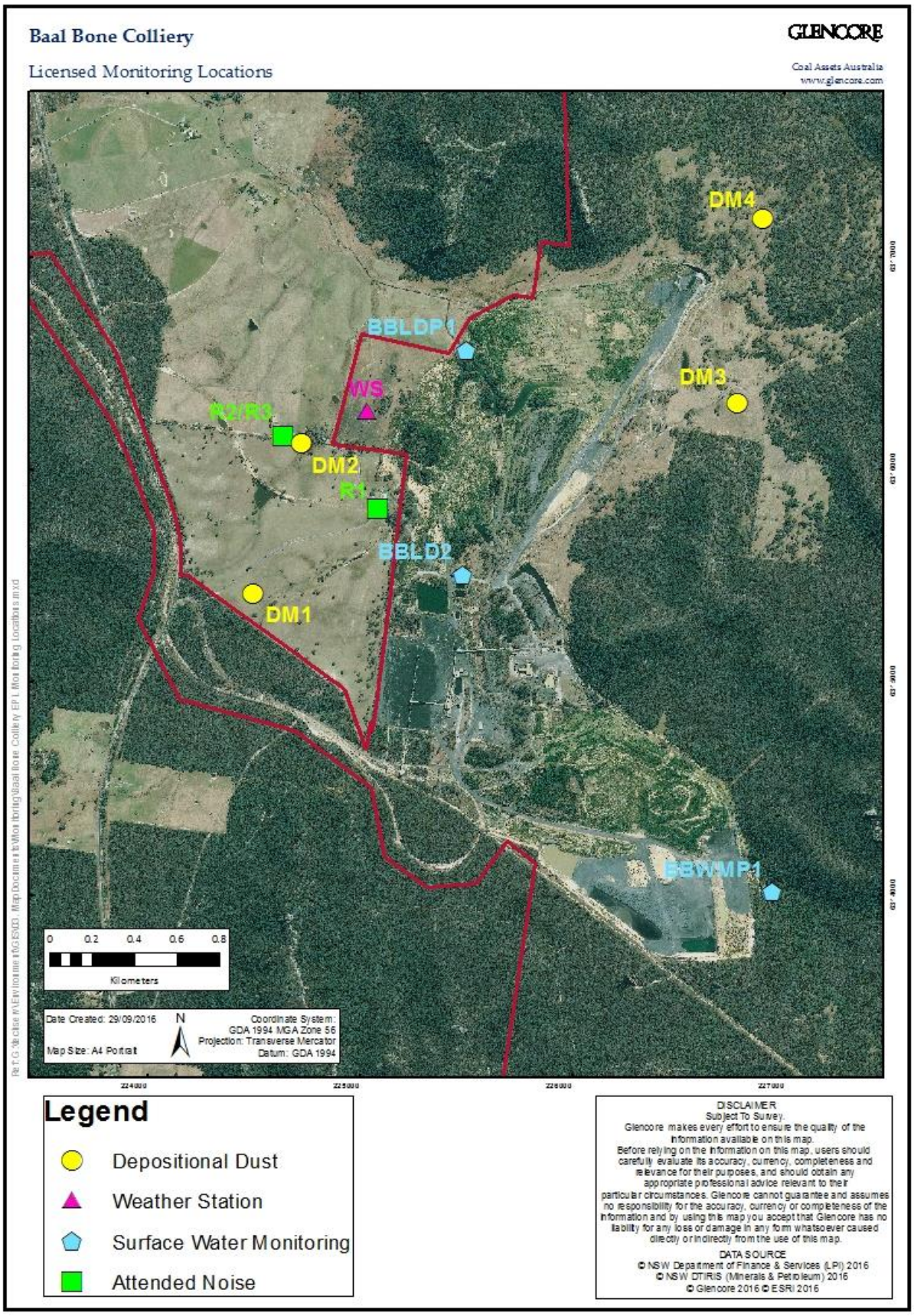
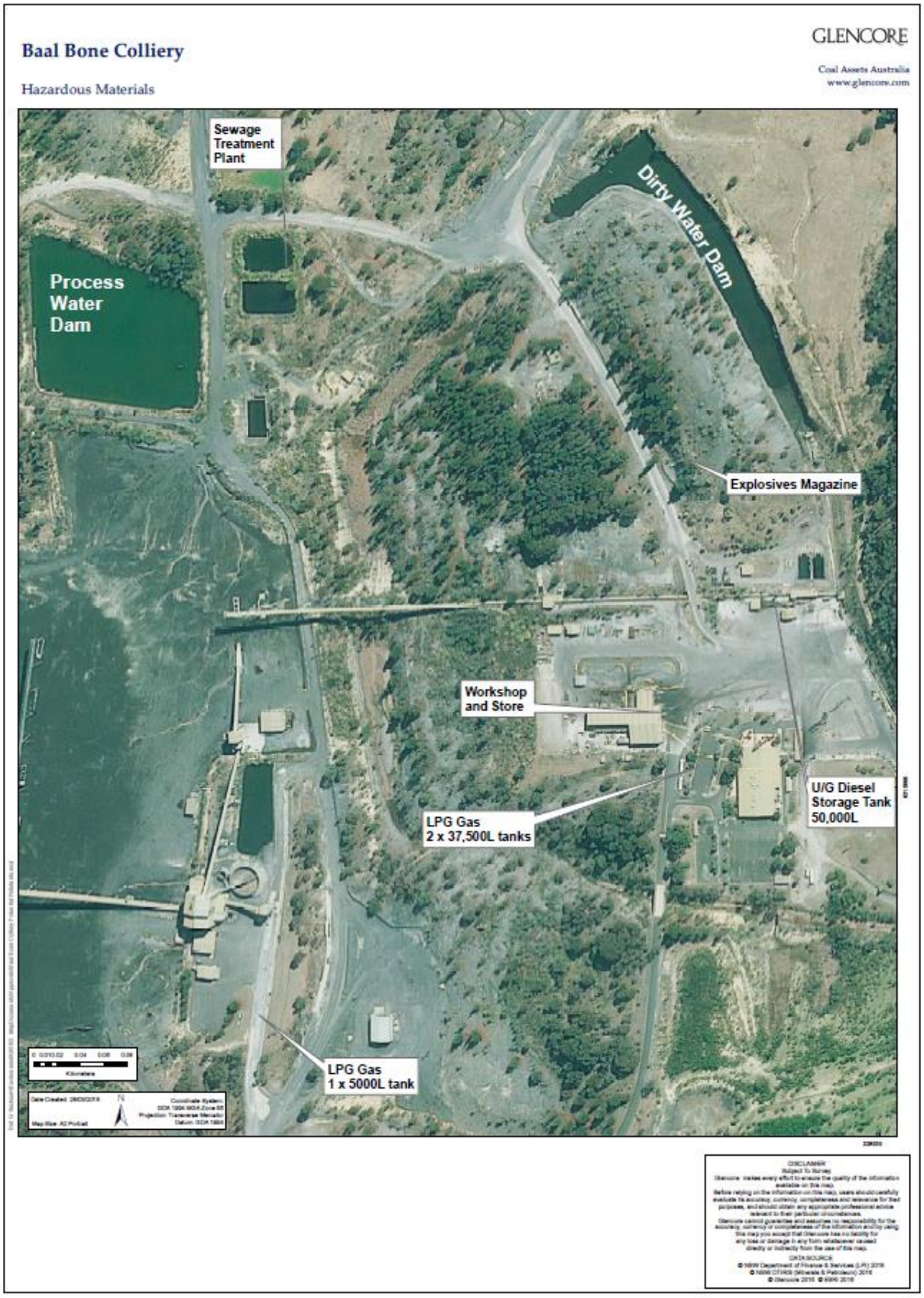
# A.1 Appendix A - Plans



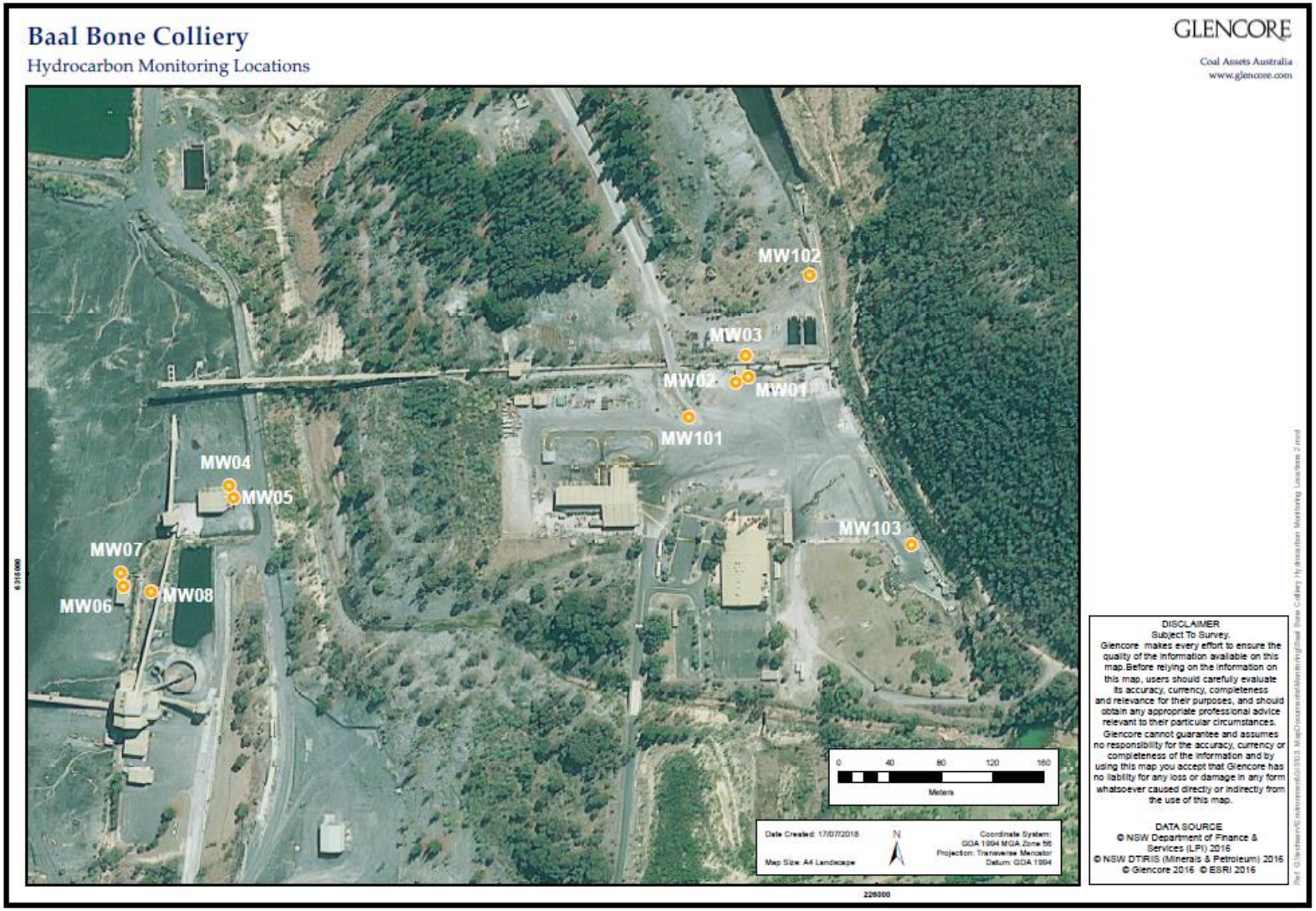

Plan 1 – Site Infrastructure



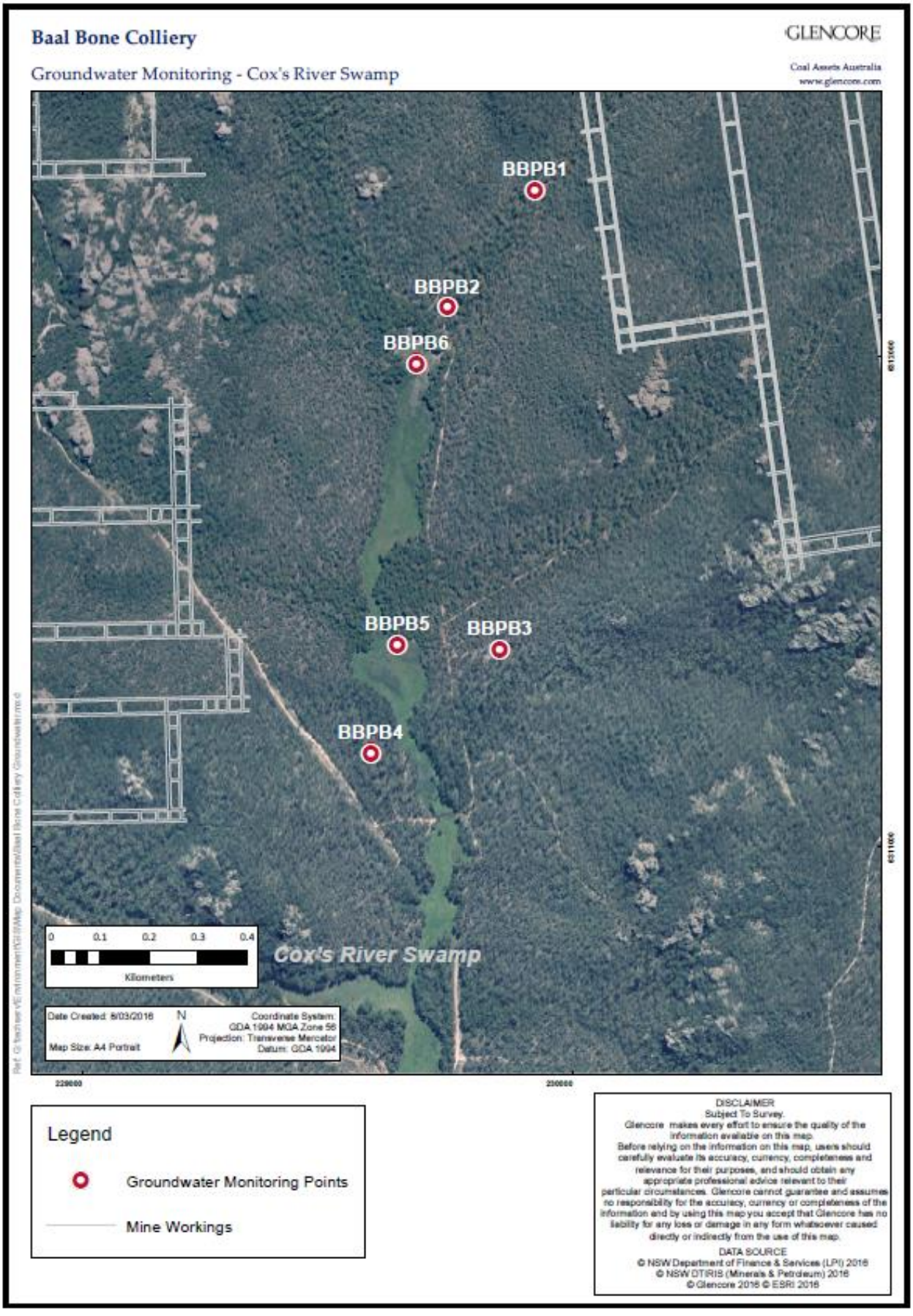

Plan 2 – Licensed Monitoring Locations



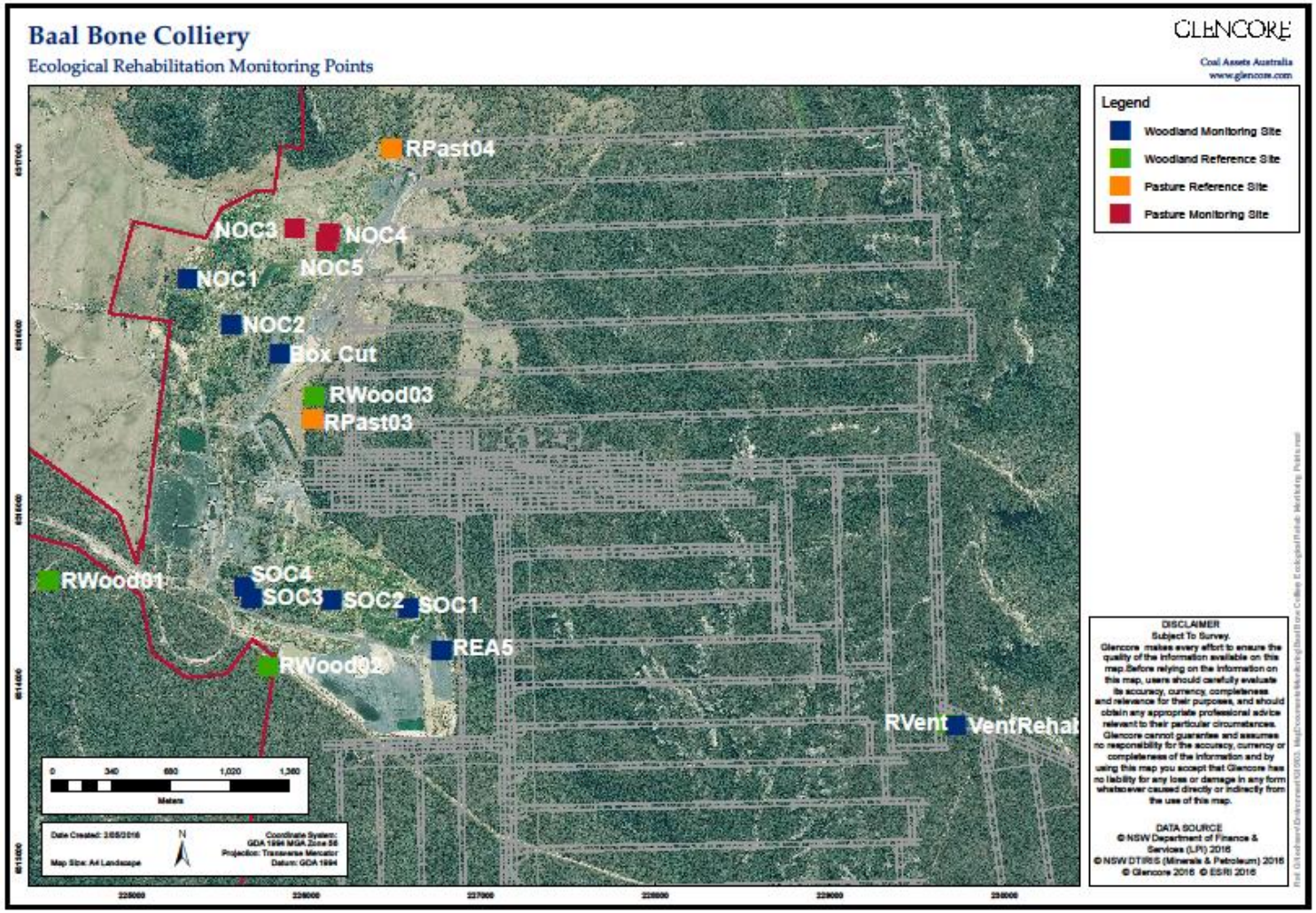

Plan 3 – Hazardous Materials




Plan 4 – Hydrocarbon Monitoring Locations




Plan 5 – Groundwater Monitoring Cox's River Swamp




Plan 6 – Ecological Rehabilitation Monitoring Points

## A.2 Appendix B – Approval